PROGRAM PLAN FOR IMPLEMENTATION
OF
CONTROL ROOM DESIGN REVIEW

GEORGIA POWER COMPANY
VOGTLE ELECTRIC GENERATING PLANT

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TABLE OF CONTENTS

ATTACHMENT 1: OPERATING EXPERIENCE REVIEW QUESTIONNAIRE AND COVER LETTER

ATTACHMENT 2: CONTROL ROOM DESIGN PROBLEM REPORT

ATTACHMENT 3: TASK ANALYSIS DATA FORMS

ATTACHMENT 4: REVIEW TEAM RESUMES

VOGTLE ELECTRIC GENERATING PLANT
UNIT 1

CONTROL ROOM DESIGN REVIEW

1.0. INTRODUCTION

The Vogtle Electric Generating Plant (VEGP) in Burke County, Georgia is the site of two nuclear power units under construction by Georgia Power Company (GPC). The plant contains two units; identical four loop Westinghouse pressurized water reactors (3411 Mwt) with General Electric turbine generators (1157 Mwe). Unit 1 is the subject of this review.

The Control Room Design Review (CRDR) is part of the effort within the industry and the Nuclear Regulatory Commission (NRC) to upgrade control rooms, emergency response facilities, and procedures. Although the CRDR is directed toward the existing control room, other areas of concern; specifically the design of a Safety Parameter Display System (SPDS), the inclusion of Post-Accident Monitoring (PAM) instrumentation, and Emergency Operating Procedures are addressed in the CRDR.

Guidance for the CRDR and related activities has been provided in the form of various NUREGs and Regulatory Guides. A Nuclear Utility Task Action Committee (NUTAC) with staff support from the Institute of Nuclear Power Operations (INPO) has developed a generic control room design review implementation plan from these guidelines. That plan and supporting documents have been used by GPC for the development of this program plan.

This implementation plan describes the manner in which GPC intends to conduct a review of the VEGP control room. GPC does not intend to wait for NRC approval of this implementation plan before commencing the review. However, GPC expects that any deficiencies in the plan noted by the NRC staff will be brought to GPC's attention in a timely manner. This implementation plan also provides a basis upon which to judge that an adequate CRDR has been conducted.

2.0 OVERVIEW

2.1 PURPOSE

The purpose of the CRDR is to ensure that the VEGP Unit 1 control room and remote shutdown panels will support safe operation during emergency conditions. The operator tasks required during emergencies will be based on the emergency procedure guidelines (EPGs) in the plant specific EOPs.

2.2 OBJECTIVES

To ensure that the CRDR fulfills its stated purpose, several objectives will be met during the review. The following specific objectives are defined for the CRDR:

2.2.1 To perform a control room survey that compares the existing control room design with accepted human engineering criteria.

2.2.2 To review relevant plant operational experience using appropriate documentation and operator questionnaires.

2.2.3 To determine the information and control requirements of control room operator tasks during emergency conditions.

2.2.4 To identify human engineering discrepancies (HEDs).

2.2.5 To evaluate the extent and importance of identified discrepancies.

2.2.6 To formulate and implement solutions for significant discrepancies (as evaluated in 2.2.5).

2.2.7 To ensure that the proposed solutions do, in fact, eliminate or mitigate the discrepancies for which they are formulated without creating new discrepancies.

2.2.8 To validate that implemented solutions eliminate or mitigate identified discrepancies.

2.3 DESCRIPTION OF CRDR ACTIVITIES

To achieve the stated objectives of the CRDR, several activities will be completed during the review. The CRDR has been split into six nominal phases: planning, execution, assessment, correction, effectiveness, and documentation. The planning phase of the CRDR is represented by this implementation plan. The documentation phase is actually concurrent with all other phases.

The activities within each phase will be described in more detail later, but a brief synopsis of these activities will help give a general picture of the review process.

2.3.1 Execution Phase

The execution phase will constitute the data gathering portion of the CRDR. During this phase, a control room survey will compare the characteristics of the existing control room with appropriate human engineering design guidelines. An examination of operating experience, both generic and plant-specific, will be conducted by a review of historical operational documents, such as plant trip reports and Licensee Event Reports (LER), through questionnaires and interviews with control room operators, and through experience gained at the plant-specific simulator. During task analysis, the Westinghouse symptom-oriented EPGs and the plant systems called for in the EPGs will be analyzed to determine the tasks required of operators during emergencies. The instrumentation and control requirements for those tasks will be established, and the adequacy and completeness of existing instrumentation and controls will be determined.

2.3.2 Assessment Phase

During the assessment phase, any discrepancies identified in the execution phase will be analyzed, and the potential impact of each discrepancy on emergency plant operation will be

evaluated. Discrepancies will be classified according to their potential impact on emergency plant operation. Significant discrepancies will be resolved through enhancement, modification, or other means, such as changes to procedures, staffing, and training. Any actions proposed to resolve significant discrepancies will be analyzed for their effect on operation. In particular, proposed solutions that affect procedural changes will be examined thoroughly for their potential impact on related procedures.

2.3.3 Documentation Phase

A summary report will be submitted at the conclusion of the assessment phase of the CRDR that will summarize the overall review process, summarize the identified human engineering discrepancies, describe the disposition of discrepancies for which no changes were made, describe control room design improvements implemented during the course of the review, identify existing design characteristics that are beneficial, and identify proposed design improvements that were not implemented during the review and their schedules for implementation if those schedules are known at the time the report is written. The summary report will be submitted to the NRC.

2.3.4 Correction Phase

A plant-specific plan will be developed that ensures the integration of proposed control room changes with other post-TMI programs, as well as plant operating status. A schedule will be developed for the orderly introduction of proposed changes. The schedule will take into account the required training of operators on pending changes. Administrative follow-up will be instituted to ensure the successful completion and integration of all control room changes.

2.3.5 Effectiveness Phase

Procedures will be implemented at VEGP to solicit, evaluate, and act on operational feedback concerning plant system design and plant procedures. This program will make certain that changes resulting from the CRDR are evaluated for their effectiveness.

2.4 DEFINITION OF TERMS

Control Room Design Review (CRDR) - A post-TMI task listed in NUREG-0660, "Task Action Plan Developed as a Result of the TMI-2 Accident," and NUREG-0737, the staff supplement to NUREG-0660, as Task I.D.1.

Control Room Survey - One of the activities that constitutes a CRDR. The control room survey is a static verification of the control room performed by comparing the existing control room instrumentation and layout with selected human engineering design criteria, i.e., checking the control room match to the physical capabilities and limitations of the human operator.

Elements of a Utility CRDR Implementation Process-Necessary parts of cohesive CRDR implementation process that a utility considers in developing and reviewing its implementation plan and schedule.

Emergency Operating Procedures (EOPs) - Plant procedures directing the operator actions necessary to mitigate the consequences of transients and accidents that cause plant parameters to exceed reactor protection setpoints, engineered safety features setpoints, or other appropriate technical limits.

Emergency Procedures Guidelines (EPGs) - Guidelines for response to transients and accidents developed by the Westinghouse Owners Group (WOG) that provide the bases for plant-specific EOPs.

Human Engineering Discrepancy (HED) - A characteristic of the existing control room that does not comply with the human engineering criteria used in the control room design review.

Nuclear Utility Task Action Committee (NUTAC) for CRDR - Representatives from various nuclear utilities and INPO organized to define areas of CRDR implementation for which an overall industry effort to provide assistance to individual utilities in completing Task I.D.1, NUREG-0737.

Operational Experience Review - One of the activities that constitutes a CRDR. The operating experience review screens plant operating documents and operator experience to discover human engineering shortcomings that have caused, or could have caused, actual operating problems in the past.

Review Team - A group of individuals responsible for directing the CRDR.

Safety Parameter Display Systems (SPDS) - An aid to the control room operating crew for use in monitoring the status of critical safety functions (CSFs) that constitute the basis for plant-specific, symptom-oriented EOPs.

Subject Matter Expert (SME) - An individual who, by virtue of training and experience, possesses in-depth knowledge in a specific subject area.

Task Analysis - The systematic process of identifying and examining operator tasks in order to identify conditions and instrumentation associated with the performance of a task. In the CRDR context, task analysis is used to determine the individual tasks that must be completed to allow successful emergency operation. This activity verifies the control room information available to the information requirements of the emergency operating tasks.

Validation - The process of determining whether the control room operating crew can perform their tasks effectively given the control room instrumentation, procedures, and training. In the CRDR context, validation implies a dynamic performance evaluation.

Verification - The process of determining whether instrumentation, controls, and other equipment present meets the specific requirements of the emergency tasks performed by operators. In the CRDR context, verification implies a static check of instrumentation against human engineering criteria.

3.0 PLANNING PHASE

3.1 CRDR REVIEW TEAM

The ultimate responsibility for the VEGP CRDR will reside with the GPC General Manager, Vogtle Nuclear Operations. Figure 1 shows the on site project organization. The day-to-day conduct of the review, however, will be the responsibility of a review team established specifically for this CRDR. The review team will provide the management oversight to ensure the integration of the project objectives and to fulfill the intent of the review. The review team is responsible for planning, scheduling, and coordinating the total, integrated CRDR. The review team will be composed of members of the VEGP Operations and Engineering departments.

3.2 REVIEW TEAM STRUCTURE

The review team is a multi-disciplined team of individuals with the wide range of skills necessary to perform the design review. The team includes the following personnel:

Edward J. Kozinsky	- review team leader
John D. Hopkins	- Senior reactor operator
Riley R. Johnson	- operations technical advisor
Alan L. James	- instrumentation and controls specialist alternate
Greg L. Hooper	- instrumentation and controls specialist
Paul M. Kochery	- design engineer

The core team will be supplemented, as required, by other disciplines such as mechanical, electrical, and industrial engineering; training; computer operations; procedures; licensing; health physics; and emergency preparedness. During the course of the review, any additional specialists (e.g., lighting, acoustics) required for specific tasks will be made available to the review team, as needed.

FIGURE 1

CRDR ORGANIZATION

General Manager, Vogtle Nuclear Operations

G. BOCKHOLD

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Manager, Unit Operations

H. WALKER

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Operations Superintendent

W. F. KITCHENS

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CRDR Project Review Team Leader

E. J. KOZINSKY

↓ ↓

Core Review Team

J. D. HOPKINS
R. R. JOHNSON
A. L. JAMES
P. M. KOCHERY
G. L. HOOPER

Discipline Support

AS NEEDED

3.2.1 Review Team Leader

The review team leader will be E. J. Kozinsky. He will provide administrative and technical direction for the project and has responsibility for the project. Access to information, facilities, and individuals providing useful or necessary input to the team will be coordinated by the review team leader. He will provide a cohesive force for the various VEGP department personnel involved with this project. Plant operations personnel provide input to the review team through daily contact with the review team leader.

It will be the responsibility of the review team leader to resolve human factors opinions on methodology, technique, review findings, assessment, and HED corrective actions that dissent with the majority opinion of the CRDR Review Team.

The Reveiw Team Leader will also act as the human factors specialist in the project and insure task performance quality is maintained at a level necessary for a valid and comprehensive review.

