

IN-PROGRESS AUDIT REPORT
OF THE
DETAILED CONTROL ROOM DESIGN REVIEW
BEING CONDUCTED BY
GEORGIA POWER COMPANY FOR
VOGTLE ELECTRIC GENERATING PLANT
UNIT 1

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IN-PROGRESS AUDIT REPORT
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1. 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.1 (Ref. 1). The need to conduct a DCRDR was confirmed in NUREG-0737 (Ref. 2) and Supplement 1 to NUREG-0737 (Ref. 3). 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 a DCRDR on a schedule negotiated with the Nuclear Regulatory Commission (NRC).

NUREG-0700 (Ref. 4) 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 DCRDRs are contained in Appendix A to Standard Review Plan (SRP), Section 18.1 of NUREG-0800 (Ref. 5). 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 multi-disciplinary 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 and do not introduce new HEDs.
8. 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.

Licensees are expected to complete Element 1 during the DCRDR's planning phase, Elements 2 through 4 during the DCRDR's review phase, and Elements 5 through 7 during the DCRDR's assessment and implementation phase. Completion of Element 8 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 of the DCRDR. Evaluation will include review of required documentation (Program Plan and Summary Report), and may also include reviews 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. 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-0800, Appendix A to SRP Section 18.1. 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 improvements should be done on a schedule acceptable to the NRC.

2. DISCUSSION

The Georgia Power Company (GPC) submitted a Detailed Control Room Design Review (DCRDR) Program Plan for its Vogtle Electric Generating Plant (VEGP) Unit 1 to the Nuclear Regulatory Commission by letter dated September 14, 1984 (Ref. 6). The DCRDR Program Plan was reviewed against the requirements of Supplement 1 to NUREG-0737 by the NRC Division of Human Factors Safety (DHFS) and consultants from Lawrence Livermore National Laboratory (LLNL). Their comments were transmitted to the GPC by letter dated February 27, 1985 (Ref. 7).

A human factors engineering in-progress audit of the Vogtle Control Room Design Review (CRDR) was performed at the site on July 9-11, 1985. The purpose of the audit was to clarify certain aspects of the review process and to confirm that the review is being conducted appropriately. The audit included observation of the Vogtle control room and remote shutdown panel, briefings by and discussions with various members of the GPC team, and examination of available documentation.

The audit was carried out by a team from the Human Factors Engineering Branch (HFEB), Division of Human Factors Safety, assisted by consultants from Lawrence Livermore National Laboratory, Livermore, California. This combined team is referred to in this report as the NRC audit team.

2.1 DCRDR Review Team

2.1.1 Requirement

Supplement 1 to NUREG-0737 requires the establishment of a qualified multi-disciplinary review team. Guidelines for review team selection are found in NUREG-0700 and NUREG-0800, Appendix A to SRP Section 18.1. NUREG-0700 guidelines state that support of the applicant's management is needed to provide to the DCRDR team all of the information, equipment, and categories of manpower needed to conduct a control room design review.

2.1.2 Findings

The Vogtle Electric Generating Plant Unit 1 Review team consists of five individuals. The resumes of the DCRDR team members indicate that the team members have adequate qualifications. During the in-progress audit the NRC audit team was told that all DCRDR team members attended a formal one week orientation program on human factors and the DCRDR process.

The audit team was told during audit discussions that the team leader, who is also the lead human factors specialist, only spends 50% of his time on the DCRDR effort. We do not believe that an individual with these two major responsibilities can provide the necessary DCRDR support with only a 50% time commitment.

In reviewing the various elements of the DCRDR and the amount of work yet to be done, it is our opinion that the number of personnel committed by the Georgia Power Company (GPC) is meager. If GPC expects to complete their DCRDR by March 1986, it could prove to be an ambitious undertaking with the present DCRDR staff level. The present DCRDR team appears to have adequate qualifications and expertise to meet the intent of the requirement of Supplement 1 to NUREG-0737. We recommend that GPC dedicate additional appropriate personnel to the DCRDR effort.

