CONTROL ROOM DESIGN REVIEW

FINAL SUMMARY REPORT

FOR

H. B. ROBINSON NUCLEAR PROJECT

UNIT NO. 2

SEPTEMBER, 1986

CRDR SUMMARY REPORT

EXECUTIVE SUMMARY

This document is the final summary report describing the activities that were conducted for the Control Room Design Review (CRDR) for Carolina Power and Light's H.B. Robinson Nuclear Project, Unit 2 (HBR2). This summary report fulfills a commitment to the NRC contained in the CRDR Program Plan. The Program Plan was submitted to the NRC by letter to the Director of Nuclear Reactor Regulation, from E. E. Utley (CP&L); dated December 31, 1984; serial: NLS-84-509.

The Product of the CRDR is the identification of Human Engineering Discrepancies (HED). An HED is a departure from some benchmark of system design suitability for the roles and capabilities of the human operator. A total of 430 HEDs were identified and are listed in Appendix A, "HBR HED SUMMARY". Of these, 57 have been corrected, and 216 will be corrected per the schedule provided in Section 6 of this report. Justifications for the acceptability of the remaining 157 HEDs have been provided in Appendix A.

Section 6 of this report lists those HEDs contained in Appendix A, which are dispositioned for corrective action. The HEDs are grouped per specific projects that will implement HED corrections. Section 6 also provides the current implementation schedule for the HED corrections. Should this schedule be revised, CP&L will promptly notify the NRC of any changes. Please note that CP&L considers Section 6 to be the commitment section of this report, and no statements contained in any other portion of this report constitute commitments for future action by CP&L. There are 26 specific HED correction projects identified in Section 6. There are two projects in Section 6 for commitments made in the CRDR Program Plan that could not be completed by the CRDR Summary Report submittal date.

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TABLE OF CONTENTS

TABLE OF CONTENTS
APPENDICES

TABLE OF CONTENTS
FIGURES

TABLE OF CONTENTS
FIGURES (CONTINUED)

TABLE OF CONTENTS
TABLES

SECTION 1.0 OVERVIEW

1.1 INTRODUCTION

This final summary report describes the activities that were involved in the Control Room Design Review (CRDR) for Carolina Power & Light's H. B. Robinson Nuclear Project, Unit 2 (HBR). It describes the methodology and result of each CRDR activity. This report has been prepared in response to NUREG-0737, Clarification of TMI Action Plan Requirements and of NUREG-0737, Supplement 1, Requirements for Emergency Response Capability (Generic Letter No. 82-33).

The format of this report consists of the following:

1. Overview
2. Management and Staffing
3. Technical Approach
4. Assessment and Design Solutions
5. Documentation and Document Control
6. Implementation Schedule
7. Conclusion

This report addresses the acceptance guidelines stated in Section 2 of the October 1981 Draft of NUREG-0801, Evaluation Criteria for Detailed Control Room Design Review, and in Section 2.0 "Planning Phase" of NUREG-0700. This report also recognized and is responsive to each of the nine criteria by which the NRC evaluates CRDR Final Summary Report submittals by licensees.

TABLE 1-1 identifies each of these evaluation, criteria, and the specific section(s) of this report that describes compliance with each criterion for the HBR CRDR.

TABLE 1-1
COMPLIANCE WITH CRDR EVALUATION CRITERIA

Criteria	HBR CRDR Final Summary Report Section Demonstrating Compliance
1. Establishment of a qualified multidisciplinary review team.	Section 2.0
2. Function and task analyses to identify control room operator tasks and information and control requirements during emergency operations.	Section 3.4
3. Comparison of display and control requirements with a control room inventory.	Section 3.6
4. Control room survey to identify deviations from accepted human factors criteria.	Section 3.3
5. Assessment of HEDs to determine which HEDs are significant and should be corrected.	Section 4.0
6. Selection of design improvements.	Section 4.6
7. Verification that selected design improvements will provide necessary correction.	Section 4.6
8. Verification that improvements will not introduce new HEDs.	Section 4.6
9. Coordination of control room improvements with changes from other programs such as SPDS, operator training, Reg. Guide 1.97 instrumentation, and upgraded EOPs.	Section 1.4

1.2 BACKGROUND

1.2.1 General

This final summary report describes the actions taken to complete the HBR CRDR. The CRDR is part of a broad effort within the nuclear industry to evaluate the adequacy of control rooms to support safe and effective operations. Guidance for the CRDR was provided by the Nuclear Regulatory Commission (NRC) in the form of various NUREGs and regulatory guides. CP&L used the relevant guidance in performing the CRDR and in developing this final summary report. CP&L dedicated the necessary resources to the CRDR to ensure success of the project.

1.2.2 H.B. Robinson

The H.B. Robinson Nuclear Project Unit 2 is a Westinghouse Pressurized Water Reactor (700 Mwe) located in Hartsville, South Carolina. It began commercial operation in March of 1971.

1.2.3 CR-1580 Review

CP&L conducted a review of the H. B. Robinson, Unit 2 Control Room in 1981 in accordance with the guidance provided in NUREG/CR-1580. As part of the CRDR effort, the earlier review was updated to NUREG-0700 criteria.

1.2.4 Summary Report Objectives

This final summary report provides a source for documentation of the CRDR activities that have taken place for HBR. It also provides a means to ensure that the CRDR is adequate and complete.

1.3 CRDR PROGRAM STRUCTURE

1.3.1 CRDR Phases

The CRDR was conducted in three phases as outlined in Figure 1-1. The following is a description of each phase of the project.

a. Phase I - Project Planning

The objective of the first phase was to develop a plan for conducting the review that describes project milestones, schedules, review methods, personnel responsibilities, and project interfaces.

Submission of the HBR Program Plan to the NRC completed the planning phase. The Program Plan was submitted in December of 1984.

NRC staff comments upon review of the Brunswick Steam Electric Plant Program Plan were taken into account in the implemention of the HBR CRDR. Changes to the plan are documented in this final summary report and consist of:

1) Format changes to the Element Tables described in Section 3.

2) Expanded methodology used in the Assessment of HEDs described in Section 4.0.

3) Post implementation HED resolution re-evaluations will not be submitted as an ammendment to this report. They will be conducted and documented as described in section 4.8.

b. Phase II - Review and Assessment

The second phase of the CRDR involved collection, reduction and analysis of data pertaining to the adequacy of the Control Room design from a human factors perspective, and assessment of any human engineering discrepancies (HEDs) identified during the process. The assessment procedure included:

1) A determination of the error potential and consequences of each HED.

2) Identification of HED disposition.

3) Assurance that the selected design improvements provide the necessary correction and that no additional HEDs were introduced as a result of these resolutions.

This report describes the methods and results of the CRDR. This report also describes CP&L's plans and schedules for correction of the HEDs.

c. Phase III - Implementation

The final phase in the CRDR is to implement the resolutions or backfits for the HEDs. Backfit specifications are reviewed prior to implementation to ensure that they fulfill the CRDR recommendations.

1.4 INTEGRATION OF CRDR WITH OTHER ACTIVITIES

Although the CRDR was specifically directed toward evaluating the control room (CR) (including the dedicated shutdown panels), CP&L recognized the interface between the CRDR and other related activities. These include the design of a Safety Parameter Display System (SPDS), implementation of REG. GUIDE 1.97 requirements, development of Emergency Operating Procedures (EOPs), operator training, and the implementation of Emergency response Facilities (ERF). The organization of the CRDR considered the coordination of the CRDR with these related efforts. This report reflects the balanced and orderly approach CP&L followed to implement the NUREG-0737, Supplement 1 requirements. It is not the intent of this report to describe all the detailed information related to the implementation of the NUREG-0737, Supplement 1 requirements.

The integration that took place in conjunction with the human factors review is discussed below:

a. Safety Parameter Display System (SPDS)

The SPDS is based on the six critical safety function status trees (CSFST) as implemented as part of the HBR Emergency Operating Procedures (EOPs). Each of these CSFSTs is associated with a fault tree analysis of parameters related to the three fission product barriers (fuel matrix, reactor coolant system and containment). This, along with trending of the individual parameters used in the CSFST make up the HBR SPDS. It functions as a companion to the EOPs and as an aid to the operator for monitoring the three fission product barriers. The CSFST contained in the SPDS are directly tied to the EOPs.

b. Regulatory Guide RG 1.97

RG 1.97 provided guidance to nuclear power plants on instrumentation which should be provided to monitor plant variables and systems during and following an accident. Per guidance provided in RG 1.97, revision 3 and NUREG-0737, Supplement 1, plant variables were selected, typed and categorized. Available HBR instrumentation was then compared to the criteria (equipment qualification, redundancy, power source, etc.) per type and category. This resulted in the identification of instrumentation system upgrades, additions or replacements. An implementation schedule was then prepared and modification development and installation begun.

c. Emergency Operating Procedures (EOP)

The EOPs were written specifically to adhere to the Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERGs), Rev. 1. Various drafts of the EOPs were tested on a simulator and received table top and control room walkthrough exercises to provide evidence that any deviation taken by CP&L in making the procedures plant-specific resulted in expected responses and ensured that safe conditions were achieved. These EOPs were written and tested by many of the same individuals that participated in the CRDR efforts and supported the HEDAT.

EOP revisions are made using the methodology specified in the EMERGENCY OPERATING PROCEDURE WRITER'S GUIDE (HBR-OMM-013).

d. Operator Training

The initial operator training program was tailored to the upgraded EOPs and was written by the personnel responsible for the development of the EOPs. The

training department is notified of all plant modifications and procedure changes through the normal distribution of these items by document control. Plant modifications and procedure changes are reviewed by training to determine the need for either dissemination of the information or updates to training lesson plans.

e. Emergency Response Facilities

The ERF has been coordinated with the CRDR in the areas of information and communication needs. The same integrated plant computer system (Emergency Response Facilities Information System or ERFIS) that drives the control room CRTs and SPDS will also drive the CRTs in the Technical Support Center (TSC) and the Emergency Operations Facility (EOF). All CRT displays available in the control room can be called up in the TSC or EOF without affecting the control room displays. This information is displayed (real time) in the TSC and EOF, which ensures maximum coordination of facilities.

The communication system between the control room and the ERF conform to the requirements of 10CFR50, Appendix E. The communication devices provided include: dedicated telephones, dial-up telephones, the Emergency Notification System and company radios.

The Lead Discipline Engineer (LDE) and Site Operatations Coordinator (SOC) for the CRDR have been involved with all the NUREG-0737, Supplement 1 issues at H. B. Robinson described above. As each of these issues continue to be implemented through the normal modification process, the interfaces between the CRDR and each of these issues will be assessed. The implementation of the human factors maintenance procedure (as described in Section 4.8 of this report) will ensure that each of the NUREG-0737, Supplement 1 items and any other item affecting the control room will conform to human factors principles.

1.5 GLOSSARY OF TERMS

Since there are differences in usages of terms, the following definitions are provided to reduce ambiguity.

CONTROL ROOM: For the purpose of this plan, the control room is defined as including the primary operating area of the main control room and the dedicated shutdown panels.

CONTROL ROOM DESIGN REVIEW: The Control Room Design Review as required by NUREG-0660, Item I.D.1 and implemented in accordance with NUREG-0700.

ENHANCEMENTS: Surface modifications that do not involve major physical changes - for example, demarcation, labeling changes, and painting.

FINAL SUMMARY REPORT: Final summary report of the results of the CRDR as required by NUREG-0660, Item I.D.1 and in accordance with Generic Letter 82-33.

FUNCTION: An action performed by one or more system constituents (people, mechanisms, structures) to achieve an objective.

FUNCTIONAL ALLOCATION: The distribution of functions among the human and machine constituents of a system.

HUMAN ENGINEERING DISCREPANCY (HED): A departure from some benchmark of system design suitability for the roles and capabilities of the human operator.

HED ASSESSMENT TEAM (HEDAT): Those individuals of the CRDR Team who have the responsibility for review and assessment of the HED reports.

HUMAN FACTORS ENGINEERING: The science of optimizing the performance of human beings, especially in industry; and the science of designing equipment for efficient use by human beings.

OBJECTIVE (MISSION, GOAL): The end-product as a result of a coordinated set of actions taken.

LICENSED OPERATOR: Any individual currently licensed by the NRC who manipulates a control or directs another to manipulate a control that directly affects reactivity (SRO or RO).

SUBTASK: An action performed by a person (or machine) directed toward completing a single task.

SYSTEM: Components that function as a whole by virtue of the interdependence of its parts: an organization of interdependent constituents that work together in a patterned manner to accomplish some purpose.

TASK: A specific action, performed by a single system constituent (person or equipment), that contributes to the accomplishment of a function. In NUREG-0700, only tasks allocated to people, in particular to control room operators, are addressed in detail. Moreover, in accordance with Generic Letter 83-22, only tasks associated with emergency systems have been evaluated.

VALIDATION: The process of determining if the physical and organizational design for operations is adequate to support effective integrated performance of the functions of the control room operating crew.

<u>VERIFICATION</u>: The process of determining if instrumentation, controls and other equipment meet the specific requirements of the tasks performed by operators.

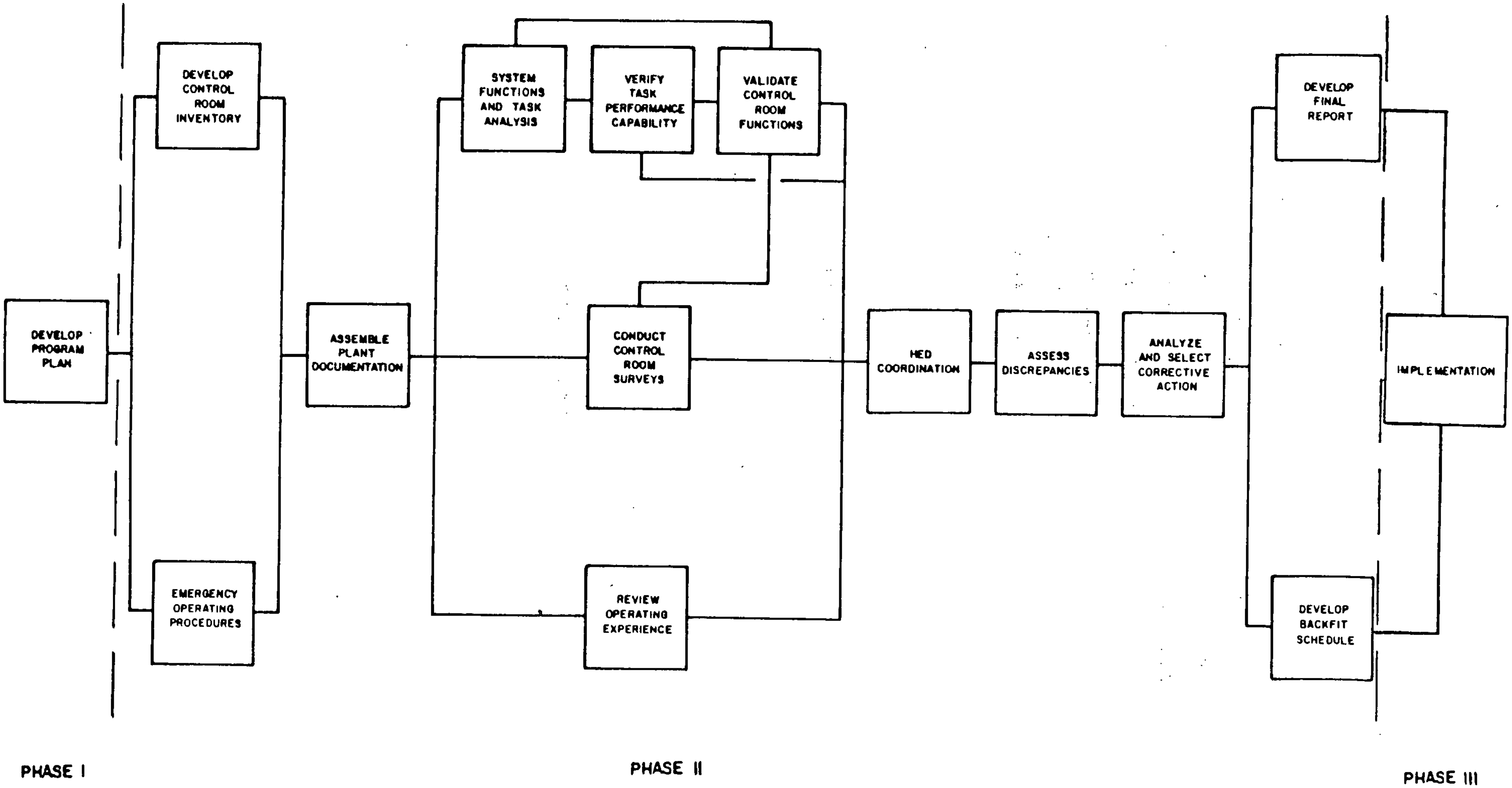
1.6 ACRONYMS

A number of acronyms are used in this report. This list is presented to facilitate the reader's use and comprehension of the report.

AC	Alternating Current
AIRD	Action-Information Requirements Details
AIRS	Action-Information Requirements Summary
ALB	Annunciator Light Box
APDMS	Axial Power Distribution Monitor System
CP&L	Carolina Power & Light Company
CR	Control Room
CRDR	Control Room Design Review
CRT	Cathode Ray Tube
CWD	Control Wiring Diagram
EDG	Emergency Diesel Generator
ERF	Emergency Response Facilities
ERFIS	Emergency Response Facilities Information System
ERG	Emergency Response Guidelines
EOP	Emergency Operating Procedure
FHB	Fuel Handling Building
FSAR	Final Safety Analysis Report
FW	Feedwater
HBR	H.B. Robinson Nuclear Project
HED	Human Engineering Discrepancy
HEDAT	Human Engineering Discrepancy Assessment Team
HF	Human Factors
HFS	Human Factors Specialist
HVAC	Heating Ventilation and Air Conditioning
I&C	Instrumentation and Control
INCORE	Incore Instrumentation System
LDE	Lead Discipline Engineer
LED	Light Emitting Diode
LHFS	Lead Human Factors Specialist
LOCA	Loss of Coolant Accident
MCB	Main Control Board

MSIV	Main Steam Isolation Valve
MWe	Megawatts Electric
NIS	Nuclear Instrumentation System
NRC	Nuclear Regulatory Commission
OER	Operating Experience Review
OALS	Operations Analysis and Logic Support
OS	Operations Support
PAM	Post Accident Monitoring
P&ID	Piping and Instrumentation Diagram
PGP	Procedure Generation Package
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RO	Reactor Operator
SFTA	System Function Task Analysis
SG	Steam Generator
SGTR	Steam Generator Tube Rupture
SI	Safety Injection
SITL	System Integration Team Leader
SOC	Site Operations Coordinator
SPDS	Safety Parameter Display System
SRO	Senior Reactor Operator
SRTA	System Review and Task Analysis
WOG	Westinghouse Owners Group

THE TASK FLOW/RELATIONSHIPS OF THE CONTROL ROOM DESIGN REVIEW
FIGURE 1-1



SECTION 2.0 MANAGEMENT AND STAFFING

2.1 INTRODUCTION

The quality of the review effort and the results of the CRDR depend upon the composition, balance, and management of the review team. The CP&L CRDR team consists of representatives from the various human factors, operations and engineering disciplines necessary to insure optimum performance of the review team. The structure and functions of the team were established to allow for maximum flexibility and interaction between team members and station personnel, yet retain a rational organizational structure.

The management and staffing is most easily described in terms of the CP&L structure that is responsible for initiating and supporting this project, the review team composition, and the functional responsibilities.

Subsequent paragraphs of this section describe the:

1) CP&L Management Support Structure
2) CRDR Team Composition and Responsibilities
3) CRDR Team Task Responsibilities

2.2 CP&L MANAGEMENT SUPPORT

Establishment of the CP&L CRDR project and the development of the project team was initiated by Mr. Guy P. Beatty, Jr., Vice President - Robinson Nuclear Project, and Mr. Richard Morgan, Plant General Manager. Directly below this level of management is Mr. Fred Lowery, the Manager - Operations, followed by Mr. John Benjamin, the Operations Support Supervisor. It is this level of management that has the direct responsibility for the review team and its on-going support. Figure 2-1 illustrates this upper management organization.

2.3 CRDR TEAM

2.3.1 General

The CRDR team and structure of the dedicated core team is shown in Figure 2-2. This core group was supplemented on an as-required basis by the remaining individuals. This support group was composed of representatives from all required disciplines such as operations, mechanical, maintenance, I&C maintenance, training, plant engineering, and human factors engineering.

Within the core CRDR team, individuals were designated as members of the Human Engineering Discrepancy Assessment Team (HEDAT). Principle responsibilities of the HEDAT were to review and assess all HED reports as described in Section 4.0, to develop recommended resolutions, and establish preliminary scheduling of all backfit activities.

2.3.2 CRDR Core Team

The core team is structured as illustrated in Figure 2.2. This enhanced the review team's ability to respond rapidly at a competent technical level to the broad spectrum of review activities on a day-to-day basis. Core team resumes are provided in Appendix C to document the proven track record of this team as managers, administrators, supervisors and technical experts.

2.3.2.1 Lead Discipline Engineer - The Lead Discipline Engineer (LDE) for the CRDR was Mr. John Benjamin, Operations Support Supervisor. He had the overall responsibility for insuring that the review was conducted as planned and scheduled. As the team manager, he reviewed the project's progress, identified any problems concerning schedules and planning, and, with the aid of the team coordinators, he resolved any coordination problems. He also assisted with the coordination between the CRDR and other NUREG-0737, Supplement 1 activities.

2.3.2.2 Site Operations Coordinator - The Site Operations Coordinator (SOC) for the CRDR was Mr. Elery Shoemaker, Senior Engineer - Operations. He worked closely with the LDE to insure the review was conducted as planned and scheduled. The SOC was responsible for day to day CRDR activities and reporting project status and progress to CP&L/H. B. Robinson Management. As the review team's technical leader, he insured that adequate technical resources were applied to all review activities. As a member of HEDAT, he coordinated/processed the CRDR HEDs.

2.3.2.3 System Integration Team Leader - The System Integration Team Leader (SITL), a consultant to HBR, was Mr. Robert Shepard. He had the overall responsibility for providing the human factors personnel to implement the CRDR as planned and scheduled. He coordinated with the SOC in directing the CRDR tasks.

2.3.2.4 Lead Human Factors Specialist - The Lead Human Factors Specialist (LHFS), a human factors consultant, was Ms. Danna Beith. She was primarily responsible for ensuring the technical quality of human factors work and the availability of appropriate human factors specialists as required throughout this project. She worked closely with the SOC and coordinated the HF

activities with the SITL. She was directly responsible for progress in the HF areas of the project and reported any deviations from planned activities, methods or procedures to the SOC in a timely manner. She also was responsible for technical justifications related to any proposed methodological or procedural changes. As a member of the HEDAT, she established accurate and realistic statements on the human performance aspects for all identified problems and suggested resolutions to HEDs that would not create other HF problems.

2.3.2.5 Operations Analysis and Logic Support - The Operations Analysis and Logic Support for the project was provided by Mr. Patrick McMurtry, a human factors consultant. He has extensive knowledge of the H.B. Robinson EOPs and systems. He coordinated with the SOC and the LHFS to provide continuity and quality in the System Function Task Analysis (SFTA) and the verification and validation tasks.

2.3.2.6 Operations Support - The Operations Support was provided by Ms. Marianne Grannan, an Industrial Engineering/human factors consultant. She was committed to the CRDR for direct support in the SFTA and verification and validation tasks. She was also available on an as-needed basis for support throughout the project.

2.3.2.7 Human Factors Specialists - Human Factors support personnel (human factors consultants), were committed to the project for direct support of data collection, data reduction and analysis, and HED generation, analysis, and resolution. Also in support of this project was a pool of human factors support personnel that represented diverse and specialized backgrounds in human factors. The support group was

directed by Mr. Walter Talley, the Human Factors Manager, and was available on an as-needed basis throughout the review.

2.3.3 Review Team Support Members

2.3.3.1 General - Review Team Support members were assigned support roles from the various required disciplines to ensure an appropriate level of technical quality for the project. Although not assigned full-time, their availability was assured by CP&L management. Individual disciplines represented in this support group included but were not limited to:

1) Operations

2) Engineering

3) Training

4) Maintenance

2.3.3.2 Operations - Experienced operators participated in various phases and activities of this project. Their participation included contributions to the Operating Experience Review (OER) (described in paragraph 3.3), assistance during the verification of task performance activities, validation of control room functions processes, and the clarification of HEDs as required. Each operator had specific, unique experiential information that contributed significantly to appropriate HED resolutions.

2.3.3.3 Engineering - The engineering representatives were primarily involved in HED assessment and resolution tasks. They provided system and equipment information relevant to the dispositions of HEDs.

2.3.3.4 Training Representative - The training representative was primarily involved in the HED assessment and resolution tasks. He provided the continuity between the HED dispositions, operator training and the simulator project.

2.3.3.5 Maintenance - The maintenance representatives were primarily involved in the HED assessment and resolution tasks. They provided I&C knowledge for control room equipment used in the disposition of HEDs.

2.3.4 CRDR Team Task Responsibilities

a. Figure 2-3 illustrates, in matrix format, the task responsibilities for each team member.