3.2.2 Instrument and Controls (I&C) Specialists

The I&C specialists will assist in the identification of plant system design features and will serve as the review team expert on the capabilities and limitations of controls and instruments. The I&C specialists also will provide input to the team during the assessment phase of the review, especially when the review team considers proposals for mitigating HEDs.

3.2.3 Senior Reactor Operator (SRO)

One SRO (certified) from VEGP will serve as a member of the core review team. The SRO will assist in identifying operator tasks and will serve as the review team expert on the operational constraints for manipulations of plant systems.

3.2.4 Design Engineer

The design engineer will assist in the identification of plant system design goals and functions and will serve as the review team expert on the factors affecting the design decisions at the plant. The design engineer will provide input or interface with project engineering as necessary during the analysis of functions and tasks for any plant systems and during the assessment, implementation, and effectiveness phases of the CRDR.

3.3 REVIEW TEAM ACTIVITIES

Review team activities will include development of methodologies, procedures, and documentation for the review, assessment of discrepancies, establishment of the overall plan and schedule for the CRDR, and integrating all action items. The review team will develop, or have developed, all reports relating to the CRDR and ensure that appropriate reports are submitted to GPC management for review and approval.

3.4 REVIEW TEAM ORGANIZATIONAL INTERFACES

3.4.1. Site Interfaces

In order to perform the CRDR expeditiously while utilizing and broadening the experience in our personnel CRDR tasks will be performed by Operations and Training personnel as often as possible, supplemented as necessary with technical specialists. The review leader will have the authority to contact the appropriate supervisor of each department to establish a cooperative working relationship with department personnel.

3.4.2 Corporate Interface

The review team will exist as a special project in the VEGP organization,but the normal corporate and site organization will provide an adequate structure of authority and supervision.

3.4.3 Coordination

It is essential that the CRDR be coordinated with other ongoing activities that involve potential physical changes to the plant, such as the construction and manning of emergency response facilities (ERFs). To ensure that such coordination takes place, the review team leader will coordinate with and provide input to all ongoing work on ERFs and the control room.

3.5 REVIEW TEAM ORIENTATION

Each member of the review team will bring their own in-depth knowledge of specific topics to the team. It is important, however, that the review team be able to conduct the CRDR from a common basis of understanding. The entire review team will undergo an orientation program to provide each team member with certain basic knowledge requirements. The purpose of the orientation is to acquaint each team member with the other disciplines represented on the team, not to make each team member an expert in all specialties.

3.5.1 Human Factors

Orientation provided for the review team will familiarize the team with principles of human factors and their application to the control room review. Included in this area will be a brief synopsis of the history of the CRDR requirement and its ultimate goals. This orientation area will be slanted toward those review team members with little or no background in human engineering.

3.5.2 Emergency Response Guidelines (ERG)

Orientation on the development and status of Westinghouse ERGs will provide review team members with a basis for the tasks analysis phase of the CRDR.

3.5.3 Post Accident Monitoring System (PAMS)

Orientation on the current status of Regulatory Guide (RG) 1.97 instrumentation at VEGP will assist the review team in integrating the CRDR with RG 1.97 implementation.

3.5.4 CRDR Familiarization

Any support personnel participating in the CRDR will receive an overview indoctrination of the CRDR and specific instruction on the methodologies for performing their support tasks.

3.5.5 Miscellaneous

During the course of the review, other areas requiring orientation will be identified and obtained to meet the needs.

3.6 USE OF CONSULTANTS

During the course of the review GPC may contract with an appropriate consulting firm to obtain additional personnel skilled in Human Factors Engineering; however, this is not currently planned.

4.0 EXECUTION PHASE

The objective of the CRDR is to determine the extent to which the VEGP control room provides the operators with sufficient information to complete their required functions and task responsibilities efficiently under emergency conditions. The review also will determine the human engineering suitability of the designs of the instrumentation and equipment in the VEGP control room. This section of the implementation plan describes the process that will be used to accomplish those overall objectives.

4.1 OPERATING EXPERIENCE REVIEW

The Vogtle Electric Generating Plant is a two-unit Westinghouse pressurized water reactor (PWR). The plant is under construction with fuel load for Unit 1 scheduled for September 1986. Each unit is a four-loop design with a net electrical output of

1157 MWe. With no operating history, the on site experience of operational personnel and data from plant operation documents will provide little information for the CRDR. Accordingly the Operating Experience Review will focus primarily on industry experience at similar plants and consider experience gained from the VEGP plant-specific simulator.

Two separate steps are involved in reviewing operating experience. The first is to review available and applicable historical documentation pertaining to plant-specific and generic occurrences. The second step is to survey operating personnel. Operating personnel surveys should identify specific problem areas in the VEGP control room and, in particular, should point out problems that occur in normal operation.

4.1.1 Historical Documentation Review

It is recognized that documentation originating elsewhere in the industry should be reviewed to ascertain whether or not generic problems have been found that might relate to VEGP. A mechanism exists at VEGP for reviewing all Significant Operating Experience Reports (SOERs) and Significant Event Reports (SERs) distributed by the Institute of Nuclear Power Operations (INPO). These reports are screened routinely for applicability to VEGP systems.

The final generic documentation to be reviewed will be Licensee Event Reports (LERs) from plants of the same design vintage and vendor type as VEGP. Since INPO maintains a complete LER data base, they will be requested to provide VEGP with a printout of LERs sorted using the following characteristics:

LERs from:	Westinghouse PWR
Listing errors by:	licensed operators
Involving either:	human error or procedural deficiency

The CRDR team leader, with the assistance of a Reactor Operator will review the appropriate SOER and SER reports from the most recent three-year period and the LER Summary. Copies of those involving control room operator, procedural, and/or control board equipment failure and/or design arrangement errors will be obtained. The reports obtained will be screened to determine if the report describes and documents a control room problem. A control room problem is defined as one that meets one or more of the following criteria:

- Equipment referenced (valve/pump controls, displays, indicators, etc.) must be in the physical confines of the control room or remote shutdown panel.

- Procedure steps referenced should be accomplished within the physical confines of the control room or remote shutdown panel.

- Personnel error referenced must have occurred in the control room on equipment in the control room or remote shutdown panel or entailed a deviation from procedures that were to be accomplished in the control room or remote shutdown panel.

Reports that pass the above selection criteria will be further reviewed to determine if similar potential for error exists at VEGP due to HED.

4.1.2 Operating Personnel Survey

The most valuable source of data on operational problems is the person who has operated the plant. The intent of the operating personnel survey is to gain as much firsthand information as possible on actual and potential operational errors. The survey will consist of a self-administered questionnaires and alternate problem notification procedures.

4.1.2.1 Questionnaire

An open-ended, self-administered questionnaire approach will be adopted. By employing this method, most of the operating personnel can be questioned and this maximizes the use of their time and that of CRDR team. The survey will cover 10 content-topics. Specifically, the areas covered will be as follows:

- workspace layout and environment
- panel design
- annunciator warning system
- communications
- process computers
- corrective and preventive maintenance
- procedures
- staffing and job design
- training
- other areas for operator comment

4.1.2.2 Administration

A cover letter will be attached to each questionnaire. The cover letter will (1) explain the purpose, (2) describe the questionnaire and provide instructions, and (3) convey what will be done with the results. A preliminary draft of the questionnaire and cover letter is included as Attachment 1.

Questionnaires will be given to simulator trainees and simulator instructors early in the CRDR process. Questions not relevant to simulator operation will be deleted from questionaires sent to personnel in simulator training. Additional questionnaires will be given to control room operators late in the CRDR after the control room is operational.

After the questionnaires have been completed, returned and logged in, they will be examined and reviewed on an item-by-item basis. Responses will be summarized in a Questionnaire Item Summary data base.

It is anticipated that both positive and negative control room features will be identified by the respondents. Further investigation, therefore, will be carried out for each item on the responses to determine whether they are in accordance with sound human engineering conventions and practices. Positive responses that are in accordance with sound human engineering conventions and practices will be recorded and disseminated to every member of the CRDR team for consideration in subsequent review processes (e.g., as possible recommendations for corrective action to HEDs). Negative responses will be investigated further to identify potential HED's.

4.1.3 Problem Reports

An open ended Control Room Design Problem Report form (attachment 2) will be sent to all control room and simulator personnel. Copies will be made available in the control room and simulator. This will allow any problem noted to be promptly reported. These Problem Reports will be entered in a data base and evaluated for possible HED's.

4.1.4 Follow-up

Follow-up interviews may be conducted to clarify information obtained on questionnaires. These follow up interviews will be performed by review team members.

4.2 CONTROL ROOM SURVEY

A survey of the existing VEGP control room will be conducted during the CRDR. The purpose of the survey will be to compare the design features of the existing control room with applicable human engineering design guidelines. The survey will be conducted by the CRDR review team. The survey team will use questionnaires, checklists, and surveys to compile information regarding the as-built characteristics of the VEGP control room.

An extensive review of the VEGP control room was conducted in 1982. The results of that CRDR will be reviewed, especially the HED's and their resolution. Items previously surveyed will be compared to revision in criteria since the original work and any additional HED's identified. Previously completed survey items will not be repeated if the Review Team determines that the duplication of effort would reveal no new information.

4.2.1 Questionnaires, Checklists, and Surveys

The NUTAC on CRDR has developed a set of questionnaires, checklists, and surveys that addresses the human engineering design considerations applicable to nuclear power plant control rooms. VEGP intends to use these survey instruments with as little modification as possible. These documents are included in the CRDR Survey Development Guideline (INPO 83-042), developed by INPO and the CRDR NUTAC. The individual survey instruments are described below.

4.2.1.1 Questionnaires

There are two questionnaires among the NUTAC survey instruments: the Engineering Department Questionnaire and the Operator Questionnaire. The Engineering Department Questionnaire is designed to compile information concerning the function and optional operation of various plant systems, such as the annunciator and emergency lighting systems. This questionnaire also solicits information on the failure modes of indicators and opinions about the adequacy of certain existing system characteristics.

The purposes of the Engineering Department Questionnaire are to educate the review team concerning the design attributes of certain plant systems and to provide an engineering input for the assessment of HEDs later in the review process. The review team leader will distribute the Engineering Department Questionnaire to the GPC Engineering Department. Each recipient will be requested to complete and return the questionnaires within four weeks.

The Operator Questionnaire is designed to collect information on operating personnel's experiences--good or bad--with control room characteristics. The items on the Operator Questionnaire solicit information that depends on actual operation of the controls and displays in the control room. This information is not easy to obtain using specific criteria for height, location, and scaling but depends on the interaction among control room instruments, procedures, layout, and staffing. Some of the information collected during the operating experience review is similar to that obtained with the operator questionnaires. However, the experience review solicits more general information.

The purpose of the Operator Questionnaire is to tap the operational knowledge of VEGP personnel and relate that knowledge to the human engineering characteristics of the VEGP control room. It is not feasible to keep all subjective opinion out of the responses to such a questionnaire. However, the individual questions are posed as objectively as possible and, by using data from many individuals, isolated individual "pet peeves" will be weighted lightly during the analysis of the information obtained.