2.1.3 Conclusions

To determine whether or not this requirement to Supplement 1 of NUREG-0737 is fully met, GPC will need to describe in detail in the Summary Report DCRDR team members participation in DCRDR activities and DCRDR resources allocation.

2.2 Function and Task Analyses

2.2.1 Requirement

Supplement 1 to NUREG-0737 requires the applicant to perform systems function and task analyses (SFTA) to identify control room operator tasks and to identify control room operator information and control needs during emergency operations. Supplement 1 to NUREG-0737 recommends the use of function and task analyses that have been used as the basis for developing emergency operating procedures technical guidelines and plant-specific emergency operating procedures to define these needs.

2.2.2 Findings

GPC's SFTA methodology as explained to the NRC audit team is unacceptable because it fails to provide an independent determination of information and control requirements based on function and task analyses as required by Supplement 1 to NUREG-0737. The NRC audit team could not determine that the GPC task analyses will be performed down to a level of detail to identify parameters and variables associated with each task. It is also necessary to identify specific characteristics of those parameters and variables such as magnitude, range, accuracy, variability, tolerances, trend and rate of change, that must be provided for the operator to successfully accomplish each task. This level of detail is necessary to determine operator information and control needs.

GPC will use the Westinghouse Owners Group (WOG) emergency response guidelines (ERGs) to develop Vogtle specific EOPs as described in Section 4.3 of the program plan. The EOPs will be the basis for the task identification and analyses to determine the instrumentation and controls (I & C) required, as described in Section 4.3.1 of the program plan. The ERGs were the topic of a March 29, 1984 meeting between the NRC and the WOG (Ref.8). Note that the GPC

program plan describes the Westinghouse ERGs as EPGs. Based on the March 29, 1984 meeting, the staff has concluded that:

- (1) it appears that Revision 1 of the ERG and background documents do provide an adequate basis for generically identifying information and control needs.
- (2) Each licensee and applicant, on a plant-specific basis must describe the process for using the generic guidelines and background documentation to identify the characteristics of needed instrumentation and controls. For the information of this type that is not available from the ERG and background documentation, licensees and applicants must describe the process to be used to generate this information (e.g., from transient and accident analyses) to derive instrumentation and control characteristics. This process can be described in either the PGP or DCRDR Program Plan with appropriate cross-referencing.
- (3) For potentially safety-significant plant-specific deviations from the ERG instrumentation and controls, each licensee and applicant must provide in the PGP a list of the deviations and their justification. These should be submitted in the plant-specific technical guideline portion of the PGP, along with other technical deviations.
- (4) For each instrument and control used to implement the emergency operating procedures, there should be an auditable record of how the needed characteristics of the instruments and controls were determined. These needed characteristics should be derived from the information and control needs identified in the background documentation of Revision 1 of the ERG or from plant-specific information.
- (5) It appears that the basic version of the ERG and background documentation provide an adequate basis for generically deriving information and control needs. However, because of the differences in

the organization of the material in the background documents between Basic and Revision 1, it is apparent that it would be easier to extract the needed information from the Revision 1 background documents.

The NRC audit team was told that GPC anticipates that it will use a consultant to provide the necessary methodology and information to assist in completion of the SFTA.

In order to be acceptable and to enable the NRC to determine that GPC has met the SFTA requirement of Supplement 1 to NUREG-0737, the SFTA processes and methodology should be fully documented and described in the Summary report. The applicant's description should include the following:

- o Discussions of the approaches and information sources used (e.g., documents, guidelines, operations personnel, multiple approaches, plant-specific calculations, etc.).
- o The rationale and methodology used in the selection of event sequences, along with a description of how it was verified that the selected sequences adequately cover the complete range of systems needed to mitigate abnormal plant conditions.
- o The process used to identify the functions, systems, subsystems, and events selected for analysis.
- o A discussion of who performed the work and how the independent reference sources, the documented independently determined information and control needs and characteristics, and the inventory process were coordinated to ensure independence, completeness, and accuracy.

An essential part of the above is the method by which the independent reference sources were documented and used to ensure the independence of the identified characteristics of the information and control needs from those of existing equipment.