HBR CRDR PROJECT MANAGEMENT SUPPORT
FIGURE 2-1

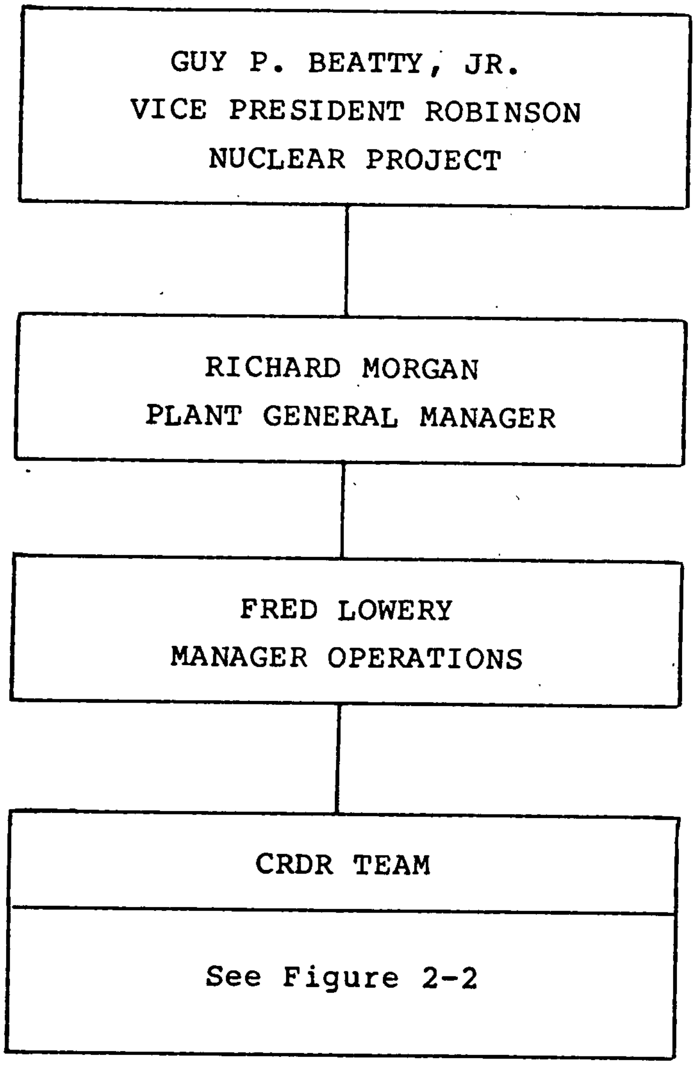
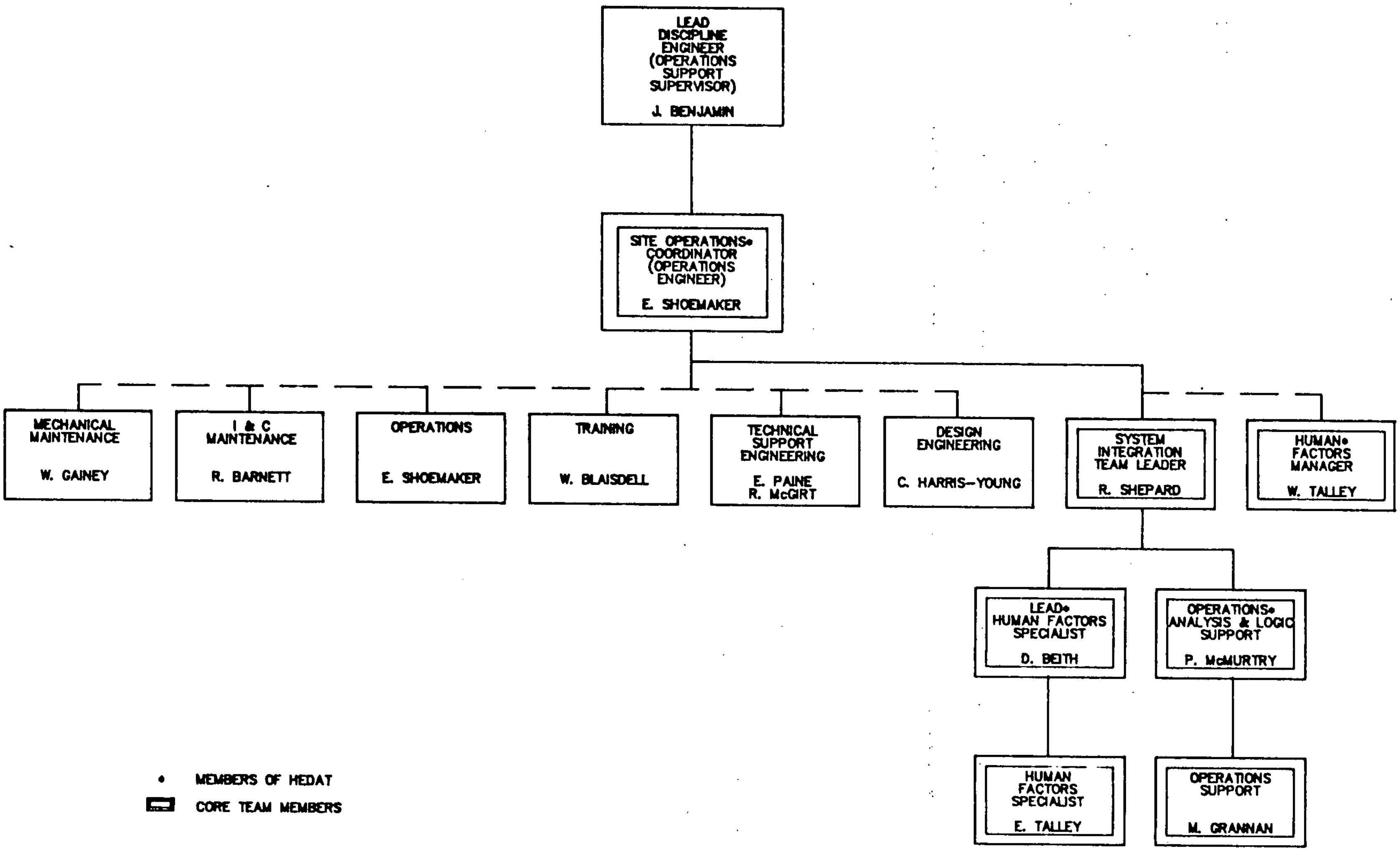


FIGURE 2-2

H. B. ROBINSON CRDR PROJECT TEAM



CRDR PROJECT MANAGEMENT TASK RESPONSIBILITIES

Figure 2-3

TASK	LDE	SOC	SITL	LHFS	OALS	OS
1. Program Definition	*	*	*	X		
2. Master Schedule Preparation and Revisions	*	X	*	X		
3. Sub-schedule Preparation and Revisions	o	*	*	X	*	
4. Detail Schedule for Plant-Specific CRDR Preparation and Revisions		o	*	X	*	
5. Periodic Update Reports	o	o	*	X	*	
6. Define CRDR Human Factors Requirements	*	*	*	X	X	
7. Conduct Plant-Specific Review (CRDR)	*	X	*	X	*	*
8. Review HEDs and Determine Corrective Actions	X	X	*	X	X	*
9. Present Recommended Corr. Action to Management and Assess Program	o	o	o	X	*	*
10. Final Summary Report Preparation				X	*	*
11. Final Summary Report Review	X	X	*	*	*	
12. Final Summary Report Approval	o	o				
13. Final Summary Report Delivery	X	*				
14. Implementation of Corrective Actions (Phase III) **	X	X		*	*	*
15. Review of Corrective Actions (Phase III) **	*	X		o	*	

X = Primary Responsibility

* = Support Responsibility

o = Approval Authority

LDE = Lead Discipline Engineer

SOC = Site Operations Coordinator

SITL = System Integration Team Leader

LHFS = Lead Human Factors Specialist

OALS = Operations Analysis and Logic Support

OS = Operations Support

** To be discontinued after design guide is in place.

SECTION 3.0 TECHNICAL APPROACH

3.1 INTRODUCTION

3.1.1 General

This section describes the procedures used by CP&L to review the completeness and suitability of the H.B. Robinson, Unit 2 Control Room. As suggested in NUREG-0700, the specific objectives of the review effort were:

a. To determine whether the control room provides the system status information, control capabilities, feedback, and performance aids necessary for the control room operators to accomplish their functions and tasks effectively.

b. To identify characteristics of the existing control room instrumentation, controls, other equipment, and physical arrangement that may detract from operator performance.

Throughout the review process, CP&L focused on ensuring that the functions and tasks assigned to the operators can be accomplished in an effective manner within the existing control room.

3.1.2 Method

The review process was conducted in six activities that parallel those described in Section 3 of NUREG-0700. Each of these activities is described below.

3.1.2.1 Operating Experience Review - This task consisted of interviewing eight operators. Interviews consisted of general and detailed questions on plant operations. See Section 3.2 of this report.

3.1.2.2 Control Room Surveys - Much of the detailed assessment of the control room was conducted via a total of 14 surveys. Thirteen of the surveys were conducted as follows:

a. Workspace - The control room workspace was evaluated by a checklist survey and direct measurements that addressed the following:
   - o Workspace Arrangement
   - o Document Organization, Use and Storage
   - o CR Access

b. Conventions - The control room was evaluated by survey for the conventions listed below, and data were subsequently compared to NUREG-0700 guidelines:
   - o Coding methods (color, shape, pattern, etc.)
   - o Standardization of abbreviations and acronyms
   - o Consistency of control use
   - o Consistency of display movement or indication

c. Controls - Controls were evaluated by measurements, observations and other assessment methods.

d. Displays - Displays were evaluated by measurements, observations or other assessment methods.

e. Communications - The communication system was evaluated by observations, noise level recording and operator interviews.

f. Emergency Equipment - Checklist and Questionnaire data concerning the inventory of the emergency equipment supply cabinets and the accessability of the equipment were collected.

g. Labels and Location Aids - Labels and location aids were evaluated by measurements, observations, and other assessment methods.

h. Annunciator System - The annunciator system was evaluated by measurements, observations and other assessment methods

i. Anthropometrics - Reach and visual access to CR components were analyzed, given the physical configuration of boards, panels, layout, etc. The data were subsequently compared to checklist item requirements.

j. Maintainability - Checklist and questionnaire data concerning operator-maintained components (trend recorders, bulbs, etc.) were collected.

k. Ambient Noise - Data were collected by direct measurements of noise levels and then compared to individual guideline items.

l. Illumination - Data were collected by direct measurements under various ambient conditions (e.g., emergency lighting, normal control room lighting) and then compared to individual guideline items.

m. Control Room Environment (HVAC) - Data were collected by observations in the control room (assessing for drafts, cold spots/hot spots), evaluation of recorded Control Room HVAC data and operator interview.

The computer survey has not been conducted because the computer is being replaced with ERFIS. A human factors review of the ERFIS and SPDS is ongoing and will be completed with the installation of ERFIS in the control room. The results of this survey will be included in the CRDR project files.

Survey data were collected from preconstructed task plans that contained checklists, interview forms and methods for direct measurements of control room parameters, such as noise levels, light levels, etc. The guidance for the conduct of the surveys was found in NUREG-0700. A sample task plan is contained in Appendix B.

3.1.2.3 System Functions and Task Analysis (SFTA) - The task analysis procedure is a descriptive process that extracts generic operator action and information requirements from systems function data, converts these requirements to a plant-specific level, and generates a data base for use as an input into the Verification of Task Performance Capabilities and the Validation of Control Room Functions.

These procedures consisted of three major activities, which were:

1. Converting the High Pressure (HP) Basic Westinghouse Owners Group (WOG) System Review and Task Analysis (SRTA) into a "HBR System Function Task Analysis."

2. Generating a list of plant-specific actions and information requirements for each task, organized by task in the form of a mechanized data base.

3. Selecting and sorting the data base so that the action requirements of a given type and the information requirements of a given type were collected together. "Type" refers to a group of actions or information requirements that have the same system, subsystem, plant component, or parameter.

3.1.2.4 Control Room Inventory - A comprehensive inventory data base of control room instrumentation, controls, and other equipment was generated to reflect control room configurations. The inventory included the necessary information (e.g., type of component, application/function, range, divisions, location) required to verify the availability and suitability of the required displays and controls. The inventory process is described in detail in Section 3.5 of this report.

3.1.2.5 Verification of Task Performance Capabilities - This analysis was composed of two subtasks: verification of instrument/control availability, and verification of human engineering suitability. The first, verification of availability, determined whether the instrumentation and controls required by the control room operator were actually available to the operator for completion of the tasks identified in the task analysis. The control room inventory data base and the task action and information requirements data base from the SFTA were the two major inputs to this task. The SFTA documentation described the instruments and controls and their main characteristics which were necessary for the required tasks; whereas the control room inventory listed the components which were actually available. A comparison of these two data bases determined if a required instrument or control was available.

The second subtask, verification of human engineering suitability, examined the components for characteristics that could degrade operator task performance and that were not necessarily apparent in control room surveys. This analysis focused on practical suitability considerations such as task-required ranges, values, or precisions.

The primary products of the verification phase were the documentation of missing task-related instrumentation and/or controls and the identification of problems regarding component suitability.

3.1.2.6 Validate Control Room Functions - This involved analysis of workload and distribution of workload for operators for specific tasks and event sequences. The primary means of analysis were traffic analysis and walk- and talk-through simulation of task sequences.

3.1.3 Products

The product of the review process was a set of human engineering discrepancies (HEDs) identified in the control room. These HEDs specified the type and extent of the problem, the potential impact on operator performance in relation to plant operation, and a suggestion for corrective action. The HEDs have been assessed and prioritized.

A detailed description of the review process is described in the following sections.

3.2 OPERATING EXPERIENCE REVIEW

3.2.1 Introduction

The intent of the Operating Experience Review (OER) was to identify control room design attributes and procedural activities that could contribute to or alleviate operator performance problems.

3.2.2 Operations Personnel Survey

3.2.2.1 General - The Operations Personnel Survey (OPS) focused on the analysis of experiential information to identify potential problems that could have contributed to degraded operator performance.

3.2.2.2 Structured Interviews - Operators were selected for structured interviews based upon their experience in plant operations. All operators interviewed were licensed at HBR. A total of eight interviews were conducted. Five of the operators were Senior Reactor Operators (SROs), four of the five are also Shift Foreman, and two were Reactor Operators (RO). One Shift Technical Advisor (STA) was interviewed. The format of the interview addressed a representative sample of general concerns for the following areas from NUREG-0700:

1. Workspace
2. Anthropometrics
3. Emergency Equipment
4. Maintainability (Operator Performed)
5. Annunciator System
6. Controls
7. Displays
8. Labels and Location Aids
9. Computer System

10. Conventions
11. Communications
12. Ambient Noise
13. Illumination
14. HVAC
15. Verification and Validation

In addition, operators were encouraged to provide any other comments or concerns they had regarding the design or operations in the control room.

3.2.2.3 Response Analysis - The response data were reviewed and tabulated. Questionnaire/interview checklists constructed from specific guidelines contained in Section 6.0 of NUREG-0700 were used to aid in the analysis of all responses. A negative response that identified a deviation from guidelines or a potential human performance problem resulted in the generation of a HED report. The HED reports were assessed by the HEDAT during the assessment phase.

3.2.2.4 Results - Summary descriptions of the operator interview HEDs and the disposition of each HED are contained within Appendix A. (NOTE - Appendix A is divided into 15 sections. Each section addresses a subject, such as controls, displays, etc.)

a. The following operator interview HEDs on Workspace are contained in Appendix A-1:

12G3-0102	12E2-0107
1200-0103	12G1-0108
1200-0104	1200-0109

b. The following operator interview HEDs on Anthropometrics are contained in Appendix A-2:

12E6-1401	12E0-1409	12E1-1412
12E7-1402	12E5-1410	12E6-1413
12E6-1406	12E2-1411	12E3-1414

c. The following operator interview HEDs on Emergency Equipment are contained in Appendix A-3:

1200-0502
1200-0504
1200-0506

d. The following operator interview HEDs on Illumination are contained in Appendix A-4:

1200-0002
1200-0006
1200-0009
1200-0010

e. The following operator interview HED on Ambient Noise is contained in Appendix A-5:

1200-0001

f. The following operator interview HED on HVAC is contained in Appendix A-6:

1200-0008

g. The following operator interview HEDs on Maintainability are contained in Appendix A-7:

1200-1702
1200-1703
1200-1713
1200-1714
1200-1716

h. The following operator interview HEDs on Communications are contained in Appendix A-8:

1200-0202
1200-0203
1200-0206
1200-0208

i. The following operator interview HEDs on Annunciator Systems are contained in Appendix A-9:

1200-2109	1200-2116	1200-2121
1200-2110	1200-2117	1200-2122
1200-2111	1200-2118	1200-2123
1200-2115	1200-2120	1200-2124

j. The following operator interview HEDs on Controls are contained in Appendix A-10:

12D1-3106	12A1-3269
1200-3229	1200-3270
12A1-3238	1200-3414
1200-3249	1200-3415

k. The following operator interview HEDs on Displays are contained in Appendix A-11:

1200-2216	12A1-2226	12E6-2416
12D1-2217	1200-2329	1200-2418
12B1-2218	12A1-2335	1200-2419
12A1-2225	1200-2412	12A1-2420

l. The following operator interview HEDs on Labels and Location Aids are contained in Appendix A-12:

12D1-1113	12D1-1117
12A1-1114	12D1-1176
1200-1115	12A1-1199
1200-1116	

m. The following operator interview HEDs on Process Computers are contained in Appendix A-13:

12G1-0305
12G1-0306
12G1-0308

n. The following operator interview HEDs on Verification and Validation are contained in Appendix A-15:

1200-5003	12A1-5019	12D1-5025
12D1-5004	12D1-5020	12D1-5026
12A1-5005	12B1-5021	1200-5028
12E0-5008	12A1-5022	12F2-5033
1200-5009	12D1-5023	
1200-5010	12A1-5024	

3.2.3 Review of Historical Documents

3.2.3.1 General - The documentation review focused on the analysis of relevant plant documents to identify any reported problems that may have contributed to degraded operator performance. Identified problems were documented in HED reports and assessed by the HEDAT with other HEDs.

3.2.3.2 Review Methods - Post Trip Reviews and Licencee Event Reports (LERs) were reviewed for human performance-related potential problems. The reviews were specifically looking for reports that identified one or more of the following problem/error causes:

a. Human Error - a classification that indicates an action or actions originating from within the control room by station personnel which caused a problem.

b. Equipment Failure - a classification that indicates a failed piece of plant equipment caused the problem and the failure was not readily or easily detected from the available control room instrumentation.

c. Procedure Problem - a classification that indicates a procedure was inadequate.

d. Other - a classification that, while not explicitly categorized as human error, equipment failure, or procedure problem, appears to have a potential human performance element involved.

3.2.3.3 Results - Summary descriptions of the documentation review HEDs and the disposition of each HED are contained within Appendix A.

a. The following human error problems HEDs are contained in Appendix A-12:

1200-11187
1200-11188

b. The following equipment failure HEDs are contained in the appendices indicated:

1200-0018 (Appendix A-4)
1200-2433 (Appendix A-11)

c. No proccedure problems were identified in the document review.

d. An equipment problem HED is contained in Appendix A-15:

1200-5048

3.3 CONTROL ROOM SURVEYS

3.3.1 Introduction

The control room surveys were planned to follow the guidance of NUREG-0700. Human factors specialists, in concert with experienced operations and engineering personnel, measured and observed a number of control room design features. Central to this survey effort were the HF guidelines contained in Section 6.0 of NUREG-0700. These guidelines were used as the criteria to which the survey data were compared.

The surveys were organized, and methodology developed to parallel the structure of Section 6.0 of NUREG-0700. The 13 surveys that were performed consist of the following:

1. Workspace
2. Anthropometrics
3. Emergency Equipment
4. Maintainability
5. Annunciator System
6. Controls
7. Displays
8. Labels and Location Aids
9. Illumination
10. Conventions
11. Ambient Noise
12. HVAC
13. Communications

In order to facilitate data collection, reduction, and analysis, and to support the review documentation requirements, task plans were developed for each of the above 13 survey areas.

3.3.2 Task Plan Procedures

Each of these task plans directed the data collection, data analysis and HED report generation based upon a mix of four basic data collection procedures. These are:

1. Measurements
2. Observations
3. Questionnaires/Interviews
4. Document Reviews

Each of these task plans used one or more of these procedures to collect the data needed to evaluate the applicable area of control room design. Task plan organization and procedure are described below. (A sample task plan is provided in Appendix B).

a. Each task plan contained a consistent format and outline. Content was varied only where necessary for the particular design area discussed. A typical task plan outline is as follows:

   1.0 Objectives
   2.0 Review Team
   3.0 Criteria Summary
   4.0 Procedures
   5.0 Equipment/Facility Requirements
   6.0 Inputs and Data Forms Listing
   7.0 Required Outputs/Expected Results
   8.0 Figures and Tables (if required)
   9.0 Procedure Exceptions (if any)
   Appendix A - Detailed Criteria (from NUREG-0700)
   Appendix B - Data Collection/Analysis Forms
   Appendix C - Criteria Matrix
   Appendix D - Task Plan Critique

b. Sections 1.0 through 8.0 of the text were brief summaries intended primarily to familiarize the task conductor with the overall task requirements. Upon completion of the task, the task conductor completed Section 9.0, if necessary, and submitted a completed Task Plan Critique from Appendix D to the LHFS. (The critique was to identify any difficulties or problems with the task plan and was not a central part of the review process.) The detailed criteria and procedural information are contained in Appendix A and B of each task plan.

c. Appendix A contained a subset of the guidelines from NUREG-0700, Section 6.0. Each guideline was worded identically to the NUREG-0700 guideline, and the guideline paragraph number was preserved for ease of cross-referencing. In total, all 14 of the Task Plan criteria sets represented subsections 6.1 through 6.7 of NUREG-0700.

   The last two subsections, 6.8 and 6.9 of NUREG-0700 Section 6.0, were used as criteria for the SFTA and the verification and validation activities. The task plans themselves occurred in the same order as the Section 6.0 subsections of NUREG-0700, and, with one main exception, were titled similarly to the Section 6.0 subsection titles. For example, the Annunciator System Review Task Plan (TP-3.1) incorporated as criteria the guidelines contained in NUREG-0700 Section 6.2. The main exception to this approach was that Section 6.1 - Workspace, of NUREG-0700, was further subdivided into seven task plans that, in general, followed the additional breakdown of Section 6.1.

   Thus, General Layout-6.1.1 became the Workspace Task Plan, Workstation Design-6.1.2 became the Anthropometrics Task Plan, Emergency Equipment-6.1.4 became the Emergency Equipment Task Plan, and Environment-6.1.5 became HVAC, Illumination, Ambient Noise, and Maintainability Task Plans.

d. Appendix B in each task plan was subdivided into as many subappendices (e.g., B1, B2, B3, etc.) as were necessary to describe the detailed data collection and analysis procedures used for that plan. Appendix B1 always contains measurements data forms and directions, B2 always contains an Operator Interview/Questionnaire, B3 always contains an Observations Checklist, and B4 was always a Document Review Checklist. B5 through B9 are

additional analyses directions and supplement forms as required. To preserve consistency from task plan to task plan, Appendices B1 through B4 are always included. The Interview/Questionnaire sections of each of the 14 task plans (with the addition of operationally related criteria from Sections 6.8 and 6.9 of NUREG-0700) constitute the prepared structured interview that is described in paragraph 3.2 of this report.

e. Appendix C of the task plans provides a criteria matrix for all the guidelines contained in Appendix A. The Criteria Matrix provides a cross-reference to the guidelines and defines the data collection methods and the suggested data sources required for evaluation of each guideline.

f. The various data types were determined by the NUREG-0700 criteria. Measurement data were those data that had to be numerically compared to the NUREG-0700 guidelines for evaluation. These pertain to such design features as display height, noise levels, or illumination levels. Observation data were those data that a trained human factors specialist could evaluate adequately by observing the design feature. These data pertain to such features as procedure and document storage and office locations. Questionnaire/Interview data were data that required a knowledge about the equipment from operators before such data could be adequately or realistically evaluated. These data pertain to such features as the meaning attached to color-codes or controls that are difficult to operate. Documentation Review data were data that had to be (or might have been) obtained by reviewing available documents that pertained to the design and/or operation of the plant. These data pertain to such design features as the availability and adequacy of a dictionary of standard terms, abbreviations and acronyms, or an administrative procedure for the control of temporary labels.

g. The task plan procedures required that the collected data be compared to one or more referenced criteria, before an HED report could be generated. In comparing the data to the criteria, the task conductor would annotate the checklist column next to the criterion guideline as either yes, no, or N/A. For the "no" check marks, an HED report was then generated and the HED report number was entered in the criterion comments column. As a cross-reference, the data collection appendix number and the guideline paragraph number were entered on the HED report form. Once this process was complete for each task plan, the surveys and reviews of the human factors suitability of the evaluated design (independent of the task requirements) were completed and documented.

h. Copies of the completed task plans were filed in the CRDR Project File.

3.3.3 Results

3.3.3.1 Summary

The control room design was compared to the applicable guidelines from NUREG-0700, Section 6.0. Some HED reports were generated against specific design features during the review that do not meet good human factors engineering design principles. The results of each task plan survey are summarized below.

The HEDs have been assessed and prioritized and improvements verified per the HED Assessment Process described in Section 4.0 of this report.

3.3.3.2 Workspace Survey

The review of the workspace arrangement for the main control room area addressed such issues as clearances between panels and opposing equipment, unobstructed pathways in the primary operating areas, accessibility and storage of expendable supplies and spare parts, and general room arrangement features.

Summary descriptions of the workspace HEDs and the disposition of each HED are included Appendix A-1.

3.3.3.3 Anthropometrics Survey

The anthropometrics review of the control board design addressed the characteristics for a standard stand-up console with benchboard and vertical back panels. Instrumentation and equipment locations were also addressed.

Summary descriptions of the anthropometric HEDs and the disposition of each HED are contained in Appendix A-2.

3.3.3.4 Emergency Equipment Survey

The equipment lockers were evaluated in terms of their location, storage capability, and labeling requirements. The protective clothing sets, the breathing apparatus, emergency equipment, and replacement supplies were counted and compared to the validated copy of the inventory list.

Summary descriptions of the Emergency Equipment Survey HEDs and the disposition of each HED are contained in Appendix A-3.

3.3.3.5 Illumination Survey

The illumination survey addressed the illumination levels throughout the control room. Illumination levels were taken at various key locations at the control panels and operator work stations under normal and emergency lighting conditions.

Summary descriptions of Illumination Survey HEDs and the disposition of each HED are contained in Appendix A-4.

3.3.3.6 Ambient Noise

The ambient noise survey addressed the listening environment, the sound level of annunciator horns and warning systems, and the ability of the operators to communicate in the control room. Noise level readings were taken at various key locations during day shift operating conditions.

Summary descriptions of the Ambient Noise Survey HEDs and the disposition of each HED are contained in Appendix A-5.

3.3.3.7 HVAC Survey

The HVAC Survey addressed the temperature and humidity levels in the control room. Hot/Cold spots, drafts, reliability and operator comments were assessed.