The review team leader will distribute the Operator Questionnaire to all Plant Operators,Shift Supervisors, and STAs at VEGP. The instructions will stipulate that the questionnaire items concerning controls, indicators, and labels should be answered on a panel-by-panel basis. A separate set of these questions will be included for each control board panel. It also will be stressed that the questionnaires should be completed during periods when the respondent is in or has access to the control room but does not have operating responsibility for the unit.

Each respondent will be requested to complete the questionnaire within one month of the date it is distributed. Each respondent also will be assured that responses will never be used to judge job performance or for any other punitive purpose.

4.2.1.2 Checklists

Five checklists are included in the NUTAC survey instruments. These are an overview checklist; operator-assisted checklist; a labeling, mimics, and demarcation checklist; a general panel checklist; and a process computer checklist. Each checklist is designed to allow one or two people to walk around the control room and determine whether individual checklist items are satisfied by the existing control room design.

The checklists are very simple to use and, except for specific items, require very little operator time. Each item in a checklist is a simple declarative sentence describing an acceptable design characteristic. For example, item two in the overview checklist states: "Sanitary Facilities and Drinking Water Are Easily Accessible." If the individual(s) using the checklist make(s) the judgement that the statement is true or correct for the control room under review, then that item is checked off, and no further action is necessary concerning the characteristic. However, if the user makes the judgement that the control room is not designed to be acceptable for a particular checklist item, an HED is written for that particular facet of the design.

Some degree of judgement is involved in various checklist items. However, the nature of these judgements is such that a common sense approach should result in a consensus among individuals on the survey concerning questionable items. If situations arise where two or more judgements cannot be reconciled, an HED will be written, and the dispute will be resolved by the review team during the assessment phase.

4.2.1.3 Surveys

Nine separate surveys will be completed during the CRDR Survey Activity. The individual surveys are the following:

- General Design Convention Survey
- Design Convention Survey for Repetitive Groupings
- Lighting Survey
- Noise Survey
- Anthropometric Survey
- Communication Survey
- Abbreviation and Acronym Survey
- Color-Coding Survey
- Control Room Computer Survey

These surveys can and will be done independently. They function as a frame work within which various measurements can be recorded. Some of the surveys consist of simply describing control room conventions such as color usage and instrument arrangement. The information obtained in these surveys will be used in other CRDR activities to determine where particular instruments or systems depart from the overall convention. For these surveys, in particular, operator input will be required to describe how certain controls function and the meaning assigned to particular colors. It should be noted that, in general, HEDs will not be written during convention surveys. Instead, the information obtained will be used during assessment.

Other surveys measure certain physical quantities, such as illumination and sound level, and to compare these measurements to acceptable upper and lower limits for such quantities. HEDs will be written for characteristics that fall outside the acceptable band. The individuals conducting these surveys must be able to operate the appropriate measuring instruments and interpret the output properly. GPC may elect to retain outside specialists to operate the measuring equipment. If not, selected personnel will be trained to use such equipment. Regardless of who actually makes the measurements, review team members will be responsible for writing any HEDs resulting.

4.2.2 Personnel Assignments

It is not necessary that the entire CRDR Review Team be involved in the day-to-day conduct of the control room survey. The actual survey, with its documentation requirements, will be conducted by Review Team members supported by members of various VEGP departments. Personnel selected to conduct the surveys will be trained to use the survey checklists and surveys properly.

4.3 TASK ANALYSIS

The operating experience review and the control room survey will identify as HEDs control room characteristics that have caused, or nearly caused, problems during normal operation or HEDs that do not conform to certain human engineering design criteria. The final activity in the CRDR execution phase, the task analysis, will identify the tasks operators must perform during emergency operation and determine whether the instrumentation, controls, and equipment are available to perform those tasks. In addition to determining the availability of suitable instrumentation, controls, and equipment, the task analysis will validate that the emergency tasks identified can be performed under simulated emergency conditions in the VEGP control room.

The task analysis will use as its basis the Emergency Response Guidelines (ERGs) developed by the Westinghouse Owners Group (WOG). These ERGs have been designed to generate plant-specific emergency operating procedures (EOPs) for Westinghouse nuclear plants. An added benefit to using the ERGs is that the analysis done as part of the systems review can be applied to verifying the plant-specific EOPs for VEGP.

4.3.1 Task Identification

Starting with specific Westinghouse ERGs, all tasks within the ERGs will be identified and analyzed to determine the instrumentation and controls required. All Emergency Response Guidelines and Functional Recovery Guidelines will be task analyzed. However, these contain steps

which appear in many ERGs and FRGs. In these cases the task analyses will completely analyze the step only once and refer to that analysis when the step is duplicated in other guidelines.

Beyond the ERG tasks to be analyzed, certain plant systems are referenced in the ERGs as resources to be used during emergency operation. As part of the task identification, the tasks necessary to use the plant systems, as they are required to be used in the ERGs, will be delineated. Any instruments and controls necessary to complete these tasks will be determined. It is probable that the operator tasks required for specific system operation can be determined using existing VEGP documentation. Where this is not the case, any additional analysis required to determine system-specific tasks will be performed and documented.

After the required tasks are delineated and the necessary instruments and controls identified, a two-step process will be undertaken that will (1) verify that the required instruments and controls are present in the control room and are of the appropriate range with the appropriate scales and labels and (2) validate, with dynamic walk-through-talk-throughs, that all ERG and system-specific steps can be completed in the VEGP control room by the normal complement of operating personnel. The methodology contained in the Emergency Response Capability (ERC) Nuclear Utility Task Action Committee (NUTAC) Component Verification and System Validation Guideline will be used to develop the actual validation procedures.

4.3.2 Verification of Instrumentation

The process of verifying that the VEGP control room contains appropriate instruments and controls will be completed in two somewhat overlapping steps. First, a determination will be made as to whether the instrumentation and controls necessary to make the decisions and implement the tasks identified previously are, in fact, present in the control room. If not, any such instance will be defined as an HED and documented accordingly.

For each ERG the walk-through procedure will be the same. A complete operating crew will be assembled at the control room and the crew members will take their normal positions relative to the control boards. The crew will execute the specific instructions in the ERG and to record comments and movements in response to those instructions. The crew will be encouraged to verbalize what they are doing, why they are doing it, and which instruments and controls they are using for each activity.

This is not a dynamic check of the adequacy of the control room layout, but it will indicate whether or not appropriate instrumentation is available in the primary control area to carry out the tasks called for in the ERGs. In addition, the instruments and controls used to operate specific plant systems can be recorded on Task Data Forms (TDF) in Attachment 4.

The second step of the verification process consists of an examination of the instrumentation and controls located in the first step (above) to determine its human engineering suitability for the task or decision it is supposed to support. Although the control room survey examined all control room instrumentation for conformance with human engineering design criteria, this verification step is required to determine if a meter, for example, has the appropriate range and scale gradations to support a particular ERG task or system-specific task. This step will be accomplished by review team personnel observing the verification. They will base their determination on the task analysis HED principles in Attachment 4 and note HED's on the TDF.

4.3.3 Validation of Control Room Functions

The final analytical step in the task analysis is to validate that the tasks delineated earlier are indeed the tasks that must be performed to carry out emergency functions and that those tasks can be completed in the VEGP control room by the normal operating crew. This evaluation will be accomplished in conjunction with EOP validation on the VEGP Unit 1 simulator. Next, specific

transients will be selected that will require operators to use the ERGs. These transients will be run on the VEGP simulator, and a VEGP operating crew will perform the actions that are required by the EOPs.

The transients to be run on the simulator have been chosen from the list of scenarios used by the Westinghouse Owners Group to validate their ERGs on the Callaway Nuclear Power Plant Training Simulator (Summary Report - Emergency Response Guidelines Validation Program, Westinghouse, WCAP-10204, September 1982). The following specific transients will be run during the simulator walk-throughs:

- reactor trip
- spurious SI
- anticipated transient without scram (ATWS)
- stuck open pressurizer PORV
- small break LOCA with loss of off-site power
- failed open S/G safety valve
- steam line leak inside containment
- steam generator tube rupture (SGTR) with secondary break
- SGTR with stuck open S/G PORV
- feedline break inside containment and SGTR
- loss of all feedwater
- spurious SI followed by LOCA

As with walk-throughs, a complete operating crew will be assembled at the simulator. The crew members will take their normal positions relative to the control boards. An observation team will be assigned to record the crew's movements and to note any deviations from the appropriate ERGs. If needed to gather appropriate data, two runs will be made for each transients. The first run will

normally be made at real time so that the events in the simulator will occur in the same time frame as in the actual plant. A second run may be made in slow time so the operating crew members can describe their actions to the observation crew and tell the observation crew which instruments are being used at any given time.

It appears that it will require about five eight-hour shifts to complete the transients. At least two crews will be run through all the scenarios. The simulator runs will be video-taped and sound recorded. The tapes serve an archival purpose. Specific analysis of the tapes will only be conducted if sufficient information is not available from other sources.

4.3.4 Data Recording and Analysis

Various data will be recorded by the members of the observation team (see Section 4.3.5) during the simulator walk-throughs. During the real time run, the movements of each crew member will be traced on a control room outline drawing by an observer. This information will be analyzed to determine the main paths between panels and panel sections and also to identify any significant need to access back panel indications or controls. In addition to crew movements, observers will trace the path of the crew through the appropriate ERGs and plant systems. Notations will be made of significant communication links used during each transient and any instances of crew member conflict (either physical access problems or communication problems) will be noted.

If an optional slow time run is conducted, the observation team will question the operating crew concerning the instrumentation they are using at any point in time and their strategy for dealing with the particular transient. This information will be cross-checked with similar information from the walk-throughs and any obvious discrepancies noted. The review team will use the control room walk-thrus and simulator runs to determine if HEDs were manifested due to the layout of the control room and the dynamic interaction of the operating crew during emergency operation.

4.3.5 Personnel Assignments

The task identification described in Section 4.3.1 is characterized by extensive analysis of ERGs and emergency resource systems before any walk-through validation is done. The analysis of system function and operator tasks will be conducted by members of the review team, aided by operations personnel. The full review team will review all such pre-analysis work.

After the pre-analysis is complete, the control room and simulator walk-throughs will require the intermittent participation of some review team members. The CRDR team leader will be responsible for scheduling crews to walk through the selected ERGs in the control room and for scheduling both crew and simulator time for transient runs in the VEGP simulator.

A group of trained observers will be required for the walk-through activities, although the number of people in this group will change, depending on whether the control room or the simulator is being used. For the dynamic simulator validation, each crew member will be tracked by a separate observer, whereas the control room walk-throughs will not be as time-critical and a person may observe more than one, or all, control room personnel.

5.0 ASSESSMENT PHASE

5.1 OBJECTIVES

The objectives of this phase of the CRDR are as follows:

- o Evaluate the significance of the HEDs defined in the previous phases of the CRDR.
- o Where HEDs are found to be of minor significance, describe the technical and operational basis for such a finding.
- o Where HEDs are found to be of potentially major significance, formulate changes to the control room, procedures, operator training, or any combination thereof to mitigate those HEDs.

Of these objectives, the most conceptually difficult is to evaluate HED significance. A fairly straightforward set of criteria for HED evaluation is described in the next section.