2.2.3 Conclusions

GPC should describe in detail in the Summary Report the personnel, the documented and auditable process, and the methodology used by GPC to conduct their SFTA. Evidence to support the identification of operator information and control needs that have been determined from a SFTA is needed for GPC to meet the requirements of Supplement 1 to NUREG-0737.

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

2.3.1 Requirement

Supplement 1 to NUREG-0737 requires the applicant to make a control room inventory and to compare the operator display and control requirements determined from the task analyses with the control room inventory to determine missing controls and displays. Guidance in NUREG-0700 also calls for a review of the human factors suitability of instruments and controls used to satisfy operator information and control requirements.

2.3.2 Findings

GPC has not performed an independent determination of information and control needs and characteristics during their SFTA. This information serves as the basis for the inventory comparison. Without this information a rigorous and systematic comparison of the control room inventory and control and display requirements cannot be made.

GPC stated during audit discussions that equipment module lists and board drawings may be used as a basis for its control room inventory.

Therefore, it is necessary that the Summary Report contain descriptions that will demonstrate to the NRC reviewers that the GPC inventory will be auditable and fulfills the intent of NUREG-0737. The descriptions shall cover, but not be limited to:

- o Accurately depict the I&C equipment which exists on the control panels.
- o Describe the I&C equipment characteristics (e.g., scales, ranges, accuracies, parameters, steps, control characteristics, etc.).
- o Be complete and current.
- o Serve as a proper basis for comparison with I&C needs to identify discrepancies eligible for corrective action.
- o Be effectively used by competent DCRDR team members to accurately and completely identify existing HEDs and as a basis to initiate effective corrective actions.

2.3.3 Conclusions

The methodology GPC plans to use to accomplish this task should be explained in detail in the Summary Report. GPC should maintain an auditable trail of all documentation used in this review phase.

2.4 Control Room Survey

2.4.1 Requirement

Supplement 1 to NUREG-0737 requires that a control room survey be conducted to identify deviations from accepted human factors principles. NUREG-0700

provides guidelines and criteria for conducting a control room survey. The objective of the control room survey is to identify, for assessment and possible correction, characteristics of displays, controls, equipment, panel layout, annunciators and alarms, control room layout, and control room ambient conditions that do not conform to good human engineering practices.

2.4.2 Findings

GPC has begun a control room survey. At the time of the in-progress audit the survey was only approximately 50% complete.

GPC stated an initial survey of the control room had been conducted in 1981. The GPC DCRDR review team evaluated the HEDs from the 1981 survey and incorporated approximately 74 of these HEDs into the present DCRDR survey.

The present survey is being conducted using guidance provided in INPO-83-042 (NUTAC). During discussions GPC stated that the NUTAC document did not cover some areas of guidance provided in NUREG-0700 and that these exceptions were outlined in Appendices B through H of the NUTAC document. The NRC audit team advised GPC that it would be necessary for GPC to compare the guidelines of INPO-83-042 with those of NUREG-0700. GPC should identify differences that exist and should identify and process all additional HEDs resulting from the comparison with NUREG-0700 guidelines. The resulting additional HEDs should be written, assessed, corrected, and reported in order for the present DCRDR to satisfy the control room survey requirement of Supplement 1 to NUREG-0737.

During the audit the NRC audit team performed a mini-audit of the control room panels and identified a number of HEDs. These HEDs are contained in Appendix A of this document. Also included in Appendix A are responses provided verbally by GPC to the HEDs identified by the NRC audit team. As can be seen by examining Appendix A, there are a number of HEDs identified by the NRC audit team which had not been identified by the GPC survey. Some of these differences can be attributed to portions of the GPC survey yet to be completed. GPC should re-evaluate its survey process to see if the difference in HEDs identified by the NRC audit team and by the GPC review is indicative

of a systematic deficiency in the GPC control room survey process. If this is not done, GPC's survey process adequacy will be questionable.

2.4.3 Conclusions

Due to the incompleteness of the GPC survey process we cannot at this time determine if the requirement to Supplement 1 of NUREG-0737 will be met. GPC should formalize their survey process. Once formalized, the process, personnel involved, guidelines used, and re-evaluation should be reported in detail in the Summary Report.