Summary descriptions of HVAC Survey HEDs and the disposition of each HED are contained in Appendix A-6.

3.3.3.8 Maintainability Survey

The maintainability survey addressed such issues as the availability, storage, and inventory of spare parts and tools, replacement of fuses and other expendables, and general operator maintainability of equipment.

Summary descriptions of the Maintainability Survey HEDs and the disposition of each HED are contained in Appendix A-7.

3.3.3.9 Communications Survey

The communication survey addressed the operators ability to communicate throughout the control room and in the plant during normal and emergency operations. The PA system, Walkie-talkie system, sound powered phone system and the conventional telephone system were evaluated.

Summary descriptions of the Communication System HEDs and disposition of each HED are contained in Appendix A-8.

3.3.3.10 Annunciator System Survey

The annunciator system survey design was compared to applicable guidelines, which addressed such items as readability of annunciator tiles, consistency of message content (such as abbreviations and acronyms), and general arrangement features. Tile messages were evaluated for multiple inputs, ambiguity, and specificity.

Summary descriptions of the annunciator HEDs and the disposition of each HED are contained in Appendix A-9.

3.3.3.11 Controls Survey

The main control board controls were evaluated for a number of characteristics such as knob configuration and dimensions, type of control, handle coding, and labeling.

Summary description of the Control HEDs and the disposition of each HED are contained in Appendix A-10.

3.3.3.12 Displays Surveys

Displays were evaluated for a number of physical characteristics such as number scale progressions and readability of internal scale labeling. The functional aspects of meters and legend light and their labels were also evaluated.

Summary descriptions of the Display HEDs and the disposition of each HED are contained in Appendix A-11.

3.3.3.13 Labels and Location Aids Survey

The existing labels on the Main Control Board and back panels were evaluated to determine if wording was appropriate, functionally correct and consistent. Labels were also evaluated against readability criteria based on viewing distances.

Summary descriptions of the labeling HEDs and the disposition for each HED are contained in Appendix A-12.

3.3.3.14 Conventions Survey

All annunciator tile engraving, panel labeling, component labeling, function labeling, and position labeling was compared to identify inconsistencies and incorrect usages with abbreviations.

The Conventions Survey also addressed the application of color coding in all areas of the control room and control directional movement.

Summary descriptions of the Conventions Survey HEDs and the disposition of each HED are contained in Appendix A-14.

3.4 SYSTEM FUNCTIONS AND TASK ANALYSIS

3.4.1 Introduction

The objective of the System Functions and Task Analysis (SFTA) was to determine action and information requirements and the performance criteria for the tasks that operators were required to accomplish under emergency conditions. These requirements and criteria served as benchmarks for the examination of the adequacy of control room instrumentation, and other equipment during the verification and validation activities.

3.4.2 Method

a. The procedure employed by CP&L in conducting the SFTA involved the development of a plant-specific task

analysis data base from generic task analytic background information and generic emergency response guidelines. Throughout this process, the emphasis was on identifying and analyzing operator action and information requirements from the plant-specific task analysis. It addressed those tasks performed under emergency conditions that provided emergency response capabilities with respect to maintaining critical plant safety functions (i.e., containment integrity, reactivity control, RCS inventory control, and heat transfer).

Figure 3-1 illustrates the general structure and organization of the SFTA process. The left blocks contain the background information and source documents used to develop the SFTA and EOPs. The central block of this figure contains a bullet item list that shows the sequence, from top to bottom, in which activities were conducted. The blocks on the right represent the documents that resulted from the SFTA and EOP development.

The task analysis methods and procedures documented herein were based on the Westinghouse Owner's Group (WOG) Emergency Response Guidelines (ERGs), Revision 1, and the WOG System Review and Task Analysis Basic (SRTA). The process as outlined in Figure 3-1 demonstrates that the starting point for the SFTA will be the ERGs and associated background documentation.

b. The Revision 1 ERGs is considered a validated data base (NRC-WOG meeting of 29 March 1984) that defined the generic plant systems and functions, including the primary action/information requirements, and allocates the functions between the human and the machine. The Revision 1 ERGs were used as the basis for the CP&L emergency response procedures development and the basis for the task analysis methods described below. The WOG

SRTA also served as a data base for the plant-specific HBR SFTA.

c. The WOG SRTA was a joint program with the ERG development program. It provided a systematic compilation of the operator tasks, instrumentation, and control requirements contained in the ERGs. The WOG SRTA documents, which consisted of TASK/SYSTEM SEQUENCE MATRICES and ELEMENT TABLES (see Figures 3-2 and 3-3), identified the following:

   1. Individual operator task requirements
   2. Sequential operator task requirements
   3. Individual instrumentation requirements
   4. Individual control requirements.

d. There is a Task/System Sequence Matrix (Figure 3-2) for each ERG guideline, and its function was to identify and inventory the tasks and subtasks associated with each ERG guideline. Essentially, the Task/System Sequence Matrices are tables of contents for each ERG guideline.

e. The Element Tables (Figure 3-3) constituted the central document in the WOG SRTA program. They identified the requirements that the user had to address in the determination of the action and information requirements.

f. The first step in the HBR SFTA process was to convert the HP Basic SRTA into a plant-specific revision. This document, called "HBR System Function Task Analysis," consisted of plant-specific Task/System Sequence Matrix Tables (Figure 3-4) and Element Tables (Figure 3-5). The HBR SFTA was based on the plant-specific emergency operating procedures, the EOP/ERG Transition Document, and the ERGs. Differences in tasks and task steps between the Rev. 1 ERGs to the HBR SFTA are documented within the Transition Document.

The EOP/ERG Transition Document (Figure 3-6) is a requirement within the Procedure Generation Package (PGP). It tracks the difference from the WOG ERGs to the plant-specific EOPs. The Transition Document consists of the following sections:

1. List of differences between the ERG Low Pressure reference plant and the H.B. Robinson plant.

2. Step deviation forms that explain any variance between an HBR procedure step and a WOG step.

3. Derivation for the parameter values used in the HBR EOPs.

The HBR Task/System Sequence Matrices (Figure 3-4) reflect the task/step differences and sequence changes made during implementation of the ERGs into HBR SFTA. The HBR Element Tables (Figure 3-5) contain a description of the plant-specific tasks. Included in this description are the plant specific knowledge requirements, task decision and action requirements, and the plant-specific instrumentation and control requirements. The instrumentation and control requirements were added to the tables based upon data from the verification activities.

g. The next step in the SFTA process was to generate a list of plant-specific action and information requirements for each task within the HBR SFTA. This information was tabulated on the Action-Information Requirements Details (AIRD) form (see Figure 3-7). The AIRD form breaks down each task into behavioral elements. A behavioral element is defined by the various behavioral or physical properties of an action requirement or information requirement. The names of these properties appear as column headers for columns 2 through 10 of the AIRD

form. Some of these properties were plant-specific and required input from plant operations/engineering personnel.

h. Structurally, the development of the AIRD forms is a manual process of extracting just the operator action and operator information requirements from the element tables. The AIRD form, when filled out, (Figure 3-8) is used only as an input form to a computerized function for sorting and selecting these action and information requirements. (For the records, the computerized printouts of the AIRD forms will be used for ease of readability). It should be noted that at this point in the SFTA process these action and information requirements have been developed in a manner that arranges them in a task-sequencing order. Numerous systems and their associated controlling requirements and feedback (to the controller) requirements are interspersed with regard to a functionally defined sequence. In the later and separate verification activities, this task-sequence listing would be difficult to compare to the control board inventory in evaluating the presence of and adequacy of the controls and displays. Hence, the next step in the SFTA process was the development of the Action-Information Requirements Summary (AIRS) forms (Figure 3-9).

i. The AIRS development is a computerized process that rearranges the data from the AIRD forms. It does not add or delete any data, but rather re-sorts the action and information requirements from their existing task-sequencing order into a system-function-parameter order. In this way, for example, every occurrence of charging flow as an information requirement are grouped together. Likewise all occurrences of the need to control charging flow are grouped together. This is done for every system, sub-system, function, and parameter

represented in the HBR SFTA process.

It is at this point that the SFTA activities as they contributed to the CRDR are considered complete.

As can now be seen, at no time during the development of the AIRD forms from the element tables to the output of the AIRS listings has any control room equipment or control board component information been used. Also, neither step (AIRD or AIRS development) adds or deletes any operator action or operator information requirements.

j. Table 3-1 summarizes the relationships between the Element Tables, the AIRD forms, and the AIRS forms.

3.4.3 Products

The product of the SFTA process is a data base of operator action and information requirements. This data base, along with the control room inventory data base, was used as input into the verification of task performance capabilities to assess the availability and suitability of instruments and equipment used by the Control Room operators. In addition, the results of the HBR SFTA were used to assist in the selection of event sequences to be analyzed during the validation of control room functions.

3.5 CONTROL ROOM INVENTORY

3.5.1 Introduction

The objective of the control room inventory was to develop a comprehensive listing of the instrumentation, controls and equipment contained in the control room. This list was used in subsequent tasks to determine the adequacy of control room components for supporting operator information and control requirements identified during the task analysis.

The control room inventory also aided in integrating multiple HEDs that could be associated with a particular component or type of component. This ensured a complete, integrated data file that aided in the implementation of backfits.

It should be noted that the control room inventory was kept up to date and reflects any component or label changes made in the control room during the CRDR process. The inventory was also used to verify label, wording, and abbreviation consistency.

3.5.2 Method

Project personnel conducted a systematic inspection and review of the control room and relevant control room documentation (e.g., instrument lists, engraving lists, etc.) to develop the control room inventory.

The inventory records contain the following information for each component:

a. Component identification number (used for sorting within the data base)
b. Component nomenclature or description

c. Component labels

d. Component characteristics (i.e., scale ranges)

e. Panel.

3.5.3 Result

The result of the control room inventory is a comprehensive record of the instrumentation, controls, and equipment contained in the control room. Tables 3-2 and 3-3 contain samples of the inventory printouts. The control room inventory was used in the verification of available and suitable control room instrumentation.

3.6 VERIFICATION OF TASK PERFORMANCE CAPABILITIES

3.6.1 Introduction

The objective of this activity was to ensure the availability and suitability of required control room instrumentation and controls. As recommended in NUREG-0700, this activity was conducted in two parts: verification of availability and verification of suitability. After the completion of the verification and validation activities, identified problems were documented on HED reports. The plant-specific instruments and controls from the inventory that satisfied the action and information requirements from the AIRS forms were also added to the element tables as shown in Figure 3-5. Copies of these element tables function as historical documents which define the baseline rationale for the selected instruments and controls.

3.6.2 Verification of Availability

Verification of availability was accomplished by comparing the operator action and information requirements identified during the task analysis to the control room inventory. The comparison was conducted on a component basis to verify the presence or absence of the required instruments and controls for each task sequence analyzed during the SFTA. For any action or information requirement where an appropriate display, control, or other device could not be found, an HED report was generated.

3.6.3 Verification of Suitability

Verification of suitability involved examination of the human engineering characteristics of instrumentation and controls identified during the verification of availability. For this process, selected guidelines from NUREG-0700 and criteria derived from the task analysis were used to determine the suitability of control room components. Such aspects of component design as the adequacy of display range, usability of displayed values, adequacy of control type, completeness and ease of understanding of component labels, and other characteristics not easily evaluated without reference to specific task sequences, were considered. Any deviations from established criteria were documented as HEDs.

3.6.4 Results

3.6.4.1 Verification of Availability

Using the SFTA data base that contains the action and information requirements and the control room inventory data base, a comparison was made to ensure the availability of all required instruments, controls, and other equipment in the control room.

3.6.4.2 Verification of Suitability

Following the verification of availability, the inventory data base was compared to the range, accuracy, trend, nomenclature, and control function requirements contained in the SFTA data base.

Summary descriptions of the Verification HEDs and the disposition for each HED are contained in Appendix A-15.

3.7 VALIDATION OF CONTROL ROOM FUNCTIONS

3.7.1 Introduction

The objective of this activity was to determine if the functions allocated to the control room operating crew during emergencies could be accomplished effectively within: 1) the structure of defined emergency procedures, and 2) the design of the control room as it exists. As with verification of task performance capabilities, validation of control room functions is an extension of the SFTA. In this case, emphasis was placed on determining the adequacy of the control room design for supporting operator task sequences.

3.7.2 Method

3.7.2.1 General

The principal activities during this task involved observing operators walking through selected event sequences. The following process was employed during this task:

a. To insure complete coverage of the control room interfaces represented in the HBR EOPs within the context of the various scenarios, the EOPs were evaluated in the validation task, including both flowpaths, and the Critical Safety Function Status Trees, the EOP Supplements and Foldouts.

b. The participants in the validation process were briefed concerning the objectives and procedures of the walkthroughs, including assumptions concerning the status of the plant at the onset of the event sequence.

c. Control Room personnel were observed as they performed each sequence. The operators were instructed to describe their actions as they performed the sequences, including:

   1. cues by which they initiate a task

   2. sources of information (displays, procedures, knowledge, etc.)

   3. application of information, including any mental conversions or uncertainties

   4. controls selected and expected system response

   5. methods for verifying system response and selection of alternative actions if response is not obtained

   6. indications that sequence is proceeding as expected

   7. indication that sequence is complete

8. other comments, as appropriate.

During this process, the observers occasionally halted the walkthrough to obtain clarification or additional information.

d. Observers recorded significant operator comments, as well as any observations that related to performance of the EOPs.

e. The results of the observations were analyzed to identify any problems with the control room layout, location of related components, operator workload, or other human engineering concerns. Discrepancies observed during the validation process were noted and recorded.

Observers recorded: 1) any difficulties the operators had in responding to the event, 2) the impact on operator performance of any previously identified HEDs, and 3) any additional discrepancies identified during this task.

3.7.2.2 Selected Events

a. Events were selected to include the items suggested in NUREG-0700, paragraph 3.8.2, and to address events listed in Section 15 of REG. GUIDE 1.70 with regard to exercising all emergency-related control room workstations, and to include all unique sequences of tasks within the EOP structure. These events covered all systems in the EOPs and all the controls and displays used in the EOPs.

b. The events selected consisted of the following:

1. PATH-1 (Reactor Trip or Safety Injection/Loss of Reactor or Secondary Coolant)

2. PATH-2 (Steam Generator Tube Rupture)

3. Loss of All AC Power

4. Loss of All AC Power Recovery without SI Required

5. Loss of All AC Power Recovery with SI Required

6. Reactor Trip Response

7. Natural Circulation Cooldown

8. Natural Circulation Cooldown with Steam Void in Vessel

9. SI Termination

10. Post-LOCA Cooldown and Depressurization

11. Transfer to Cold Leg Recirculation

12. Transfer to Hot Leg Recirculation

13. Faulted Steam Generator Isolation

14. Post-SGTR Cooldown Using Backfill

15. Post-SGTR Cooldown Using Blowdown

16. Post-SGTR Cooldown Using Steam Dump

17. Loss of Emergency Coolant Recirculation

18. Uncontrolled Depressurization of All Steam Generators

19. SGTR with Loss of Reactor Coolant: Subcooled Recovery

20. SGTR with Loss of Reactor Coolant Saturated Recovery

21. SGTR Without Pressurizer Pressure Control

22. LOCA Outside Containment

23. Energizing Pressurizer Heaters from Emergency Busses

24. Response to Nuclear Power Generation/ATWS

25. Response to Loss of Core Shutdown

26. Response to Inadequate Core Cooling

27. Response to Degraded Core Cooling

28. Response to Saturated Core Cooling

29. Response to Loss of Secondary Heat Sink

30. Response to Steam Generator Overpressure

31. Response to Steam Generator High Level

32. Response to Loss of Normal Steam Release Capability

33. Response to Steam Generator Low Level

34. Response to Imminent Pressurized Thermal Shock

35. Response to Anticipated Pressurized Thermal Shock

36. Response to High Containment Pressure

37. Response to Containment Flooding

38. Response to High Containment Radiation Level

39. Response to High Pressurizer Level

40. Response to Low Pressurize Level

41. Response to Voids in Reactor Vessel

3.7.3 <u>Results</u>

The control room validation resulted in the identification of seven task sequences in the EOPs which needed improvement. These task sequences were written up as HED 1200-4005, which is contained in Appendix A-15.

SYSTEM FUNCTION AND TASK ANALYSIS (SFTA) PROCESS

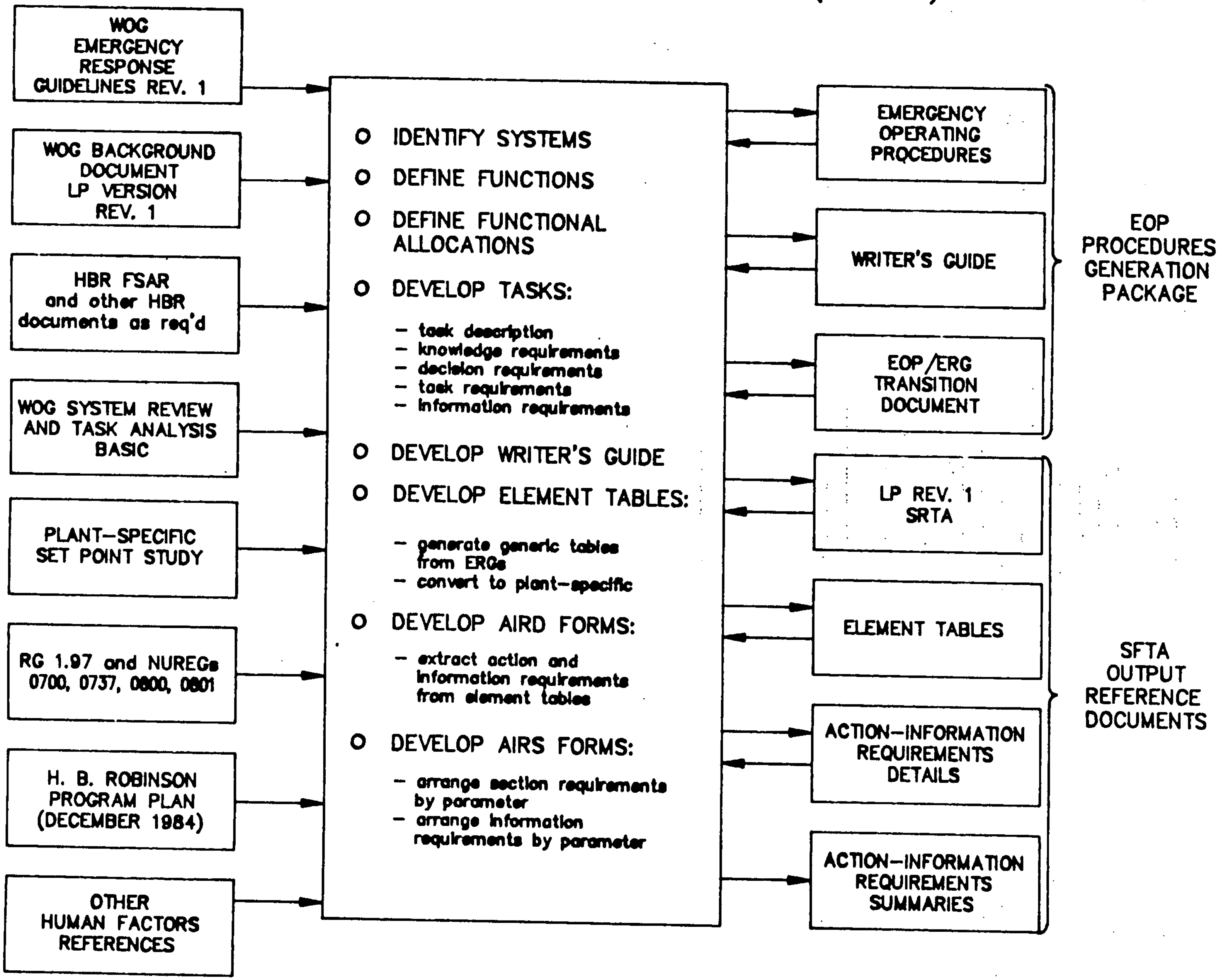


FIGURE 3-1

_______________ Task/Systems Sequence Matrix

____

Page _____ of _____

Operator Tasks				Systems																				
Task	Master Task	Task Title	SEQUENCE	REACTOR PROTECTION	ESF ACTUATION	NUCLEAR INSTRUMENTATION	CONTROL ROD DRIVE	RADIATION MONITORING	CONTAINMENT	REACTOR COOLANT	SAFETY INJECTION	RESIDUAL HEAT REMOVAL	CHEMICAL AND VOLUME CONTROL	COMPONENT COOLING WATER	SERVICE WATER	CONTAINMENT SPRAY	CONTAINMENT AIR HANDLING	MAIN STEAM	MAIN FEEDWATER	AUXILIARY FEEDWATER	STEAM GENERATOR BLOWDOWN	ELECTRICAL POWER	TURBINE CONTROL	OTHER

FIGURE 3-2

FIGURE 3-3

ELEMENT TABLE **TASK** ________

Function -

Task -

Task Objective

Task Information Requirements

Task Decision (Criteria) Requirements

Task Knowledge Requirements

Task Requirements

Consequences of Task Error/Omission

Information below obtained from verification and validation task

Task Instruments

Task Controls

FRP-C2 (FR-C.2) Task/Systems Sequence Matrix

RESPONSE TO DEGRADED CORE COOLING

Page 1 of 4

HBR Revision 1

Operator Tasks

Task	Master Task	Task Title	SEQUENCE	REACTOR PROTECTION	ESF ACTUATION	NUCLEAR INSTRUMENTATION	CONTROL ROD DRIVE	RADIATION MONITORING	CONTAINMENT	REACTOR COOLANT	SAFETY INJECTION	RESIDUAL HEAT REMOVAL	CHEMICAL AND VOLUME CONTROL	COMPONENT COOLING WATER	SERVICE WATER	CONTAINMENT SPRAY	CONTAINMENT AIR HANDLING	MAIN STEAM	FEEDWATER	AUXILIARY FEEDWATER	STEAM GENERATOR BLOWDOWN	ELECTRICAL POWER	TURBINE CONTROL	OTHER
FRP-C.2/1		Verify SI Valve Alignment - PROPER EMERGENCY ALIGNMENT	1		X						X	X												
FRP-C.2/2		Verify SI Flow In All Trains	2		X					X	X	X	X											
FRP-C.2/3		Check RCS Vent Paths	3							X														
FRP-C.2/4		Check RCP Status	4							X			X	X				X						1
FRP-C.2/5		Check Core Cooling	5							X														
FRP-C.2/6		Check SI Accumulator Isolation Valve Status	6								X													
FRP-C.2/7		Check Intact S/G Levels	7															X	X	X				
FRP-C.2/8		Depressurize All Intact S/Gs To 160 PSIG	8							X								X						
FRP-C.2/9		Check RHR Pumps - RUNNING	9									X												

FIGURE 3-4

FRP-C2 (FR-C.2) Task/Systems Sequence Matrix

RESPONSE TO DEGRADED CORE COOLING

Page 2 of 4

HBR Revision 1

Operator Tasks / Systems

Task	Master Task	Task Title	SEQUENCE	REACTOR PROTECTION	ESF ACTUATION	NUCLEAR INSTRUMENTATION	CONTROL ROD DRIVE	RADIATION MONITORING	CONTAINMENT	REACTOR COOLANT	SAFETY INJECTION	RESIDUAL HEAT REMOVAL	CHEMICAL AND VOLUME CONTROL	COMPONENT COOLING WATER	SERVICE WATER	CONTAINMENT SPRAY	CONTAINMENT AIR HANDLING	MAIN STEAM	MAIN FEEDWATER	AUXILIARY FEEDWATER	STEAM GENERATOR BLOWDOWN	ELECTRICAL POWER	TURBINE CONTROL	OTHER
FRP-C.2/10		Check If SI Accumulators Should Be Isolated	10							X	X													
FRP-C.2/11		Stop All RCPs	11							X			X											
FRP-C.2/12		Depressurize All Intact S/Gs To Atmospheric Pressure	12							X								X						
FRP-C.2/13		Verify SI Flow	13								X	X	X											
FRP-C.2/14		Close All SI Accumulator Isolation Valves	14								X													
FRP-C.2/15		Stop All RCPs	15							X			X											
FRP-C.2/16		Check Core Cooling	16							X														
FRP-C.2/17		Go To PATH-1, Entry Point D	17																					2

FRP-C2 (FR-C.2) Task/Systems Sequence Matrix

RESPONSE TO DEGRADED CORE COOLING

Page 3 of 4 HBR Revision 1

FIGURE 3-4 (continued)

Operator Tasks

Task	Master Task	Task Title	Sequence	Reactor Protection	ESF Actuation	Nuclear Instrumentation	Control Rod Drive	Radiation Monitoring	Containment	Reactor Coolant	Safety Injection	Residual Heat Removal	Chemical and Volume Control	Component Cooling Water	Service Water	Containment Spray	Containment Air Handling	Main Steam	Main Feedwater	Auxiliary Feedwater	Steam Generator Blowdown	Electrical Power	Turbine Control	Other
		Notes and Cautions																						
FRP-C.2/1-C		Go To EPP-9 On RWST Low Level									X													
FRP-C.2/3-C		Insure PZR PORV Closed When RCS Pressure Is Below PZR PORV Setpoint								X														
FRP-C.2/4-N		Do Not Trip RCPs On Loss Of Support Conditions																						3
FRP-C.2/7-C-1		Alternate AFW Water Sources Are Necessary On CST Low Level																	X					1
FRP-C.2/7-C-2		Use Damaged S/G Only If Necessary																						3
FRP-C.2/9-C		Insure RHR Pumps Do Not Overheat From Lack Of CCW												X										
FRP-C.2/11-C		Monitor Symptoms For FRP-C.1 During Subsequent Steps								X														

FRP-C2 (FR-C.2) Task/Systems Sequence Matrix

RESPONSE TO DEGRADED CORE COOLING

Page 4 of 4

HBR Revision 1

Operator Tasks

Task	Master Task	Task Title	SEQUENCE	REACTOR PROTECTION	ESF ACTUATION	NUCLEAR INSTRUMENTATION	CONTROL ROD DRIVE	RADIATION MONITORING	CONTAINMENT	REACTOR COOLANT	SAFETY INJECTION	RESIDUAL HEAT REMOVAL	CHEMICAL AND VOLUME CONTROL	COMPONENT COOLING WATER	SERVICE WATER	CONTAINMENT SPRAY	CONTAINMENT AIR HANDLING	MAIN STEAM	MAIN FEEDWATER	AUXILIARY FEEDWATER	STEAM GENERATOR BLOWDOWN	ELECTRICAL POWER	TURBINE CONTROL	OTHER
		Other System Notes																						
		(1) Primary water system																						
		(2) Administrative Task																						
		(3) Information																						

FIGURE 3-4 (continued)

ELEMENT TABLE
HBR REVISION 1

TASK FRP-C.2/13

Function - Monitor/Restore Core Cooling

Task - Verify SI Flow

Task Objective

o To verify SI flow delivery to the RCS

Task Information Requirements

o SI flow indication

o RHR flow indication

o SI pumps

o RHR pumps

o SI valves

o RHR valves

o VCT level indication

o VCT level controls

o Charging pumps

o Charging flow indication

o Charging header pressure indication

o Charging flow controls

Task Decision (Criteria) Requirements

o To determine if SI flow exists (existence of flow)

Task Knowledge Requirements

None

ELEMENT TABLE
HBR REVISION 1

TASK FRP-C.2/13

Task Requirements

13. Verify SI Flow:

   * SI pump flow indicators - CHECK FOR FLOW

     OR

   * RHR pump flow indicators - CHECK FOR FLOW

     - Continue efforts to establish SI flow. Try to establish charging flow to RCS. Return to step 12

Consequences of Task Error/Omission

o If SI flow does not exist, task error/omission will result in failure to establish another source of make-up flow to the RCS. The inadequate core cooling condition will exist for a longer period of time with severe consequences.