5.2 EVALUATION CRITERIA

Human engineering discrepancies found during the control room survey, the operating experience review, and the task analysis will be evaluated by the review team for their potential to adversely affect emergency operation . A categorization scheme will be used that requires each HED to be assessed by the review team and prioritized for resolution. The following four categories are designed to be unique so a consensus can be obtained from the review team as to which category each HED should be assigned.

- o Category 1 (Safety Significant) - HEDs that have caused errors in or are judged likely to affect adversely the management of emergency conditions by control room operators.

- o Category 2 - HEDs that are known to have caused problems during normal operation.

- o Category 3 - HEDs that can be "fixed" with simple and inexpensive enhancements, so-called "paint, tape, and label" (PTL) fixes. This may seem to be an implementation rather than an assessment category. However, there probably will be HEDs that the review team feels are very easy to fix but difficult to assess as to effect on emergency operation. This category is for such HEDs.

- o Category 4 - HEDS that do not fit into Categories 1 through 3. These HEDs are judged by the review team as unlikely to affect emergency operation, not documented as causing problems during normal operation, and not simple or cheap to fix.

The precise method to be used to put HEDs into these categories has not been delineated. It is envisioned that comparing HEDs to higher level principles, such as those listed in the CRDR NUTAC

document Human Engineering Principles for Control Room Design Review, will help determine which HEDs are likely to result in actual performance problems. Those HEDs that are likely to affect performance will be further categorized as described above.

Any review team member who feels strongly that an HED has been assessed with a too low priority will be able to put that opinion in writing and have the written statement included in the permanent record of the CRDR.

5.3 RESOLUTION OF HEDS

One of the final responsibilities of the review team will be to propose solutions to the HEDs that have been identified and categorized. There are, in general, many ways to solve specific human engineering problems. Correction of HED's may be accomplished by enhancement (use of color, minics, or labels), class improvements (grouped indicators or controls by type or model number) or individual discrepancy corrections (case-by-case). In some cases, a change in training or procedures may suffice.

If it is determined that the correction should involve movement, modification, addition, or deletion of instrumentation, then these corrections will be evaluated with respect to their impact on the existing control room, including operator performance, training, and procedures. Before any large-scale changes are approved, the proposed modifications will be built into the simulator, if practical, and evaluated to determine their effectiveness. Before any changes are made, even small-scale changes, a review by operations personnel will be obtained.

Criteria related to several characteristics will be used by the review team when evaluating candidate proposals for HED correction. At least the following characteristics of each proposal will be considered:

- impact on operating effectiveness
- system safety
- cost
- impact on plant availability
- consistency with existing features
- compliance with regulatory design requirements
- impact on control room staffing
- impact on operator training programs

6.0 DOCUMENTATION PHASE

Adequate documentation and document control creates a traceable and systematic translation of information from one phase of the CRDR to the next. The CRDR team will have access to a complete, up-to-date set of documents to manage and execute the various steps and phases of the control room reviews.

This section describes the functional requirements that will be fulfilled by the documentation system GPC will use to support its control room design review.

6.1 GENERAL DOCUMENTATION REQUIREMENTS

Many documents will be referenced and produced during the CRDR project.

The documentation system will meet the following requirements:

- provide a record of all documents used by the review team as references during various phases of the CRDR.
- provide a record of all correspondence generated or received by the review team during the review

- provide a record of all documents produced by the review team as project output
- allow an audit path to be generated through the project documentation
- retain project files in a manner that allows future access to help determine the effects of control room changes proposed in the future.

6.2 REFERENCES

The following documents have been identified as possible reference material to be used during the review project. As the review progresses, it is anticipated that additional material and references will be identified.

- VEGP Final Safety Analysis Report
- Westinghouse Emergency Response Guidelines (ERGs)
- Regulatory Guides (e.g., RG 1.97 and RG 1.47)
- NRC guidance documents (e.g., NUREG-0700)
- VEGP training materials
- control room drawings (floor plan, panel layout, etc.)
- control room photographs (panel photographs, etc.)
- human factors design information
  - -- Van Cott & Kinkade
  - -- McCormick
  - -- MIL-STD-1472C
- piping and instrumentation diagrams (P&IDs)
- computer software descriptions
- results of preliminary control room review activities

- instrument tabulations
- annunciator and label engraving lists
- INPO/TVA Pilot Systems Review (INPO 82-014)
- CRDR NUTAC documents
- VEGP abbreviation and acronym lists

6.3 REVIEW DOCUMENTATION

Through the review process, documents will be processed to record data, analyses, and findings. Whenever practical and appropriate, standard forms will be developed and used. The bulk of the documentation generated by the review process will be necessary to do the following:

- document the criteria used for each review activity
- record the results of the survey, operating experience review, and systems review
- compile HEDs and associated data for review and assessment

In order to facilitate systematizing and recording control room design review activities, GPC will developed standard forms based on INPO NUTAC reports. However experience gained in the review may require changes to these forms.

6.4 SUMMARY REPORT

Upon completion of the CRDR, a summary of the results will be prepared and submitted to the NRC for review. The summary report will describe the results of the CRDR and will be submitted within six months after completion of the review. This report will summarize the review process, provide descriptions of the identified human engineering discrepancies (HEDs), detail proposed corrective actions and present implementation schedules for each action. Details of the CRDR, along with complete documentation, will be available for NRC evaluation and review.

The final report will specify the personnel who participated in the Control Room Design Review and delineate their qualifications. It also will indicate any modifications or revisions made to the implementation plan submitted to the NRC. These may become necessary periodically throughout the CRDR and will be described by the review team in the report.

A summary of the Operating Experience Review processes and results will be contained in the final report. The types of historical reports reviewed and the period of time they covered will be provided.

The final report for the CRDR will provide a summary of processes involved in the task analysis and will contain the following:

o charts or list of major systems and subsystems, and their major components

o task descriptors, organized by system

Data management procedures used to record review data and provide a data base for the review will be described.

Samples of forms used in the control room survey will be provided. Procedures used for verification of task performance capabilities and validation of control room functions will be summarized.

Details of the assessment procedure used in this process will be summarized and supporting documentation provided. HED's and their resolution will be summarized. Identified design improvements, whether safety-related or not, will be described.

Implemented or proposed design solutions and implementation schedules will be described. Such scheduling will be governed by priorities, and any departure from this prioritization will be explained. Any deviation from the proposed CRDR methodology described herein will be discussed and appropriate explanation provided.

7.0 CORRECTION PHASE

The actions required to resolve significant HEDs will vary, as will the time required to complete proposed changes. It is essential, however, to set some end point for completing the proposed changes for each HED category.

7.1 SCHEDULING

The following schedule will become goals for GPC when planning the activities appropriate to resolve significant HEDs.

Category	Completion
1	As soon as practical after a specific solution has been approved by GPC management. Prior to fuel loading.
2	As soon as practical. No later than first refueling outage after the review.
3	No specific completion date. Corrective action will be based on economic judgement.
4	No specific completion date. Not planned. Impractical with current technology.

It should be recognized that these completion dates are goals and that some changes may still be pending after these dates. GPC will make all reasonable efforts to meet these goals.

7.2 IMPLEMENTATION

Modifications required to resolve significant HEDs will be implemented using approved GPC Nuclear Operations or GPC Nuclear Construction Department procedures.

Since the plant modification process for selected HEDs may take considerable amount of time for implementation, the implementation and follow-up activities will rely upon normal site

organization. Therefore, it is imperative that the HED(s) and the resulting modification request(s) are very explicit as to what is to be done.

The use of existing plant modification procedures ensures that plant operators will be made aware of impending changes and will be trained to use the modified control panels and systems, since the current station modification process is to involve the VEGP training department in the early stages of the modification.

This approach to the implementation of changes will help ensure the success of the modifications and will give the line organization a tool for developing their techniques for long-term support of the control room.

8.0 EFFECTIVENESS PHASE

During the correction phase of the CRDR, proposed modifications and enhancements were evaluated for their effectiveness in solving the deficiencies that prompted them. However, no feasible evaluation method can account beforehand for all the circumstances encountered during actual operation. Recognizing the need for operational feedback on the usability of control room changes resulting from the CRDR, GPC will delineate an operational feedback path at VEGP.

8.1 VALIDATION OF CHANGES

The validation of control room changes will be accomplished using two different methods. First, after changes are installed and have been operational for approximately 60 days, the review team from the CRDR will inspect the control room to ensure that, as installed, the changes accurately reflect their original recommendations regarding particular HEDS. If the review team consensus is that any or all of the installed changes do not meet the intent of their recommendations or for some other reason do not mitigate the HEDs for which they were designed, the review team leader will report those findings.

Each installed change will be placed in one or more of four categories by the review team. These categories are as follows:

- o The change reflects the intent of the recommendation and appears to mitigate the associated HED(s).
- o The change reflects the intent of the recommendation, but the problem associated with the HED(s) appears to still be present.
- o The change does not reflect the intent of the recommendation.
- o The change has created an HED other than the HED that prompted the change.

Any HED still present after the changes or created by the changes will be treated as a problem reported during operating, and it will be evaluated by the plant engineering staff.

8.2 FUTURE CONTROL ROOM CHANGES

In order to ensure adequate human factors considerations for control room changes that are considered after the CRDR is completed, the results of the CRDR will be available for engineering and operations personnel to reference. This will provide a standard to evaluate the human factors acceptability of all proposed control room modifications.

The control room basis, or current configuration, will be reflected in the simulator maintained at the VEGP site. This will provide a tool for use when evaluating proposed control room changes before the changes are actually implemented.

9.0 COORDINATION WITH OTHER ACTIVITIES

The CRDR process described in this implementation plan will be coordinated with other post-TMI activities in several ways. These activities include the following:

- o upgrading emergency operating procedures
- o upgrading emergency response facilities, including the development and installation of an SPDS
- o installation of post-accident monitoring instrumentation (RG 1.97)

9.1 EMERGENCY OPERATING PROCEDURES

The Task Analysis portion of the CRDR will use the Westinghouse ERGs as its starting point. Thus, the task of upgrading emergency procedures is inherently integrated into the CRDR. The simulator validation of the task analysis will be combined with the VEGP EOP validation program.

9.2 SAFETY PARAMETER DISPLAY SYSTEM

It is the intent of GPC to use the task analysis phase of the CRDR to define the operator information requirements during conditions of emergency operation. These requirements will define many of the plant inputs to the SPDS and the display format for the CRTs required. The SPDS will be surveyed against those requirements.

It is anticipated that some HEDs defined during the review and judged to be significant by the review team may be resolved by incorporating certain features into the SPDS and associated displays. This will serve to further integrate the SPDS into the CRDR.

9.3 REGULATORY GUIDE 1.97

The design of RG 1.97 instrumentation is essentially complete. This instrumentation will be evaluated in the CRDR survey and task analysis.

10.0 ACCEPTANCE CRITERIA

This implementation plan was developed to describe the process whereby GPC will conduct the human factors review of the VEGP control room. A sincere effort has been made by GPC to ensure that all major aspects of an effective CRDR have been considered during the development of this implementation plan. Since GPC is committed to perform their CRDR as described in this document, the acceptability of the CRDR also should be judged against this document and supporting procedures.

