

May 31, 1990

Docket No. 50-334  
Serial No. BV-90-002

Mr. J. D. Sieber, Vice President  
Nuclear Group  
Duquesne Light Company  
P. O. Box 4  
Shippingport, Pennsylvania 15007

Dear Mr. Sieber:

SUBJECT: DETAILED CONTROL ROOM DESIGN REVIEW (TAC 56102)

The Commission has completed its review of the Detailed Control Room Design Review (DCRDR) for the Beaver Valley Power Station, Unit 1. The evaluation results are contained in the enclosed Safety Evaluation. The staff has concluded that the DCRDR requirements as specified in Supplement 1 to NUREG 0737 are met.

Duquesne Light Company is requested to inform the Commission not later than July 9, 1990, in writing, of the actual or projected final implementation date for corrective actions identified as a result of the DCRDR. Also, Duquesne Light Company is requested to inform the Commission, in writing, when all currently unimplemented corrective actions have actually been implemented and the modifications have been determined to be operational.

Sincerely,

/s/

Albert W. De Agazio, Senior Project Manager  
Project Directorate I-4  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Enclosure:  
Safety Evaluation

cc w/enclosure:  
See next page

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S. Varga (14E4)

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S. Norris

Project Manager

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Tech Branch that had input in package (Principal Contributor of SE)

E. Jordan (MNBB 3302)

ACRS (10)

E. Wenzinger (Region I)

Mr. J. Sieber  
Duquesne Light Company  
cc:

Jay E. Silberg, Esquire  
Shaw, Pittman, Potts and Trowbridge  
2300 N Street, N.W.  
Washington, DC 20037

Nelson Tonet, Manager  
Nuclear Safety  
Duquesne Light Company  
P. O. Box 4  
Shippingport, Pennsylvania 15077

Commissioner Roy M. Smith  
West Virginia Department of Labor  
Building 3, Room 319  
Capitol Complex  
Charleston, WV 25305

John D. Borrows  
Director, Utilities Department  
Public Utilities Commission  
180 East Broad Street  
Columbus, Ohio 43266-0573

Director, Pennsylvania Emergency  
Management Agency  
Post Office Box 3321  
Harrisburg, Pennsylvania 17105-3321

Beaver Valley Power Station  
Units 1 & 2

Bureau of Radiation Protection  
Pennsylvania Department of  
Environmental Resources  
ATTN: R. Janati  
Post Office Box 2063  
Harrisburg, Pennsylvania 17120

Mayor of the Borough of  
Shippingport  
Post Office Box 3  
Shippingport, Pennsylvania 15077

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

Resident Inspector  
U.S. Nuclear Regulatory Commission  
Post Office Box 181  
Shippingport, Pennsylvania 15077



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

ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE DETAILED CONTROL ROOM DESIGN REVIEW

DUQUESNE LIGHT COMPANY

BEAVER VALLEY POWER STATION, UNIT NO. 1

DOCKET NO. 50-334

1.0 INTRODUCTION

Item I.D.1, "Control Room Design Reviews," of Task I.D., "Control Room Design," of the "NRC Action Plan Developed as a Result of the TMI-2 Accident," (NUREG-0660) states that operating reactor 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 accidents or to cope with them, should they occur, by improving the information provided to them. Supplement 1 to NUREG-0737 confirmed and clarified the DCRDR requirement in NUREG-0660. In accordance with Supplement 1 to NUREG-0737, each applicant or licensee is required to conduct its DCRDR on a schedule negotiated with the NRC.

Duquesne Light Company (DLC) has conducted a Detailed Control Room Design Review for the Beaver Valley, Unit 1 nuclear power plant. A chronology of the Beaver Valley, Unit 1 DCRDR is provided below.

July 23-26, 1984	NRC conducted in-progress DCRDR audit
September 12, 1984	Results of in-progress audit forwarded to DLC
November 29, 1985	DCRDR Summary Report submitted to NRC
February 13, 1986	NRC met with DLC to discuss DCRDR
January 5, 1988	Supplement 1 to DCRDR Summary Report submitted to NRC
May 4, 1989	Supplement 2 to DCRDR Summary Report submitted to NRC.

This Safety Evaluation (SE) is based on the documentation and events mentioned above. The staff was assisted in their evaluation by Science Applications International Corporation (SAIC).



## 2.0 EVALUATION

The staff evaluation of the Beaver Valley, Unit 1 DCRDR follows.

### 2.1 Establishment of a Qualified Multidisciplinary Review Team

During the 1984 in-progress DCRDR audit, the staff concluded that DLC's team had the proper mix of disciplines recommended in NUREG-0800. Therefore, the team composition meets the Supplement 1 to NUREG-0737 requirement for establishment of a qualified multidisciplinary review team.

### 2.2 Function and Task Analysis to Identify Control Room Operator Tasks and Information and Control Requirements During Emergency Operations

The system function and task analysis performed at Beaver Valley, Unit 1 was based on the Westinghouse Owner's Group Emergency Response Guidelines (ERGs), Revision 1. The ERGs served as the basis for developing the plant specific emergency operating procedures at Beaver Valley, Unit 1.

Using the information and control requirements established for the ERGs, and subsequently customized to Beaver Valley, Unit 1, DLC documented the required information and control requirements and identified the necessary instrumentation and control characteristics. This activity was conducted independent of the existing control room.