2.5 Assessment of HEDs

2.5.1 Requirement

Supplement 1 to NUREG-0737 requires that HEDs be assessed to determine which HEDs are significant and should be corrected. NUREG-0700 contains guidelines for the assessment process.

Section 2.5 and Exhibit 2.2 of Appendix A to SRP Section 18.1 contain additional assessment guidance. The objective of the assessment process is to identify HEDs that can individually or interactively impact plant safety, operator physical performance, sensory/perceptual performance, and/or cognitive performance. Examples of significant task variables are communications needs, task duration and frequency, delay or absence of feedback, accuracy and speed requirements, and concurrent task requirements.

2.5.2 Findings

Sections 5.1 and 5.2 of the GPC DCRDR program plan describe a generally acceptable approach for writing a formal and detailed description of what was done, how it was done, and who executed the assessment process. However, the NRC audit team found that no auditable records or documented guidelines are available which formally state the details of the HED assessment methodology and the evaluation criteria used by the GPC DCRDR HED assessment team.

The HEDs assessed by GPC fell into the following paraphrased categories:

o Category 1	4	HEDs that have caused or may cause <u>errors</u> during emergency conditions.
o Category 2	10	HEDs that have caused <u>problems</u> during normal operation.
o Category 3	93	HEDs that can be easily fixed.
o Category 4	19	HEDs that are unlikely to affect emergency or normal operation.
o Category 4a	57	HEDs that do not warrant corrective action.
o Canceled	11	
o Not categorized and/or resolved	9	
o Canceled with questions comments	<u>7</u>	
Total	210	

The complete description of Category 4 stated in Section 5.2 of the program plan should be refined to modify the statement "not documented as causing problems during normal operation and not simple or cheap to fix". The criteria, as written, do not clearly describe the characteristics of HEDs intended to be placed in Category 4.

The criteria for classifying HEDs should include consideration of plant safety, the potential for operator error and degradation of operator

performance, interaction, cumulative effects among all categories of HEDs, and provision for category upgrading, as appropriate.

The four classification categories stated in the program plan have been supplemented by an additional category, 4A, in which to place HEDs that do not warrant corrective actions.

It was observed that the proportion of Category 1 and Category 2 GPC HEDs appear to be much smaller than the proportions of significant HEDs reported by other plants. The audit team was not presented with information which would explain the smaller number of HEDs. This observation, coupled with the results of the NRC audit team mini-audit of the control room, leads the staff to conclude that GPC should carefully reassess its HED identification and assessment criteria and results. The objective of such an assessment process review is to ensure that potential sources of human factors problems, HED interaction, and operational degradation are identified accurately and are corrected.

Appendix B of this report contains comments which resulted from our review of the GPC HEDs submitted.

2.5.3 Conclusions

In order for the NRC to be able to evaluate the acceptability of the assessment process, GPC needs to document its assessment methodology and criteria and describe it in detail in the Summary Report.

2.6 Selection of Design Improvements

2.6.1 Requirements

Supplement 1 to NUREG-0737 requires selection of control room design improvements that will correct significant HEDs. It also states that improvements that can be accomplished with an enhancement program should be done promptly.

2.6.2 Findings

Section 5.3 of the program plan describes a generally acceptable approach to the selection of design improvements but the NRC audit team observed that auditable details of the selection process are lacking.

Our discussions determined that the GPC review team subjectively and collectively considered many significant factors but the selection process has not been formalized in writing. Therefore, it could not be reviewed for agreement with the recommendations of NUREG-0700 and the guidance of Appendix A to SRP Section 18.1 of NUREG-0800.

The selection and specification of corrective actions and alternate corrective actions were stated by GPC to be performed and documented by the DCRDR team. Changes were reviewed by operating personnel or built into the simulator before approval and implementation. Regular plant processes were used to handle the implementation of corrective actions (e.g. requests for engineering assistance and the engineering change system). Details of the above were not available in written form.