ATTACHMENT 1

OPERATING EXPERIENCE QUESTIONNAIRE

NOTE - The following questions are listed in a format designed to minimize space requirements. The actual questionnaires will contain one question per page, single-sided.

Interoffice Correspondence

Georgia Power

DATE: June 7, 1984

RE: Plant Vogtle - Units 1 & 2
Control Room Design Review
File: X5AB03 System: 4603
Log:977
Security Code: NC
Keyword: Control Room

FROM: E. J. Kozinsky

TO: SRO Trainees
Simulator Instructors

In order to improve the operational reliability of the Vogtle Control Room, I will be conducting a Control Room Design Review to identify and correct problems in the Control Room. An important part of that review is to review operating experience to discover human engineering shortcomings that have caused or almost caused actual operating problems in the past.

Your recent experience in the simulator is a valuable source of this type information. Please take a few minutes to fill out the attached questionnaire. This will help me identify problems and correct them.

Do not feel limited by the structure of the questionnaire. Use the blank forms at the back of the packet to point out any problem area you noted that did not seem to fit the questions. Be specific in identifying controls or displays. Suggest changes, this is your chance to make it right. Thank you for your help.

Ed

EJK/pc

Attachment

xc: W. F. Kitchens
P. D. Rushton

OPERATING EXPERIENCE QUESTIONNAIRE

The following questions are grouped into 5 content areas. Specifically, the areas to be covered are the following:

- o panel design
- o annunciator system
- o control room layout
- o training
- o comments

The main idea in this questionnaire is to get you to tell me two things about each topic. First, and most important, I want to know if the particular characteristic of the control room has ever caused or almost caused an operation problem. Specifically, has the design led or allowed you to do something that you didn't intend to do? If so, I want you to describe those incidents. If not, have you seen someone else do something wrong or misoperate a piece of equipment because of the design? I am particularly interested in incidents that caused plant transients or challenged a safety system. If equipment was misoperated, but the error was discovered quickly and corrected, I want to know that, too.

The second thing I would like to know is any aspect of the systems covered in a topic area that helped you during plant operation. These might be characteristics of particular systems that let you operate more quickly or efficiently. Perhaps there are features that let you know when a transient is eminent. If you personally do not know of any such features, have you seen someone else benefit from specific design features?

I know that this is a fairly tedious task, but I want to assure you that I will do something about control room features that have caused or nearly caused operational problems. Thank you in advance for helping make Vogtle a better place to work.

WORK SPACE LAYOUT AND ENVIRONMENT

1. Has the layout of the control panels in the control room ever caused you or someone you have seen to either misoperate or be unable to operate any plant system? If so, please describe. This question refers only to the placement of the panels themselves, not to the arrangement of controls and displays on the panels.

2. Is there some aspect of the panel layout that helps you operate particular systems or the plant in general? Please describe.

3. Has the layout of control room equipment other than panels (e.g., computer console) ever caused you or someone you have seen either to misoperate or be unable to operated any plant system? If so, please describe.

4. Does the layout of control room equipment help you operate particular plant systems or the plant in general? Please describe.

5. Has the arrangement of furniture in the control room ever hindered your access to the operating area or obstructed you view of important displays? If so, please describe.

6. Does the furniture arrangement provide easy access to the operating area and allow you to see the plant instrumentation? Please describe any features that are particularly helpful.

7. Has the lighting in the control room, either normal or emergency, ever caused you or someone you have seen to either misoperate or be unable to operate any plant system? If so, please describe. This question refers to both the level of control room lighting and to other characteristics such as glare, color, etc.

8. Is there some feature of the control room lighting that helps you operate particular systems or the plant in general? Please describe.

9. Has the noise level in the control room ever caused missed verbal communication or misinterpretation of instructions between you and other members of the operating staff? If so, please describe. This question refers both to the ambient (plant) noise and to the noise caused by alarms, phones, etc.

10. Has the temperature and/or humidity in the control room ever reached a level, either high or low, at which you were very uncomfortable? Please describe.

11. Has the temperature/humidity ever reached the level, either high or low, that control room instrumentation or equipment malfunctioned? Please describe.

PANEL DESIGN

1. Has the layout of controls and displays on any particular panel(s) ever caused you or someone you have seen to misoperate any plant system? If so, please describe.

2. Does the layout of controls and displays on any panel(s) help you operate particular systems or the plant in general? Please describe.

3. Have you ever activated a piece of plant equipment by accidentally bumping a control that is placed in a precarious location? If so, please describe.

4. Have you ever had to leave the main operating area to activate a control or read a display during an emergency or time-critical situation? If so, please describe. This question refers mainly to back panel controls and indicators.

5. Have you ever had to put temporary labels, Dymo type, grease pencil markings, or other clarification on a control room panel to make systems easier to operate and understand? If so, please describe.

ANNUNCIATORS

1. Has the layout or operation of the annunicator system ever caused you or someone you have seen to misoperate any plant system? Please describe.

2. Has the layout or operation of the annunciator system ever misled you as to what is happening in the plant? If so, please describe.

3. Are there any features of the annunciator system that you find helpful for plant operation or for diagnosing off-normal occurrences? Please describe.

4. In general, have you used the information supplied by the annunciator system more for normal, abnormal, or emergency operation?

5. Are there any annunicators that you consider essential for operation during emergency or post-trip conditions? If so, please list them.

COMMUNCIATIONS

1. Has the plant communication system ever caused you or someone you have seen to misoperate any plant system? If so, please describe. This question refers to the telephones, sound-powered phones, walkie-talkies, and PA system in the plant.

2. Is there any feature of the communication system that helps you operate a particular system or the plant in general? Please describe.

3. Has the use of the communication system ever caused control room instrumentation to operate improperly (e.g., nuclear instrumentation picking up walkie-talkie signals)? If so, please describe.

4. Is there any general problem with the plant communication system that degrades its usefulness during plant operation (for example, absence of a protocol requiring walkie-talkie users to identify themselves) If so, please describe.

PLANT COMPUTER SYSTEM

1. Has any feature of the VEGP plant computer system ever caused you or someone you have seen to misoperate any plant system? If so, please describe.

2. Has the plant computer system ever misled you as to what is happening in the plant? Please describe. This question refers to computer output that misleading because of inaccuracies, incorrect status indications, time delays, etc.

3. Is there any feature(s) of the plant computer system that you have found particularly useful during plant operation? Please describe.

4. In general, have you used the plant computer system more for normal, abnormal, or emergency operation?

5. Do you believe that you understand how the plant computer system works well enough to use the system to its potential? Please explain.

6. Although it is not absolutely required, do you think the plant computer system is necessary for normal operation? How about emergency operation?

MAINTENANCE

1. Has maintenance performed in the control room ever caused you or someone you have seen to misoperate or be unable to operate any plant system? If so, please describe. This question refers to such activities as surveillance testing, indicator light replacement, chart paper replacement, etc.

2. Has miscommunication between you or other operations people and maintenance ever caused the misoperation or unavailability of a plant system? If so, please describe.

3. Is there some feature of the VEGP maintenance program that you have found helpful in operating the plant (e.g., direct accountability for clearing work orders)? If so, please describe.

4. Do you use job aids to perform the required maintenance in the control room? For example, is a special tool provided for indicator light replacement?

PROCEDURES

1. Has using a procedure ever caused you or someone you have seen to misoperate any plant system? If so, please describe.

2. Are there particular procedures that you tend to use more than others? Please list them.

3. Are the emergency procedures usable as they are now written? Please explain.

4. Has a procedure, normal or emergency, ever left you in doubt as to what your next action should be? If so, which procedure (s)?

5. Are there procedures that are particularly easy to use during normal or emergency operation? Which ones and why?

STAFFING

1. Has the number of people on duty in the control room ever caused you or someone you have seen to misoperate or be unable to operate any plant system? Please describe.

2. Has the division of responsibility in the control room ever left you in doubt as to what you should do next or who was in charge? If so, please explain.

3. Is there some feature of the control room staffing policy that helps or allows you to operate the plant more effectively than you might otherwise? If so, what?

4. In your experience, has the STA provided worthwhile input to the operations staff during transients?

5. Have you or someone you have seen ever been misled by anything the STA said? Please explain.

TRAINING

1. Has the training you received ever led you or someone you have seen to misoperate or be unable to operate any plant system? If so, please describe.

2. Has the training you received been applicable to the operating situations you have encountered? If not, please describe the deficiencies.

3. Is there some feature of the GPC training program that has been especially helpful to you during plant operation? Please describe.

4. Has your training placed too much or too little emphasis on emergency operation? Please suggest a balance between normal and emergency emphasis during training (e.g., 60/40).

5. Have there been instances when the transients you see during requalification actually occur at the plant? Please cite an example.

6. Do you feel that more practice handling transients would be beneficial for operating during such transients? Can you give an example where such practice was or would have been helpful?

COMMENTS

CONTROL/INDICATOR #:

PROBLEM:

RECOMMENDATION:

ATTACHMENT 2

CONTROL ROOM DESIGN PROBLEM REPORT

Interoffice Correspondence

Georgia Power

DATE: June 19, 1984

RE: Plant Vogtle - Units 1 & 2
Control Room Design Problem Report
File: X5AB03 System: 4603
Log: GSU-1012
Security Code: NC
Keyword: Control Room

FROM: E. J. Kozinsky

TO: RO/SRO Trainees

To improve the reliability of operations at Vogtle, I will be conducting a Control Room Design Review to identify and correct problems in the Control Room. Your experience in the simulator is a valuable source of information on design problems. When you note a problem in the simulator, please fill out a Control Room Design Problem Report.

The purpose of a Control Room Design Report is to identify problems in the Simulator Control Room of an operational nature. I am trying to get operator input on switch and annunciator layout and labels in order to provide useful information to you, the operators. If you have any problems or suggestions, please fill out a report and sent it to me. I will do my best to correct any problems we can practically fix.

Look for problems in your simulator training classes and report while they are fresh on your mind. I'm especially interested in problems as you learn the board, before you learn to compensate for the design problems. That learning period is the truest indicator of design problems.

EJ

EJK:pc

xc: W. F. Kitchens

CONTROL ROOM DESIGN PROBLEM REPORT

FROM: ______________________ DATE: ______________________

TO: E. J. Kozinsky

CONTROL/INDICATOR (# AND NAME):

PROBLEM:

RECOMMENDATION:

ATTACHMENT 3

TASK ANALYSIS DATA FORMS

TASK SEQUENCE CHART (TSC)

PLANT, UNIT # ____________

SEQUENCE NO. __________ SEQUENCE TITLE ______________________________ REV. # ____________

TASKS IN MAIN SEQUENCE		SEQ./TASKS POTENTIALLY BRANCHED TO*			COMMENTS
NUMBER	TASK TITLE	SEQUENCE NUMBER	TASK NO.	TITLE	

TASK DATA FORM (TDF)

Plant Unit # ______________________

Operating Sequence Name ______________________ Number __________ Rev.# __________ Page ___ of ___

Task Title ______________________ Task # __________

Task Objective ______________________

Task Cue ______________________

SUBJECT			IMMEDIATE OBJECT OF ACTION (Control Room Component)				REMOTE OBJECT OF ACTION				COMM.	HED T.D.No.
[illegible]	LOCATION	OPERATING TEAM	NAME	DESCRIPTION	PLANT I.D.	LOCATION	PLANT COMPONENT	COMPONENT STATE	PARAMETER	PARAMETER STATE	STATES & LOCATIONS	

COMMENTS:

TASK ANALYSIS HED PRINCIPLES

1. Are all of the controls, displays and indicators that are required to perform this task present in the control room?

2. Are the controls, displays and indicators grouped in accordance with the information and control requirements of this task?