Information below obtained from verification and validation task

Task Instruments

SIS001
o SI cold leg header flow indication:

- SAFETY INJECTION -
  SI COLD LEG HEADER FLOW
  FI-943

SIS002
o SI header pressure indication:

- SAFETY INJECTION -
  SI HEADER PRESSURE
  PI-940

- SAFETY INJECTION -
  SI HEADER PRESSURE
  PI-943

ELEMENT TABLE
HBR REVISION 1

TASK FRP-C.2/13

SIS003
o SI hot leg header flow indication:

- SAFETY INJECTION -
  SI HOT LEG HEADER FLOW
  FI-940

SIS004
o SI to hot leg flow indication:

- SAFETY INJECTION -
  SI HOT LEG ISOL VA 866A
  FI-932

- SAFETY INJECTION -
  SI HOT LEG ISOL VA 866B
  FI-933

RHR003
o RHR pump flow indicator:

- RHR -
  RESID HX TOTAL FLOW
  FI-605

SIS104
o SI pumps:

- SAFETY INJECTION
  PUMP A

- SAFETY INJECTION
  PUMP B

- SAFETY INJECTION
  PUMP C

RHR106
o RHR pumps:

- RES HT RMVL
  PUMP A

- RES HT RMVL
  PUMP B

ELEMENT TABLE
HBR REVISION 1

TASK PRP-C.2/13

RHR101
o RHR core deluge valves:

- RES HT RMVL LOOP TO
  RCS COLD LEG
  VA 744A

- RES HT RMVL LOOP TO
  RCS COLD LEG
  VA 744B

RHR102
o RHR heat exchanger bypass flow process controller:

- RESIDUAL HX BYPASS FLOW -
  FC-605

RHR103
o RHR heat exchanger discharge flow process controller:

- RESIDUAL HX DSCHG FLOW -
  HIC-758

RHR104
o RHR heat exchanger discharge valves:

- RES HX A DSCHG
  VA 759A

- RES HX B DSCHG
  VA 759B

SIS101
o Containment sump to RHR suction isolation valves:

- CONTAINMENT SUMP RECIRCULATION -
  CONT SUMP RECIRC SUCT
  VA 860A

- CONTAINMENT SUMP RECIRCULATION -
  CONT SUMP RECIRC SUCT
  VA 860B

- CONTAINMENT SUMP RECIRCULATION -
  CONT SUMP RECIRC SUCT
  VA 861A

- CONTAINMENT SUMP RECIRCULATION -
  CONT SUMP RECIRC SUCT
  VA 861B

ELEMENT TABLE
HBR REVISION 1

TASK FRP-C.2/13

SIS102
o SI pumps discharge header cross-connect valves:

- SI PUMP DSCHG HDR
  CROSS-CONN
  VA 878A

- SI PUMP DSCHG HDR
  CROSS-CONN
  VA 878B

SIS103
o SI pumps miniflow recirculation valves:

- CONTAINMENT SUMP RECIRCULATION -
  HI HD SI TEST LINE TO RWST
  VA 856A

- CONTAINMENT SUMP RECIRCULATION -
  HI HD SI TEST LINE TO RWST
  VA 856B

SIS105
o Hot leg injection header shutoff valve:

- LOOPS 2 & 3
  HOT LEG INJ SHUTOFF
  VA 869

SIS106
o Hot leg injection valves:

- LOOP 3
  HOT LEG INJECTION
  VA 866 A

- LOOP 2
  HOT LEG INJECTION
  VA 866 B

SIS107
o RHR loop recirculation valves:

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RECIRC
  VA 863A

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RECIRC
  VA 863B

ELEMENT TABLE
HBR REVISION 1

TASK PRP-C.2/13

SIS108
o RWST discharge isolation valves:

- CONTAINMENT SUMP RECIRCULATION –
RWST DSCHG
VA 864A

- CONTAINMENT SUMP RECIRCULATION –
RWST DSCHG
VA 864B

SIS109
o RWST to RHR pumps isolation valves:

- CONTAINMENT SUMP RECIRCULATION –
RHR LOOP RWST ISOL
VA 862A

- CONTAINMENT SUMP RECIRCULATION –
RHR LOOP RWST ISOL
VA 862B

BIT101
o BIT inlet isolation valves:

- BORON INJ TANK INLET
VA 867A

- BORON INJ TANK INLET
VA 867B

BIT102
o BIT outlet isolation valves:

- BORON INJ TANK OUTLET
VA 870A

- BORON INJ TANK OUTLET
VA 870B

VCT001
o VCT level indication:

- CVCS –
VOLUME CONTROL TANK LEVEL
LI-115

VCT202
o VCT high/low level alarm:

- APP-003 REACTOR COOLANT AND MAKEUP SYSTEMS
(VOL CONT TK HI/LO LEVEL)

ELEMENT TABLE
HBR REVISION 1

TASK PRP-C.2/13

VCT101
o VCT level process controller:

- VOLUME CONTROL TANK -
  VOL CONT TANK LEVEL
  LC-112

VCT103
o VCT outlet isolation valve:

- VOLUME CONTROL TANK -
  OUTLET
  VA 115C

C&L104
o Charging pumps (PD pumps):

- CHARGING PUMP
  A

- CHARGING PUMP
  B

- CHARGING PUMP
  C

C&L105
o Charging pumps speed process controllers:

- CHARGING PUMP A
  SPEED
  SC-151

- CHARGING PUMP B
  SPEED
  SC-152

- CHARGING PUMP C
  SPEED
  SC-153

C&L201
o Charging pump motor overload/trip alarm:

- APP-003 REACTOR COOLANT AND MAKEUP SYSTEMS
  (CHARGING PMP MOTOR OVRLOAD/TRIP)

ELEMENT TABLE
HBR REVISION 1

TASK PRP-C.2/13

C&L203
o Charging pumps low speed alarm:

- APP-001 MISCELLANEOUS NSSS
  (CHARGING PMPS LO SPEED)

C&L001
o Charging flow indication:

- CVCS -
  CHARGING LINE FLOW
  FI-122A

C&L002
o Charging pumps discharge header pressure indication:

- CVCS -
  CHARGING PUMPS DISCH PRESS
  PI-121

C&L101
o Charging flow control valve process controller:

- CHARGING LINE -
  CHARGING FLOW -
  HIC-121

RCP401
o Local controls/instrumentation for RCP seal injection:

- LOCAL

RCP007
o RCP thermal barrier Delta P indication:

- RCP's -
  RCP LP1 THERMAL BARR DELTA P
  PI-131A

- RCP's -
  RCP #2 THERMAL BARR DELTA P
  PI-128A

- RCP's -
  RCP LP3 THERMAL BARR DELTA P
  PI-125A

RCP201
o RCP labryinth seal low delta P alarm:

- APP-001 MISCELLANEOUS NSSS
  (RC PMPS LABYRTH SEAL LO DELTA P)

ELEMENT TABLE
HBR REVISION 1

TASK FRP-C.2/13

C&L102
o Charging line loop A isolation valve:

- CHARGING LINE -
CHARGING LINE LOOP A HOT LEG
VA 310A

C&L103
o Charging line loop B isolation valve:

- CHARGING LINE -
CHARGING LINE LOOP B COLD LEG
VA 310B

CVC102
o Auxiliary spray valve:

- CHARGING LINE -
AUX PRZR SPRAY
VA 311

Task Controls

SIS104
o SI pumps:

- SAFETY INJECTION
PUMP A

- SAFETY INJECTION
PUMP B

- SAFETY INJECTION
PUMP C

RHR106
o RHR pumps:

- RES HT RMVL
PUMP A

- RES HT RMVL
PUMP B

ELEMENT TABLE
HBR REVISION 1

TASK PRP-C.2/13

RHR101
o RHR core deluge valves:

- RES HT RMVL LOOP TO
  RCS COLD LEG
  VA 744A

- RES HT RMVL LOOP TO
  RCS COLD LEG
  VA 744B

RHR102
o RHR heat exchanger bypass flow process controller:

- RESIDUAL HX BYPASS FLOW -
  FC-605

RHR103
o RHR heat exchanger discharge flow process controller:

- RESIDUAL HX DSCHG FLOW -
  HIC-758

RHR104
o RHR heat exchanger discharge valves:

- RES HX A DSCHG
  VA 759A

- RES HX B DSCHG
  VA 759B

SIS101
o Containment sump to RHR suction isolation valves:

- CONTAINMENT SUMP RECIRCULATION -
  CONT SUMP RECIRC SUCT
  VA 860A

- CONTAINMENT SUMP RECIRCULATION -
  CONT SUMP RECIRC SUCT
  VA 860B

- CONTAINMENT SUMP RECIRCULATION -
  CONT SUMP RECIRC SUCT
  VA 861A

- CONTAINMENT SUMP RECIRCULATION -
  CONT SUMP RECIRC SUCT
  VA 861B

FIGURE 3-5 (continued)

ELEMENT TABLE
HBR REVISION 1

TASK FRP-C.2/13

SIS102
o SI pumps discharge header cross-connect valves:

- SI PUMP DSCHG HDR
  CROSS-CONN
  VA 878A

- SI PUMP DSCHG HDR
  CROSS-CONN
  VA 878B

SIS103
o SI pumps miniflow recirculation valves:

- CONTAINMENT SUMP RECIRCULATION -
  HI HD SI TEST LINE TO RWST
  VA 856A

- CONTAINMENT SUMP RECIRCULATION -
  HI HD SI TEST LINE TO RWST
  VA 856B

SIS105
o Hot leg injection header shutoff valve:

- LOOPS 2 & 3
  HOT LEG INJ SHUTOFF
  VA 869

SIS106
o Hot leg injection valves:

- LOOP 3
  HOT LEG INJECTION
  VA 866 A

- LOOP 2
  HOT LEG INJECTION
  VA 866 B

SIS107
o RHR loop recirculation valves:

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RECIRC
  VA 863A

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RECIRC
  VA 863B

ELEMENT TABLE
BBR REVISION 1

TASK PRP-C.2/13

SIS108
o RWST discharge isolation valves:

- CONTAINMENT SUMP RECIRCULATION -
  RWST DSCHG
  VA 864A

- CONTAINMENT SUMP RECIRCULATION -
  RWST DSCHG
  VA 864B

SIS109
o RWST to RHR pumps isolation valves:

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RWST ISOL
  VA 862A

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RWST ISOL
  VA 862B

BIT101
o BIT inlet isolation valves:

- BORON INJ TANK INLET
  VA 867A

- BORON INJ TANK INLET
  VA 867B

BIT102
o BIT outlet isolation valves:

- BORON INJ TANK OUTLET
  VA 870A

- BORON INJ TANK OUTLET
  VA 870B

VCT101
o VCT level process controller:

- VOLUME CONTROL TANK -
  VOL CONT TANK LEVEL
  LC-112

ELEMENT TABLE
HBR REVISION 1

TASK PRP-C.2/13

VCT103
o VCT outlet isolation valve:

- VOLUME CONTROL TANK -
  OUTLET
  VA 115C

C&L104
o Charging pumps (PD pumps):

- CHARGING PUMP
  A

- CHARGING PUMP
  B

- CHARGING PUMP
  C

C&L105
o Charging pumps speed process controllers:

- CHARGING PUMP A
  SPEED
  SC-151

- CHARGING PUMP B
  SPEED
  SC-152

- CHARGING PUMP C
  SPEED
  SC-153

C&L101
o Charging flow control valve process controller:

- CHARGING LINE -
  CHARGING FLOW -
  HIC-121

RCP401
o Local controls/instrumentation for RCP seal injection:

- LOCAL

C&L102
o Charging line loop A isolation valve:

- CHARGING LINE -
  CHARGING LINE LOOP A HOT LEG
  VA 310A

ELEMENT TABLE
HBR REVISION 1

TASK PRP-C.2/13

C&L103
o Charging line loop B isolation valve:

- CHARGING LINE -
  CHARGING LINE LOOP B COLD LEG
  VA 310B

CVC102
o Auxiliary spray valve:

- CHARGING LINE -
  AUX PRZR SPRAY
  VA 311

FIGURE 3-6

HBR/WOG EOP Step Deviation Document

HBR Procedure #/Step FRP-C.2 / 13 Rev. 0

WOG Procedure #/Step FR-C.2 / 15 Rev. LP-REV. 1 FINAL

1. HBR step 13

13. Verify SI Flow: * SI pump flow indicators - CHECK FOR FLOW OR * RHR pump flow indicator - CHECK FOR FLOW	Continue efforts to establish SI flow. Try to establish charging flow to RCS. Return to step 12.

2. WOG step 15

15. Verify SI Flow: o High-head SI pump flow indicators - CHECK FOR FLOW - OR - o Low-head SI pump flow indicators - CHECK FOR FLOW	Continue efforts to establish SI flow. Try to establish any other high pressure injection: [Enter plant-specific list] Return to Step 14.

Page 1

HBR/WOG EOP Step Deviation Document

3a. Justification of Differences

Step I-13: R-13 — Step number is changed because of previous HBR changes.

Step R-13: In RNO establish charging flow is entered as the other high pressure injection.

Step I-13: R-13 — Plant-specific terminology is used. Step intent is unchanged.

3b. Explanation of Footnote Values

None

4. HBR Instrumentation/Control Requirements

Instrumentation:

SIS001
- o SI cold leg header flow indication:
  - SAFETY INJECTION - SI COLD LEG HEADER FLOW FI-943

SIS002
- o SI header pressure indication:
  - SAFETY INJECTION - SI HEADER PRESSURE PI-940
  - SAFETY INJECTION - SI HEADER PRESSURE PI-943

SIS003
- o SI hot leg header flow indication:
  - SAFETY INJECTION - SI HOT LEG HEADER FLOW FI-940

Page 2

<u>HBR/WOG EOP Step Deviation Document</u>

SIS004
o SI to hot leg flow indication:

- SAFETY INJECTION -
  SI HOT LEG ISOL VA 866A
  FI-932

- SAFETY INJECTION -
  SI HOT LEG ISOL VA 866B
  FI-933

RHR003
o RHR pump flow indicator:

- RHR -
  RESID HX TOTAL FLOW
  FI-605

SIS104
o SI pumps:

- SAFETY INJECTION
  PUMP A

- SAFETY INJECTION
  PUMP B

- SAFETY INJECTION
  PUMP C

RHR106
o RHR pumps:

- RES HT RMVL
  PUMP A

- RES HT RMVL
  PUMP B

RHR101
o RHR core deluge valves:

- RES HT RMVL LOOP TO
  RCS COLD LEG
  VA 744A

- RES HT RMVL LOOP TO
  RCS COLD LEG
  VA 744B

RHR102
o RHR heat exchanger bypass flow process controller:

- RESIDUAL HX BYPASS FLOW -
  FC-605

Page 3

HBR/WOG EOP Step Deviation Document

RHR103
- RHR heat exchanger discharge flow process controller:
  - RESIDUAL HX DSCHG FLOW - HIC-758

RHR104
- RHR heat exchanger discharge valves:
  - RES HX A DSCHG VA 759A
  - RES HX B DSCHG VA 759B

SIS101
- Containment sump to RHR suction isolation valves:
  - CONTAINMENT SUMP RECIRCULATION - CONT SUMP RECIRC SUCT VA 860A
  - CONTAINMENT SUMP RECIRCULATION - CONT SUMP RECIRC SUCT VA 860B
  - CONTAINMENT SUMP RECIRCULATION - CONT SUMP RECIRC SUCT VA 861A
  - CONTAINMENT SUMP RECIRCULATION - CONT SUMP RECIRC SUCT VA 861B

SIS102
- SI pumps discharge header cross-connect valves:
  - SI PUMP DSCHG HDR CROSS-CONN VA 878A
  - SI PUMP DSCHG HDR CROSS-CONN VA 878B

SIS103
- SI pumps miniflow recirculation valves:
  - CONTAINMENT SUMP RECIRCULATION - HI HD SI TEST LINE TO RWST VA 856A
  - CONTAINMENT SUMP RECIRCULATION - HI HD SI TEST LINE TO RWST VA 856B

HBR/WOG EOP Step Deviation Document

SIS105
o Hot leg injection header shutoff valve:

- LOOPS 2 & 3
  HOT LEG INJ SHUTOFF
  VA 869

SIS106
o Hot leg injection valves:

- LOOP 3
  HOT LEG INJECTION
  VA 866 A

- LOOP 2
  HOT LEG INJECTION
  VA 866 B

SIS107
o RHR loop recirculation valves:

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RECIRC
  VA 863A

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RECIRC
  VA 863B

SIS108
o RWST discharge isolation valves:

- CONTAINMENT SUMP RECIRCULATION -
  RWST DSCHG
  VA 864A

- CONTAINMENT SUMP RECIRCULATION -
  RWST DSCHG
  VA 864B

SIS109
o RWST to RHR pumps isolation valves:

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RWST ISOL
  VA 862A

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RWST ISOL
  VA 862B

Page 5

HBR/WOG EOP Step Deviation Document

BIT101
- BIT inlet isolation valves:
  - BORON INJ TANK INLET VA 867A
  - BORON INJ TANK INLET VA 867B

BIT102
- BIT outlet isolation valves:
  - BORON INJ TANK OUTLET VA 870A
  - BORON INJ TANK OUTLET VA 870B

VCT001
- VCT level indication:
  - CVCS - VOLUME CONTROL TANK LEVEL LI-115

VCT202
- VCT high/low level alarm:
  - APP-003 REACTOR COOLANT AND MAKEUP SYSTEMS (VOL CONT TK HI/LO LEVEL)

VCT101
- VCT level process controller:
  - VOLUME CONTROL TANK - VOL CONT TANK LEVEL LC-112

VCT103
- VCT outlet isolation valve:
  - VOLUME CONTROL TANK - OUTLET VA 115C

C&L104
- Charging pumps (PD pumps):
  - CHARGING PUMP A
  - CHARGING PUMP B
  - CHARGING PUMP C

Page 6

HBR/WOG EOP Step Deviation Document

C&L105
o Charging pumps speed process controllers:

- CHARGING PUMP A
  SPEED
  SC-151

- CHARGING PUMP B
  SPEED
  SC-152

- CHARGING PUMP C
  SPEED
  SC-153

C&L201
o Charging pump motor overload/trip alarm:

- APP-003 REACTOR COOLANT AND MAKEUP SYSTEMS
  (CHARGING PMP MOTOR OVRLOAD/TRIP)

C&L203
o Charging pumps low speed alarm:

- APP-001 MISCELLANEOUS NSSS
  (CHARGING PMPS LO SPEED)

C&L001
o Charging flow indication:

- CVCS -
  CHARGING LINE FLOW
  FI-122A

C&L002
o Charging pumps discharge header pressure indication:

- CVCS -
  CHARGING PUMPS DISCH PRESS
  PI-121

C&L101
o Charging flow control valve process controller:

- CHARGING LINE -
  CHARGING FLOW -
  HIC-121

RCP401
o Local controls/instrumentation for RCP seal injection:

- LOCAL

Page 7

BBR/WOG EOP Step Deviation Document

RCP007
o RCP thermal barrier Delta P indication:

- RCP's -
  RCP LP1 THERMAL BARR DELTA P
  PI-131A

- RCP's -
  RCP #2 THERMAL BARR DELTA P
  PI-128A

- RCP's -
  RCP LP3 THERMAL BARR DELTA P
  PI-125A

RCP201
o RCP labryinth seal low delta P alarm:

- APP-001 MISCELLANEOUS NSSS
  (RC PMPS LABYRTH SEAL LO DELTA P)

C&L102
o Charging line loop A isolation valve:

- CHARGING LINE -
  CHARGING LINE LOOP A HOT LEG
  VA 310A

C&L103
o Charging line loop B isolation valve:

- CHARGING LINE -
  CHARGING LINE LOOP B COLD LEG
  VA 310B

CVC102
o Auxiliary spray valve:

- CHARGING LINE -
  AUX PRZR SPRAY
  VA 311

FIGURE 3-6 (continued)

HBR/WOG EOP Step Deviation Document

Control:

SIS104
- o SI pumps:
  - SAFETY INJECTION PUMP A
  - SAFETY INJECTION PUMP B
  - SAFETY INJECTION PUMP C

RHR106
- o RHR pumps:
  - RES HT RMVL PUMP A
  - RES HT RMVL PUMP B

RHR101
- o RHR core deluge valves:
  - RES HT RMVL LOOP TO RCS COLD LEG VA 744A
  - RES HT RMVL LOOP TO RCS COLD LEG VA 744B

RHR102
- o RHR heat exchanger bypass flow process controller:
  - RESIDUAL HX BYPASS FLOW - FC-605

RHR103
- o RHR heat exchanger discharge flow process controller:
  - RESIDUAL HX DSCHG FLOW - HIC-758

RHR104
- o RHR heat exchanger discharge valves:
  - RES HX A DSCHG VA 759A
  - RES HX B DSCHG VA 759B

Page 9

HBR/WOG EOP Step Deviation Document

SIS101
o Containment sump to RHR suction isolation valves:

- CONTAINMENT SUMP RECIRCULATION - CONT SUMP RECIRC SUCT VA 860A
- CONTAINMENT SUMP RECIRCULATION - CONT SUMP RECIRC SUCT VA 860B
- CONTAINMENT SUMP RECIRCULATION - CONT SUMP RECIRC SUCT VA 861A
- CONTAINMENT SUMP RECIRCULATION - CONT SUMP RECIRC SUCT VA 861B

SIS102
o SI pumps discharge header cross-connect valves:

- SI PUMP DSCHG HDR CROSS-CONN VA 878A
- SI PUMP DSCHG HDR CROSS-CONN VA 878B

SIS103
o SI pumps miniflow recirculation valves:

- CONTAINMENT SUMP RECIRCULATION - HI HD SI TEST LINE TO RWST VA 856A
- CONTAINMENT SUMP RECIRCULATION - HI HD SI TEST LINE TO RWST VA 856B

SIS105
o Hot leg injection header shutoff valve:

- LOOPS 2 & 3 HOT LEG INJ SHUTOFF VA 869

Page 10

HBR/WOG EOP Step Deviation Document

SIS106
o Hot leg injection valves:

- LOOP 3
  HOT LEG INJECTION
  VA 866 A

- LOOP 2
  HOT LEG INJECTION
  VA 866 B

SIS107
o RHR loop recirculation valves:

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RECIRC
  VA 863A

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RECIRC
  VA 863B

SIS108
o RWST discharge isolation valves:

- CONTAINMENT SUMP RECIRCULATION -
  RWST DSCHG
  VA 864A

- CONTAINMENT SUMP RECIRCULATION -
  RWST DSCHG
  VA 864B

SIS109
o RWST to RHR pumps isolation valves:

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RWST ISOL
  VA 862A

- CONTAINMENT SUMP RECIRCULATION -
  RHR LOOP RWST ISOL
  VA 862B

BIT101
o BIT inlet isolation valves:

- BORON INJ TANK INLET
  VA 867A

- BORON INJ TANK INLET
  VA 867B

HBR/WOG EOP Step Deviation Document

BIT102
- o BIT outlet isolation valves:
  - BORON INJ TANK OUTLET VA 870A
  - BORON INJ TANK OUTLET VA 870B

VCT101
- o VCT level process controller:
  - VOLUME CONTROL TANK - VOL CONT TANK LEVEL LC-112

VCT103
- o VCT outlet isolation valve:
  - VOLUME CONTROL TANK - OUTLET VA 115C

C&L104
- o Charging pumps (PD pumps):
  - CHARGING PUMP A
  - CHARGING PUMP B
  - CHARGING PUMP C

C&L105
- o Charging pumps speed process controllers:
  - CHARGING PUMP A SPEED SC-151
  - CHARGING PUMP B SPEED SC-152
  - CHARGING PUMP C SPEED SC-153

C&L101
- o Charging flow control valve process controller:
  - CHARGING LINE - CHARGING FLOW - HIC-121

HBR/WOG EOP Step Deviation Document

RCP401
- o Local controls/instrumentation for RCP seal injection:
  - LOCAL

C&L102
- o Charging line loop A isolation valve:
  - CHARGING LINE -
    CHARGING LINE LOOP A HOT LEG
    VA 310A

C&L103
- o Charging line loop B isolation valve:
  - CHARGING LINE -
    CHARGING LINE LOOP B COLD LEG
    VA 310B

CVC102
- o Auxiliary spray valve:
  - CHARGING LINE -
    AUX PRZR SPRAY
    VA 311

5. WOG Instrumentation/Control Requirements

Instrumentation:
- o High-head SI pumps flow indicators
- o Low-head SI pumps flow indicators
- o Plant-specific instrumentation to monitor other sources of make-up flow to the RCS
- o High-head SI pump status indication
- o Low-head SI pump status indication
- o SI valves position indication

Control:
- o Switches for:
  - High-head SI pumps
  - Low-head SI pumps
  - SI valves
- o Plant-specific controls to establish other sources of make-up flow to the RCS

Page 13

HBR/WOG EOP Step Deviation Document

6. Justification of Instrumentation/Control Differences

Charging flow is used as the other source of high pressure injection at HBR. Including the instrumentation and controls for charging flow does not constitute a difference between the WOG guidelines and the HBR lists.