The method used to choose a cost effective action from among alternate proposals was not discussed. The method described for recording HEDs and following the progress to the completion of implementation was not complete and systematic. A system for coordinating and correlating changes with EOPs

and operator training was not completely described. The approach used to explore the interaction of HEDs and proposed corrective actions with other HEDs was not described or discussed. GPC mentioned that HED categories are used to determine implementing priorities and schedules, but systematic details of how this is accomplished were not discussed.

2.6.3 Conclusions

For the NRC to evaluate the acceptability of the GPC methodology and its execution by the DCRDR team, it is necessary that the details of the corrective action selection and implementation process as stated in the Findings Section above be documented. The description should convey to a reviewer a complete and unambiguous understanding of corrective action selection criteria and the process for implementing design improvements. This documentation should be provided in the Summary Report. It is recommended that GPC commit to the on-going application of human factors review to future changes using DCRDR criteria and review processes.

2.7 Verification of Control Room Design Improvements

2.7.1 Requirements

Supplement 1 to NUREG-0737 requires verification that selected control room design improvements will provide the necessary corrections of HEDs and will not introduce new HEDs into the control room.

2.7.2 Findings

The NRC audit team confirmed that a formal and auditable description of the verification process has not been written. GPC stated that this will be described in the Summary Report. GPC also stated that significant changes may be updated on the simulator for evaluation of effectiveness and that other changes would be reviewed by operations personnel.

It was not clear to the NRC audit team to what extent a systematic and comprehensive verification program exists. Some objectives of verification are to confirm that:

- o The corrective action chosen will correct the HED.
- o The correction does not generate new HEDs.
- o The corrective actions follow accepted human factors practices.
- o Effects on operations, training and procedures are identified and corrected.
- o Plant operation and safety are enhanced.
- o Interactions among HEDs and corrective actions are considered.
- o Plant and control room conventions exist and are consistently followed.

2.7.3 Conclusions

In order for the NRC to evaluate the acceptability of the verification process and its execution by the DCRDR team, enough details must be provided in the Summary Report to convey a complete and unambiguous understanding of the process.

2.8 Coordination of Control Room Improvements with Other Programs

2.8.1 Requirements

Supplement 1 to NUREG-0737 requires that control room improvements be coordinated with changes from other programs; (e.g., safety parameter display

system (SPDS), operator training, Regulatory Guide 1.97 (R.G. 1.97), and emergency operating procedures (EOPs)).

2.8.2 Findings

The R.G. 1.97 instrumentation was complete and was reviewed by GPC in conjunction with the DCRDR. Several systems are computer based and will be included as part of the computer system review (e.g. fire protection monitoring, SPDS, pre- and post-accident monitoring, plant safety monitoring system (PSMS)). The computer task force will coordinate Proteus, SPDS, and PSMS, with DCRDR activities. The DCRDR Team Leader is active in the review of the SPDS (e.g. software support and operation), and is working with the ERF personnel. The fire protection system will be reviewed after installation using the computer systems checklist.

The audit team was advised that the DCRDR team leader is in charge of coordination and is aware of the necessity for coordination with other efforts. The discussions did not include specific descriptions of a comprehensive system whereby the team leader is formally consulted and/or advised by others concerning matters which should be coordinated (e.g. training, interfaces, simulator procedures, SPDS).

2.8.3 Conclusions

The NRC audit team is satisfied that the intent of the processes and execution of the coordination effort was adequately described. In order for the NRC to review and determine the acceptability of the coordination effort, it will be necessary to document and describe an auditable and comprehensive description of control room improvement coordination activities, including how the team leader is advised of items concerning coordination, in the Summary Report.

CONCLUSIONS

The NRC audit team found the Vogtle Unit 1 DCRDR Program lacking in several areas and, hence, at this time it would not meet the requirements of Supplement 1 to NUREG-0737. However, the NRC audit team found that GPC is willing to respond to the concerns and comments expressed in the body of this report. The discussions during the in-progress audit and the results of the in-progress audit as described in this report will serve to clarify for GPC the NRC DCRDR policy to require auditable compliance with Supplement 1 to NUREG-0737. This policy implies considering the guidelines of NUREG-0700 and the DCRDR evaluation criteria of the Standard Review Plan, NUREG-0800, Section 18.1, Appendix A.

