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December 23, 1983

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Docket Nos. 50-259/260/296  
and 50-390/391/327/328/438/439

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*CC for  
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Docket Nos: 50-259/260/296  
50-390/391  
50-327/328  
and 50-438/439

Mr. H. G. Parris  
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Dear Mr. Parris:

Subject: Comments on TVA Program Plan for Control Room  
Design Reviews

Enclosed are comments on the Program Plan for control room design reviews that are applicable to all TVA nuclear Plants, i.e. Watts Bar, Sequoyah, Browns Ferry and Bellefonte. These comments are provided for your consideration in strengthening the programs. No written response is requested; however, the staff would like a meeting to discuss the specific concerns that are described in the enclosure and to afford TVA an opportunity to more fully describe the control room review process. Please contact Mr. Carl Stahle, Project Manager for the Sequoyah facility, who will serve as coordinator for the other facilities with regard to a meeting date and time.

Sincerely,

/S/

Thomas M. Novak, Assistant Director  
for Licensing  
Division of Licensing

Enclosure:  
As stated

cc: See next page

DL:LB #4  
CStahle/hmc  
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LA:DL:LB #4  
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DL:LR #4  
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AD:DL  
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·NUCLEAR REGULATORY COMMISSION  
STAFF COMMENTS  
ON THE  
PROGRAM PLAN FOR CONTROL ROOM DESIGN REVIEWS  
FOR  
ALL TVA NUCLEAR PLANTS

BACKGROUND

Licenses and applicants for operating licenses shall conduct a Detailed Control Room Design Review (DCRDR). The objective is to "improve the ability of nuclear power plant control room operators to prevent accidents or cope with accidents if they occur by improving the information provided to them" (from NUREG-0660 Item I.D). The need to conduct a DCRDR was reaffirmed in NUREG-0737 and Supplement 1 to NUREG-0737. DCRDR requirements in Supplement 1 to NUREG-0737 replaced those in earlier documents. Supplement 1 to NUREG-0737 requires each applicant or licensee to conduct their DCRDR on a schedule negotiated with the Nuclear Regulatory Commission (NRC).

NUREG-0700 describes four phases of the DCRDR and provides applicants and licensees with guidelines for its conduct. The phases are:

1. Planning
2. Review
3. Assessment and implementation
4. Reporting

Criteria for evaluating each phase are contained in NUREG-0801.

A Program Plan is to be submitted within two months of the start of the DCRDR. Consistent with the requirements of Supplement 1 to NUREG-0737, the Program Plan shall describe how the following elements of the DCRDR will be accomplished:

1. Establishment of a qualified multidisciplinary review team
2. Function and task analyses to identify control room operator tasks and information and control requirements during emergency operations
3. A comparison of display and control requirements with a control room inventory

4. A control room survey to identify deviations from accepted human factors principles
5. Assessment of human engineering discrepancies (HEDs) to determine which HEDs are significant and should be corrected
6. Selection of design improvements
7. Verification that selected design improvements will provide the necessary correction
8. Verification that improvements will not introduce new HEDs
9. Coordination of control room improvements with changes from other programs such as SPDS, operator training, Reg. Guide 1.97 instrumentation, and upgraded emergency operating procedures

A Summary Report is to be submitted at the end of the DCRDR. As a minimum, it shall:

1. Outline proposed control room changes
2. Outline proposed schedules for implementation
3. Provide summary justification for HEDs with safety significance to be left uncorrected or partially corrected

The NRC will evaluate the organization, process, and results of each DCRDR. Evaluation will include review of required documentation (Program Plan and Summary Reports) and may also include review of additional documentation, briefings, discussions, and on-site audits. In-progress audits may be conducted after submission of the Program Plan but prior to submission of the Summary Report. Pre-implementation audits may be conducted after submission of the Summary Report. Evaluation will be in accordance with the requirements of Supplement 1 to NUREG-0737. Additional guidance for the evaluation is provided by NUREG-0700 and NUREG-0801. Results of the NRC evaluation of a DCRDR will be documented in a Safety Evaluation Report (SER) or SER Supplement.

Significant HEDs should be corrected. Improvements which can be accomplished with an enhancement program should be done promptly. Other control room upgrade may begin following publication of the SER (or SER Supplement), resolution of any open issues, and approval of a schedule for upgrade.

