

Docket Nos.: 50-445
and 50-446

AUG 13 1984

Mr. M. D. Spence
President
Texas Utilities Generating Company
400 N. Olive Street
Lock Box 81
Dallas, Texas 75201

Dear Mr. Spence:

Subject: Status of the Comanche Peak Steam Electric Station (Units 1 and 2)
Control Room Design Review

Enclosed for your information is a report on the status of the NRC staff's review of the Comanche Peak control room design. The unresolved items were discussed with your staff during Mr. Dennis Serig's (the principal staff reviewer) visit to the plant site the week of July 31, 1984. Should your program plan not be fully resolved by fuel load of Unit 1, licensing will be accomplished on a PDA basis as opposed to a final DCRDR basis, with unresolved items to be settled after licensing as a licensing condition.

Sincerely,

ORIGINAL SIGNED BY:

B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing

Enclosure:
As stated

cc: See next page

CONCURRENCES:

DL:LB#1 DL:LB#1
JStefano:es BYoungblood
8/9/84 8/9/84

DIST:

Docket File W. T. Russell
NRC PDR V. A. Moore
Local PDR D. I. Serig
PRC System T. A. Ippolito
NSIC
LB#1 Rdg
MRushbrook
JStefano
OELD, Attorney
ACRS 16
EJordan
NGrace

8408210158 840813
PDR ADOCK 05000445
F PDR



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

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Sincerely,

A handwritten signature in cursive script that reads "B. J. Youngblood".

B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing

Enclosure:
As stated

cc: See next page

AUG 13 1984

COMANCHE PEAK

Mr. M. D. Spence
President
Texas Utilities Generating Company
400 N. Olive St., L.B. 81
Dallas, Texas 75201

cc: Nicholas S. Reynolds, Esq.
Bishop, Liberman, Cook,
Purcell & Reynolds
1200 Seventeenth Street, N. W.
Washington, D. C. 20036

Robert A. Wooldridge, Esq.
Worsham, Forsythe, Sampels &
Wooldridge
2001 Bryan Tower, Suite 2500
Dallas, Texas 75201

Mr. Homer C. Schmidt
Manager - Nuclear Services
Texas Utilities Generating Company
Skyway Tower
400 North Olive Street
L. B. 81
Dallas, Texas 75201

Mr. H. R. Rock
Gibbs and Hill, Inc.
393 Seventh Avenue
New York, New York 10001

Mr. A. T. Parker
Westinghouse Electric Corporation
P. O. Box 355
Pittsburgh, Pennsylvania 15230

Renea Hicks, Esq.
Assistant Attorney General
Environmental Protection Division
P. O. Box 12548, Capitol Station
Austin, Texas 78711

Mrs. Juanita Ellis, President
Citizens Association for Sound
Energy
1426 South Polk
Dallas, Texas 75224

Ms. Nancy H. Williams
CYGNA
101 California Street
San Francisco, California 94111

Mr. James E. Cummins
Resident Inspector/Comanche Peak
Nuclear Power Station
c/o U. S. Nuclear Regulatory
Commission
P. O. Box 38
Glen Rose, Texas 76043

Mr. John T. Collins
U. S. NRC, Region IV
611 Ryan Plaza Drive
Suite 1000
Arlington, Texas 76011

Mr. Lanny Alan Sinkin
114 W. 7th, Suite 220
Austin, Texas 78701

B. R. Clements
Vice President Nuclear
Texas Utilities Generating Company
Skyway Tower
400 North Olive Street
L. B. 81
Dallas, Texas 75201

William A. Burchette, Esq.
1200 New Hampshire Avenue, N. W.
Suite 420
Washington, D. C. 20036

Ms. Billie Pirner Garde
Citizens Clinic Director
Government Accountability Project
1901 Que Street, N. W.
Washington, D. C. 20009

David R. Pigott, Esq.
Orrick, Herrington & Sutcliffe
600 Montgomery Street
San Francisco, California 94111

Anthony Z. Roisman, Esq.
Trial Lawyers for Public Justice
2000 P. Street, N. W.
Suite 611
Washington, D. C. 20036

