DCR 015

Docket No. 50-220

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Niagara Mohawk Power Corporation
ATTN: Mr. C. V. Mangan
Senior Vice President
c/o Miss Catherine R. Seibert
Syracuse, New York 13202

Dear Mr. Mangan:

SUBJECT: SAFETY EVALUATION - DETAILED CONTROL ROOM DESIGN REVIEW (TAC 56141)

Re: Nine Mile Point Nuclear Station, Unit 1

Enclosed is our safety evaluation (SE) regarding the Detailed Control Room Design Review (DCRDR) for Nine Mile Point Nuclear Station, Unit 1 (NMP-1). The staff was assisted in its evaluation of the NMP-1 DCRDR by Science Applications International Corporation (SAIC). A copy of the SAIC Technical Evaluation Report (TER) is also attached. The staff concurs with the evaluations and conclusions in the TER. However, our SE input provides additional information regarding some DCRDR elements not discussed in the TER.

As presented in the enclosed SE, the DCRDR for NMP-1 is incomplete. Discussion of each DCRDR element and a listing of specific actions necessary to complete the DCRDR are provided in the SE. You should provide the information identified in Section 3.0 of the SE on a schedule to be negotiated with your Project Manager.

The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,
Original signed by:

John A. Zwolinski, Director
BWR Project Directorate No. 1
Division of BWR Licensing

Enclosure:
Safety Evaluation
w/attached TER

cc w/enclosure:
See next page

Retyped by JGriffin 5/13/86.

DBL:PD#1	DBL:PD#1	DBL:AD/BWR	BC:EICSB	DBL:PD#1
CJamerson	JKelly:hmc	GLainas	MSrinivasan	JZwolinski
5/14/86	5/14/86	6/12/86	6/23/86	6/25/86

with corrections

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO TMI ITEM I.D.1.2 - DETAILED CONTROL ROOM DESIGN REVIEW

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR POWER STATION, UNIT 1

DOCKET NO. 50-220

1.0 INTRODUCTION

Niagara Mohawk Power Corporation (NMPC) submitted its Program Plan for a Detailed Control Room Design Review (DCRDR) for the Nine Mile Point Nuclear Station, Unit 1 (NMP-1) by letter dated September 30, 1983. NRC staff comments on that plan were forwarded to NMPC on January 25, 1984. Results of the Program Plan review indicated the need for an in-progress audit. The staff conducted the audit from November 27-30, 1984. An audit report was forwarded to the Division of Licensing for transmission to NMPC on February 14, 1985. The DCRDR Summary Report for NMP-1 was submitted on July 1, 1985.

2.0 EVALUATION

A synopsis of the staff's position on the NMP-1 DCRDR is provided below. The position is based on all available information and is arranged in order of the DCRDR elements identified in Supplement 1 to NUREG-0737. The staff was assisted in its evaluation by Science Applications International Corporation (SAIC) personnel. A copy of the SAIC Technical Evaluation Report (TER), which contains a detailed evaluation of the NMP-1 DCRDR, is attached. The staff concurs with the evaluations and conclusions in the TER.

2.1 Establishment of a qualified multidisciplinary review team

A qualified multidisciplinary review team has been established for conduct of the NMP-1 DCRDR. NMPC should assure that personnel from appropriate disciplines are involved in activities required to complete the DCRDR.

2.2 Function and task analyses to identify control room tasks and information and control requirements during emergency operations

A function and task analysis effort using Revision 0 of the NMP-1 Emergency Procedure Guidelines (EPGs) has been completed. NMPC has committed to update that effort using Revision 1 of the NMP-1 EPGs. The continuing task analysis effort should identify any new or modified tasks, the information and control capabilities necessary to complete those tasks, and the displays and controls (including their appropriate characteristics) required to satisfy the information and control capability needs. The Summary Report indicated a late 1985 schedule for

the function and task analysis update using Revision 1 of the NMP-1 EPGs. Completion of that update for use in the activities described in 2.3 below, should satisfy the function and task analysis element of the DCRDR.

