February 12, 1987

Docket No. 50-336

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Mr. Edward J. Mroczka, Senior Vice President
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Dear Mr. Mroczka:

We have completed our review of your Detailed Control Room Design Review (DCRDR) submittals, concerning Millstone Unit 2, which were provided in response to TMI Action Item I.D.1. We find the Millstone Unit 2 DCRDR to be acceptable with the exception of the items described in Section 4.0 of the enclosed Safety Evaluation. In addition, the implementation schedule provided in the DCRDR Summary Report dated September 30, 1986 is acceptable. The report from our consultant, Science Applications International Corporation, is provided as an attachment to the Safety Evaluation. The outstanding items should be addressed in your supplemental report concerning the Safety Parameter Display System/Process Computer which should be submitted by August 1, 1987.

Sincerely,

/s/

D. H. Jaffe, Project Manager
PWR Project Directorate #8
Division of PWR Licensing-B

Enclosure:
As stated

cc w/enclosure:
See next page

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Mr. Edward J. Mroczka
Northeast Nuclear Energy Company

Millstone Nuclear Power Station
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2

DOCKET NO. 50-336

DETAILED CONTROL ROOM DESIGN REVIEW (TMI ITEM I.D.1)

## 1.0 INTRODUCTION

Item I.D.1, "Control Room Design Reviews," of Task I.D., "Control Room Design," of the Nuclear Regulatory Commission (NRC) Action Plan NUREG-0660 (Ref. 1) developed as a result of the TMI-2 accident states that operating licensees and applicants for operating licenses will be required to perform a Detailed Control Room Design Review (DCRDR) to identify and correct design discrepancies. The objective, as stated in NUREG-0660, is to improve the ability of nuclear power plant control room operators to prevent or cope with accidents if they occur by improving the information provided to them. Supplement 1 to NUREG-0737 (Ref. 2), confirmed and clarified the DCRDR requirement in NUREG-0660. As a result of Supplement 1 to NUREG-0737, each applicant or licensee is required to conduct their DCRDR on a schedule negotiated with NRC.

## 2.0 BACKGROUND

On February 26, 1985, Northeast Nuclear Energy Company (NNECo) provided the staff with the Control Room Design Review (CRDR) Implementation Plan (Ref. 3) for Millstone Unit 2. The staff reviewed the plan and forwarded review comments (Ref. 4) to the licensee. On June 24, 1986, the staff met with the licensee to discuss staff comments on the program plan. By letter dated August 12, 1986, the licensee provided a response (Ref. 5) to the staff's comments. By letter dated September 30, 1986, the licensee provided the staff with a Summary Report (Ref. 6) for the Control Room Design Review. Also, the staff, with assistance from a contractor (Science Applications International Corporation), conducted an audit (December 2-4, 1986) of the licensee's DCRDR. The contractor's Technical Evaluation Report (TER) on the audit and the review of the Summary Report is attached. The staff's safety evaluation is based upon a review of the above identified material.

## 3.0 EVALUATIONS

The results from the staff's review are summarized with regard to each of the elements of the DCRDR required by Supplement 1 to NUREG-0737.

3.1 Multidisciplinary Review Team

Based on data in the Summary Report, the audit, and an evaluation of the licensee's review team, the staff concludes that the licensee has established a qualified multidisciplinary review team that meets the requirements of Supplement 1 to NUREG-0737.

3.2 System Function and Task Analysis

Millstone Unit 2 based its task analysis upon the upgraded Emergency Operating Procedures (EOP's). These EOP's are based upon the Combustion Engineering Owners Group (CEOG) Emergency Procedure Guidelines (EPG's), Revision 1. Millstone Unit 2 is the same class plant as that used as a generic plant in the development of the CEOG EPG's.