STATUS REPORT
ON THE
CONTROL ROOM DESIGN REVIEW
FOR
COMANCHE PEAK STEAM ELECTRIC STATION

BACKGROUND

Texas Utilities Generating Company (TUGCO) is performing a control room design review for Comanche Peak Steam Electric Station (CPSES). Background on staff evaluation of that review, through November 1983, was provided in Supplement 4 to the Safety Evaluation Report (SER). Subsequent to issuance of SER Supplement 4, TUGCO submitted Supplement 1 to the "Human Factors Control Room Design Review of Comanche Peak Steam Electric Station." That supplement, dated March 8, 1984, provided:

1. Clarification of responses to human engineering discrepancies (HEDs) as requested in the June 21, 1983, control room audit report.
2. Responses to HEDs identified during the April 1983, control room audit.
3. HEDs identified as the result of interim environmental surveys in the Unit 1 control room.
4. A cross-reference to detailed control room design review (DCRDR) Program Plan information.
5. Information on the function and task analysis.

Information in TUGCO's December 1982 report and March 1984 supplement has been evaluated with respect to licensing of CPSES Unit 1. Current status of the control room design review is provided below.

DISCUSSION

The CPSES control room design review has identified 353 HEDs in the Unit 1 control room. An April 1983, control room audit closed about 40% of these HEDs as acceptably corrected. The remainder are open. The majority of the open HEDs require an audit of the implemented correction prior to licensing. The NRC resident inspector has been asked to assist in this task, but he has been unable to do so because of the number of open items and the other demands that arise at this stage of construction. A few HED resolutions required clarification to be acceptable. Clarifications were provided in TUGCO's March 1984 Supplemental Report. The March 1984 Supplemental Report also provided proposed corrections for HEDs identified during the April 1983 audit and the subsequent environmental surveys. In general, the proposed HED corrections and clarified resolutions appear acceptable, however, discussions between TUGCO and the staff are needed to assure the acceptability of several proposed corrections and clarified resolutions. Completion of the above actions is required prior to licensing. Given the need to close-out a large number of HEDs prior to licensing, the need for clarification of several issues related to licensing and to completion of the DCRDR, and the short time before projected licensing, HFEB plans to perform a pre-licensing audit in July 1984. The current expectation is that CPSES, Unit 1 will be licensed

on the basis of a control room preliminary design assessment. DCRDR issues will also be discussed during the July 1984 audit. Those determined not to be completed will be recommended as license conditions.

DRAFT AUDIT AGENDA

Day 1. Entry briefing.

Audit of HED corrections in the control room.

Day 2. Continued audit of HED corrections in the control room.

Day 3. Continued audit of HED corrections in the control room.

Discussion of clarifications provided in March 1984 supplement.

Discussion of proposed corrections for newly identified HEDs.

Day 4. Discussion of DCRDR issues.

Day 5. Continued discussion of DCRDR issues.

Exit Briefing.

NUCLEAR REGULATORY COMMISSION
STAFF COMMENTS
ON THE
COMANCHE PEAK STEAM ELECTRIC STATION
DETAILED CONTROL ROOM DESIGN REVIEW
PROGRAM PLAN

BACKGROUND

Licensees 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" (NUREG-0660, Item I.D). The need to conduct a DCRDR was confirmed in NUREG-0737 and Supplement 1 to NUREG-0737. DCRDR requirements in Supplement 1 to NUREG-0737 replaced those in the earlier documents. Supplement 1 to NUREG-0737 requires each applicant or licensee to conduct its 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 draft 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 program such as SPDS, operator training, Reg. Guide 1.97 instrumentation, and upgraded emergency operating procedures.

Element 1 is expected to be accomplished during the planning phase.

Elements 2 through 4 are expected to be accomplished during the review phase. Elements 5 through 8 are expected to be accomplished during the assessment and implementation phase. Accomplishment of element 9 is expected to cut across the planning, review, and assessment and implementation phases.

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 DCRDR. Evaluation will include review of required documentation (Program Plan and Summary Report) 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.

A human factors evaluation of the design of the remote shutdown capability provided to meet 10 CFR Part 50, Appendix A, GDC-19 and 10CFR Part 50, Appendix R is not specifically identified as a requirement in Supplement 1 to NUREG-0737. Staff review of this issue is not complete. In the interim, it is recommended that the scope of the DCRDR include a human factors evaluation of the design of the remote shutdown capability. To the extent practical, 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 system vents) made or planned as a result of other post-TMI actions, and the lessons learned from operating reactor events such as the Salem ATWS events should also be integrated. Implications of the Salem ATWS events are discussed in NUREG-1000 and required actions are described in Section 1.2, Post Trip Review - Data and Information Capability, of the enclosure to Generic Letter 83-28.