2.3 Comparison of display and control requirements with a control room inventory

Automated and manual data bases serve as the inventory of displays and controls in the NMP-1 control room. Characteristics of the display and controls are included in the data base. A computerized comparison of display and control requirements identified by the task analysis with displays and controls available in the control room has been made, and Human Engineering Observations (HEOs) have been identified. Some of those HEOs resulted from limitations in the automated data base and were found to be invalid when compared to information in the manual data base. This element of the DCRDR should be satisfied upon comparison of new or modified display and control requirements identified by the update of the function and task analysis (See 2.2 above) with the control room inventory.

2.4 A control room survey to identify deviations from accepted human factors principles

The control room survey was consistent with that described in Generic Letter 83-18. NMPC committed to measure temperature, humidity, and air velocity in the control room during July 1985. Those measurements will allow evaluation of environmental conditions in the control room during hot weather and when emergency ventilation is in use. The control room survey element of the DCRDR should be satisfied upon completion of the environmental measurements listed above.

2.5 Assessment of Human Engineering Discrepancies (HEDs) to determine which are significant and should be corrected

The staff was concerned about the possibility of bias in the HEO assessment process used by NMPC. In response to the staff's concern, NMPC obtained an independent assessment of HEOs previously rejected as insignificant. Several HEOs were reclassified as significant as the result of the independent assessment. HEO found to be significant were redesignated HEDs. This element of the DCRDR should be satisfied upon assessment of HEOs resulting from ongoing DCRDR activities (e.g., comparison of new or modified display and control requirements identified by the function and task analysis update with the control room inventory, verification that HEDs are corrected, and verification that new HEDs are not introduced).

2.6 Selection of design improvements

The Summary Report indicates that 530 HEOs have been identified by the NMP-1 DCRDR. About 16% of those were determined to have been resolved previously by fixes which are either in-progress or complete. Another 33% were assessed as significant and redesignated HEDs. Those HEDs were subjected to the process for selecting design improvements. That process resulted in HEDs being grouped in terms of the type of correction planned (i.e., "cosmetic" or "functional" fixes). An "Integrated Cosmetic Program - ICP" was developed to correct the 133 HEDs assigned to the cosmetic group. The Summary Report indicates that the ICP addresses:

1. Demarcation
2. Labeling
3. Indicator scales
4. Mimics
5. Control handles
6. Indicator lights
7. Recorder paper

Corrections have also been selected for many of the 42 HEDs assigned to the functional group. However, the Summary Report indicates that some "...review, analysis, or programmatic activity..." is required to complete the selection of design improvements for some HEDs in the functional fix group. The selection of design improvements element should be satisfied when corrections for all previously identified HEDs (see Appendix D of the attached TER) and corrections for significant HEDs which may be identified by ongoing DCRDR activities are determined.

2.7 Verification that selected improvements will provide the necessary correction and verification that improvements will not introduce new HEDs

NMPC has described two activities for performing the required verifications. The first activity, which has already been completed, involved application of the ICP to the control room simulator. Several changes to the ICP resulted from an iterative selection and verification process involving operators and human factors specialists. The second activity involves verification of the functional fixes. The group of HEOs identified as already resolved will be included as part of this activity. The Summary Report indicates that the second verification activity will include:

1. Check-off that the work has been completed
2. Human factors review that the fix was effective
3. Query to NMP-1 Operations as to resolution of the original concern

The Summary Report further indicates that the functional fixes have not yet been verified. That activity is planned to follow implementation of the corrections in the control room. The staff is concerned about NMPC's schedule for verifying the functional fixes. The object of the verifications is to assure, prior to implementation of the corrections in the control room, that HED corrections are effective and that they do not introduce new HEDs. The schedule proposed by NMPC does not appear to provide for such assurance. A means for resolving this concern should be developed.