3. Are the controls, displays and indicators labeled according to the requirements of this task?

4. Can the displays and annunciators used in this task be read accurately from viewing position of the operator? Can displays be read while operating associated controls?

5. Do the displays give the operator direct, readily usable information:

   o Parameter values with required precision?

   o Range, band, limit shown if the operator needs to know in/out of range/band, above/below limit,etc.

   o Trend information when needed?

   o Rate of change information when needed?

   o Percentage information used only when appropriate?

   o Digital or analog information used when needed?

   o Status or demand information as appropriate for the task?*

6. If instrumentation orcontrol capabilities are unavailable under certain plant conditions, are there alternate means provided for the operator to meet task needs.

* To be noted only for cases known to the operator; task analysis,is not expected to determine power source of all indications.

7. Are related controls and displays within functional groups, arranged in the same relative positions? For example:

A display	B display	C display
A control	B control	C control

8. Is the display obscured while operating its associated control?

9. Are there any controls, control positions or displays which the operator knows do not serve any function?

NOTE

If the Task Analysis Team discovers a HED which in their judgement would require operational knowledge to discover or would be a decrement to Task performance, they should feel free to report it even though it is nominally allocated to the Survey or Operating Experience Review.

ATTACHMENT 4

REVIEW TEAM RESUMES

RESUME

NAME: Edward J. (Ed) Kozinsky

DATE OF BIRTH: August 28, 1946

DATE EMPLOYED: January 23, 1984

TITLE: Operations Supervisor

EDUCATION: Bachelor of Science (Chemistry)
Baylor University, 1968

LICENSE/CERTIFICATIONS: Senior Reactor Operator Certification.
August 1984, Vogtle Project.
Engineer Officer, Naval Reactors ERDA, 1975

WORK EXPERIENCE:

SUMMARY

4 years Navy Nuclear Power School Instructor
4 years Navy Nuclear Power Plant Operations
6 years Nuclear Power Plant Operations Research
1 month participation at a PWR (Sequoyah) 2/84

NUCLEAR (GPC)

Position:	Operations Supervisor
Dates:	January 23, 1984 - Present
Location:	Plant Vogtle, Burke Co., GA
Plant Status:	Under construction & startup
Job Description:	Responsible for safe and efficient operation of the plant during initial test program and commercial operation. Direct review of control room design and normal, abnormal, and emergency operating procedures.

NUCLEAR

OTHER

Position:	Senior/Principle Engineer
Dates:	February 28, 1978 - January 22, 1984
Location:	General Physics Corporation Chattanooga, TN
Job Description:	Conducted research programs dealing with nuclear power plant control room design, operator performance and reliability, and computer based operator aids. Work with Electric Power Research Institute (EPRI) produced a Performance Measurement System for Nuclear Power Plant Simulators. Department of Energy work defined a Disturbance Analysis and Surveillance System (DASS) for nuclear power plant use.

NUCLEAR

OTHER (CONT'D)

Nuclear Regulatory Commission sponsored research included the Safety Related Operator Action (SROA) program at Oak Ridge National Laboratories and simulator studies on operator error rates at Sandia National Laboratories.

Position: Division Officer, U. S. Navy
Dates: February 1974 - February 1978
Location: Atlantic SSBN645/SSN638
Job Description: Responsible for the safe operation and maintenance of naval nuclear power plant systems. Qualified as Engineerin Officer of the Watch.

Position: Instructor, U. S. Navy
Dates: May, 1969 - August, 1973
Location: Naval Nuclear Power School Bainbridge, MD
Job Description: Develop lesson materials and exams and present a 12 week course of instruction on power plant chemistry, radiological fundamentals, and reactor materials to officer and enlisted students.

TRAINING

NUCLEAR

Course Title: U. S. Navy Nuclear Power Program
Dates: August 1973 - February 1974
Total Course Hrs.: 1280
Vendor: Nuclear Training Unit, Windsor Locks, CT
Description: A program of classroom and on the job training on the S1C pressurized water reactor. Qualified as Engineering Officer of the Watch.

Course Title: Engineer Officer School
Dates: November 1975
Total Course Hrs.: 160
Vendor: U. S. Navy, Charleston, S.C.
Description: A program of classroom and self study to prepare for the Engineer Officer examination (on the S5W naval nuclear power plant)

TRAINING

NUCLEAR (CONT'D)

administered by the Naval Reactors branch of the Energy Research and Development Agency (ERDA).

Course Title:	Hot License Training
Dates:	March - April 1978
Total Course Hrs.:	240
Vendor:	General Physics Corporation
Description:	A program of classroom (120 hr.) and simulator (120 hr.) training for hot license certification on the Sequoyah (Westinghouse-PWR) plant.
Course Title:	SRO Certification Program Plant Vogtle.
Dates:	January - July 1984
Total Course Hrs.:	1,120
Vendor:	GPC; General Physics
Description:	Prepare SRO Canidates for certificatio Basic PWR Theory, Design, and Operation with 8 weeks of Simulator Training.

TRAINING

OTHER

University of Tennessee, Chattanooga

1. Fluid Flow
2. Analysis Methods (Advanced Differential Equations)
3. Statistics

AFFILIATIONS

Human Factors Society
American Nuclear Society

PUBLICATIONS

Praskievicz and Kozinsky, "Performance Measurement System for Training Simulators," Proceedings-Training of Nuclear Facility Personnel, Oak Ridge National Laboratory Conf.-790404 (Gatlinburg, TN), April 1980.

Kozinsky and Crowe, "Utilization of Performance Measurement System Data for Leak Detection Model Validation," GP-R-658 (For Babcock & Wilcox-1632, Sandia National Laboratories Project 42-6770), July 1980.

Kozinsky and Praskievicz, "Utility Industry Simulator Verification Practices," GP-R-23002, Oak Ridge National Laboratory #40X-40432C, January 1981.

Barks & Kozinsky, "Human Factors Review of the Alvin W. Vogtle Control Room," GP-R-23003, for Georgia Power Company, February 1981.

T. Bott, E. Kozinsky, D. Crowe, P. Haas, Criteria for Safety Related Nuclear Power Plant Operator Actions: Initial Pressurized Water Reactor (PWR) Simulator Exercises, ORNL/NUREG/TM-434, NUREG/CR-1908, Oak Ridge National Laboratory, September 1981.

Kozinsky, "Human Factors Research on Power Plant Simulators," Proceedings of the Human Factors Society 25th Annual Meeting (Rochester, N.Y.), Human Factors Society, October 1981

Kozinsky, "Human Factors Research Using the EPRI Performance Measurement System," CSNI Specialist Meeting on Operator Training and Qualifications (Charlotte, N.C.), Committee on the Safety of Nuclear Installations OECD Nuclear Energy Agency-Paris France/USNRC/INPO, October 1981.

Kozinsky, Guttmann, "Simulator Data on Human Error Probabilities," International ANS/ENS Topical Meeting in Probabilities Risk Assessment (Port Chester, N.Y.), American and European Nuclear Societies, October 1981.

Haas, Kozinsky, "Time Response Data on Safety-Related Operator Actions and Implications for Manual Allocation of Safety Functions," Ninth Water Reactor Safety Research Information Meeting (Gaithersburg, MD), U. S. Nuclear Regulatory Commission, November 1981.

Belsterling, Kozinsky, et.al., Specification and Verification of Nuclear Power Plant Training Simulator Response Characteristics, Part I: Summary of Current Practice for Nuclear and Non-Nuclear Simulators, ORNL/TM-7985, NUREG/CR-2353 Vol. I, Oak Ridge National Laboratory, November 1981

Kozinsky, E.J., "Computerized Measurement of Operator Performance on Simulators," Proceedings: 1981 Winter Simulation Conference, Society for Computer Simulation, December 1981.

Kozinsky, Crowe, Morris, Haas, Criteria for Safety-Related Nuclear Power Plant Operator Actions: Initial Boiling Water Reactor (BWR) Simulator Exercises, NUREG/CR-2534, Oak Ridge National Laboratory, April 1982.

Barks, Eckel, Kozinsky, Task Analysis for Safety Related Operator Action, PWR Pilot Study, NUREG/CR-2598, Oak Ridge National Laboratory, March 1982.

Topmiller, Eckel, Kozinsky, Human Reliability Data Bank for Nuclear Power Plant Operations: Volume 1: A Review of Existing Human Reliability Data Banks, NUREG/CR-2744, SAND 82-7057, Sandia National Laboratories, September 1982.

Comer, Kozinsky, Eckel, Human Reliability Data Bank for Nuclear Power Plant Operations: Volume 2: A Data Bank Concept and System Description, NUREG/CR-2744, Sandia National Laboratories, September 1982.

Topmiller, Eckel, Kozinsky, "Review and Evaluation of Human Error Reliability Data Banks," Proceedings of the International Thermal Reactor Safety Conference, American Nuclear Society, Chicago, Illinois, September 1982.

Kozinsky, "The Impact of Procedures on Operator Performance," Proceedings of the International Meeting on Thermal Reactor Safety, American Nuclear Society, September, 1982.

Kozinsky, "Plant Design Criteria for Safety Related Operator Actions," Proceedings of the International Conference on Cybernetics and Society, IEEE, October, 1982.

Beare, Dorris, Kozinsky, "Response Times of Nuclear Power Plant Operations: Comparison of Field and Simulator Data," Proceedings of the Human Factors Society 26th Annual Meeting, Human Factors Society, October, 1982.

Mahaffey, Kozinsky, et.al., Functional Classification of the Edwin I. Hatch Nuclear Plant Using an Integrated Approach to Economical, Reliable, Safe Nuclear Power Production, Georgia Institute of Technology and General Physics Corporation, September, 1982.

Beare, Dorris, Kozinsky, et.al., "Criteria for Safety-Related Nuclear Power Plant Operator Actions: Initial Simulator to Field Data Calibration," NUREG/CR-3092, ORNL/TM-8599, Oak Ridge National Laboratory, February 1983.

Barks, Gomer, Kozinsky, Moody, "Nuclear Power Plant Control Room Task Analysis: Pilot Study for Boiling Water Reactors," NUREG/CR-3415, ORNL/SUB/79-40432/1 Oak Ridge National Laboratory, Sept. 1983.

D. S. Crowe, A. N. Beare, E. J. Kozinsky, and P. M. Haas, "Criteria for Safety-Related Nuclear Power Plant Operator Actions: 1982 Pressurized Water Reactor (PWR) Simulator Exercises," NUREG/CR-3123 (ORNL/NUREG/TM-8626), April 1983.