To support the DCRDR at CE plants, the CEOG conducted a generic task analysis. The results of this effort are contained in CE-NPSD-299 which provides the methodology and the information and control requirements to perform a task analysis based upon the emergency operating procedures (EOP's). On September 6, 1985, CEN-307, "CE Owners Group Generic Information Characteristics Review" was submitted for NRC review. This report gives a thorough description of the model and method employed in conducting the generic task analysis. The task analysis conducted during the Millstone Unit 2 DCRDR was based upon the analysis of plant specific EOP's. Plant specific requirements were developed with the aid of guidelines contained in CEN-307. This plant specific task analysis and the development of the display and control requirements were conducted by Combustion Engineering under contract to the Millstone Unit 2 licensee. During the audit of the licensee's DCRDR, the NRC Audit Team selected one step in two different procedures. For each of these steps, the licensee's personnel described the analyses performed and the display and control verification that was conducted. The results from the walkthroughs provided the staff with an understanding of the process used and the products from the effort. Additional details may be found in the attached TER.

It is the staff's judgement, based upon its review of all DCRDR documentation provided by the licensee and the data evaluated during the audit, that NUREG-0737, Supplement 1 function and task analysis requirements are satisfied. However, since IE Information Notice No. 86-64, dated August 14, 1986, indicates that many utilities may have not appropriately developed or implemented upgraded EOP's, the licensee should verify that the problems with EOP's identified in this Information Notice are not applicable to them. If there are problems, the licensee should consider re-evaluating the adequacy of their DCRDR task analysis.

3.3 Control Room Inventory

During the audit, the NRC Audit Team evaluated the control room inventory and its comparison against the information and control needs derived from the system function and task analysis. In general, the staff found that the comparison of information and control requirements with the existing control room was effectively conducted. However, the staff did note one or two discrepancies/oversights in the definition and recording of human engineering discrepancies (HED's). The staff recommended that the licensee reassess the comparison process to ensure that all HED's identified have been recorded and processed. Additional details on this matter may be found in the attached TER.

3.4 Control Room Survey

The control room survey conducted at Millstone Unit 2 was performed by utilizing the checklists identified in Section 6 of NUREG-0700. Other guidelines, such as NUTAC documents, MIL Standards, etc., were used as supplemental information only.

During the audit, the staff evaluated the methodology used for the survey, including an evaluation of the dynamic criteria used in the survey. The methods used in the surveys conducted to date were acceptable. Only one survey remains. The remaining survey concerns the process computer and the Safety Parameter Display System (SPDS). The licensee committed to provide a Supplement (on or about August 1, 1987) to the Summary Report upon completion of the survey. The staff will review and report on these data in a Supplemental Safety Evaluation.

3.5 Assessment of Human Engineering Discrepancies

The Human Engineering Discrepancies found during the control room survey, the operating experience review, and the task analysis review were evaluated and prioritized. Four categories of priority were used and consisted of:

Priority 1 (safety significant) is the priority assigned to most HED's found during task analysis because the EOP's are being reviewed in the task analysis.

Priority 2 (operational/reliability) is the category for HED's that have caused problems or could cause a problem during operation.

Priority 3 HED's are defined as HED's that can be determined to have a minor effect on the reliability of operations.

Priority 4 HED's are those judged to have no consequence upon operations.

During the audit, the staff evaluated the process used and the results from the assessment activity. It noted that all HED's identified from the task analysis were categorized as priority 1. The staff review of the assessment process and the prioritization process concluded that this step in the DCRDR meets the requirements of NUREG-0737, Supplement 1. However, the audit also noted that concerns resulting from the licensee's operator survey were addressed in a global manner. While operator surveys are not a specific NRC requirement for the DCRDR, they do serve as a valuable source of information to identify specific problems with a control room. The staff recommends that the licensee reassess the results of the operator survey to ensure that all comments related to control room survey items and to task analysis have been properly processed. Additional details on this concern may be found in the attached TER.

3.6 Selection of Design Improvements

The licensee has developed a technically sound process to implement design improvements and makes extensive use of a full-scale mockup. During the audit, the staff sampled HED's for which corrective actions were identified. The staff evaluated the corrective actions and found them acceptable. The staff also evaluated all priority 1 HED's for which no corrective actions were planned. The licensee's rationale for the uncorrected HED's was reviewed and agreed with. Based on this data, the staff concludes that the licensee meets the requirement of NUREG-0737, Supplement 1.