The staff concluded as a result of the 1984 in-progress audit and 1985 Summary Report evaluation that DLC's function and task analysis was satisfactory. Therefore, it is the staff's judgment that DLC has satisfied the Supplement 1 to NUREG-0737 requirement for a function and task analysis to identify control room operator tasks and information and control requirements during emergency operations.

### 2.3 Comparison of Display and Control Requirements with Control Room Inventory

DLC's inventory activity was integrated into the upgraded emergency operating procedures verification of task performance activity. The purpose of this activity was to verify the availability and suitability of each instrument checked as part of (1) the emergency operating procedures walk-through/talk-through task, and (2) the real-time exercise of emergency operating procedures on the simulator. During this activity the DCRDR team was tasked to determine if any of the following problems existed:

- o Inadequate instrumentation
- o Incorrect hardware referenced
- o Inadequate control feedback
- o Insufficient information to perform step
- o Inaccurate information to perform step
- o Insufficient label/abbreviation
- o Insufficient/inaccurate location information.

The list of emergency procedures, emergency contingency actions, and functional restoration guidelines representing a comprehensive set of emergency tasks, was included in the Summary Report. Discrepancies were documented as Human Engineering Discrepancies (HEDs).

It is the staff's judgment that DLC satisfactorily compared operator information and control requirements to the control room inventory, thereby meeting this Supplement 1 to NUREG-0737 requirement.

#### 2.4 Control Room Survey

The staff determined as a result of the in-progress audit and Summary Report evaluation, that DLC needed to complete additional survey work in order to meet this Supplement 1 to NUREG-0737 requirement. DLC conducted the additional survey work and documented the results in the May 1989 Second Supplement to the Summary Report. The additional surveys conducted by DLC included:

- o Computer system survey
- o Heating Ventilation and Air Conditioning survey
- o Illumination survey
- o Communications survey.

Based on a review of the additional survey results, and previous survey evaluations, it is the staff's judgment that the requirement for a control room survey to identify deviations from accepted human factors principles has been properly implemented.

#### 2.5 Assessment of Human Engineering Discrepancies to Determine Which are Significant and Should be Corrected

The Summary Report described the HED Assessment as an integrated part of the DCRDR process. The assessment process was the same as the one evaluated and found acceptable during the in-progress audit.

HEDs that were assessed as Priority 1 safety significant were scheduled for correction no later than 18 months after issue of all design outputs. All HEDs requiring corrective action were scheduled to be implemented prior to startup following the seventh Beaver Valley, Unit 1 refueling outage.

Based on a review of the Summary Report and the Supplemental Summary Reports, and the in-progress audit, the requirement for assessment of HEDs to determine which are significant and should be corrected has been satisfied.

#### 2.6 Selection of Design Improvements

The 1985 Summary Report described a process for development and selection of alternate means of correcting HEDs. For each HED assessed as a problem, the control room design review team developed corrective actions using control room improvement techniques such as enhancements, equipment and panel modifications, procedures changes, and training. Each of the potential HED resolutions was evaluated for impact on safety, operational effectiveness,

plant availability requirements, control room staffing, and consistency with other Supplement 1 to NUREG-0737 upgrade programs. It is the staff's judgment that this was an acceptable process for selection of design improvements. During the 1986 NRC meeting with DLC, the staff requested that DLC provide additional information regarding the HED resolution tracking process. This information was provided in Section 4.0 of the second Supplement to the Summary Report that was submitted to the NRC on May 4, 1989. DLC indicated in the HED tracking system that approximately 20 of the 563 remained to be corrected. Our review of the 20 open HEDs indicated that they were not safety significant and the proposed modifications were acceptable.

Based on DLC's DCRDR Supplemental Summary Report submittals and the NRC in-progress audit, the requirement for selection of design improvements has been satisfied.

#### 2.7 Verification that Selected Improvements Provide the Necessary Corrections Without Introducing New HEDs

DLC provided the criteria used in the analysis of corrective actions in the 1985 Summary Report. Based on DLC's procedures, the Supplement 1 to NUREG-0737 requirement for verification that the selected design improvements do provide the necessary corrections without introducing new HEDs has been satisfied.

#### 2.8 Coordination of Control Room Improvements with Changes from Other Programs Such as Safety Parameter Display System (SPDS), Operator Training, Regulatory Guide 1.97 Instrumentation, and Upgraded Emergency Operating Procedures

Based on the materials presented in the Summary Reports, the Supplement 1 to NUREG-0737 requirement for coordination of the DCRDR with other improvement programs such as the safety parameter display system, operator training, Regulatory Guide 1.97 instrumentation and upgraded emergency operating procedures is satisfied.

### 3.0 CONCLUSIONS

The DCRDR program implemented at Beaver Valley, Unit 1 satisfies all of the requirements of Supplement 1 to NUREG-0737. The staff may confirm, by means of an inspection at some future date, that corrective actions have been completely and properly implemented.

Principal contributor: C. Goodman

Dated:

References

1. U.S. Nuclear Regulatory Commission, "NRC Action Plan Developed as a Result of the TMI-2 Accident," NUREG-0660, Vols. 1 and 2, May 1980.
2. U.S. Nuclear Regulatory Commission, "Clarification of TMI Action Plan Requirements, Requirements for Emergency Response Capability," NUREG-0737 Supplement 1, December 1982.
3. NUREG-0800, "Standard Review Plan," Section 18.1, "Control Room," and Appendix A, "Evaluation Criteria for Detailed Control Room Design Review (DCRDR)," September 1984.