HEOs identified during the verification process as having not been corrected or as having been introduced by correction of an HED should be subjected to the selection and verification of design improvements processes iteratively until problems are resolved. These elements should be satisfied upon verification of the functional fixes and verification of corrections for significant HEOs identified by ongoing DCRDR activities (including verification itself).

2.8 Coordination of control room improvements with changes from other programs such as the Safety Parameter Display System (SPDS), operator training, Reg. Guide 1.97 instrumentation, and upgraded Emergency Operating Procedures (EOPs)

The Summary Report indicates that the SPDS was specifically reviewed as part of the DCRDR. The Summary Report also indicates a Fall 1985 schedule for formal training on modifications to the control room resulting from the DCRDR. Training for future modifications to the control room resulting from the DCRDR is to be integrated into NMP-1's normal Operator Requalification Training cycle. Verification that training will correct certain HEDs was not addressed. The Summary Report did not indicate that instrumentation installed to satisfy Reg. Guide 1.97 had been or will be subjected to a human factors review. However, NMPC did commit to review control room changes which result from the NRC's review of its Reg. Guide 1.97 submittal. Finally, the Summary Report indicates that Revision 0 of the NMP-1 EPGs was used both in developing plant-specific EOPs and in conducting a task analysis as part of the DCRDR. Further coordination of the DCRDR and upgrade of the EOPs is addressed in paragraphs 2.2 and 2.3 above. The coordination element should be satisfied upon:

1. Verification that HEDs to be resolved solely by training are, in fact, corrected and that new HEDs are not introduced.

2. Review of new instrumentation required to satisfy Reg. Guide 1.97 (previous additions due to Reg. Guide 1.97 should be included if they have not already been reviewed).

3. Update of the function and task analysis and comparison of new or modified display and control needs with a control room inventory.

HEOs identified by the above activities should be assessed and design improvements should be selected, verified, and scheduled for implementation.

2.9 Summary Report requirements

The Summary Report provided:

1. Proposed resolutions for most of the HEOs NMPC plans to correct, but resolutions for some HEOs which NMPC plans to correct depend upon further study.

2. Statements indicating implementation of most corrections by the end of the Spring 1986 refueling outage while implementation of a few proposed corrections is to be deferred until the 1988 refueling outage.

3. Justifications for not correcting certain HEOs.

Review of the above information identified several concerns. Appendix A of the attached TER lists HEOs for which the proposed correction either could not be evaluated or appeared inadequate. Appendices B and C list HEOs for which the justification for not correcting HEOs appeared inadequate. Appendix D lists HEOs which are undergoing additional review prior to determination of corrections. The Summary Report requirement will be satisfied upon:

1. Submittal of proposed corrections and implementation schedules for HEOs undergoing further study.

2. Submittal of proposed corrections and implementation schedules for HEOs identified by ongoing DCRDR activities which NMPC plans to correct

3. Submittal of justifications for decisions not to correct safety significant HEOs identified by ongoing DCRDR activities

4. Resolution of the concerns identified in the appendices to the attached TER

3.0 CONCLUSION

3.1 Ongoing DCRDR Activities

The DCRDR for NMP-1 is incomplete. In the staff's judgment, completion of several activities is essential to satisfy the DCRDR requirements of Supplement 1 to NUREG-0737. Those activities are:

1. Update of the function and task analysis using Revision 1 of the NMP-1 EPGs and comparison of any new or modified display and control requirements identified by this update with the control room inventory.

2. Measurement of temperature, humidity, and ventilation in the control room.

3. Survey of new instrumentation required to satisfy Reg. Guide 1.97 (any previous Reg. Guide 1.97 upgrades to the control room should be included if they have not already been surveyed).

4. Assessment of HEOs identified by ongoing DCRDR activities (e.g., comparison of control room inventory with new or modified display and control requirements identified by the function and task analysis update, environmental surveys, survey of Reg. Guide 1.97 instrumentation, etc.).