ACTION-INFORMATION REQUIREMENTS DETAILS (AIRD)

Sheet ______ of ______

PLANT: ______________________ UNIT: __________ ORIGINATOR: __________ DATE: __________

EOP NO: __________ EOP NAME: ______________________ REVIEWER: __________ DATE: __________

ERG NO: __________

STEP NO: __________ STEP NAME: ______________________

STEP OBJECTIVE: ______________________

REMARKS:

BEHAVIORAL ELEMENTS											
Action	Verb	System	Component/ Equipment No.	Parameter	Direction	State/Value	Units/Rate	Precision	Trending Required?	Comments	On AIRS Sh No

FIGURE 3-7

ACTION-INFORMATION REQUIREMENTS DETAILS (AIRD) Sheet 1 of 2

PLANT: H.B. Robinson UNIT: 2 ORIGINATOR: P.L. McMurtry DATE: July 11, 1986
EOP NO: ERP-C.2 EOP NAME: Response to Degraded Core Cooling REVIEWER: ______ DATE: ______
ERG NO: FR-C.2
STEP NO: 13 STEP NAME: Verify SI Flow
STEP OBJECTIVE: To verify SI flow delivery to the RCS.
REMARKS:

BEHAVIORAL ELEMENTS

Action	Verb	System	Component/ Equipment No.	Parameter	Direction	State/Value	Units/Rate	Precision	Trending Required?	Comments	On AIRS Sh No
01	Observe	SI	SI Flow Indication	Flow					N	Presense of Flow	
02	Observe	RHR	RHR Flow Indication	Flow					N	Presense of Flow	
R01 01	Adjust	SI	SI Pumps	Position		start					
R01 02	Observe	SI	SI Pumps	Status		Running					
R01 03	Adjust	SI	SI Valves	Position		Open/ Close				Proper Alignment for SI flow	
R01 04	Observe	SI	SI Valves	Position		Open/ Closed					
R01 05	Adjust	RHR	RHR Pumps	Position		Start					
R01 06	Observe	RHR	RHR Pumps	Status		Running					
R01 07	Adjust	RHR	RHR Valves	Position		Open/ Close				Proper Alignment for RHR Flow	

FIGURE 3-8

ACTION-INFORMATION REQUIREMENTS DETAILS (AIRD)

Sheet 2 of 2

PLANT: H.B. Robinson **UNIT:** 2 **ORIGINATOR:** P.L. McMurtry **DATE:** July 11, 1986
EOP NO: EPP-C.2 **EOP NAME:** Response to Degraded Core Cooling **REVIEWER:** **DATE:**
ERG NO: FR-C.2
STEP NO: 13 **STEP NAME:** Verify SI Flow
STEP OBJECTIVE: To verify SI flow delivery to the RCS.
REMARKS:

BEHAVIORAL ELEMENTS

Action	Verb	System	Component/ Equipment No.	Parameter	Direction	State/Value	Units/Rate	Precision	Trending Required?	Comments	On AIRS Sh No
R01 08	Observe	RHR	RHR Valves	Position		Open/ Closed					
R01 09	Observe	CVC	VCT Level Indication	Level					N	Sufficient level to start charging pumps.	
R01 10	Adjust	CVC	VCT Level Controls	Status		Automatic					
R01 11	Adjust	CVC	Charging Pumps	Position		Start					
R01 12	Observe	CVC	Charging Pumps	Status		Running					
R01 13	Observe	CVC	Charging Flow Indications	Flow					N	Presense of flow	
R01 14	Observe	CVC	Charging Header Pressure Indication	Pressure					N	Presense of Positive Header Pressure	
R01 15	Adjust	CVC	Charging Flow Controls	Position		Open/ Close				Proper alignment for charging flow.	
R01 16	Observe	CVC	Charging Flow Controls	Position		Open/ Closed					

FIGURE 3-8 (continued)

ACTION-INFORMATION REQUIREMENTS SUMMARY (AIRS)

PAGE # 104

REPORT DATE : 08/18/86

PLANT: H. B. ROBINSON
UNIT NO.: 2

ORG: M. . GRANNAN DATE: 08/18/86

REVIEWER: P.L. McMurtry DATE: 9-17-86

SORT BLOCK	SUMMARY OF REQ. BLOCK		VERIFICATION SUMMARY BLOCK		
	CONTROLS	INDICATORS	DEVICE ID NO.	PASS	FAIL
SYSTM / PARAMETER C&L / POSITION	STATE: open/close	STATE/VALUE: N/A UNITS: N/A PRECISION: N/A	UA 310B (12A1-32166)	✓	

(CONTINUED)

INDIVIDUAL DETAILS

EOP NO.	STEP NO.	ACTN	VERB	SYSTM	PARAMETER	DIRECTION	STATE/VALUE	UNIT/RATE	TREND
FRP-C.1	02	R0527	ADJUST	C&L	POSITION		OPEN		
FRP-C.1	02	R0528	OBSERVE	C&L	POSITION		OPEN		
FRP-C.1	03	R0226	DETERMINE	C&L	POSITION		OPEN/CLOSED		
FRP-C.1	03	R0227	ADJUST	C&L	POSITION		OPEN		
FRP-C.1	03	R0228	OBSERVE	C&L	POSITION		OPEN		
FRP-C.1	13	R0157	DETERMINE	C&L	POSITION		OPEN/CLOSED		
[illegible]1	13	R0158	ADJUST	C&L	POSITION		OPEN		
FRP-C.1	13	R0159	OBSERVE	C&L	POSITION		OPEN		
FRP-C.1	20	R0157	DETERMINE	C&L	POSITION		OPEN/CLOSED		
FRP-C.1	20	R0158	ADJUST	C&L	POSITION		OPEN		
FRP-C.1	20	R0159	OBSERVE	C&L	POSITION		OPEN		
FRP-C.2	02	R0526	DETERMINE	C&L	POSITION		OPEN/CLOSED		
FRP-C.2	02	R0527	ADJUST	C&L	POSITION		OPEN		
FRP-C.2	02	R0528	OBSERVE	C&L	POSITION		OPEN		
FRP-C.2	04	R0326	DETERMINE	C&L	POSITION		OPEN/CLOSED		
FRP-C.2	04	R0327	ADJUST	C&L	POSITION		OPEN		
FRP-C.2	04	R0328	OBSERVE	C&L	POSITION		OPEN		
FRP-C.2	13	R0157	DETERMINE	C&L	POSITION		OPEN/CLOSED		
FRP-C.2	13	R0158	ADJUST	C&L	POSITION		OPEN		
FRP-C.2	13	R0159	OBSERVE	C&L	POSITION		OPEN		
FRP-C.3	02	R0526	DETERMINE	C&L	POSITION		OPEN/CLOSED		
FRP-C.3	02	R0527	ADJUST	C&L	POSITION		OPEN		
FRP-C.3	02	R0528	OBSERVE	C&L	POSITION		OPEN		
FRP-H.1	17	029	DETERMINE	C&L	POSITION		OPEN/CLOSED		
[illegible]	17	030	ADJUST	C&L	POSITION		OPEN		

ACTION-INFORMATION REQUIREMENTS SUMMARY (AIRS)

PAGE # 81 REPORT DATE : 08/18/86

PLANT: H. B. ROBINSON
UNIT NO.: 2

ORG: M. . GRANNAN DATE: 08/18/86
REVIEWER: P.L McMurtry DATE: 9-17-86

SORT BLOCK	SUMMARY OF REQ. BLOCK		VERIFICATION SUMMARY BLOCK		
SYSTM / PARAMETER	CONTROLS	INDICATORS	DEVICE ID NO.	PASS	FAIL
C&L / FLOW	STATE: N/A	STATE/VALUE: 0-25 UNITS: GPM PRECISION: X5	FI-122A (12A1-22036)	✓	

INDIVIDUAL DETAILS

EOP NO.	STEP NO.	ACTN	VERB	SYSTM	PARAMETER	DIRECTION	STATE/VALUE	UNIT/RATE	TREND
EPP-02	06	001	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
EPP-02	07	R1002	OBSERVE	C&L	FLOW	INCREASING		GPM	Y
EPP-02	08	R0102	OBSERVE	C&L	FLOW	INCREASING		GPM	Y
EPP-02	12	114	OBSERVE	C&L	FLOW		0	GPM	
EPP-02	12	228	OBSERVE	C&L	FLOW		0	GPM	
EPP-02	12	323	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
[illegible]-02	12	433	OBSERVE	C&L	FLOW	INCREASING		GPM	Y
[illegible]-02	15	002	MONITOR	C&L	FLOW			GPM	
EPP-02	18	R0178	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
EPP-02	19	R0268	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
EPP-02	20	021	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
EPP-02	21	R1002	OBSERVE	C&L	FLOW	INCREASING		GPM	Y
EPP-02	22	R0121	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
EPP-02	23	R0519	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
EPP-03	08	114	OBSERVE	C&L	FLOW		0	GPM	
EPP-03	08	228	OBSERVE	C&L	FLOW		0	GPM	
EPP-03	08	323	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
EPP-03	08	433	OBSERVE	C&L	FLOW	INCREASING		GPM	Y
FRP-C.1	02	R0519	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
FRP-C.1	03	R0219	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
FRP-C.1	13	R0150	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
FRP-C.1	20	R0150	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
FRP-C.2	02	R0519	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
FRP-C.2	04	R0319	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
FRP-C.2	13	R0150	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	
[illegible]C.3	02	R0519	OBSERVE	C&L	FLOW	GREATER THAN	25	GPM	

TABLE 3-1

A COMPARISON OF

THE ELEMENT TABLES, THE AIRD FORMS, AND THE AIRS FORMS

ELEMENT TABLES	AIRD FORMS	AIRS FORMS
o CONTAINS A LISTING OF ACTION (CONTROL) AND INFORMATION REQUIREMENTS SORTED BY BEHAVIORAL TASK	o CONTAINS A LISTING OF ACTION (CONTROL) AND INFORMATION REQUIREMENTS SORTED BY PROCEDURE GUIDE-LINE	o CONTAINS A LISTING OF ACTION (CONTROL) REQUIREMENTS BY PARAMETER AND A LISTING OF INFORMA-TION REQUIREMENTS BY PARAMETER
o ALSO CONTAINS THE TASK DESCRIPTION, KNOWLEDGE REQUIRE-MENTS, AND SKILL REQUIREMENTS	o CONTAINS PARAMETIC INFORMATION (ie., PARAMETER, VALUE, DIRECTION OF VALUE MOVEMENT, ETC.)	o CONTAINS THE REQUIRED RANGE OF VALUES, LONG OBSERVATION TIMES (IF APPLICABLE), AND THE REQUIRED PRECISION FOR ALL NOTED VALUES
o ACTS AS AN HISTOR-ICAL DOCUMENT AND A CENTRAL LOCATION FOR TASK PERFORMANCE INFORMATION. AFTER CRDR VERIFICATION, RELATED CONTROLS AND AND INSTRUMENTATION ARE ADDED	o IS AN INTERMEDIATE STEP IN EXTRACTING THE ACTION AND IN-FORMATION REQUIRE-MENTS THAT THE CR EQUIPMENT MUST MEET	o PRIMARY DATA SOURCE USED DURING CRDR VERIFICATION TO EVALUATE THE CR INVENTORY FOR PRESENCE OF, AND ADEQUACY OF ALL CONTROLS AND DISPLAYS

TABLE 3-2

HBR CONTROL ROOM INDICATIONS

PANEL	ID	NAME	UNITS	SYS #
A1	21001	APP-001/MISCELLANEOUS NSSS		
A1	21002	APP-002/ENGINEERING SAFEGUARDS SYSTEM		
A1	21003	APP-003/REACTOR COOLANT & MAKEUP SYSTEMS		
A1	21004	APP-004/FIRST OUT REACTOR TRIPS		
A1	22011	RCS CH I LOOP 1 FLOW	0-120 %	FI 414
A1	22012	RCS CH II LOOP 1 FLOW	0-120 %	FI 415
A1	22013	RCS CH III LOOP 1 FLOW	0-120 %	FI 416
A1	22014	RCS CH I LOOP 2 FLOW	0-120 %	FI 424
A1	22015	RCS CH II LOOP 2 FLOW	0-120 %	FI 425
A1	22016	RCS CH III LOOP 2 FLOW	0-120 %	FI 426
A1	22017	RCS CH I LOOP 3 FLOW	0-120 %	FI 434
A1	22018	RCS CH II LOOP 3 FLOW	0-120 %	FI 435
A1	22019	RCS CH III LOOP 3 FLOW	0-120 %	FI 436
A1	22020	RCS NARROW RANGE PRESS	0-10 X 100 PSIG	PI 403
A1	22021	RCS WIDE RANGE PRESS	0-30 X 100 PSIG	PI 402
A1	22022	REACTOR VESSEL HEAD TEMP / TI 400	50-600 DEG F	TI 400
A1	22024	RCP #1 SEAL #1 PRESS	0-400 PSIG	PI 156A
A1	22025	RCP LP1 THERMAL BARR DELTA P	0-100 INWC	FI 131A
A1	22026	RCP #2 SEAL #1 PRESS	0-400 PSIG	PI 155A
A1	22027	RCP LP2 THERMAL BARR DELTA P	0-100 INWC	FI 128A
A1	22028	RCP #3 SEAL #1 PRESS	0-400 PSIG	PI 154A
A1	22029	RCP LP3 THERMAL BARR DELTA P	0-100 INWC	FI 125A
A1	22030	COMP COOL PUMP INLET TEMP	50-200 DEG F	TI 610
A1	22031	COMP COOL SURGE TANK LEVEL	0-100 %	LI 614B
A1	22032	COMP COOL DISCHARGE FLOW	60-220 GPM X 100	FI 613
A1	22033	COMP COOL HX OUTLET TEMP	50-200 DEG F	TI 607
A1	22034	RESID HX TOTAL FLOW	0-850 GPM X 10	FI 605
A1	22035	REGEN HX OUTLET TEMP	100-600 DEG F	TI 123
A1	22036	CHARGING LINE FLOW / FI 122A	0-150 GPM	FI 122A
A1	22037	REGEN HX LTDN OUTLET TEMP	100-600 DEG F	TI 140
A1	22038	LOW PRESS LTDN REL LINE TEMP	50-300 DEG F	TI 141
A1	22039	NON REG HX OUTLET TEMP	50-200 DEG F	TI 144
A1	22040	NON REG HX LTDN FLOW TEMP	50-200 DEG F	TI 143
A1	22041	LOW PRESS LTDN PRESS	0-600 PSIG	PI 145
A1	22042	LOW PRESS LTDN FLOW	0-150 GPM	FI 150
A1	22043	EXC LTDN HX OUTLET TEMP	30-300 DEG F	TI 139
A1	22044	EXC LTDN HX OUTLET PRESS	0-250 PSIG	PI 138
A1	22045	SI HOT LEG ISOL VAL 866A	0-600 GPM	FI 932
A1	22046	SPRAY HEADER FLOW / FI 958A	0-1500 GPM	FI 958A
A1	22047	SI HOT LEG ISOL VAL 866B	0-600 GPM	FI 933
A1	22048	SPRAY HEADER FLOW / FI 958B	0-1500 GPM	FI 958B
A1	22049	SI HOT LEG HEADER FLOW	0-1000 GPM	FI 940
A1	22050	SI HEADER PRESSURE	0-2000 PSIG	PI 940
A1	22051	SI COLD LEG HEADER FLOW	0-1000 GPM	FI 943
A1	22052	SI HEADER PRESSURE	0-2000 PSIG	PI 943
A1	22053	REFUEL WATER STOR TANK LEVEL	0-100 %	LI 948
A1	22054	BORON INJ TANK HEADER PRESS	0-2000 PSIG	PI 934
A1	22055	SPRAY ADDITIVE FLOW	0-50 GPM	FI 949
A1	22056	SPRAY ADDITIVE TANK LEVEL / LI 949	0-100 %	LI 949

TABLE 3-3

Page 1
09-17-1986

HBR CONTROL ROOM CONTROLS

PANEL	ID	NAME	POSITIONS
A1	32160	PRZR REL TK MAKEUP ISOL VA 519A & B	CLOSE/OPEN
A1	32161	PRZR RELIEF VA 455C	CLOSE/AUTO/OPEN
A1	32162	PRZR RELIEF LINE SHUTOFF VA 536	CLOSE/OPEN
A1	32163	PRZR RELIEF VA 456	CLOSE/AUTO/OPEN
A1	32164	PRZR RELIEF LINE SHUTOFF VA 535	CLOSE/OPEN
A1	32165	AUX PRZR SPRAY VA 311	CLOSE/OPEN
A1	32166	CHARGING LINE LOOP B COLD LEG VA 310B	CLOSE/OPEN
A1	32167	CHARGING LINE LOOP A HOT LEG VA 310A	CLOSE/OPEN
A1	32168	PRZR RELIEF TK MU ISOL VA 519C	CLOSE/OPEN
A1	32169	PRZR RELIEF TK DRAIN VA 523	CLOSE/OPEN
A1	32170	PRZR RELIEF TK VENT VA 549	CLOSE/OPEN
A1	32171	PRZR RELIEF VA 455C	NORMAL/LOW PRESSURE
A1	32172	PRZR RELIEF VA 456	NORMAL/LOW PRESSURE
A1	32173	CHARGING PUMP B	STOP/START
A1	32174	PRZR HTR BACK-UP GROUP A	OFF/AUTO/ON
A1	32175	CHARGING PUMP C	STOP/START
A1	32176	PRZR HTR BACK-UP GROUP B	OFF/AUTO/ON
A1	32177	PRIMARY WATER TO BLENDER VA 114A	CLOSE/AUTO/OPEN
A1	32178	PRIMARY WATER PUMP B	STOP/AUTO/START
A1	32179	VOLUME CONT TK MAKEUP VA 114B	CLOSE/AUTO/OPEN
A1	32180	BLENDED MAKEUP TO CHG PUMP SUCTION VA 113B	CLOSE/AUTO/OPEN
A1	32181	BORIC ACID TO BLENDER VA 113A	CLOSE/AUTO/OPEN
A1	32182	BORIC ACID TO CHARGING PMP SUCTION HDR VA 350	CLOSE/OPEN
A1	32183	EMERG MAKE-UP TO CHG SUCTION VA 115B	CLOSE/OPEN
A1	32184	VENT VA 258	CLOSE/OPEN
A1	32185	OUTLET VA 115C	CLOSE/OPEN
A1	32186	VCT/HLDP TK DIV VA 115A	VCT/HLDP
A1	32187	RCS MAKEUP MODE	BORATE/AUTO/DILUTE/ALT DILUTE
A1	32188	RCS MAKEUP SYSTEM	STOP/START
A1	32189	BORIC ACID PUMP A / BLEND	STOP/AUTO/START
A1	32190	BORIC ACID PUMP B / BIT	STOP/AUTO/START
A1	32367	SI PUMP DSCHG HDR CROSS-CONN VA 878A	CLOSE/OPEN
A1	32376	TM-408A TAVG	LP1 2&3/LP1&2/LP1&3/LP2&3
A1	32377	PRZR HTR CONTROL GROUP	OFF/ON
A1	32378	PRIMARY WATER PUMP A	STOP/AUTO/START
A1	32481	CHARGING PUMP A	STOP/START
A1	32500	INSTRUMENT AIR ISOL TO CV IA PCV-1716	OVERRIDE/AUTO/RESET
A1	32501	RCS LOOPS 2 & 3 VA 956E & VA 956F	NORMAL/OVERRIDE OPEN
A1	32502	S/G A BLOWDOWN VA 1933A & VA 1933B	NORMAL/OVERRIDE OPEN
A1	32503	S/G B BLOWDOWN VA 1934A & VA 1934B	NORMAL/OVERRIDE OPEN
A1	32504	S/G C BLOWDOWN VA 1935A & VA 1935B	NORMAL/OVERRIDE OPEN
A1	32505	PW TO PRT VA 519A & 519B	NORMAL/OVERRIDE OPEN
A1	32506	RMS 11 & 12 ISOL RMS 1,2,3, & 4	NORMAL/OVERRIDE OPEN
A1	32518	HEAD VENT VA 567	OPEN/CLOSE
A1	32519	HEAD VENT VA 568	OPEN/CLOSE
A1	32520	PZR VENT VA 569	OPEN/CLOSE
A1	32521	PZR VENT VA 570	OPEN/CLOSE
A1	32522	PZR ISOL VA 571	OPEN/CLOSE
A1	32523	CV ATMOS VA 572	OPEN/CLOSE

SECTION 4.0 ASSESSMENT AND DESIGN SOLUTIONS

4.1 INTRODUCTION

NUREG-0700 defines a Human Engineering Discrepancy (HED) as "a departure from some benchmark of system suitability for the roles and capabilities of the human operator." Section 6 of NUREG-0700 contains these design benchmarks or guidelines. While it can be expected that the CRDR process will produce reports of Human Engineering Discrepancies, it does not follow that all discrepancies will necessarily degrade operator performance to the point that plant safety would be affected. The objective of the assessment process was for the HED Assessment Team (HEDAT) to evaluate the relative significance of each HED based upon an estimate of the probability of the occurrence of an error, the probability of correcting the error and the probable consequences of not correcting the error.

The method for HED Assessment that was used by the HBR HEDAT is based on the methods proposed in draft NUREG-0801.

4.2 METHOD USED FOR RECORDING HEDs

HEDs were recorded on Human Engineering Discrepancy Report forms, which are included in each Task Plan as Appendix B9 (see Figure 4-1). A discrepancy/deviation from the guidelines is recorded on the HED form with the items/components involved. The form also contains a place for recording the data collection method (e.g. Observation, Operator Interview, etc.) and a place for listing potential human errors that may exist because of the discrepancy. The second page of the HED form contains a place for the suggested backfit and the disposition of the HED.

A summary sheet was also attached to each HED. This summary contains a record of the final disposition of the HED, the category number, and the final corrective action.

4.3 ASSESSMENT TEAM COMPOSITION

The HED assessment team (as indicated on Figure 2-2) consists of the following individuals:

- o Site Operations Coordinator
- o Human Factors Manager
- o Lead Human Factors Specialists
- o Operations Analyst & Logic Support Individuals

Other members of the CRDR project team were included in HED assessment meetings on an as-needed basis.

4.4 ASSESSMENT

The approach employed by CP&L in assessing HEDs involved prioritization of each HED based on estimations of the potential for error and the consequence of errors resulting from the HED. Assessment of the HEDs was based on:

- o component design factors (e.g., extent of deviation from guideline, conformance to plant design conventions),

- o task factors (e.g., difficulty, frequency, time demands), and

- o human factors (physical performance, sensory and perceptual performance, cognitive performance).

4.4.1 Assessment of HEDs for Cumulative effects

HEDs were easily assessed for cumulative effects with the HED numbering scheme developed by CP&L. The numbering scheme (described in Figure 4-2) identifies the component type within the HED number. This allowed for easy tracking and grouping of HEDs that addressed the same components or design feature, such as labeling, annunciator, workspace, etc.

The process used to assess HEDs for cumulative effects consisted of:

a. Grouping HEDs that addressed the same problems.

b. Grouping HEDs that addressed the same components.

c. Assessment of HEDs for probability of error and the consequence of error occurrence.

When HEDs addressed the same components the HEDAT would re-assess the HEDs for cumulative effects to determine if the component required modification due to the number of HEDs against that component. Grouping HEDs that addressed the same problems allowed the HEDAT to assess the scope for potential fixes. For example, the HEDs that addressed individual problems with the component labels on the main control board, were determined to be so numerous that the HEDAT concluded that the majority of the labels should be replaced. These HEDs will be resolved by the panel re-labeling that will be done in conjunction with the re-painting of the panel.

HEDs were also verified for consistencies across panels. For example, an HED addressing a particular type of rotary control on the main control board was grouped with any HEDs for the same type of component that was on the dedicated shutdown panels. These HEDs were assessed together and the same resolution was assigned to these HEDs.

4.4.2 HED Evaluation

Each HED was evaluated for probability of error occurrence and consequence of error occurrence.

a. Guidelines for estimating HED potential for error were structured into a questionnaire (See Table 4-1). These

guidelines were based upon design and task factors that comprise error potential.

In the evaluation process the HEDAT went through the error potential questionnaire answering each question by consensus of agreement as yes or no. A "yes" answer to any question classified the HED as having a potential for error.

b. Guidelines for estimating consequence of error are also contained within a questionnaire (see Table 4-2). These guidelines are based upon plant safety, availability, capacity, and control function parameters.

   If the HEDAT answered any question in this questionnaire "yes," it was determined that a potential consequence of error exists with the HED.

4.5 PRIORITIZATION OF HEDS

Based on the results of the assessment for probability of error occurrence and error consequence, the HEDs were assigned priority numbers based on the process outlined in Figure 4-3. The priority numbers allowed for further assessment of HEDs in terms of significance and prioritization. The HED categories are defined as follows:

a. Priority 1 -- Those HEDs that were documented errors which have a significant consequence of error. Included were errors that might have safety consequences or result in a violation of a technical specification.

b. Priority 2 -- Those HEDs that are documented errors which had an insignificant consequence of error, or those HEDs that have a significant error potential and a significant consequence of error.

c. Priority 3 -- Those HEDs that had significant error potential and an insignificant consequence of error.

d. Priority 4 -- Those HEDs that had an insignificant error potential and a significant consequence of error.

e. Priority 5 -- Those HEDs that had an insignificant error potential and an insignificant consequence of error.

4.6 SELECTION AND VERIFICATION OF DESIGN IMPROVEMENTS

The procedure used in the selection and specification of corrective actions for HEDs that were to be corrected involved an analysis for correction by enhancement, an analysis for correction by design alternatives, and an assessment of the extent of the correction.