DISCUSSION

Texas Utilities Generating Company (TUGCO) submitted a report entitled "Human Factors Control Room Design Review of Comanche Peak Steam Electric Station," in December 1982. Supplement 1 to that report was submitted in May 1984. That supplement provided a cross-reference to DCRDR Program Plan information in the December 1982 report and March 1984 supplement. Program Plan information for Comanche Peak Steam Electric Station (CPSES) has been reviewed against the requirements of Supplement 1 to NUREG-0737. Results of the review are provided below.

Establishment of a qualified multidisciplinary review team. TUGCO's December 1982, report provided a list of control room design review team members along with information about their roles, experience, and education. Detailed resumes were also provided. Based on information in that report:

1. A utility employee had overall administrative leadership of the DCRDR.

2. A mix of disciplines; including electrical engineering, mechanical engineering, human factors, and nuclear plant operations; were represented on the review team.

The above aspects of the review team organization appear conducive to an adequate DCRDR. Organization of the review team for accomplishing the various DCRDR tasks required by Supplement 1 to NUREG-0737 was not explicitly stated in the December 1982 report or March 1984 Supplement. Thus, the level of participation by personnel from the various disciplines in the various tasks is not known. In the staff's judgment, an adequate DCRDR would involve some mix of disciplines for each task. That aspect of the review team organization could not be evaluated.

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

Supplement 1 to NUREG-0737 requires function and task analyses to identify control room operator tasks and information and control requirements during emergency operations as part of both the DCRDR and upgrade of Emergency Operating Procedures. An acceptable process is:

1. Analyze the functions to be performed by systems in responding to transients and accidents to define and describe the tasks the operators are expected to perform.

2. From the tasks identified in Item 1 above, define the information necessary (e.g., parameter, value, status) for the operators to determine the need to perform the task and the information necessary to determine that the task has been performed successfully. (Note that no instrumentation has been identified yet; only operator information and control needs derived from the task).

3. Analyze the operator needs (from 2 above) to determine the characteristics of the information and control capability needed to perform the task. (Information characteristics include parameter type, dynamic range, setpoints, resolution/accuracy, speed of response, units, and the need for trending, alarming, etc. Control characteristics include type (discrete or continuous, rate, gain, response requirements, locking functions, and information feedback associated with control use).

The December 1982 report and March 1984 Supplement stated that TUGCO used the Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERGs) in satisfying the function and task analysis requirement. Use of the WOG ERGs in satisfying the function and task ~~analysis~~ requirements of Supplement 1 to NUREG-0737 was the topic of a March 29, 1984 meeting between the Westinghouse Owners Group and the Nuclear Regulatory Commission staff. CPSES was a participant in that meeting. The summary of that meeting is attached (w/o enclosures). It provides guidance to utilities using the WOG ERGs to satisfy

the function and task analysis requirements of the DCRDR and PGP. CPSES has informally agreed to resubmit its PGP in accordance with that guidance. The information in the revised PGP will be reviewed to determine if the function and task analysis requirements of the DCRDR and PGP have been satisfied.

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

Supplement 1 to NUREG-0737 requires that the results of the function and task analysis, in terms of operators' information and control needs, be compared with a control room inventory. Adequate performance of this element of the DCRDR is predicated on adequate performance of the function and task analysis.

The availability and human factors suitability of instruments and controls to satisfy operator needs should be verified as part of the required comparison. HEDs identified by the comparison should be treated in the same way as those identified by other processes (e.g., by the control room survey).

Although CPSES did not provide information on a control room inventory, TUGCO's March 1984 supplemental report did indicate that verification of availability was part of the process for developing plant specific ERGs. Verification of human factors suitability was not addressed as part of that process. There is insufficient information to fully evaluate this element.

A control room survey to identify deviations from acceptable human factors principles. A control room survey against guidelines in NUREG/CR-1580 and more recently against guidelines in NUREG-0700 has been conducted at CPSES. The remote shutdown panel has been included in that review. Several aspects of the survey remain to be accomplished pending completion of the control room. With those exceptions, the control room survey appears adequate based on information gained during the April 1983 control room audit and further information provided in TUGCO's March 1984 supplemental report.

Assessment of HEDs to determine which are significant and should be corrected.