5. Completion of the selection of design improvements for HEDs in the functional fix group (see paragraph 2.6 above) and selection of design improvements for significant HEOs (i.e., HEDs) identified by ongoing DCRDR activities.

6. Verification of function fixes, corrections for HEDs identified by ongoing DCRDR activities, and training resolutions for HEDs.

3.2 Reporting Requirements

NMPC is required to maintain an auditable record of all activities necessary to complete the DCRDR. In addition, a supplement to the DCRDR Summary Report synopsizing the results of the above activities should be submitted within nine months of receiving this safety evaluation. That supplement should:

1. Outline proposed control room changes resulting from the above activities.

2. Outline proposed schedules for implementing those changes.

3. Provide summary justification for HEOs with safety significance (i.e., HEDs) resulting from the above activities to be left uncorrected or to be partially corrected.

In addition, the Summary Report Supplement should:

1. Identify actual staffing for each activity required to complete the DCRDR (as listed in 3.1 above).

2. Address the staff's concern related to scheduling verification of HED corrections following implementation.

3. Provide more definitive descriptions of HEOs and the proposed corrective actions for these HEOs identified under paragraph 1 of Appendix A to the TER.

4. Propose actions which acceptably correct HEOs identified under paragraph 2 of Appendix A to the TER.

5. Clearly describe justifications for not correcting HEOs identified under paragraph 1 of Appendix B to the TER.

6. Provide clear bases for the justification given for not correcting HEOs identified under paragraphs 2 and 3 of Appendix B and paragraph 2 of Appendix C to the TER. Discuss operational or behavioral factors and how the cumulative or interactive effects of other HEOs were considered.

7. Provide more definitive descriptions of HEOs and clearly describe the justification for HEOs categorized as invalid which are identified under paragraph 1 of Appendix C to the TER.

8. Submit proposed corrections for HEOs identified in Appendix D of the attached TER which are undergoing further study, or provide justification for not correcting or only partially correcting them.

Evaluation of the NMP-1 DCRDR will continue through completion of the above activities. Final staff evaluation will be reported in a supplement to this SE input.

Principal Contributor: D. Serig

Dated: July 1, 1986

REFERENCES

NUREG-0700, "Guidelines for Control Room Design," September 1981.

NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980; Supplement 1, December 1982.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 18.1, Rev. 0, September 1984.

Letter from C. V. Mangan (NMPC) to D. G. Eisenhut (NRC), Subject: "... Generic Letter 82-33...," April 15, 1983.

NMPC submittal for NMP-1. Subject: Summary Report and Program Plan for the Control Room Design Review, September 30, 1983.

Memo from W. T. Russell (NRC) to G. C. Lainas (NRC) for transmittal to NMPC, Subject: Response to Nine Mile Point Program Plan Submittal, January 25, 1984.

Letter from R. A. Hermann (NRC) to B. G. Hooten (NMPC), Subject: Meeting Summary Detailed Control Room Design Review - August 17, 1984, October 1, 1985.

Letter from C. V. Mangan to D. B. Vassallo (NRC), Subject: Request for Schedule Extension in Order to Submit an Expanded Final Summary Report for the Detailed Control Room Design Review, December 12, 1984.

Memo from W. H. Regan (NRC) to D. B. Vassallo for transmittal to NMPC. Subject: Results of the November 27-30, 1984 In-progress Audit of the Nine Mile Point Nuclear Station, Unit 1 Detailed Control Room Design Review, February 14, 1985.

Memo from W. H. Regan to D. B. Vassallo for transmittal to NMPC, Subject: Minutes of a May 9-10, 1985 Meeting Between Niagra Mohawk Power Corporation and the Nuclear Regulatory Commission, June 6, 1985.

NMPC submittal for NMP-1, Subject: Final Summary Report for Detailed Control Room Design Review of Nine Mile Point Unit One, July 1985.