The process followed by the HEDAT, as outlined in Figure 4-4, initially consisted of a determination of whether the HED could be corrected by an enhancement. An enhancement was defined as a fix that consisted of labeling, demarcation, operator aids, etc.

Where correction by enhancement was not possible, the discrepancy was analyzed for correction by a design alternative. The HEDAT would first develop design alternatives as suggested backfits for the HED. These alternatives were then reviewed to determine the most appropriate alternative. Criteria used in the assessment of this review consisted of:

a. Integration with other NUREG-0737, Supplement 1 programs

b. Safety consequences

c. The extent of the suggested correction in terms of cost restrictions

d. Any other constraints (e.g., availability of replacement equipment).

The HEDAT would then select a design alternative and assess it to determine if the HED would be corrected. It was also the responsibility of the Lead HF Specialists and the Site Operations Coordinator to verify that the design alternative did not create any new HEDs or invalidate other HEDs. This was done by verifying that the correction was in compliance with NUREG-0700 guidelines.

If new HEDs were created or other corrected HEDs were invalidated, the HEDAT would re-evaluate the design alternative and select another alternative. The process of assessing the alternative and verifying the design alternative would be repeated for the second alternative.

The implementation ratings associated with a given category were intended to aid in prioritizing HED corrective actions. Priority 1 HEDs were given first priority, Priority 2 HEDs second priority, Priority 3 HEDs third priority, and Priority 4 and 5 lowest priority.

The HEDs that were approved for correction and their implementation schedule are listed in Section 6.0 of this report.

4.7 SCHEDULING OF CORRECTIONS

HEDAT approved projects were incorporated into the plants project planning and scheduling system. This process involves the submittal of plant improvement request forms by the SOC which contained descriptive information on the scope of the project. The scope of each project was obtained from the individual HEDs being resolved as summarized in Section 6.0 of this report.

Once in the planning and scheduling system, each project is assigned a unique number to allow tracking of the project through the system including the addition of the project to the Facility Automated Commitment Tracking System (FACTS). The FACTS provides for a closeout document in the form of project completion that will be available in the FACTS files.

The projects that require design changes will result in modification development. This procedure provides for the pre-implementation review as outlined in Section 4.8 below. The modification process requires the necessary procedure changes and training program updates to be complete prior to modification closeout.

The projects that do not require modification (enhancements, labeling, etc.) will be coordinated by the Site Operations Coordinator. The necessary documentation to demonstrate project closeout and proper integration of changes to training documents and procedures will be provided to the RAIL file.

4.8 HUMAN FACTORS REVIEW OF FUTURE CONTROL ROOM DESIGN IMPROVEMENTS

The modification procedures will be updated to include a human factors design guide document to insure that future changes to the control room conform to established human factors

principles. The design guide document will provide the necessary documentation to show that human factors was considered, consistent with the established HBR criteria and conventions.

Until the modification procedure is revised to include the design guide (see Section 6.0 of this report), the method of insuring the integrity of the human factors review will involve the LDE and SOC.

The Lead Discipline Engineer and the Site Operations Coordinator will be responsible for insuring that control room modifications adequately incorporate human factors principles consistent with HBR established criteria and conventions. This responsibility will include obtaining the necessary human factors expertise when required.

FIGURE 4-1

ANNUNCIATOR SYSTEM

APPENDIX B9

HUMAN ENGINEERING DISCREPANCY (HED) REPORT

____

PLANT/UNIT

ORIGINATOR: ______________________________ HED NO: ____________

VALIDATED BY: ______________________________ DATE: ____________

a) HED TITLE: ____

____

b) ITEMS INVOLVED:

c) PROBLEM DESCRIPTION AND 0700 PARA. NUMBER:

d) DATA COLLECTION DESCRIPTION AND CODE NUMBER:

e) SPECIFIC HUMAN ERROR(S):

FIGURE 4-1 (continued)
ANNUNCIATOR SYSTEM

APPENDIX B9
HED REPORT (CONTINUED)

______________________ HED NO: __________
PLANT/UNIT

f) SUGGESTED BACKFIT:

g) REVIEW AND DISPOSITION:

FIGURE 4-2

HED NUMBERING SCHEME

HED numbers are composed of a nine (9) digit number divided into two (2) groups by a hyphen (done for ease of reading). The first digit contains the plant identification number. The second digit is the unit number at the plant. The third and fourth digits contain the physical location (panel identification) of the component. The fifth and sixth digits contain the component type or design feature (e.g., a rotary control or a component label). The seventh, eighth and ninth digits are sequence numbers for the fifth and sixth digits.

The sequence numbers allow for 999 separate HEDs for any given two-digit component or design feature identifier. The unique identity of an HED is dependent upon the last five digits. This was done to keep a specific four or five digit HED number unique within a given power plant unit.

Below is an example of an HED number which describes the one hundred-eighth (108) label HED written against the A Section of the main control board for unit 2 at H.B. Robinson Nuclear Project.

1 2 A1 - 11 108

Plant

Unit No.

Physical Location

Component Type or Design Feature

Sequence Number

FIGURE 4-3

HED PRIORITIZATION

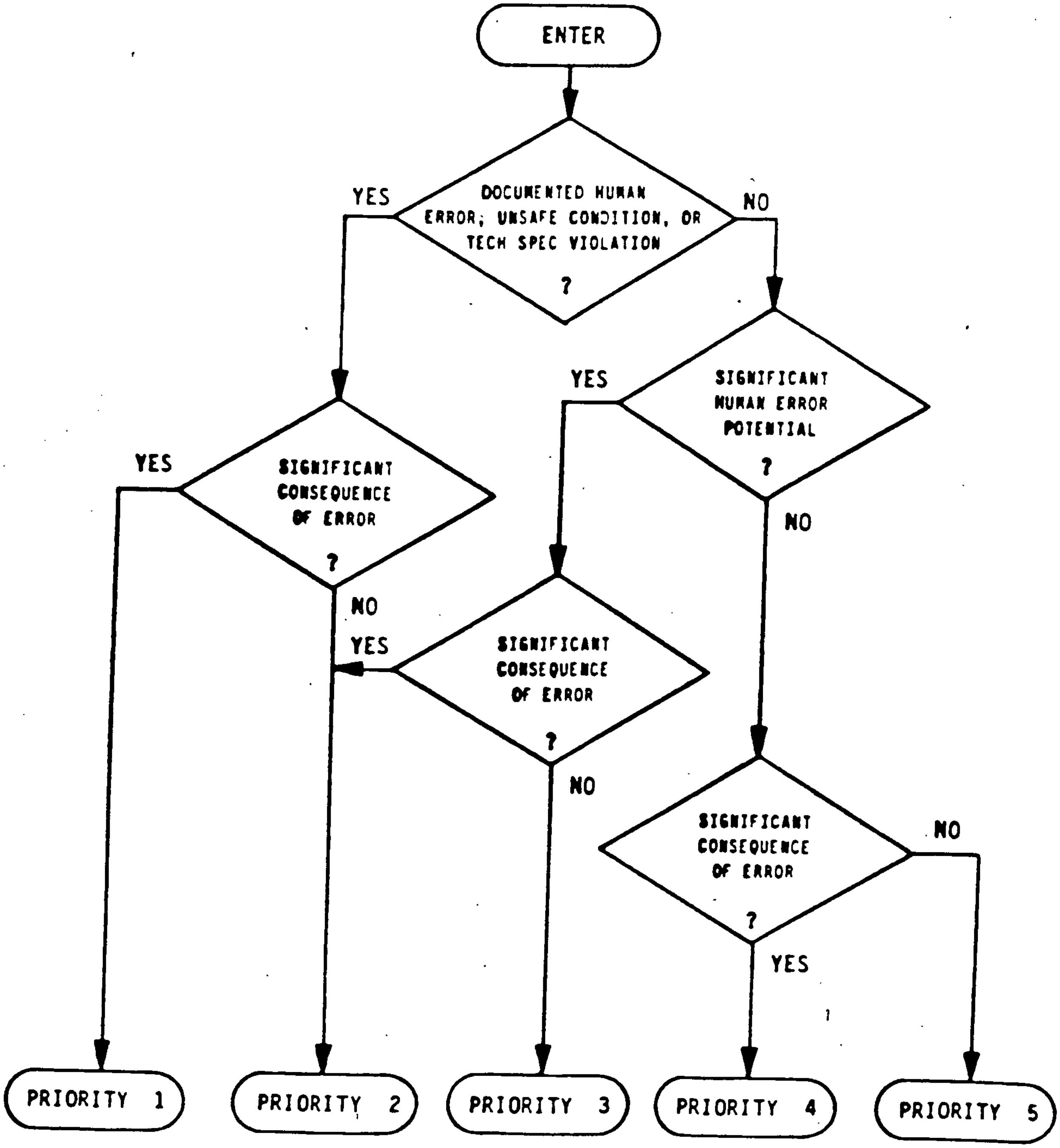


TABLE 4-1
HED ERROR POTENTIAL QUESTIONNAIRE

The HED is or will:	check one: yes	no
1. Cause undue operator fatigue		
2. Cause operator confusion		
3. Cause operator discomfort		
4. Adversely affect operator's mental/physical workload		
5. Distract Control Room personnel from their duties		
6. Affect operator's ability to see or read accurately		
7. Affect operator's ability to hear correctly		
8. Affect operator's ability to communicate accurately with others		
9. Degrade operator's ability to manipulate controls correctly		
10. Cause a significant delay of necessary feedback to the operator		
11. Deprive the operator of positive feedback about control tasks		

TABLE 4-1 (continued)

	check one yes	no
12. Violate operator expectations of Control Room conventions or practices		
13. Violate operator expectations of population stereotypes		
14. Lead to inadvertent actuation or de-actuation of controls		
15. Tasks in which this discrepancy is involved will be highly stressful		
16. Operators have attempted to correct this discrepancy themselves (i.e. self-training, temporary labels,'cheaters', helper controls, compensating body movements, etc.)		
17. A documented error		

Criteria: Answer to any of the above questions 'yes' -- error potential significant. All 'no' -- error potential insignificant.

TABLE 4-2
HED CONSEQUENCE OF ERROR QUESTIONNAIRE

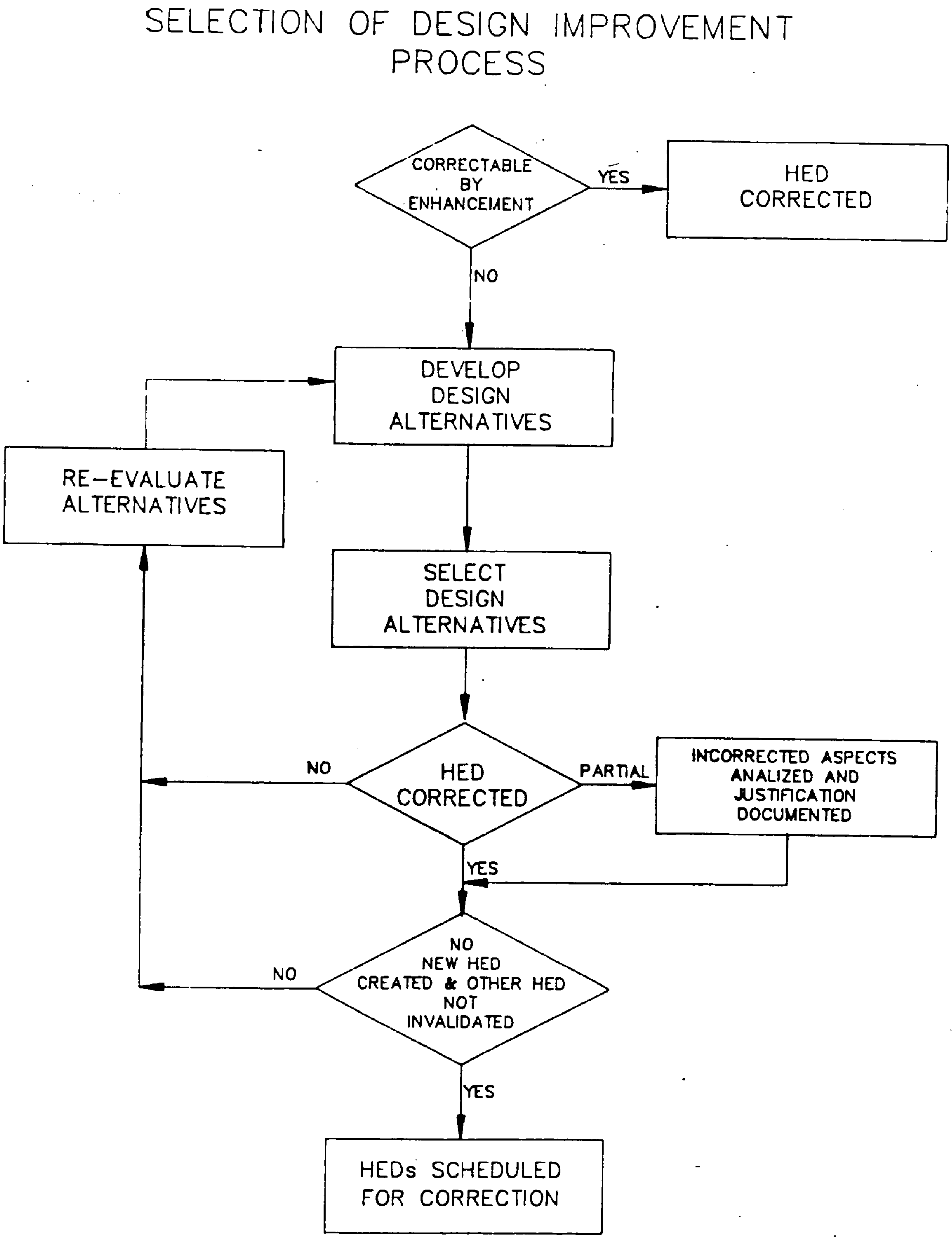
	check one yes	no
1. The HED could result in degrading of:		
RCS Temperature Control		
RCS Pressure Control		
Reactor Power Control		
Steam Generator Pressure Control		
Steam Generator Water Level		
Containment Pressure Control		
Turbine Control		
ECCS Control		
Radioactivity Release Control		
Secondary containment temperature control		
2. This HED presents a risk of injury to Control Room personnel.		
3. This HED could result in violation of a safety limit.		
4. This HED could result in the unavailability of a safety-related system needed to mitigate transients.		
5. This HED could result in the unavailability of a system needed to shut down the plant safely.		
6. This HED could result in the violation of a technical specification.		

TABLE 4-2 (continued)

	check one yes	no
7. This HED could result in a limiting condition for operation.		
8. This HED could result in a reactor/turbine trip or runback.		
9. This HED could result in a forced outage as a result of equipment damage.		
10. This HED could result in a degraded safety condition not covered above.		

Criteria: Answer to any of the above questions 'yes' -- error significant. All 'no' -- consequence of error insignificant.

FIGURE 4-4


SELECTION OF DESIGN IMPROVEMENT PROCESS
CORRECTABLE BY ENHANCEMENT
YES
HED CORRECTED
NO
DEVELOP DESIGN ALTERNATIVES
RE-EVALUATE ALTERNATIVES
SELECT DESIGN ALTERNATIVES
NO
HED CORRECTED
PARTIAL
INCORRECTED ASPECTS ANALIZED AND JUSTIFICATION DOCUMENTED
YES
NO
NO NEW HED CREATED & OTHER HED NOT INVALIDATED
YES
HEDs SCHEDULED FOR CORRECTION

SECTION 5.0 DOCUMENTATION AND DOCUMENT CONTROL

CP&L recognized the critical role of document control during the CRDR process. The SOC was responsible for controlling CRDR documentation (including letters and memos, progress reports, interim reports, HED reports, and summary reports) per established HBR procedures. All final versions of primary CRDR project documents were assigned a unique designator prior to distribution, and a hard copy was maintained in a central CRDR project file.

The CRDR project file will be turned over to plant document control and will be maintained on microfilm as a permanent plant document.

SECTION 6.0 IMPLEMENTATION SCHEDULE

6.1 INTRODUCTION

Items 6.2.1 through 6.2.26 below constitute the Projects Implementation Schedule of the HEDs selected for partial or complete correction. The schedule development considered HED priority, integration, CP&L and HBR resources, previously scheduled projects and commitments, and business planning processes, etc. This schedule will result in the timely, efficient, and cost effective implementation of the projects.

Items 6.2.27 and 6.2.28 constitute the schedule for commitments contained in the CRDR program plan which could not be completed by the DCRDR summary report submittal date.

6.2 COMMITMENTS

6.2.1

Unused Components Removal Project - Complete by the end of outage 11 (1987).

HEDs to be resolved: 6 Total

12E6-1705	12E0-5008	12E3-5013
12A1-5005	1200-5009	1200-5037

6.2.2

RWST and Spray Additive Tank Level Meter Rearrangement Project - Complete by the end of outage 11 (1987).

HEDs to be resolved: 1 Total

1200-5040

6.2.3

Administrative Procedure Project. - Complete by the end of outage 11 (1987).

HEDs to be resolved: 2 Total

1200-1720
1200-2329

6.2.4

Control Room Painting & Relabeling Project. - Complete by the end of 1987.

HEDs to be resolved: 93 Total

1200-1103	1200-1149	12E1-1194	12E0-11108
12D1-1113	12E1-1151	12E5-1196	12E6-11109
1200-1115	12E5-1152	12E3-1197	12E3-11111
1200-1116	12E6-1156	12A1-1199	12E2-11113
12B1-1123	12E6-1159	12E1-1307	1200-11114
1200-1124	1200-1160	12E8-2137	12E8-11119
1200-1125	12B1-1161	1200-2148	12E5-11120
12D1-1126	12E5-1162	12E5-2322	12F2-11122
12A1-1127	12D1-1163	12E5-2326	12E4-11123
12B1-1128	12E3-1165	12E0-2337	12E7-11124
12B1-1129	12E2-1167	12E1-2403	12D1-11128
12B1-1130	12E5-1173	1200-2414	12E6-11130
12A1-1131	12E5-1174	1200-2424	12E0-11131
1200-1132	1200-1176	12D1-3106	12F2-11132
1200-1133	12E7-1179	12E1-3218	12E1-11133
1200-1134	12E1-1181	1200-3229	1200-11134
12D1-1137	12E1-1182	1200-3249	1200-11135
1200-1140	12D1-1183	1200-3279	12E0-11136
12D1-1144	1200-1184	12A1-5014	1200-11141
12D1-1145	12E5-1185	12E1-11102	1200-11142
1200-1146	12E5-1187	1200-11105	12E4-11150
12E5-1147	12E1-1188	1200-11106	12F3-11180
	12E5-1189	12E0-11107	12E2-11182
	12E2-1193		1200-11185

6.2.5

EOP Upgrade Project. - Complete by the end of 1987.

HEDs to be resolved: 1 Total

1200-4005

6.2.6

Shift Foreman Office and Communications Link Project-Complete by the end of 1987.

HEDs to be resolved: 1 Total

1200-0102

A15-32. **HED NO:** 1200-5044

HED TITLE: THE GENERATOR TEMPERATURE RECORDER IS LOCATED ON THE RMS PANEL AND NOT GROUPED WITH RELATED CONTROLS AND DISPLAYS.

PRIORITY: 5

DISPOSITION: THE RECORDER IS USED FOR TRENDING PURPOSES ONLY. THE RECORDER IS NOT FUNCTIONALLY GROUPED WITHIN THE RMS PANEL BUT IS LOCATED AS CLOSE AS POSSIBLE TO THE TURBINE SUPERVISORY PANEL. BECAUSE THERE IS NO ROOM TO RELOCATE THE RECORDER ON THE TURBINE SUPERVISORY PANEL THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A15-33. **HED NO:** 1200-5045

HED TITLE: THE AFW CONTROLS ARE NOT CONSISTENTLY ARRANGED WITH OTHER RELATED CONTROLS AND DISPLAYS.

PRIORITY: 3

DISPOSITION: THE CONTROLS WILL BE REARRANGED WITHIN THE AFW FLOW CONTROL VALVE PROJECT.

A15-34. **HED NO:** 1200-5046

HED TITLE: PHASE A ISOLATION ALARM IS NOT PROVIDED ON THE MAIN CONTROL BOARD.

PRIORITY: 3

DISPOSITION: AN ANNUNCIATOR WILL BE PROVIDED WITHIN THE ANNUNCIATOR PROJECT.

A15-35. **HED NO:** 1200-5047

HED TITLE: THE DS/FP ANNUNCIATOR PANELS ARE LOCATED ON THE RMS PANEL AND ARE NOT FUNCTIONALLY RELATED TO THE RMS CONTROLS AND DISPLAYS.

PRIORITY: 3

DISPOSITION: PANELS WILL BE RELOCATED WITH IN THE ANNUNCIATOR PROJECT.

A15-36. HED NO: 1200-5048

HED TITLE: FW REGULATORY VALVE CONTROLLERS ARE NOT SENSITIVE ENOUGH FOR ADEQUATE CONTROL AT LOW POWER LEVELS.

PRIORITY: 1

DISPOSITION: ADJUSTMENTS MADE TO THE TURBINE STARTUP CONTROL CIRCUITRY, IMPROVED PROCEDURAL GUIDANCE AND ADDITIONAL OPERATOR TRAINING HAS SIGNIFICANTLY IMPROVED OPERATOR CONTROL OF THE TURBINE STARTUP PROCESS. STEAM GENERATOR LEVEL TRANSIENTS DURING TURBINE STARTUP HAVE THUS BEEN MINIMIZED. THE EXISTING FEEDWATER CONTROLS ARE ADEQUATE FOR CONTROLLING THE MINIMAL STEAM GENERATOR LEVEL TRANSIENTS NOW EXPERIENCED DURING TURBINE STARTUP.

A15-37. HED NO: 1200-4003

HED TITLE: CONTROLS AND DISPLAYS FOR THE S/G BLOWDOWN ISOLATION VALVES ARE SEPARATED ACROSS TWO PANELS. CONTROLS ARE LOCATED WITHIN R-19 ON THE RMS PANEL, AND THE BLOWDOWN STATUS INDICATION IS LOCATED ON THE A PANEL.

PRIORITY: 5

DISPOSITION: THE BLOWDOWN ISOLATION VALVES CLOSE AUTOMATICALLY ON A SIGNAL FROM RADIATION MONITOR R-19. THE BLOWDOWN ISOLATION VALVES ALSO CLOSE ON A CONTAINMENT ISOLATION SIGNAL (PHASE A). THE INDICATION IS, THEREFORE, LOCATED WITH THE INDICATION FOR OTHER VALVES THAT CLOSE ON THE PHASE A SIGNAL. THIS ALLOWS THE OPERATOR TO RAPIDLY DETERMINE ALL PHASE A VALVES ARE CLOSED SHOULD THIS AUTOMATIC FEATURE BE ACTUATED. THE CONTROLS LOCATED ON THE RMS PANEL ARE USED WHEN THE AUTOMATIC ACTUATION SYSTEMS FAIL. THE HEDAT DETERMINED THAT REDUNDANT POSITION INDICATION FOR THE BLOWDOWN ISOLATION VALVES IS NOT NECESSARY.

A15-38. HED NO: 1200-4005

HED TITLE: ACTION SEQUENCES WITHIN SIX EOPS CAUSE THE OPERATOR TO MOVE BACK AND FORTH SEVERAL TIMES BETWEEN TWO PANELS.

PRIORITY: 5

DISPOSITION: PROCEDURE STEPS WILL BE RE-ORDERED WITHIN THE EOP UPGRADE PROJECT.

APPENDIX B

SAMPLE TASK PLAN

TP-3.1 HBR
May 1, 1983

HUMAN FACTORS TASK PLAN

FOR THE

ANNUNCIATOR SYSTEM REVIEW

RECORD OF REVISIONS

Rev. No.	Rev. Date	Description

TABLE OF CONTENTS

APPENDICES

1.0 OBJECTIVES

a. To assess to what degree the annunciator system conforms to the criteria in NUREG-0700.

b. To identify and document any features in the annunciator system design that do not conform to the criteria in NUREG-0700.

2.0 REVIEW TEAM SELECTION AND RESPONSIBILITIES

a. A human factors specialist to conduct the data collection and analysis and to prepare the task report.

b. A client nuclear operations specialist to supply plant systems information concerning alarm parameters and alarm response procedures.

c. A client plant engineer/opertor to assist in identifying relevant plant systems information.

3.0 CRITERIA

The criteria are from NUREG-0700; paragraphs 6.3.1.1; 6.3.1.2a through d(2); 6.3.1.3a through d; 6.3.1.4a and b; 6.3.1.5a through b(3); 6.3.2.1a through f; 6.3.3.1a through b(2); 6.3.2.2a and b; 6.3.3.1a through c(3); 6.3.3.2a through f(2); 6.3.3.3a through f; 6.3.3.4a through d; 6.3.3.5a through d(6); 6.3.4.1a through d(2); 6.3.4.2a through c; 6.3.4.3a and b; 6.5.1.6a through c(2) and e(1) through 3(3); and 6.6.6.2a, b, and c (see Appendix A).

4.0 PROCEDURES

4.1 General Instructions

4.1.1 Preparation and Conduct of Procedures

a. Prior to conduct of this task, ensure that all required data forms, plant documentation, engineering drawings, equipment, and materials are available. Ensure that permission has been obtained for all required access to the control room or other plant areas.

b. Record all exceptions, deviations, or changes to these procedures in Section 9.0 of this Task Plan. Number each entry sequentially, starting with 1. Include an explanation (technical justification) as to why the exception, deviation, or change was made.

4.1.2 Task Plan Critique

Upon completion of this task, fill out the Task Plan Critique contained in Appendix D. Submit the completed critique to your supervisor or project manager.