The staff's review also noted that only one design guideline for control room modification had been documented by the licensee. The licensee stated that several additional design guidelines would be documented in the near future. The staff recommended that these guidelines be documented in order that they be available for use when implementing the design changes to the control room.

3.7 Verification that Design Improvements Provide Necessary Correction and Do Not Introduce New HED's

The design verification process utilized by the licensee consisted of iterative panel assessment by operators. The mock up of the control boards were modified to correct HED's. As each panel was modified, operators were used to evaluate the modifications. Operator comments were evaluated and, if necessary, additional modifications were made to the panels. Operators were then used to re-evaluate the modifications. This process was repeated until operator comments were resolved.

In addition to the design verification process, a design validation process was also conducted with the mock up. The design validation consisted of a walkthrough of three procedures by two operators.

These procedures encompassed greater than 90% of the emergency tasks assigned operators and they covered greater than 85% of the control board. Only four new HED's were identified from the design validation process. This low number of HED's indicates that a very effective design verification was conducted.

The verification program as described by the licensee is acceptable and meets the requirements of Supplement 1 to NUREG-0737. Additional details may be found in the attached TER.

3.8 Coordination of the DCRDR with other NUREG-0737 Supplement 1 Programs

During the audit, the staff found that several HED's were to be resolved through new training for operators. In evaluating these HED's, it was found that the HED's were being assessed by the Training Department, but no training program was developed as yet. The licensee was informed that the staff wishes to be kept informed on the disposition of these HED's, with priority 1, but rejected by the Training Department.

The licensee plans to modify the training simulator after the changes to the control room are made. The staff discussed the training of operators for the changes in the control room. Because of the large number of changes, the staff expressed concerns for human error by operators resulting from the potential negative transfer of training. The staff recommended that the licensee consider keeping the control room mock up as a training aid in the re-training of operators.

The staff also conducted a review of priorities and schedules for control room modifications. Based on the data obtained, it was concluded that the priorities and schedules were acceptable.

Based on the review of the licensee's coordination plan, the staff concludes that it is adequate and meets the requirements of Supplement 1 to NUREG-0737.

4.0 CONCLUSIONS

Based upon the staff's review of the licensee's DCRDR to date, it is concluded that the licensee has met many of the requirements for the review. In addition, the implementation schedule provided in the DCRDR Summary Report is acceptable. One control room survey remains to be completed and the licensee committed to provide a Supplement to the Summary Report regarding the SPDS/process computer. The staff will review and report on the supplement after it is received. The Supplement should also address the following items:

1. The licensee should reassess the comparison process between the products of the task analysis and the control room inventory to ensure that all HED's identified have been recorded and processed.

2. The licensee should reassess the results of the operator survey to ensure that all comments related to control room survey and to task analysis have been properly resolved.

3. Human factors guidelines should be documented in order that they be available for use when implementing the design changes to the control room.

4. The concerns of IE Information Notice 86-64 should be addressed.

5. The licensee should identify those priority 1 HED's rejected by the Training Department.

We understand that the Supplement will be issued by August 1, 1987.

5.0 REFERENCES

1. U.S. Nuclear Regulatory Commission, NUREG-0660, "NRC Action Plan Developed as a Result of the TMI-2 Accident," October, 1981.

2. U.S. Nuclear Regulatory Commission, NUREG-0737, "Clarification on TMI Action Plan Requirements," November 1980, Supplement 1, December 1982.

3. Letter from W. G. Council, Northeast Utilities, to J. R. Miller, NRC, Subject: Control Room Design Review Implementation Plan, dated February 26, 1985.

4. Letter from E. G. Tourigny, NRC, to J. F. Opeka, Northeast Utilities, Subject: Detailed Control Room Design Review Program Plan for Millstone Unit 2, dated May 23, 1985.

5. Letter from J. F. Opeka, Northeast Utilities, to A. C. Thadani, NRC, Subject: Response to NRC Staff Comments, dated August 12, 1986.

6. Letter from J. F. Opeka, Northeast Utilities, to A. C. Thadani, NRC, Subject: Control Room Design Review Summary Report, dated September 30, 1986.

Attachment:
Technical Evaluation Report,
SAIC-86/1997

Principal Contributor:
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