A brief description of the process used to assess the significance of HEDs was provided in TUGCO's December 1982 report. HED assessment was the product of a meeting of the HED review committee. An effort to identify potential safety consequences was noted, but there did not appear to be an explicit prioritization of HEDs based on the likelihood of operator error and the safety consequences of such an error. The April 1983 control room audit indicated that the assessment process, in general, resulted in identification of HEDs which were significant and should be corrected despite the apparent lack of a prioritization scheme.

Selection of design improvements. A brief description of the process used to select design improvements was provided in TUGCO's December 1982 report. Like assessment of HEDs, selection of design improvements appears to have been the product of a meeting of the HED review committee. The April 1983 control room audit indicated that this process did, in general, result in

selection of the type of design improvements appropriate to resolving the individual HEDs. Design guidelines for annunciators, vertical indicators, labels and location aids, and coding at CPSES were provided in TUGCO's December 1982 report and March 1984 supplement. The integrated effect of design improvements and application of guidelines could not be determined during the April 1983 control room audit due to implementation status of corrections at that time.

Verification that selected design improvements will provide the necessary correction. This element of the DCRDR was not addressed in TUGCO's December 1982 report or March 1984 supplement.

Verification that improvements will not introduce new HEDs. This element of the DCRDR was not addressed in TUGCO's December 1982 report or March 1984 supplement.

Coordination of control room improvements with changes from other programs. DCRDR Program Plans are required to describe how control room improvements will be coordinated with programs such as the SPDS, operator training, Reg. Guide 1.97 instrumentation, and upgraded emergency procedures. TUGCO's December 1982 report and March 1984 supplement only addressed coordination with respect to upgraded emergency procedures.

CONCLUSION

Staff review of the CPSES DCRDR Program Plan materials indicated several areas where adequate information was not provided. They were:

1. Level of participation of personnel from various disciplines in the different DCRDR tasks.
2. Completion of the function and task analysis and comparison of results with a control room inventory to verify availability and human factors suitability of instruments and controls required for emergency operation.
3. Verification that HEDs provide necessary correction and do not introduce new HEDs.
4. Coordination of control room improvements with changes from other programs.

The staff recommends discussion of the above areas during a pre-licensing audit planned for late July 1984.

REFERENCES

NUREG-0660, "NRC Action Plan Developed as a Result of the TMI-2 Accident," May 1980,; revision I, August 1980.

NUREG/CR-1580, "Human Engineering Guide to Control Room Evaluation," July 1981, draft report.

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

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

NUREG-0801, "Evaluation Criteria for Detailed Control Room Design Reviews," October 1981, draft report.

NUREG-1000, "Generic Implications of ATWS Events at the Salem Nuclear Power Plant," April 1983.

NUREG-0797, Supplement No. 4, "Safety Evaluation Report Related to the Operation of Comanche Peak Steam Electric Station, Units 1 and 2," November 1983.

Generic Letter 83-28, "Required Actions Based on Generic Implications of Salem ATWS Events," July 8, 1983.

Memorandum from H. Brent Clayton, Section Leader, Procedures and Systems Review Branch, Division of Human Factors Safety, Office of Nuclear Reactor Regulation, U. S. Nuclear Regulatory Commission to Dennis L. Ziemann, Chief, Procedures and Systems Review Branch; subject, "Meeting Summary--Task Analysis Requirements of Supplement 1 to NUREG-0737--March 1984 Meeting with Westinghouse Owners Group Procedures Subcommittee and other Interested Persons," April 5, 1984.

"HFE Preliminary Assessment of the Comanche Peak Unit Control Room," dated November 17, 1980.

"Control Room Design Review Audit Report--Comanche Peak, Unit 1," dated April 30, 1981.

"Summary of Meeting on Human Factor Review of the Comanche Peak Control Room," dated May 27, 1982.

Letter from R. J. Gary (TUGCO) to H. R. Denton (NRC); subject, "Transmittal of the Human Factors Control Room Design Review Final Report," December 15, 1982.

Letter from H. C. Schmidt (TUGCO) to Director of Nuclear Reactor Regulation; Subject, "System Function Task Analysis," March 1, 1983.

Letter from R. J. Gary to Director of Nuclear Reactor Regulation; Subject, "Response to NRC Generic Letter 82-33," April 15, 1983.

"Results of In-Progress Audit of Comanche Peak Electric Station Control Room Design Review,": June 21, 1983.

Letter from R. J. Gary to Director of Nuclear Reactor Regulation; Subject, "Transmittal of Supplement 1 to Human Factors Control Room Design Review Final Report," March 8, 1984