4.2 Data Collection

a. Data are collected using various methods and procedures consisting of measurements, observations, interviews and questionnaires, and document reviews. Appendix C illustrates the distribution of the criteria for the various methods.

b. Measurements and observations should be made for all items contained on the Measurement data forms and Observations checklists contained in Appendix B.

c. The operator interviews (Appendix B) should be administered to a significant number of the licensed reactor operators for the plant. Administration may be conducted singly or in a group, but should be proctored or monitored.

d. The results of the System Function and Task Analysis tasks should be reviewed for annunciator-relevant data in reference to NUREG-0700 guidelines 6.3.3.1; 6.3.1.4a; 6.3.3b and d(2); 6.3.3.4a and c; 6.3.4.3a; and 6.6.6.2a(1), (2), and (3).

e. In addition to the review results from d, above, plant documentation should be reviewed to verify the items listed in the Document Review Checklist in Appendix B. The required plant documents include:

1. Annunciator Response Procedures

2. Administrative Procedures relevant to annunciators.

4.3 Analysis

a. All deviations from the criteria shall be recorded on Human Engineering Discrepancy (HED) reports (Appendix B). Recorded information shall include the instrument or instruments involved (e.g., auditory alarm horns, specific light tiles, etc.), a description of the problem including the 0700 paragraph number of the criteria, and a recommended solution.

b. Data collection method(s) shall also be recorded on the HED form (see Appendix B). Where data from two or more sources are contradictory, resolution of the conflict through data review and client interview shall be made.

c. Use the analysis aids from Appendix B for all data reduction and analysis. Upon completion of all analyses, ensure that the criteria in Appendix A are properly annotated (as specified in the analysis aids).

d. Submit the completed task plan to your immediate supervisor for review. Upon project management approval, initiate Task Report 3.1.

5.0 EQUIPMENT AND FACILITY REQUIREMENTS

a. Access to the control room.

b. Sound level meter.

c. Protractor and tape measure.

d. Flash comparator.

6.0 INPUTS AND DATA FORMS

a. Annunciator Response Procedures

b. Annunciator Administrative Procedures

c. Completed Task Reports for:

    1. System Function and Task Analysis

    2. Labels and Location Aids

    3. Maintainability

d. Criteria List (Appendix A)

e. The following from Appendix B:

    1. Measurements Data Forms

    2. Interview Forms

    3. Observations Checklist

    4. Documentation Review Checklist

    5. Analysis Aids

    6. HED Report Forms

f. Criteria Matrix (Appendix C)

g. Task Plan Critique Form (Appendix D)

7.0 OUTPUTS AND RESULTS

a. Completed HEDs

b. Completed Task Report.

8.0 FIGURES AND TABLES

None

9.0 PROCEDURE EXCEPTIONS

The following exceptions, deviations, and changes were made to these procedures during conduct of the task (include a statement of justification on each item):

APPENDIX A
CRITERIA

APPENDIX A
CRITERIA

N/A	YES	NO	COMMENTS

6.3.1.1 GENERAL SYSTEM DESIGN

Annunciator warning systems are the primary control room interface to immediately alert the operator to out-of-tolerance changes in plant condition. Annunciator warning systems consist of three major subsystems: (a) an auditory alert subsystem, (b) a visual alarm subsystem, and (c) an operator response subsystem (see Exhibit 6.3-1). Together, these three subsystems should be designed to provide a preferred operational sequence for annunciator warnings as indicated in Exhibit 6.3.2.

6.3.1.2 ALARM PARAMETER SELECTION

a. SETPOINTS - The limits or setpoints for initiating the annunciator warning system should be established to meet the following goals:

   (1) Alarms should not occur so frequently as to be considered a nuisance by the operators.

   (2) However, setpoints should be established to give operators adequate time to respond to the warning condition before a serious problem develops.

b. GENERAL ALARMS —

   (1) Alarms that require the control room operator to direct an auxiliary operator to a given plant location for specific information should be avoided.

   (2) If general alarms must be used, they should only be used for conditions that allow adequate time for auxiliary operator action and subsequent control room operator actions.

APPENDIX A
CRITERIA

	N/A	YES	NO	COMMENTS
6.3.1.2 (Cont'd)				
c. MULTICHANNEL OR SHARED ALARMS —				
(1) Annunciators with inputs from more than one plant parameter setpoint should be avoided. Multi-input alarms that summarize single-input annunciators elsewhere in the control room are an exception.				
(2) Where multi-input annunciators must be used, an alarm printout capability should be provided. The specifics of the alarm should be printed on an alarm typer with sufficient speed and buffer storage to capture all alarm data.				
(3) A reflash capability should be provided to allow subsequent alarms to activate the auditory alert mechanism and reflash the visual tile even though the first alarm may not have been cleared.				
d. MULTI-UNIT ALARMS —				
(1) Alarms for any shared plant systems should be duplicated in all control rooms.				
(2) When an item of shared equipment is being operated from one control room a status display or signal should be provided in all other control rooms which could potentially control this equipment.				

APPENDIX A
CRITERIA

	N/A	YES	NO	COMMENTS
6.3.1.3 FIRST OUT ANNUNCIATORS				
a. REACTOR SYSTEM —				
(1) A separate first out panel should be provided for the reactor system.				
(2) The first out panel should consist of separate annunciator tiles for each of the automatic reactor trip functions.				
(3) In the event of a reactor trip, the tile associated with the event should illuminate, and no other.				
b. TURBINE-GENERATOR SYSTEM — A separate first out panel, similar in function to the reactor system panel, is recommended.				
c. POSITION - First out panels should be located directly above the main control work station for the system.				
d. APPLICATION - First our annunciators should conform to the general auditory, visual, and operator response guidelines of this section.				
6.3.1.4 PRIORITIZATION				
a. LEVELS OF PRIORITY —				
(1) Prioritization should be accomplished using a relatively small (2-4) number of priority levels.				

APPENDIX A
CRITERIA

	N/A	YES	NO	COMMENTS
6.3.1.4a (Cont'd) (2) Prioritization should be based on a continuum of importance, severity, or need for operator action in one or more dimensions, e.g., likelihood of reactor trip, release of radiation. Exhibit 6.3-3 provides an example of prioritization based on three levels of prioritization. b. PRIORITY CODING - (1) Some method for coding the visual signals for the various priority levels should be employed. Acceptable methods for priority coding include color, position, shape, or symbolic coding. (2) Auditory signal coding for priority level is also appropriate. See Guideline 6.2.2.3 for recommended coding techniques. 6.3.1.5 CLEARED ALARMS a. AUDITORY SIGNAL - Cleared alarms should have a dedicated, distinctive audible signal which should be of finite duration. b. VISUAL SIGNAL - The individual tile should have one of the following: (1) A special flash rate (twice or one-half the normal flash rate is preferred, to allow discrimination), or (2) Reduced brightness, or				

APPENDIX A
CRITERIA

N/A	YES	NO	COMMENTS

6.3.1.5b (Cont'd)

(3) A special color, consistent with the overall control room color coding scheme, produced by a differently colored bulb behind the tile.

6.3.2.1 SIGNAL DETECTION

a. INTENSITY - The signal should be such that operators can reliably discren the signal above the ambient control room noise. A nominal value of 10 dB(A) above average ambient noise is generally adequate.

b. CONTROL - Signal intensity, if adjustable, should be controlled by administrative procedure.

c. LIMITS - The signal should capture the operator's attention but should not cause irritation or a startled reaction.

d. DETECTION - Each auditory signal should be adjusted to result in approximately equal detection levels at normal operator work stations in the primary operating area.

e. RESET - The annunciator auditory alert mechanism should automatically reset when it has been silenced.

f. IDENTIFICATION - The operator should be able to identify the work station or the system where the auditory alert signal originated. Separate auditory signals at each work station within the primary operating area are recommended.

APPENDIX A
CRITERIA

	N/A	YES	NO	COMMENTS
6.3.2.2 AUDITORY CODING				
a. LOCALIZATION				
(1) Auditory coding techniques should be used when the operator work station associated with the alarm is not in the primary operating area.				
(2) Coded signals from a single audio source should not be used to identify individual work stations within the primary operating area.				
b. PRIORITIZATION - Coding may be used to indicate alarm priority. (See Guideline 6.3.1.4.)				
6.3.3.1 VISUAL ANNUNCIATOR PANELS				
a. LOCATION - Visual alarm panels should be located above the related controls and displays which are required for corrective or diagnostic action in response to the alarm. (See Exhibit 6.3-4.)				
b. LABELING -				
(1) Each panel should be identified by a label above the panel.				
(2) Panel identification label height should be consistent with a subtended visual angle of at least 15 minutes when viewed from a central position within the primary operating area.				

APPENDIX A
CRITERIA

	N/A	YES	NO	COMMENTS
6.3.3.2 VISUAL ALARM RECOG AND IDENT				
a. FLASHING - The specific tile(s) on an annunciator panel should use flashing illumination to indicate an alarm condition.				
b. FLASHRATE - Flash rates should be from three to five flashes per second with approximately equal on and off times.				
c. FLASHER FAILURE - In case of flasher failure of an alarmed tile, the tile should illuminate and burn steadily.				
d. CONTRAST DETECTABILITY - There should be high enough contrast between alarming and steady-on tiles, and between illuminated and nonilluminated tiles, so that operators in a normally illuminated control room have no problem discriminating alarming, steady-on, and steady-off visual tiles.				
e. "DARK" ANNUNCIATOR PANELS - A "dark" annunciator panel concept should be used. This means that under normal operating conditions no annunciators would be illuminated; all of the visual tiles of the annunciator panels would be "dark."				
f. EXTENDED DURATION ILLUMINATION - If an annunciator tile must be "ON" for an extended period during normal operations (e.g., during equipment repair or replacement), it should be:				
(1) Distinctively coded for positive recognition during this period, and				
(2) Controlled by administrative procedures.				

APPENDIX A
CRITERIA

	N/A	YES	NO	COMMENTS
6.3.3.3 ARRANGEMENT OF VISUAL ALARM TILES				
a. MATRIX ORGANIZATION - Visual alarms should be organized as a matrix of visual alarm tiles within each annunciator panel.				
b. FUNCTIONAL GROUPING - Visual alarm tiles should be grouped by function or system within each annunciator panel. For example area radiation alarms should be grouped in one panel, not spread throughout the control room.				
c. LABELING OR AXES -				
(1) The vertical and horizontal axes of annunciator panels should be labeled with alphanumerics for ready coordinate designation of a particular visual tile.				
(2) Coordinate designation is preferred on the left and top sides of the annunciator panel.				
(3) Letter height for coordinate designation should be consistent with a subtended visual angle of at least 15 minutes as viewed from a central position within the primary operating area.				
d. PATTERN RECOGNITION -				
(1) The number of alarm tiles and the matrix density should be kept low (a maximum of 50 tiles per matrix is suggested).				
(2) Tiles within an annunciator panel matrix should be grouped by subsystem, function, or other logical organization.				

APPENDIX A
CRITERIA

	N/A	YES	NO	COMMENTS
6.3.3.3 (Cont'd)				
e. OUT-OF-SERVICE ALARMS - Cues for prompt recognition of an out-of-service annunciator should be designed into the system.				
f. BLANK TILES - Blank or unused annunciator tiles should not be illuminated (except during annunciator testing).				
6.3.3.4 VISUAL TILE LEGENDS				
a. UNAMBIGUOUS - Annunciator visual tile legends should be specific and unambiguous. Wording should be in concise, short messages.				
b. SINGULARITY - Alarms which refer the operator to another, more detailed annunciator panel located outside the primary operating area should be minimized.				
c. SPECIFICITY - Tile legends should address specific conditions; for example, do not use one alarm for HIGH-LOW, TEMPERATURE-PRESSURE.				
6.3.3.5 VISUAL TILE READABILITY				
a. DISTANCE - The operator should be able to read all the annunciator tiles from the position at the work station where the annunciator acknowledge control is located.				
(1) Letter height should subtend a minimum visual angle of 15 minutes, or .004 x viewing distance. The preferred visual angle is 20 minutes, or .006 x viewing distance.				

APPENDIX A
CRITERIA

	N/A	YES	NO	COMMENTS
6.3.3.5a (Cont'd)				
(2) Letter height should be identical for all tiles, based on the maximum viewing distance. Separate calculations should be made for stand-up and sit-down work stations.				
b. TYPE STYLE - The size and style of lettering should meet the following:				
(1) Type styles should be simple.				
(2) Type styles should be consistent on all visual tiles.				
(3) Only upper-case type should be used on visual tiles.				
c. LEGEND CONTRAST - Legends should provide high contrast with the tile background.				
(1) Legends should be engraved.				
(2) Legends should be dark lettering on a light background.				
d. LETTER DIMENSIONS AND SPACING -				
(1) Stroke-width-to-character-height ratio should be between 1:6 and 1:8.				
(2) Letter width-to-height ratio should be between 1:1 and 3:5.				
(3) Numeral width-to-height ratio should be 3:5.				
(4) Minimum space between characters should be one stroke width.				

APPENDIX A
CRITERIA

N/A	YES	NO	COMMENTS

6.3.3.5d (Cont'd)

(5) Minimum space between words should be the width of one character.

(6) Minimum space between lines should one one-half the character height.

6.3.4.1 CONTROLS (See Exhibit 6.3-5).

a. SILENCE -

(1) Each set of operator response controls should include a silence control.

(2) It should be possible to silence an auditory alert signal from any set of annunciator response controls in the primary operating area.

b. ACKNOWLEDGE

(1) A control should be provided to terminate the flashing of a visual tile and have it continue at steady illumination until the alarm is cleared.

(2) Acknowledgement should be possible only at the work station where the alarm originated.

c. RESET

(1) If an automatic cleared alarm feature is not provided, a control should be provided to reset the system after an alarm has cleared.

APPENDIX A
CRITERIA

	N/A	YES	NO	COMMENTS
6.3.4.1c (Cont'd)				
(2) The reset control should silence any audible signal indicating clearance and should extinguish tile illumination.				
(3) The reset control should be effective only at the work station for the annunciator panel where the alarm initiated.				
d. TEST				
(1) A control to test the auditory signal and flashing illumination of all tiles in a panel should be provided.				
(2) Periodic testing of annunciators should be required and controlled by administrative procedure.				
6.3.4.2 CONTROL SET DESIGN				
a. POSITIONING OF REPETITIVE GROUPS - Repetitive groups of annunciator controls should have the same arrangement and relative location at different work stations. This is to facilitate "blind" reaching.				
b. CONTROL CODING - Annunciator response controls should be coded for easy recognition using techniques such as:				
(1) Color coding:				
(2) Color shading the group of annunciator controls;				
(3) Demarcating the group of annunciator controls; or				
(4) Shape coding, particularly the silence control. (See Exhibit 6.3-5, Example 2.)				

APPENDIX A
CRITERIA

N/A	YES	NO	COMMENTS

6.3.4.2 (Cont'd)

c. NONDEFEATABLE CONTROLS - Annunciator control designs should not allow the operator to defeat the control. For example, some pushbuttons used for annunciator silencing and acknowledgement can be held down by inserting a coin in the ring around the pushbutton. This undesirable design feature should be eliminated.

6.3.4.3 ANNUNCIATOR RESPONSE PROCEDURES

a. AVAILABILITY - Annunciator response procedures should be available in the control room.

b. INDEXING - Annunciator response procedures should be indexed by panel identification and annunciator tile coordinates.

6.5.1.6 COLOR CODING

a. REDUNDANCY - In all applications of color coding, color should provide redundant information. That is, the pertinent information should be available from some other cue in addition to color.

b. NUMBER OF COLORS -

(1) The number of colors used for coding should be kept to the minimum needed for providing sufficient information.

(2) The number of colors used for coding should not exceed 11.

APPENDIX A
CRITERIA

	N/A	YES	NO	COMMENTS
6.5.1.6 (Cont'd) c. MEANING OF COLORS - (1) The meaning attached to a particular color should be narrowly defined. (2) Red, green, and amber (yellow) should be reserved for the following uses: Red: unsafe, danger, immediate operator action required or an indication that a critical parameter is out of tolerance. Green: safe, no operator action required, or an indication that a parameter is within tolerance. Amber (yellow): hazard (potentially unsafe), caution, attention required, or an indication that a marginal value or parameter exists. d. PRINCIPLES OF COLOR SELECTION (1) The primary principle which should be applied in selecting colors for coding purposes which do not have the immediate safety implications of red, green, and amber is to ensure that each color is recognized as different from any other.				

APPENDIX A
CRITERIA

N/A	YES	NO	COMMENTS

6.5.1.6d (Cont'd)

Exhibit 6.5-7 lists 22 colors of maximum contrast. Each successive color has been selected so that it will contrast maximally with the color just preceding it and satisfactorily with earlier colors in the list. The first 9 colors have been selected so as to yield satisfactory contract for red-green-deficient as well as color-normal observers. The remaining 13 colors are useful only for color-normal observers.

(2) Colors selected for coding should contrast well with the background on which they appear.

(3) Ambient lighting in the area in which color coding is used will influence the apparent color of the coded element (especially for surface colors). Each color selected for coding should be evaluated under all illumination conditions under which it is used.

6.6.6.2 DEMARCATION

a. USE - Lines of demarcation can be used to:

(1) Enclose functionally related displays.

(2) Enclose functionally related controls.

(3) Group related controls and displays.

APPENDIX A
CRITERIA

	N/A	YES	NO	COMMENTS
6.6.6.2 (Cont'd)				
b. CONTRAST - Lines of demarcation should be visually destinctive from the panel background.				
c. PERMANENCE - Lines of demarcation should be permanently attached.				

APPENDIX A
CRITERIA

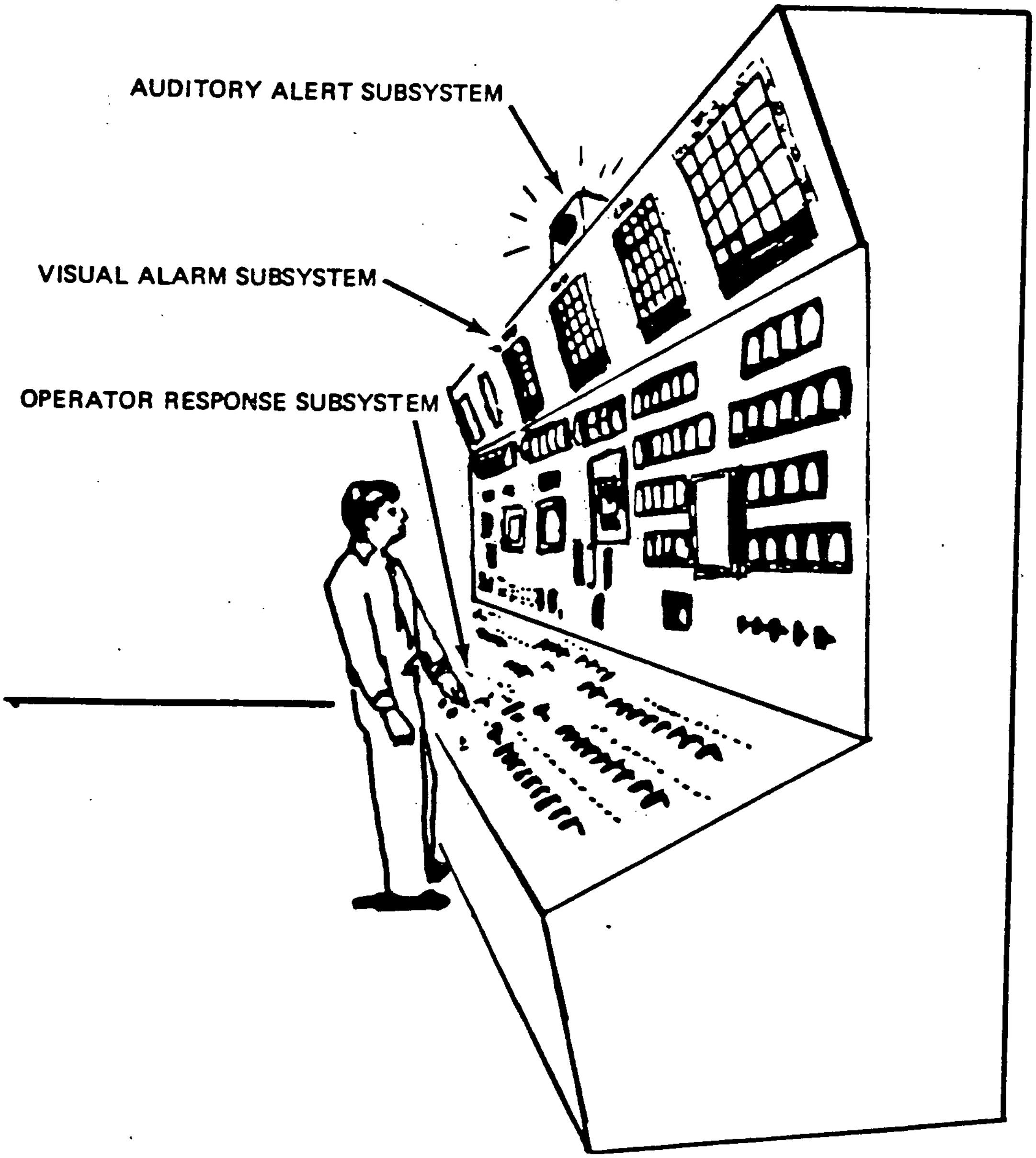


Exhibit 6.3-1
Annunciator Warning System

APPENDIX A
CRITERIA

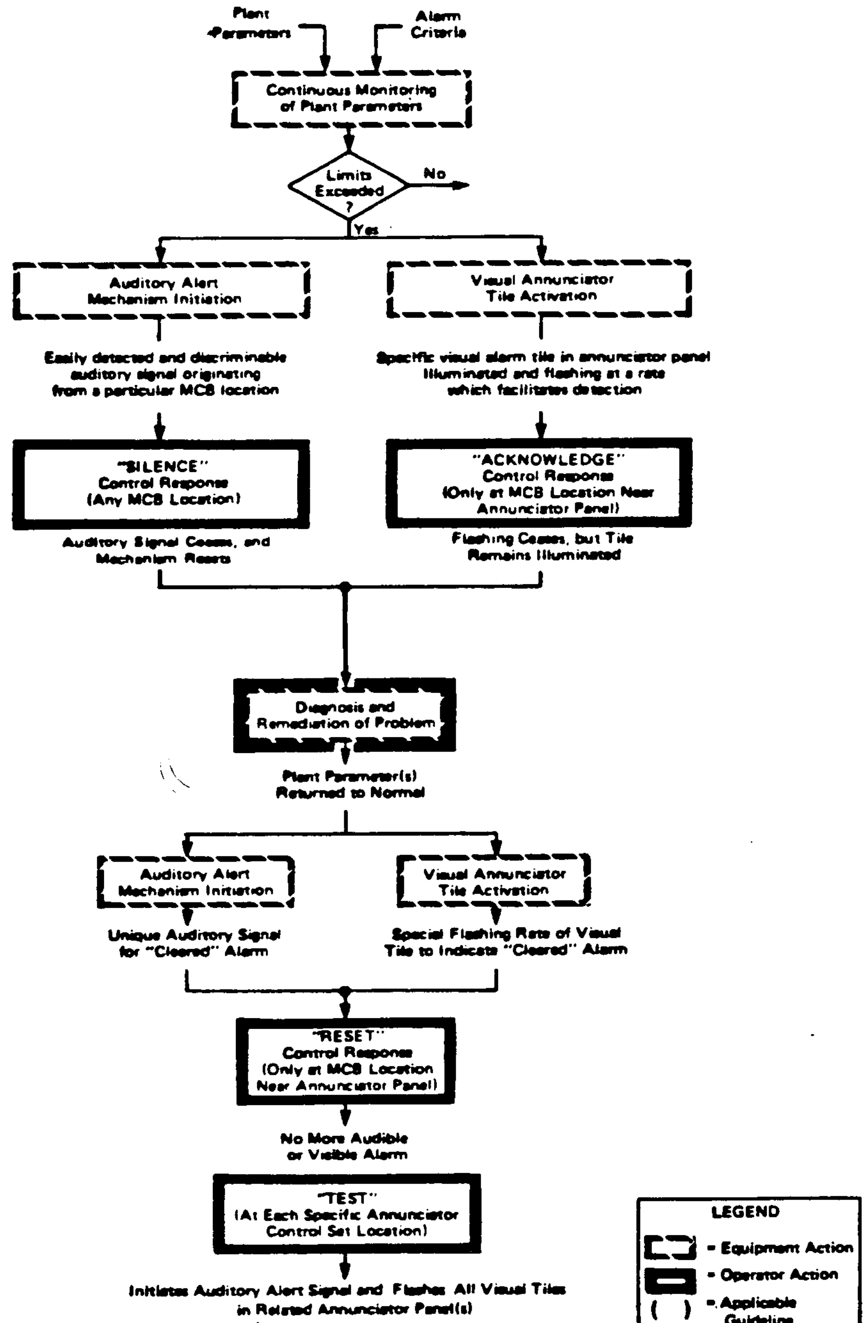


Exhibit 6.3-2
Annunciator System Preferred Operational Sequence

APPENDIX A
CRITERIA

FIRST PRIORITY ALARMS

- Plant shut down (reactor trip, turbine trip)
- Radiation release
- Plant conditions which, if not corrected immediately, will result in automatic plant shutdown or radiation release, or will require manual plant shutdown.