A. N. Beare, R. E. Dorris, C. R. Bovell, D. S. Crowe, and E. J. Kozinsky, "A Simulator-Based Study of Human Errors in Nuclear Power Plant Control Room Tasks," NUREG/CR-3309, SAND 83-7095, Sandia National Laboratories, 1983.

Kozinsky, Gray, Beare, Barks, and Gomer, "Safety-Related Operator Actions: Methodology for Developing Criteria," NUREG/CR 3515, ORNL/TM-8942, March, 1984.

RESUME

NAME: John D. Hopkins

DATE OF BIRTH: April 29, 1957

DATE EMPLOYED: July 5, 1977

TITLE: Shift Supervisor

EDUCATION: 1 1/3 years Augusta Collge

LICENSE/CERTIFICATIONS Senior Reactor Operator Certification, 8/84, Vogtle Project
Reactor Operator License received 4/82 for Hatch 1 & 2

WORK EXPERIENCE:

SUMMARY: 6 3/4 years power plant experience (Commercial Power Plant) (42¼ months with weighting factors)

NUCLEAR (GPC)

Position: Shift Supervisor
Dates: August 1984 - Present
Location: Plant Vogtle, Burke Co., Ga.
Plant Status: Under construction & startup
Job Description: Direct operators on shift during CAT, and startup. Assigned to C/R Design Modifications/ Human Factor Group.

Position: Shift Foreman-In-Training
Dates: March 17, 1984 - August 1984
Location: Plant Vogtle, Burke Co, Ga.
Plant Status: Under construction and startup
Job Description: Attending SRO certification school and assigned to C/R Design Modifications/Human Factors group.

Position: Plant Operator
Dates: January 1984 - March 17, 1984
Location: Plant Vogtle, Burke Co., Ga.
Plant Status: Under construction & startup
Job Description: Attend SRO Certification School

Position: Assistant Plant Operator Reactor Operator License
Dates: 4/82 to 12/83
Plant Status: Commercial Operation
Job Description: Duties consist of Control Room Operation of Unit 2 BWR under normal and transit conditions, normal startup, shutdown and refueling operations, the refueling flow and in Control Room.

NUCLEAR (GPC) CONT'D

Position:	Assistant Plant Operator
Dates:	10/79 to 4/82
Location:	Plant Hatch
Plant Status:	Commercial Operation
Job Description:	Duties consist of operation of radwaste facilities including liquid and solid waste processing. During this time I attended the Hatch RO license school for RO license preparation.

Position:	Plant Equipment Operator
Dates:	7/77 to 10/79
Location:	Plant Hatch
Plant Status:	Commercial Operation
Job Description:	Daily check of remote equipment and remote equipment operation.

TRAINING

NUCLEAR

Course Title:	Substation Operation
Dates:	January 1980
Total Course Hrs.:	40
Vendor:	GPC
Description:	Design and operation of 230/500 kv switchyard

Course Title:	Turbine Generator Operation
Dates:	November 1982
Total Course Hrs.:	40
Vendor:	Spectrum Technical Training
Description:	Design, operation and construction of Turbine Generator and auxillary systems required for T-G startup, shutdown and operation.

Course Title:	Basic Nuclear Preparation
Dates:	
Total Course Hrs.:	320 hrs.
Vendor:	GPC
Description:	This course is designed to prepare personnel in basics needed to enter the license program. Studies consisted of instruction in mathematics, classical physics, chemistry, electricity and heat transfer.

TRAINING

NUCLEAR (CONT'D)

Course Title:	Physics
Dates:	
Total Course Hrs.:	320 hrs.
Vendor:	GPC
Description:	Study is structured to provide instruction in Nuclear Theory and Operation. Subjects included Nuclear Physics, Radiation Detection and Shielding, Core Physics, Reactor Operations and Operating Characteristics.
Course Title:	Basic Technology
Dates:	
Total Course Hrs.:	240 hrs.
Vendor:	GPC
Description:	This course provides a technical understanding of the design and operating characteristics of a BWR. Material studied includes Thermodynamics, Fluid Mechanics, Heat Transfer, Health Physics, and Nuclear Instrumentation.
Course Title:	Reactor Technology
Dates:	
Total Course Hrs.:	400 hrs.
Vendor:	GPC
Description:	This provides a technical knowledge of the Plant E.I.Hatch systems including all safety systems and operational settings.
Course Title:	BOP Systems
Dates:	
Total Course Hrs.:	480 hrs.
Vendor:	GPC
Description:	This study reviews the Plant Technical Specifications and introduces plant familiarization in the field.

TRAINING

NUCLEAR (CONT'D)

Course Title: Simulator or on-the-job
Dates:
Total Course Hrs.: 320 hrs.
Vendor: GPC
Description: This is a 20 week phase of training which includes 8 wks. study and observation in the plant and a 12 week observation of Control room operations. This phase of training includes all normal duties of control room work, field work, maintenance preparation and assistance with various tests. Control manipulations are performed on both the simulator and in the control room.

Course Title: Walkthru & Evaluation
Dates:
Total Course Hrs.: 320 hrs.
Vendor: GPC
Description: This study involves Training Department walkthru's followed by vendor evaluations.

Course Title: Reactor Startup Qualification
Dates:
Total Course Hrs.: 40 hrs.
Vendor: General Electric Corp.
Description: (G.E. hot license certification)

Course Title: SRO Certification Program Plant Vogtle
Dates: 1/84 to 7/84
Total Hrs.: 1120 hrs.
Vendor: GPC; General Physics
Description: Prepare SRO candidates for certification. Basic PWR Theory, Design, and Operations with 8 weeks of Simulator Training.

RESUME OF

RILEY R. JOHNSON

EXPERIENCE:

July 1984 to Present	Consultec Services, Inc. Vogtle Electric Generating Plant Waynesboro, GA Operations Support Supervisor Duties: Provide assistance to VEGP Nuclear Operations in areas of procedure, review, training, plant testing/operations and human factors evaluations. Temporarily assigned to V.C. Summer Operations Training Staff in support of the VEGP SRO Licensing Program.
Jan 1984 to July 1984	Operations Supervisor for Deseret Generation and Transmission at a 400 MW coal fired plant. Duties include supervising the testing, startup and operation of various plant equipment and supervising a shift of 6 operators.
Jan 1982 to Jan 1984	Ebasco Services, Inc. Waterford III Nuclear Station Taft, LA A 1165 MW Combustion Engineering PWR Position: Principal Engineer Duties: Serving as the operations oriented member of a multidiscipline review team (System Operability Assurance Review Team) whose function is to perform detailed reviews of plant systems to identify design discrepancies and operational concerns and to complete detailed analysis of system reaction to single component or control failures. Later participated in the Waterford III control room design review and the resolution of the human engineering discrepancies (per NUREG 0700). Also developed plant systems training lectures for the technician training program.

May 1980 to Jan 1982	NUS Corporation Virgil C. Summer Nuclear Station Jenkinsville, SC Position: Staff Engineer Duties: Responsible for writing and reviewing plant surveillance test procedures. Later assigned to the Activities Coordination Team whose function was to act as liaison with the various construction, startup, operating and maintenance factions to minimize interference and the duplication of effort during pre-operational testing. In addition to the Activities Coordination team, I served as Task Leader for the operations assistance group whose function is to advise the Shift Supervisor on the correct and proper operation of plant equipment during startup and operations and to conduct on shift training for the operations group.
April 1979 to May 1980	Westinghouse Electric Corporation Krsko Project, Krsko, Yugoslavia. Position: Primary Plant Startup Supervisor Duties: Responsible for reviewing, rewriting, and recommending for approval startup tests and plant operating procedures, also responsible for supervising a test team in performing various startup tests on 600 MW Westinghouse design pwr and evaluating the results of those tests.
July 1978 to April 1979	Colorado UTE Electric Association Craig, Colorado Position: Control Room Operator Duties: Responsible for performing various startup tests, operating major pieces of equipment, and directing the operation of auxiliary equipment of a 450 MW coal fired power plant.
July 1973 to July 1978	Arkansas Power and Light Company Arkansas Nuclear One Unit One A 1025 MW B&W design pwr and as plant operator on Unit 2, a 980 MWCE design pwr. Position: All positions from auxiliary power to plant operator.

Duties: Responsible for all phases of equipment operation and startup testing including obtaining senior reactor operator certification (1978), a reactor operator license (1976), and a high pressure boiler operator license (1973).

May 1965 to April 1973

United States Navy
Position: Machinist Mate
Duties: Responsible for operation and maintenance of naval nuclear power plants and for training new navy operators in safe and correct operation and maintenance procedures.

RESUME

NAME: Alan Lee James

TITLE: Associate Engineer

DEGREE: Electrical Engineering (Bachelors)

DATE OF BIRTH: 11/10/59

DATE EMPLOYED: 7/6/81

WORK EXPERIENCE:

NUCLEAR (GPC)

Position: Plant Engineer
Dates: 7/6/84 to Present
Location: Plant Vogtle
Plant Status: Under Construction
Job Description: PERMS, Control Room Workspace Modification
Class 1E 125 VDC Lead Test Supervision

Position: Associate Engineer
Dates: 1/6/83 to 7/6/84
Location: Plant Vogtle
Plant Status: Under Construction
Job Description: Telephone System, Plant Manual Review Coord., PERMS, Control Room Workspace Modification

Position: Junior Engineer
Dates: 7/6/81 to 1/6/83
Location: Plant Vogtle
Plant Status: Under Construction
Job Description: PAM's, PERM's, Equipment Qualification

Position: PEO
Dates: 7/9/81 to 7/26/81
Location: Plant Hatch
Plant Status: Operational
Job Description: PEO Work

NUCLEAR (OTHER) NONE

NON-NUCLEAR (GPC) NONE

NON-NUCLEAR (OTHER) NONE

TRAINING:

NUCLEAR

Course Title: STA Course
Dates: 2/1/82 to 6/18/82
Total Course Hrs: 640
Vendors: General Physics
Description: In depth study on Plant Vogtle and its associated systems.

TRAINING (NUCLEAR) Cont'd:

Course Title: Simulator Training
Dates: 6/21/82 to 7/30/82
Total Course Hrs: 120
Vendor: General Physics
Description: Four hours per day classroom instruction followed by four hours of instruction using the Plant Vogtle Simulator.

Course Title: PWR Course
Dates: 8/17/81 to 8/21/81
Total Course Hrs: 40
Vendor: Georgia Power
Description: Study of a general PWR.

Course Title: Respirator Training
Dates: 7/12/81
Total Course Hrs: 8
Vendor: GPC, Plant Hatch
Description: Use of different types of respirators.

Course Title: Health Physics and Security Training
Dates: 7/10/81
Total Course Hrs: 8
Vendor: GPC, Plant Hatch
Description: General Health Physics Training and Emergency Procedures

Course Title: PERMS Training
Dates: 6/18/84 to 6/29/84
7/6/84 to 7/13/84
Total Course Hrs: 120
Vendor: Westinghouse
Description: Study of the Radiation Monitoring System.