Our general conclusions about the GPC DCRDR processes are as follows:

- o Comprehensive and systematic written descriptions of the processes used for the execution of the DCRDR tasks are lacking.
- o Detailed and systematic written descriptions of the criteria, factors and guidelines used by the DCRDR team in executing the DCRDR tasks is incomplete.
- o GPC should commit to the creation and identification of auditable records of all phases of the DCRDR.

Some specific major concerns:

- o The time commitment of individual team members appears to be inadequate in some cases. Specifically the team leader, who also functions as the lead human factors specialist, has only 50% of his time committed to the DCRDR effort. We do not believe an individual

with these two major responsibilities can provide the necessary DCRDR support with a 50% time commitment.

- o GPC stated they expect to load fuel by September, 1986. Subsequent to the audit, GPC changed its fuel load date to December 1, 1986. Completion of the DCRDR on the current schedule (submittal of the Summary Report in March 1986) could be a very ambitious undertaking with present DCRDR staffing. We believe the present level of staffing and time commitment will prove to be inadequate with the amount of work remaining to be done.
- o GPC's present SFTA which is based upon EOPs fails to provide an independent determination of information and control needs. Until a documented and auditable identification of operator information and control needs has been determined from an SFTA, GPC will not meet the requirements of Supplement 1 to NUREG-0737.
- o GPC has not performed an independent determination of information and control needs and characteristics during their SFTA. Without this information a rigorous and systematic comparison of the control room inventory with control and display requirements cannot be made.
- o The acceptable use of equipment module lists and control board drawings as an inventory for comparison of independently determined needs with as-built equipment should be supported by documentation which demonstrates that the actual control board equipment is in exact and complete agreement with all aspects of the inventory.
- o The mini-audit conducted by the NRC audit team identified a number of HEDs not identified by the GPC DCRDR review team in their survey. We are concerned that the differences in HEDs identified by GPC and the NRC audit team may be an indication of a systematic deficiency in the GPC control room survey process.

- o GPC should carefully review the assessment criteria and the results of HED categorization to ensure that potential sources of HED interaction, operator error, and operational degradation are identified and corrected.

Additional items which need to be fully described in the Summary Report:

- o Team members participation in DCRDR activities and DCRDR resource allocation.
- o The documented and auditable process and methodology they used to conduct their SFTA.
- o How GPC conducted a comparison of the control room inventory with control and display requirements identified in the SFTA.
- o The GPC control room survey is only 50% complete. GPC should explain their survey process.
- o GPC should re-evaluate their survey process to ensure that it provides a complete, rigorous and systematic review of control room panels.
- o Details of the processes, criteria, and execution of the following should be described.
 - * Selection and specification of alternate HED corrective actions.
 - * The complete step by step system for identifying and following HED's from inception to implementation and verification.

- * The system of correlating changes with EOPs and operator training.
 - * The approach used to explore the interaction with in the CR of HEDs, corrective actions, HED categories, and scheduling of implementations.
 - * GPC should develop and provide evidence that a systematic and comprehensive verification program exists and will be used to meet the NRC verification requirements.
- o GPC should provide documentation that describes in detail the processes used in the assessment, selection of design improvements, implementation of corrective actions, and coordination efforts.

Additionally:

- o GPC should dedicate additional appropriate personnel to the DCRDR effort.
- o GPC should maintain an auditable trail of all documentation used in the comparison phase of the DCRDR.

REFERENCES

1. NUREG-0660, "NRC Action Plan Developed as a Result of the TMI-2 Accident", May 1980; Revision 1, August 1980.
2. NUREG-0737, "Clarification of the TMI Action Plan Requirements," November 1980.
3. NUREG-0737, "Clarification of TMI Action Plan Requirements," Supplement 1, December 1982.
4. NUREG-0700, "Guidelines for Control Room Design Reviews", September 1981.
5. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants", Section 18.1, Appendix A, "Evaluation Criteria for Detailed Control Room Design Reviews", September 1984.
6. "Program Plan for Implementation of Control Room Design Review Georgia Power Company, Vogtle Electric Generating Plant", Letter from D. O. Foster to Elinor G. Adensam, September 14, 1984.
7. Transmittal of Comments on "Detailed Control Room Design Review for Vogtle Unit 1 Program Plan", Letter from Elinor G. Adensam to Donald O. Foster, February 27, 1985.
8. "Meeting Summary--Task Analysis Requirements of Supplement 1 to NUREG-0737--March 29, 1984 Meeting with Westinghouse Owners Group Procedures Subcommittee and Other Interested Persons," Memorandum from H. Brent Clayton, to Dennis L. Ziemann, April 5, 1984.