## DISCUSSION

The Tennessee Valley Authority (TVA) submitted a generic Control Room Design Review Plan June 9, 1983 to satisfy the program plan requirements of Supplement 1 to NUREG-0737 for the Sequoyah, Watts Bar, Bellefonte and Browns Ferry Nuclear Plants. The plan was resubmitted September 13, 1983 to

correct duplicating errors in the original plan. The staff, with assistance from its contractors reviewed the submittal with reference to the requirements of Supplement 1 to NUREG-0737 and the guidance contained in NUREGs 0700 and 0801.

The Program Plan states that "TVA considers the activities performed by the BWR Owners' Group as sufficient for meeting the requirements of this Program Plan for the Browns Ferry Unit control rooms, with the exception of completing Subsections 6.6 (Task Analysis) and 6.7 (Additional Analysis)." The staff agrees that a task analysis must be conducted for the Browns Ferry DCRDR. In addition, Generic Letter 83-18 specifies that program plans which reference the BWROG Survey Program should:

1. Document the qualifications of survey team members, and number and extent of plant personnel participation
2. Identify portions of the plant's DCRDR not performed in accordance with the methodology specified in the BWROG Program Plan
3. Discuss the program for prioritization of HEDs, reporting of results, and implementation of control room enhancements

Items 1 and 2, above, are not specifically addressed in the Program Plan and should, therefore, be provided. The staff assumes that the issues in Item 3 will be accomplished for Browns Ferry in the same manner as described in the Program Plan for the other TVA plants. The results of the Brown Ferry DCRDR should be reported to the NRC in a Summary Report.

The staff concurs with the TVA plan to address the auxiliary control room and equipment required to transfer control to the auxiliary control room in the DCRDR of each unit. To the extent practicable, without delaying completion of the DCRDR, it should also address any control room modifications and additions (such as controls and displays for inadequate core cooling and reactor systems vents) made or planned as a result of other post-TMI actions. The "new instrumentation survey" discussed in Section 7.3.18 of the plan should meet this objective. The lessons learned from operating reactor events such as the Salem ATWS events should also be integrated into the DCRDR to the extent practicable. Generic implications of the Salem ATWS events are discussed in NUREG-1000 and required actions are described in Section 1.2., Post-Trip Review - Data Information Capability, of the enclosure to Generic Letter 83-28.

The TVA Program Plan addresses most of the nine elements of a DCRDR specified in Supplement 1 to NUREG-0737. Certain of the elements, notably the task analysis, should be strengthened to provide reasonable assurance that the control room reviews based on the plan will produce results that satisfy NRC requirements. The following staff comments are organized around the elements identified in the Supplement. No formal response to the concerns noted in the staff comments is required. However, a meeting at NRC headquarters is



requested with the licensee to clarify some aspects of the TVA plan. An in-progress audit of the DCRDR of at least one TVA plant, probably Bellefonte, is anticipated at a time mutually agreeable to the staff and TVA.

1. Establishment of a Qualified Team

If personnel are selected according to the qualifications described in the plan, a suitable multidisciplinary team should be available to perform the reviews. The plan states that "the structure of the review team will vary for the different CRDR efforts because of the needs, capabilities, and resources available". Deviations in the qualifications and experience of core team members from that described in the plan should be described and justified in the summary reports.

2. Function and Task Analyses

The purpose of the DCRDR task analysis, as stated in Supplement 1 to NUREG-0737, is to "identify control room operator tasks and information and control requirements during emergency operations." TVA's planned task analysis appears sufficient to identify emergency operation tasks but does not provide a means for identifying and analyzing operators information and control requirements for carrying out those tasks. The methodology described in the plan appears directed exclusively toward identifying the controls and other devices which are available in the control room without providing analysis of the characteristics of the information and the control capability which needs to be provided by the instrumentation and controls. Although the plan indicates that the completed task analysis worksheets will be used to determine if instruments and controls are appropriately located and suitable for decision making, it is not clear how this can be accomplished without first explicitly defining the nature of the required information. Although the walk-through/talk-through described in Section 7.3.19 of the plan will be valuable for establishing traffic patterns, revealing the organization of operator tasks, and supporting the human engineering evaluation of control room equipment, the staff does not believe it will suffice as the sole means for establishing operators' information needs and control capability requirements. The TVA plan states that "The CRDR task analysis activity starts with the plant-specific symptom-oriented Emergency Operation Instructions (EOIs) after they have been validated..." If the EOI validation effort has included analysis of the operators' information requirement, TVA should provide a description of that analysis. Implementation of the control room task analysis as described in the Program Plan will not satisfy the requirements of Supplement 1 to NUREG-0737.