Course Title: Startup Class
Dates: 4/9/84 to 4/19/84
Total Course Hrs: 36
Vendor: GPC
Description: Studied different CAT's and Startup Procedures.

NON-NUCLEAR

Course Title: Decision Making
Dates: 2/1/82 to 2/3/82
Total Course Hrs: 24
Vendor: Process Management Skills
Description: Study of different types of the decision making process.

TRAINING (NON-NUCLEAR) Cont'd:

Course Title: Principles of Leadership
Dates: 9/12/83 to 9/16/83
Total Course Hrs: 40
Vendor: GPC
Description: How to be an effective supervisor.

Course Title: Dimension PBX
Comm. Star Training
Date: 9/22/83
Total Course Hrs: 8
Vendor: Southern Bell
Description: Working of the telephone system at Plant Vogtle.

OTHER:

(Applicable to Power Plant or Related Industry) NONE

RESUME

NAME: Gregory L. Hooper

TITLE: Associate Engineer

DEGREE: Bachelors in Electrical Engineering

DATE OF BIRTH: September 9, 1958

DATE EMPLOYED: March 1. 1982

WORK EXPERIENCE:

NUCLEAR (GPC)

Position: Junior Engineer
Dates: 3/1/82 to 3/1/83
Location: Plant Vogtle
Plant Status: Under Construction
Job Description: PAMS(RG 1.97) instrumentation, PERMS radiation monitoring computer, MET Tower, PROTEUS plant computer, Main Control Board, Human Factors Engineering, I & C

Position: Associate Engineer
Dates: 3/1/83 to 7/19/83
Location: Plant Vogtle
Plant Status: Under Construction
Job Description: PROTEUS plant computer, Main Control Board, Human Factors Engineering

Position: Associate Engineer
Dates: 11/21/83 to 3/21/84
Location: Westinghouse
Plant Status: N/A
Job Description: Wrote software for the PROTEUS plant computer

Position: Associate Engineer
Dates: 7/23/84 to Present
Location: Plant Vogtle
Plant Status: Under Construction
Job Description: Test Supervisor for the PROTEUS plant computer and the Main Control Board

NON-NUCLEAR (GPC)

Position: Co-op
Dates: 12/76 to 3/80
Location: Macon Division
Plant Status: N/A
Job Description: Energy Services Dept.

NON-NUCLEAR (OT IER)	Position:	Assistant Engineer
	Dates:	6/29/81 to 2/19/83
	Location:	Fluor Eng. & Constr.
	Plant Status:	N/A
	Job Description:	Instrumentation, Drafting, Heat Tracing

TRAINING:

NUCLEAR	Course Title:	PWR
	Dates:	7/19/82 to 7/23/82
	Total Course Hrs:	40
	Vendor:	GPC Training Dept.
	Description:	Brief overview of nuclear physics and PWR plant systems.
	Course Title:	Engineering Technology
	Dates:	4/2/84 to 6/22/84
	Total Course Hrs:	480
	Vendor:	GPC Training Dept.
	Description:	Nuclear Physics, Plant systems operations, thermodynamics, electrical concepts, integrated plant operations.
	Course Title:	Simulator Training
	Dates:	6/25/84 to 7/6/84
	Total Course Hrs:	80
	Vendor:	GPC Training Dept.
	Description:	Simulated plant heat-up, load changes, start-up and accidents
	Course Title:	Start-up Training
	Dates:	7/9/84 to 7/20/84
	Total Course Hrs:	80
	Vendor:	GPC Training Dept.
	Description:	Reviewed Start-up procedures, CAT procedures, and Test Supervisor responsibilities.
NON-NUCLEAR	Course Title:	PROTEUS computer training
	Dates:	7/25/83 to 11/18/83
	Total Course Hrs:	680
	Vendor:	Westinghouse
	Description:	Detailed hardware and software training

RESUME

NAME: Paul M. Kochery

T Plant Engineering Supervisor

DEGREE: BS (Electrical Engineering)
BS (Physics & Mathematics)

DATE OF BIRTH: March 18, 1945

DATE EMPLOYED: February 22, 1977

WORK EXPERIENCE:

NUCLEAR (GPC)

NUCLEAR (GPC)	Position:	Plant Engineering Supervisor
	Dates:	2-23-83 thru present
	Location:	Plant Vogtle - Power Generation
	Plant Status:	Under Construction
	Job Description:	Coordinate electrical DWG reviews design reviews, control room design reviews, Equipment Qualification Program, Plant Telecommunication system, MET Tower, EOF Communucation Instrumentation and Control System Reviews, Scaling, Proteus Computer, Secondary Plant Performance and implementation of Reg. 1-67 and Reg. 0700.
	Position:	Sr. Plant Engineer
	Dates:	3/20/82 - 2-22-83
	Location:	Plant Vogtle - Power Generation
	Plant Status:	Under Construction
	Job Description:	Group Leader - coordinate electrical DWG reviews, design reviews, control room design reviews, Equipment Qualification Program, Plant Telecommunication system and implementation of Reg. 1-67 and Reg. 0700.
	Position:	Construction Engineer
	Dates:	11/5/79 - 9/3/79
	Location:	Plant Hatch - Temp. Assignment
	Plant Status:	Operating
	Job Description:	Supervisor - Problem Solving.
	Night Shift:	Pipe support modification to concur with NRC bulletin 79-04 and 79-014.
	Position:	Construction Engineer - Instrumental and Control
	Dates:	11/4/79 - 11/5/79; 9/3/79 - 9/29/79
	Location:	Plant Vogtle - Construction
	Plant Status:	Construction
	Job Description:	Review specification, generate construction (instrumentation) dept. procedure, review instrumentation drawing, resolve any installation problems.

	Position:	Construction Engineer - Instrumentation and Control
	Dates:	2/22/77 - 11/4/78
	Location:	Plant Hatch
	Plant Status:	Construction, start-up and operation
	Job Description:	Complete responsibility of installing all instrumentation and tubing at Plant Hatch, Unit 2. Also helped Mechanical Section in Hanger Surveillance and provided engineering support for insulation installation.
NUCLEAR (OTHER)		None
NON-NUCLEAR (GPC)	Position:	Field Engineer - Piping, Instrumentation and Control
	Dates:	9/29/79 - 3/20/82
	Location:	Plant Scherer
	Plant Status:	Construction, start-up and operation
	Job Description:	Resolve piping and pipe support problem, material take off and requisitioning. Coordinate activities of all the contractors in installing piping and instrumentation and piping support. Evaluate the bids and specification, re-design control air system, coordinate start-up and outage work. Planning and scheduling of inst. installation and cost evaluation of instrumentation installation contract.
NON-NUCLEAR (OTHER)	Position:	Instrumentation Engineer
	Dates:	2/5/75 - 2/22/77
	Location:	Plant Wansley - Davis Electrical Constructors
	Plant Status:	Construction, start-up and operation
	Job Description:	Coordinate the activities for Plant Wansley, Unit #2 instrumentation installation. Solve all installation problems.
	Position:	Project Electrical Engineer
	Dates:	1/5/75 - 2/5/76
	Location:	Lone Star Cement, Roanoke, Va. - Davis Electrical
	Plant Status:	Construction - start-up
	Job Description:	Povide supervision and coordination for the installation of the H-V switchyard. All equipment and instrumentation and control prepared the lay out for

stacker and reclaimers. Plan and schedule the outage activities, including manpower and material.

Position: QC and Test Engineer
Dates: 5/1/74 - 12/30/74
Location: Cutler Hammer Canada, Toronto, Ontario, Canada
Plant Status: Operating
Job Description: Develop Test procedures and direct the QC personnel. Help customers QC programmer.

Position: Electrical Engineer
Dates: 5/72 - 5/74
Location: Cape Fear, NC DuPont Fiber Plant - Davis Electrical Constructors
Plant Status: Construction - start-up and operation
Job Description: Design lighting for General Plant. Resolve installation problem. Schedule the shutdown work. Re-design the control circuit for cutting and bailing machine. Supervision of Drafting Section, Shop and Warehouse.

Position: Engineer Trainee
Dates: 9/2/70 - 9/5/71
Location: State Electricity Board, Kerala, India
Job Description: Review specification, inspect the installation of 66 KV substation.

TRAINING:

Course Title: Operation Technology Training
Total Course Hrs: 16 wks.
Vendor: Ga. Power Co.

Course Title: AWS Certification
Total Course Hrs: 40
Vendor: Ga. Power Co.

Course Title: Visual Inspection - Level 2
Total Course Hrs: 16
Vendor: Ga. Power Co.

TRAINING (Cont'd):

Course Title: Liquid Pentrant Testing - Level 2
Total Course Hrs: 32
Vendor: Ga. Power Co.

Course Title: Magnetic Particle Testing
Total Course Hrs: 16
Vendor: Ga. Power Co.

Course Title: Inst. and Control Inspection
Total Course Hrs:
Vendor: Ga. Power Co.

Course Title: Mech. Structural Inspection
Total Course Hrs: 40
Vendor: Ga. Power Co.

Course Title: Inspection 2½ in. and Smaller Pipes
Total Course Hrs: 16
Vendor: Ga. Power Co.

Course Title: Standard First Aid
Total Course Hrs: 4
Vendor: Ga. Power Co.

Course Title: Cardiopulmonary Resuscitation
Total Course Hrs: 4
Vendor: Ga. Power Co.

Course Title: Safe Work Procedure for Closed Vessel
Total Course Hrs: 8
Vendor: Ga. Power Co.

Course Title: Codes and Standards
Total Course Hrs: 16
Vendor: Ga. Power Co.

Course Title: Tech. Communication
Total Course Hrs: 40
Vendor: Neilson

Georgia Power Company
Route 2, Box 299A
Waynesboro, Georgia 30830
Telephone 404 554-9961, Ext. 3360
404 724-8114, Ext. 3350

Georgia Power
the southern electric system

D. O. Foster
Vice President and Project
General Manager
Vogtle Project

September 14, 1984

Director of Nuclear Reactor Regulation
Attention: Ms. Elinor G. Adensam, Chief
Licensing Branch #4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

File: X7BC06
Log: GN-416

REF.: Dutton to Adensam, 4/14/84, Generic Letter 82-33

NRC DOCKET NUMBERS 50-424 AND 50-425
CONSTRUCTION PERMIT NUMBERS CPPR-108 AND CPPR-109
VOGTLE ELECTRIC GENERATING PLANT - UNITS 1 AND 2
PROGRAM PLAN FOR IMPLEMENTATION OF CONTROL ROOM DESIGN REVIEW

Dear Mr. Denton:

The referenced letter stated a commitment to provide you with the subject plan approximately twenty-four (24) months prior to fuel load. Enclosed please find twelve (12) copies of the subject plan.

Should you have any questions on the enclosed submittal, do not hesitate to contact me.

Yours truly,

D. O. Foster

D. O. Foster

DOF/JAB/sw
Enclosure
xc: M. A. Miller
R. A. Thomas
J. A. Bailey
L. T. Gucwa
G. F. Trowbridge, Esquire
L. Fowler
C. A. Stangler
J. E. Joiner, Esquire
G. Bockhold, Jr.

A003
1/1