APPENDIX A

1. NRC Audit Team HEDS

<u>HED</u>	<u>Photo ID</u>	
A001	(4)	Lettering size is inconsistent on annunciator tiles.
A002	(4)	There are no alpha-numeric coding of annunciator tiles to prevent interchange of tiles if two or more are removed at the same time.
A003	(5)	Many annunciator tiles indicate more than one specific condition (i.e., HI/LO).
A004	(6)	Non glare coating on meter covers is not uniform and causes readability problems.
A005	(7)	There is not presently a location identification system for legend indicator lens to prevent interchanging when removed for bulb changes.
A006	(2)	There is a lack of hierarchical labeling on panels.
A007	(8)	Labels are not consistent in the use of white and black letters.
A008		There is some question whether the torque required to operate some J-handle switches for a period of time would result in operator discomfort.

A009	(9)	Inconsistent use of indicator arrows on T-handle switches.
A010	(10)	Some trend recorders are not operational and should be reviewed for human factors prior to placing in operation.
A011	(11)	There appears to be excessive use of J-handle switches on control panels. This could lead to operator confusion under stress.
A012		Some meters appear to fail at zero rather than off scale while others fail off-scale.
A013	(12)	Scale size on controllers is too small to read from operating position.
A014		There is a general lack of color banding or limit markings on meter scales.
A015	(13)	There many instances of several sets of switches with identical labels. (i.e. nomenclature)
A016	(14)	Some annunciator panels have more than 50 tiles.
A017	(15)	There are instances of meter strings with more than the recommended 5 meters in a row.
A018	(13)	Some switch label engravings are filling up with dirt. This will result in readability problems.
A019	(1,2)	There is a general lack of demarcation on display panels in the control room.

- A020 (16) There are many labels which are held in place by tape.
- A021 (17) There are two switches with tan faceplates in the middle of a grouping of system switches with green face plates. The tan switches are not system related.

Photo Log Cross Index

<u>Photo Number</u>	<u>HED</u>
1	A019
2,3	A006, A016, A019
4	A001, A002
5	A003
6	A004
7	A005
8	A007
9	A009
10	A010
11	A011
12	A013
13	A015, A018
14	A016
15	A017
16	A020
17	A021

APPENDIX A

2. GPC Responses to NRC Audit Team HEDs

The following are GPC verbatim responses to the HEDs identified by the NRC audit team.

A001	No HED, on a survey not done yet
A002	No HED, on a survey not done yet
A003	No HED, on a survey not done yet
A004	No HED, construction damage covered by construction deficiency report.
A005	No HED
A006	HED 1004,1026
A007	HED 1090
A008	Problem Report 16 and 49, No HED design feature of hold to operate valves. Torque required reviewed in 1982 and knob type handles eliminated.
A009	No HED, no arrow used on spring return to center controls.
A010	No HED, general panel checklist G-43, deferred until construction is complete, will address this.

A011 HED-1051 being reconsidered by team.

A012 No HED, addressed in engineering questionnaire, not yet evaluated for HED's.

A013 No HED, these are demand signals on Hagan controllers and are not used for quantitative readings.

A014 HED-1048

A015 HED-1135

A016 No HED on #, HED-1054 addresses this area.

A017 No HED, all associated with diesel.

A018 HED-1090 current construction dirt is a temporary condition.

A019 HED 1004,1007

A020 No HED, temporary construction condition.

A021 No HED, a generic HED will be written to address color changes. HED-1206 is a similar generic abbreviation HED.