3. Control Room Inventory

A control room inventory is described in Section 7.3.3 of the Plan as a subtask of the control room survey. The plan does not specify how the inventory will be accomplished. The description provided states that the inventory will be limited to identifying only that equipment associated with the Emergency Operation Instructions. Although this is not consistent with the recommendations of Section 3.5.1 of NUREG-0700 that the inventory include all instrumentation controls and equipment, a limited inventory would be adequate if it is compared with the results of a task analysis which thoroughly defines operator information and control requirements and if the inventory identifies the available equipment in sufficient detail with regard to parameters, ranges, and locations, etc.

4. Control Room Survey

Although there appears to be a discrepancy between NRC and TVA nomenclature (the TVA definition of control room survey is broader than NRC's), the effort described in the plan indicates substantial understanding and commitment to NRC survey requirements and guidelines. The "Control Room Human Engineering Checklists" provided in Appendix A of the plan essentially reproduce Section 6 of NUREG-0700 with certain modifications. Some of the modifications to the NUREG-0700 guidelines, e.g., color coding guidelines, refer to TVA conventions and standards. While the staff concurs with the planned approach to conducting the survey, this should not be construed as endorsement of specific TVA conventions and standards. A note to Appendix A states that the checklists provided in the plan may be replaced by a checklist developed by the Nuclear Task Action Committee on Control Room Design Review. Significant departures from the plan should be described and justified in the summary reports.

5. Assessment of HEDs

The objectives of TVA's planned assessment of Human Engineering Concerns (HECs) and subsequent assessment of HEDs appear adequate. The plan states that "assessment criteria and guidelines will be developed to aid the Review Team in the analysis and prioritization of HEDs." Since these criteria and guidelines are not provided in the plan, the staff is unable to comment on their adequacy.

6. Selection of Design Improvements

The plan indicates, appropriately, that alternative approaches to correcting HEDs are available and that these alternatives may include training or procedural changes, simple surface enhancements and

extensive modifications necessitating the movement, addition or deletion of controls and displays. The plan states that, "A proposed HED action plan will be prepared by the CRDR team for each plant and submitted through appropriate TVA line organizations for review and use... The appropriate TVA line organization will be responsible for final disposition of the CRDR team HED action plan." It is not clear whether "final disposition" means "implementation" or "decision". Thus, the role of the CRDR team, including personnel with human factors expertise, in determining what improvements will be implemented is not clear.

7 & 8 Verification that Improvements Will Provide Necessary Corrections and Will Not Introduce New HEDs.

The use of training simulators and mock-ups to analyze modifications implemented as a result of HEDs identified during the DCRDR is endorsed by the staff. The staff is unsure, however, if TVA intends to make modifications to the control room before, concurrent with, or after they are tested on simulators or mock-ups. Although the staff agrees that verification and validation may be "long-term processes involving continued testing and analysis," some modifications, e.g., certain surface enhancements, can be made without extended testing and should be implemented promptly. The staff endorses in concept the performance of an unreviewed safety question determination "to document that proposed design improvements can be introduced into the CR without increased risk, or a temporary or permanent reduction in safety." However, insufficient information is provided in the plan to allow any judgment about the suitability of TVA's approach.

9. Coordination of the DCRDR with Other Improvement Programs

Although the plan states that integration of the DCRDR with other programs is a responsibility of team management, little indication of how this will be accomplished is provided.

Conclusions

As a result of the staff's review of the TVA plan, we recommend that a meeting be held at NRC's Bethesda offices to further discuss the DCRDR process and to clarify certain elements of the review. This meeting and a proposed in-progress audit of the DCRDR will be arranged through the Division of Licensing.

## REFERENCES

1. Letter from D. S. Kammer to E. Adensam, forwarding "Program Plan for Control Room Design Reviews for All TVA Nuclear Plants", June 9, 1983.
2. Letter from L. M. Mills to E. Adensam, forwarding TVA Program Plan, September 13, 1983.
3. Supplement 1 to NUREG-0737, "Requirements for Emergency Response Capability" (Generic Letter No. 82-33), December 17, 1982.
4. NUREG-0700, "Guidelines for Control Room Design Reviews," September 1981.
5. NUREG-0801, "Evaluation Criteria for Detailed Control Room Design Reviews", Draft for Comment, October 1981.
6. "NRC Staff Review of the BWR Owners' Group (BRWOG) Control Room Survey Program" (Generic Letter 83-18), April 19, 1983.
7. NUREG-1000, "Generic Implications ATWS Events at the Salem Nuclear Power Plant," April 1983.
8. "Required Actions Based on Generic Implications of Salem ATWS Events" (Generic Letter 83-26), July 28, 1983.