APPENDIX B

Comments on GPC Assessment of GPC HEDs

This appendix contains questions and comments related to the GPC assessments of GPC HEDs. Answers, justifications, and rationales should be transmitted by GPC to the NRC for review.

- A. The following HEDs were not categorized. They need to be reviewed and a statement of assessment and HED resolution be made.

HEDs 1125, 1171, 1137, 1189, 1202, 1207, 1208, 1209, 1210.

- B. The following HEDs were canceled on the basis that they were beyond the scope of the CRDR. GPC needs to state and justify the rationale for this decision.

- o HED - 1078 Annunciator legends say 'Crud Level' vice 'Crud Tank Level'. 'High-Low' and 'Low-High' legends are confusing. On panel 1-1224-P5-FB/Drawing 1X4AN06-312.
- o HED - 1079 Back Flushable Filter Panel 1-1224-P5-FBP Drawing 1X4AN06-290 uses green/open, red/closed valve indication - opposite from plant convention.
- o HED - 1173 Mimic bus is continuous at crossings.

- C. Three canceled HEDs (i.e. 1163, 1170, 1191) were related to errors or anomalies in the simulator. It was stated that the simulator will be corrected to match the control room.

It is important to EOP upgrades and operator training that the simulator be an exact duplicate of the control room. GPC needs to submit to the NRC a statement explaining their policy concerning the existence of differences between the simulator and the control room.

- D. There are 57 Category 4A HEDs for which no corrective actions are planned.

The following comments and questions are typical of concerns identified by our review, and should be addressed by GPC and responses submitted to the NRC for review. Many of the responses should be more descriptive and contain a more comprehensive statement of the resolutions and the justifications for no correction.

- o There are a significant number of HEDs which describe equipment which does not follow the recommended anthropometric limits. These decisions should be justified in more detail. (e.g. 1001, 1002, 1032, 1041, 1066, 1067, 1068, 1069, 1070, 1071)
- o HEDs 1004 and 1026 state that hierarchical labeling might impair the location of more critical instruments. This decision needs to be justified in more detail.
- o HED 1085 refers to HED 1004 (above) and states that hierarchical labels will be used to tie S6 level recorder feed controllers together. This apparent contradiction should be explained.
- o There are several HEDs which state that the existing train grouping of controls takes precedence over grouping them by

number sequences. These decisions should be justified in more detail. (e.g. 1005, 1006, 1008, 1027, 1092, 1093, 1094).

- o Several HEDs state that training or administrative control justifies no corrective action. These decisions should be justified in more detail (e.g., 1033, 1081, 1099, 1103, 1159).
- o Several HEDs concern unsatisfactory control-display integration. The justifications should contain dimensions or other details to more completely explain the rationale for no corrective action (e.g. 1037, 1042, 1060).
- o Some HEDs are related to the inconsistent use of conventions (e.g. 1035, 1085, 1099). It was understood by the NRC audit team that Vogtle conventions/standards are not yet complete. A statement should be provided to the NRC which explains how GPC will address the relationship between existing HEDs, the incomplete status of the DCRDR (in regard to potential future HEDs) and the anticipated uniform and consistent adherence of all instruments and controls to the conventions/standards that are not yet complete.
- o Some other HEDs for which the justifications for no correction are not clear, are questionable, or lack sufficient detail, are listed below and need to be addressed in the Summary Report.

HED-1073 - The justification is a statement of fact but does not address the deviation from recommended HF principles.

HED-1106 - The justification is questionable.

HED-1108, 1110, 1113, 1132, 1203, 1204 - The justification is not clear and complete.

- E. Category 3 and Category 4 HEDs were scanned for general format and content, but were not reviewed in detail. It was observed that the texts of many of the HED forms in all categories, was sparse and/or indefinite. They were sometimes hard to read and were not complete enough to allow comprehensive conclusions to be drawn. The NRC audit team was advised by GPC at the audit that this situation will be remedied. The Summary Report should address and describe the remedies to the above shortcomings.
- F. For all HEDs selected for correction, GPC should designate and submit an implementation schedule which is acceptable to the NRC. In general, HED correction implementations are recommended to be completed prior to fuel load.