SECOND PRIORITY ALARMS

- Technical specification violations which if not corrected will require plant shutdown
- Plant conditions which, if not corrected, may lead to plant shut down or radiation releases

THIRD PRIORITY ALARMS

- Plant conditions representing problems (e.g., system degradation) which affect plant operability but which should not lead to plant shutdown, radiation release, or violation of technical specifications

Exhibit 6.3-3
Three-Level Annunciator Prioritization Example

APPENDIX A
CRITERIA

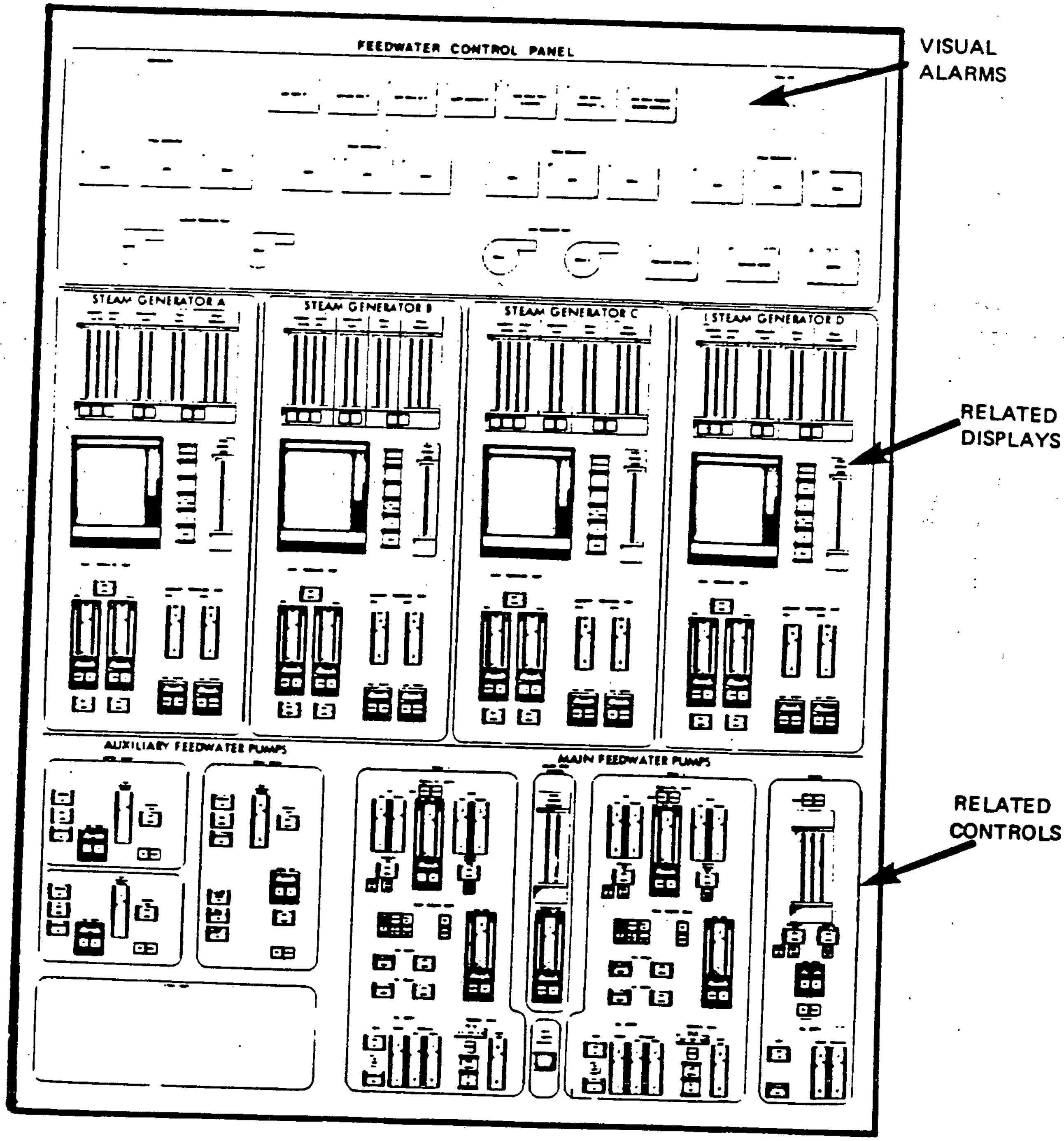
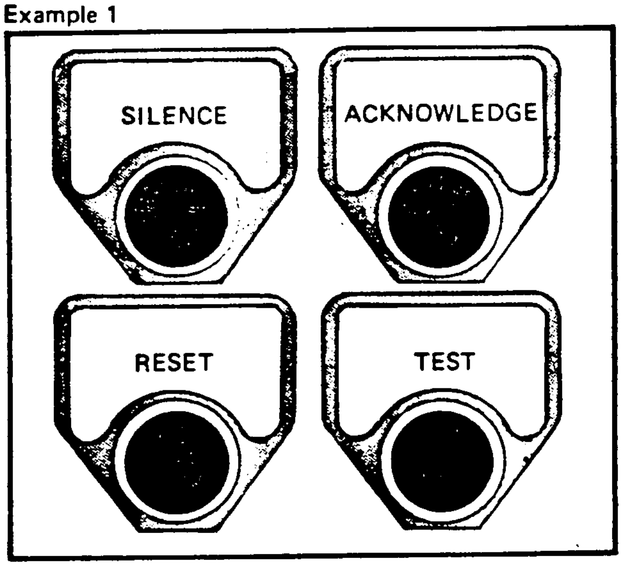


Exhibit 6.3-4
Visual Alarms Located Above The Related Controls And Displays
(From Seminars et al., 1979)

APPENDIX A
CRITERIA

Example 1



Example 2

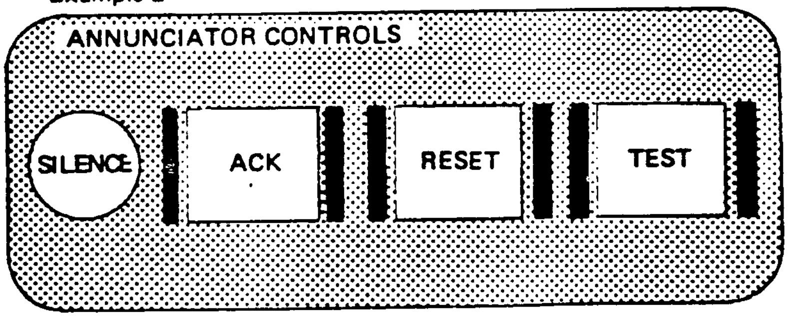


Exhibit 6.3-5
Annunciator Response Controls

APPENDIX A
CRITERIA

Color Serial or selection number	General color name	ISCC-NBS centroid number	ISCC-NBS color-name (abbreviation)	Munsell renotation of ISCC-NBS Centroid Color
1	white	263	white	2.5PB 9.5/0.2
2	black	267	black	N 0.8/
3	yellow	82	v.Y	3.3Y 8.0/14.3
4	purple	218	s.P	6.5P 4.3/9.2
5	orange	48	v.O	4.1YR 6.5/15.0
6	light blue	180	v.l.B	2.7PB 7.9/6.0
7	red	11	v.R	5.0R 3.9/15.4
8	buff	90	gy.Y	4.4Y 7.2/3.8
9	gray	265	med. Gy	3.3GY 5.4/0.1
10	green	139	v.G	3.2G 4.9/11.1
11	purplish pink	247	s.pPk	5.6RP 6.8/9.0
12	blue	178	s.B	2.9PB 4.1/10.4
13	yellowish pink	26	s.yPk	8.4R 7.0/9.5
14	violet	207	s.V	0.2P 3.7/10.1
15	orange yellow	66	v.OY	8.6YR 7.3/15.2
16	purplish red	255	s.pR	7.3RP 4.4/11.4
17	greenish yellow	97	v.gY	9.1Y 8.2/12.0
18	reddish brown	40	s.rBr	0.3YR 3.1/9.9
19	yellow green	115	v.YG	5.4GY 6.8/11.2
20	yellowish brown	75	deep yBr	8.8YR 3.1/5.0
21	reddish orange	34	v.rO	9.8R 5.4/14.5
22	olive green	126	d.OlG	8.0GY 2.2/3.6

Exhibit 6.5-7
Twenty-Two Colors Of Maximum Contrast
(From Kelly, 1965)

APPENDIX B
DATA FORMS

TABLE OF CONTENTS

APPENDIX B
DATA FORMS

APPENDIX B1.2
MEASUREMENTS DATA

2. SOUND MEASUREMENTS (AUDIBLE SIGNALS)

2.1 Annunciator Audible Alarms - 6.3.2.1a.

Measure the sound level in dB(A) for each annunciator audible alarm at each of the following operator positions:

TABLE 2

	Alarm Loc	Safety Systems Pos 1	Safety Systems Pos 2	Reac Cont	Turb Gen	Elec Dist	Rad Mon Console	Op's Desk
1.	____	____	____	____	____	____	____	____
2.	____	____	____	____	____	____	____	____
3.	____	____	____	____	____	____	____	____
4.	____	____	____	____	____	____	____	____
5.	____	____	____	____	____	____	____	____

2.2 Data Reduction and Analysis

For data reduction and analysis, obtain the appropriate analysis aids from Appendix B5 (ref. B5.2).

APPENDIX B1.3
MEASUREMENTS DATA

3. LIGHT MEASUREMENTS (TILE FLASH CHARACTERISTICS) - 6.3.5b(1) and 6.3.3.2b

3.1 Using the Flash Comparator, measure the flash rate of tiles in alarm and in clear. Record the rates.

Alarm Flash Rate: ________________

Cleared Flash Rate: ________________

3.2 Using the Flash Comparator, measure the on-off ratio for the alarm flash rate and cleared flash rate.

On-Off Ratio (Alarm): ________________

On-Off Ratio (Cleared): ________________

APPENDIX B2
OPERATOR INTERVIEW

INSTRUCTIONS

1. Read the following to the operators before starting interview:

   a. The following are questions concerning the general layout, functional organization, and operational considerations in your control room. Most of the questions will require a YES or NO answer, with some additional information.

   b. Please mention any issues you feel relevant to this review when you think about them, you do not have to wait for a question on the subject.

   c. If you do not understand a question, please ask for clarification.

   d. All of your answers and your biographical information will be kept in the strictest confidence and will be used to aid in the performance of the detailed control room design review.

PLEASE BEGIN

APPENDIX B2
OPERATOR INTERVIEW

BIOGRAPHICAL DATA:

Name: ______________________________ Age: __________

Sex: ______________ Height: ____________ Weight: __________

Current Position/Title: ______________________________

1. Do you have a current reactor operator's license? YES _____ NO _____

2. Amount of licensed experience at this plant: ____________________

3. Total amount licensed experience: ____________________

4. Related experience and amount (example: operator-trainee, Hodge NPP Unit 1, 1 year):

5. Education:

   a. Highest level attained: ____________________

   b. Specialized Schools or courses (list):

6. Military experience:

APPENDIX B2
OPERATOR INTERVIEW/QUESTIONNAIRE

1. Do you have a first out annunciator panel where only the tile associated with the reactor trip event illuminates and all subsequent alarms on that panel are "locked out"? YES NO

2. Do you know of any automatic reactor trip functions that do not have a separate annunciator tile on the first out panel (either missing or shared with other functions)? YES NO

3. Are the annunciator panels in the control room identified by a label above each panel? YES NO

4. From your primary operating area, can you read all annunciator panel labels with a minimum of effort? YES NO

5. Is the annunciator system priority coded by color, position, shape, or symbolic coding of the tiles? YES NO

6. If color coding is used, are there more than eleven colors used for coding the panels? YES NO

7. If color coding is used, is the meaning redundant, as an example, if priority coding uses color, does it also use tile position? YES NO

APPENDIX B2
OPERATOR INTERVIEW/QUESTIONNAIRE

8. Is there only one meaning attached to each color used for coding the tiles? YES NO

9. Are all meanings attached to any color coded tiles standard to those color meanings throughout your control room? YES NO

10. For color coded tiles is: YES NO

a. red always used for unsafe, danger, immediate operator action required, or as an indication that a critical parameter is out of tolerance?

b. green always used for safe, no operator action required, or as an indication that a parameter is within tolerance? YES NO

c. amber (yellow always used for hazard (potentially unsafe), caution, attention required, or as an indication that a marginal value or parameter exists? YES NO

11. Do you know of any unnecessary color coding on the annunciator tiles or panels? YES NO

12. For colors used in tile coding, are any difficult to tell apart? YES NO

APPENDIX B2
OPERATOR INTERVIEW/QUESTIONNAIRE

13. Are auditory signals priority coded by pulse, frequency change (warbling), intensity, or different frequencies for different signals? YES NO

14. If you have separate alarm horns, can you easily identify the work station or system where the auditory signal originated? YES NO

15. Do you have different alarm horns for work areas not at the main control board? YES NO

16. If the auditory alarm signal has only one source, is the sound coded to direct you to different work areas? YES NO

17. Do any of the alarm horns startle or irritate you? YES NO

18. If you have different alarm horns, do any of them sound too loud or too soft in comparison to the others at your normal work station? YES NO

19. Do you have a silence control with each set of response controls in your primary operating area? YES NO

APPENDIX B2
OPERATOR INTERVIEW/QUESTIONNAIRE

20. Is a control provided which terminates a flashing visual tile, but allows a steady illumination until the alarm is cleared? YES NO

21. Can you acknowledge an alarm from more than one response control area? YES NO

22. If cleared alarms do not reset automatically, do you have a control to reset them yourself? YES NO

23. Does the reset control silence the auditory signal as well as extinguish the illumination? YES NO

24. Does the reset control operate from more than one response control area? YES NO

25. Can you defeat any of the annunciator controls, such as locking out the audible alarm or locking down the acknowledge control? YES NO

26. Can you test the auditory and flashing illumination signals of all tiles for each panel? YES NO

APPENDIX B2
OPERATOR INTERVIEW/QUESTIONNAIRE

27. Is there an administrative procedure that controls the periodic testing of all annunciators? YES NO

28. Are all tiles dark on annunciator panels when no alarm is indicated? YES NO

29. Can you easily tell if a tile is normally on for an extended duration during normal operating conditions? YES NO

30. Are you immediately aware if an annunciator tile is out of service? YES NO

31. Can you immediately determine when the flasher of an alarm tile fails? YES NO

32. Do you know of any alarms that occur so frequently that you consider them a nuisance? YES NO

33. Do you know of any alarms that do not give you ample time to respond to a warning condition? YES NO

APPENDIX B2
OPERATOR INTERVIEW/QUESTIONNAIRE

34. When responding to an alarm tile, can you readily locate the controls and displays required for corrective or diagnostic action? YES NO

35. Do you have access to annunciator response procedures in the control room? YES NO

36. Do you know of any alarms which require you to obtain additional information from a source outside the control room area? YES NO

37. Are there too many alarms which require additional information from panels outside your operating area? YES NO

38. If alarms are used that require information outside the control room, do they allow you ample time to respond? YES NO

39. Are alarms provided for shared equipment in all control rooms? YES NO

40. If there a status display or signal provided for shared equipment in all control rooms which indicates that the equipment is currently being operated? YES NO

APPENDIX B2
OPERATOR INTERVIEW/QUESTIONNAIRE

41. Do you have any tiles with dual messages such as HIGH-LOW? YES NO

42. Does the multi-input alarm have a reflash capability that reflashes the visual tile after an auditory alert event if the first alarm has not been cleared? YES NO

43. Do multi-input annunciators provide you will an alarm printout? YES NO

44. Does the multi-input alarm typer have sufficient speed to print the alarm data fast enough for your needs? YES NO

45. Does the alarm typer ever skip or loose information, or garble (mix up) the printing? YES NO

APPENDIX B3
OBSERVATIONS CHECKLIST

INSTRUCTIONS

1. Using the attached checklist, make all the noted observations.
2. Record all necessary information in the comments column to justify an N/A check and to detail a NO check.
3. Ensure that all comments for NO checks include component, instrument, panel, equipment, etc., identification and location information.
4. Initiate HED reports on all NO checks per the directions contained in the checklist analysis aids.

APPENDIX B3
OBSERVATIONS CHECKLIST

	N/A	YES	NO	COMMENTS
1. A separate first out panel should be provided for the reactor system - 6.3.1.3a(1).				
2. A separate first out panel is recommended for the turbine-generator system that is functionally similar to the reactor system panel - 6.3.1.3b.				
3. First out panels should be located above their main work stations - 6.3.1.3c.				
4. All first our panels should conform to the general auditory and visual items in the rest of this check-list - 6.3.1.3d.				
5. A small number (2-4) of levels of priority coding are used - 6.3.1.4a(1).				
6. Priority coding of color, position, shape, or symbol is used for visual signals - 6.3.1.4b(1).				

APPENDIX B3
OBSERVATIONS CHECKLIST

	N/A	YES	NO	COMMENTS
7. Any color used on tiles are on ALB panels should contrast with the control board color - 6.5.1.6e(1).				
8. Any color used for tile coding should be recognizable from all other tile code colors for all illumination conditions - 6.5.1.6e(3).				
9. Auditory signal priority coding may be used - 6.3.1.4b(2).				
10. If more than one, each auditory signal should sound at approximately equal loudness at normal work stations in the primary operating area - 6.3.2.1d.				
11. An auditory signal should capture the operator's attention but should not irritate or cause a startled reaction - 6.3.2.1c.				
12. Separate auditory signals at each work station within the primary operating area are recommended - 6.3.2.1f.				

APPENDIX B3
OBSERVATIONS CHECKLIST

	N/A	YES	NO	COMMENTS
13. The operator should be able to identify the work station or area where the auditory alert originated - 6.3.2.1f.				
14. The auditory signal should automatically reset when silenced - 6.3.2.1e.				
15. When an alarm clears (or is cleared) there should be a dedicated, distinct audible signal with a finite duration - 6.3.1.5a.				
16. Auditory alert signal's, if adjustable, should be controlled by administrative procedure - 6.3.2.1b.				
17. The specific title(s) in an ALB should visually flash to indicate an alarm condition - 6.3.3.2a.				
18. In case of flasher failure, an alarming tile should illuminate and burn steadily - 6.3.3.2c.				

APPENDIX B3
OBSERVATIONS CHECKLIST

	N/A	YES	NO	COMMENTS
19. Contrast between tiles should present no problem discriminating between alarming, steady-on, and steady-off conditions - 6.3.3.2d.				
20. Under normal (nonalarmed) conditions no annunciator tiles should be illuminated - 6.3.3.2e.				
21. If a tile must be on for an extended period during normal operations it should be distinctively coded for positive recognition during this period (see also 6.3.3.2f(2), item 2c on the Document Review Checklist) - 6.3.3.2f(1).				
22. Cleared tiles should have either a special flash rate, a reduced brightness, or a special color - 6.3.1.5b(1) through b(3).				
23. All tiles associated with a given acknowledge control should be readable when operating that control - 6.3.3.5a.				

APPENDIX B3
OBSERVATIONS CHECKLIST

	N/A	YES	NO	COMMENTS
24. Character style on all tiles should be simple - 6.3.3.5b(1).				
25. Character style should be consistent on all tiles - 6.3.3.5b(2).				
26. Character style should be uppercase on all tiles - 6.3.3.5b(3).				
27. Tile legends should have high contrast with the tile background - 6.3.3.5c.				
28. Tile legends should be engraved - 6.3.3.5c(1).				
29. Tile legends should be dark and opaque on a light and translucent background - 6.3.3.5c(2).				
30. Tile legends should be specific, unambiguous, concise, and short - 6.3.3.4a.				

APPENDIX B3
OBSERVATIONS CHECKLIST

	N/A	YES	NO	COMMENTS
31. Tile legends should address specific conditions, HIGH TEMP, or LOW PRESS, not HIGH-LOW TEMP-PRESS - 6.3.3.4c.				
32. Tiles should be organized as a matrix within each ALB - 6.3.3.3a.				
33. The vertical and horizontal axes of the ALBs should be alpha-numerically labeled for tile designation coordinates - 6.3.3.3c(1).				
34. Coordinate designators are preferred at the left and top sides of the ALBs.				
35. Character height for the coordinate labels should be the same height as those used in tile legends - 6.3.3.3c(3).				
36. The number of tiles in an ALB should be kept low, with a maximum of 50 tiles per ALB suggested - 6.3.3.3d(1).				

APPENDIX B3
OBSERVATIONS CHECKLIST

	N/A	YES	NO	COMMENTS
37. Cues for prompt recognition of an out-of-service annunciator should be designed into the system - 6.3.3.3e.				
38. Blank or unused tiles should not be illuminated except during annunciator testing - 6.3.3.3f.				
39. Demarcation lines may be used to enclose functionally related tiles - 6.6.6.2a(1).				
40. Demarcation lines may be used to group tiles with their related controls and/or displays - 6.6.6.2a(1) through a(3).				
41. If used, demarcation lines should be visually distinctive from the panel background - 6.6.6.2b.				
42. If used, demarcation lines should be permanently attached - 6.6.6.2c.				

APPENDIX B3
OBSERVATIONS CHECKLIST

	N/A	YES	NO	COMMENTS
43. ALBs should be located above the controls and displays required for corrective or diagnostic action when they alarm - 6.3.3.1a.				
44. Each ALB should be identified by a label directly above it - 6.3.3.1b(1).				
45. Each set of annunciator controls should include a silence control - 6.3.4.1a(1).				
46. An acknowledge control should be provided that terminates the flashing and causes the tile to continuously illuminate until it has cleared - 6.3.4.1b(1).				
47. If an automatic cleared alarm feature is not provided, a control should be provided to reset the system after an alarm has cleared - 6.3.4.1c(1).				

APPENDIX B3
OBSERVATIONS CHECKLIST

	N/A	YES	NO	COMMENTS
48. A control to test the auditory alarm and the flashing illumination of all tiles in a panel (i.e., in one or more ALBs) should be provided - 6.3.4.1d(1).				
49. Repetitive groups of annunciator controls should have the same arrangement and relative location at different work stations - 6.3.4.2a.				
50. Annunciator controls should be coded differently than other panel controls either by color, demarcation, or shape - 6.3.4.2b(1) through b(4).				
51. Shape coding is preferred for the silence control - 6.3.4.2b(4).				
52. Annunciator control designs should not allow the operator to defeat the control operations such as inserting a coin into a control guard ring - 6.3.4.2c.				
53. Annunciator response procedures should be available in the control room - 6.3.4.3a.				

APPENDIX B4
DOCUMENTATION REVIEW CHECKLIST

INSTRUCTIONS

Collect the following documents and review them for the information contained in the attached checklist:

1. Administrative Procedures concerning annunciators
2. Annunciator Response Procedures
3. Results from the following task reports:
   a. Convention Survey
   b. System Function Task Analysis
   c. Labeling Survey
4. Ensure that all comments for NO checks include component, instrument, panel, equipment, etc., identification and location information.
5. Initiate HED reports on all NO checks per the directions contained in the checklist analysis aids.

APPENDIX B4
DOCUMENTATION REVIEW CHECKLIST

	N/A	YES	NO	COMMENTS
1. ANNUNCIATOR RESPONSE PROCEDURES				
a. Response procedures should be indexed by panel I.D. and tile coordinates - 6.3.4.3b.				
b. Annunciators with inputs from more than one plant parameter set point should be avoided (multi-input alarms that summarize single-input alarms elsewhere in the control room are an exception - 6.3.1.2c(1).				
2. PLANT ADMINISTRATIVE PROCEDURES				
a. Periodic testing of annunciators should be required and controlled by administrative procedures-6.3.4.1d(2).				
b. If audible alarm intensity is operator- adjustable, it should be controlled by administrative procedures - 6.3.2.1b.				
c. When annunciator tiles must be on for an extended period during normal operations, it should be controlled by administrative procedures (see also 6.3.3.2f(1), item 19 on the Observations Checklist) - 6.3.3.2f(2).				

APPENDIX B4
DOCUMENTATION REVIEW CHECKLIST

	N/A	YES	NO	COMMENTS
3. SFTA REVIEW REPORT				
a. The annunciator warning system should be designed as the primary alerting interface with the operator for out-of-tolerance conditions. It should consist of three major subsystems: auditory alerts, visual alarm, and operator response. These three subsystems should function to provide a preferred operational sequence for annunciator warnings - 6.3.1.1.				
b. Visual alarm tiles should be grouped by function, system, subsystem, or other logical organization within ALBs - 6.3.3.3b and d(2).				
c. Prioritization of annunciators should be based on a continuum of importance, severity, or need for operator action in one or more dimensions such as, the likelihood of a reactor trip or the likelihood of a release of radiation - 6.3.1.4a(2).				

APPENDIX B4
DOCUMENTATION REVIEW CHECKLIST

	N/A	YES	NO	COMMENTS
d. Tile legends should address specific conditions rather than a range of conditions and/or parameters. As an example, separate tiles should be used to indicate temperature-low, temperature-high, pressure-low, and pressure-high, rather than a single tile with the legend HIGH-LOW TEMP-PRESS - 6.3.3.4c.				
e. If used, demarcation lines enclose functionally relate groups of tiles either separately or with their related controls and displays - 6.6.6.2a(1), a(2), and a(3).				

APPENDIX B5.1
MEASUREMENTS ANALYSIS

1. LINEAR MEASUREMENT (LABELING)

1.1 ALB Summary Labels - 6.3.3.1b(2).

a. If there are no summary labels, check N/A for criterion 6.3.3.1b(2) in Appendix A.

b. If there are summary labels, calculate the visual angels for each label for the operator positions listed in Table 1.1b.

TABLE 1.1b

	ALB Ident	MCB Safety Systems Pos 1	MCB Safety Systems Pos 2	MCB Reac Cont	MCB Turb Gen	MCB Elec Dist	Rad Mon Console	Op's Desk
1.	____	____	____	____	____	____	____	____
2.	____	____	____	____	____	____	____	____
3.	____	____	____	____	____	____	____	____
4.	____	____	____	____	____	____	____	____
5.	____	____	____	____	____	____	____	____
6.	____	____	____	____	____	____	____	____
7.	____	____	____	____	____	____	____	____

Calculations (use extra sheets, as needed):

APPENDIX B5.1
MEASUREMENTS ANALYSIS

c. If all visual angles in Table 1.1b are 15 minutes of arc or greater, check YES for criterion 6.3.1b(2) in Appendix A.

d. If there are visual angles in Table 1.1b less than 15 minutes of arc, record on an HED report form the position(s) and label(s) where this is so. Include the code number TP-3.1B5.1.1 in data collection description. For criterion 6.3.3.1b(2) in Appendix A, check the NO column and record the HED report number and the code number, TP-3.1B5.1.1 in the COMMENTS column.

1.2 Tile Labels - 6.3.3.51(1) and d(1) through d(6).

a. Calculate the visual angles for each character height at its farthest left and farthest right location for each work station in Table 1.2a, below.

TABLE 1.2a

ALB NO/ Chr Ht	Sta 1 Lt	Sta 1 Rt	Sta 2 Lt	Sta 2 Rt	Sta 3 Lt	Sta 3 Rt	Sta 4 Lt	Sta 4 Rt	Sta 5 Lt	Sta 5 Rt

Calculations (use extra sheets, as required):

APPENDIX B5.1
MEASUREMENTS ANALYSIS

b. If all visual angles in Table 1.2a are 15 minutes of arc or greater, check YES for criterion 6.3.3.5a(1) in Appendix A.

c. If any visual angles in Table 1.2a are less than 15 minutes of arc, record on an HED report form the position(s) and tile legend(s) where this is so. Include the code number TP-3.1B5.1.2 in the data collection description. For criterion 6.3.3.5a(1) in Appendix A, check the NO column and record the HED report number and the code number, TP-3.1B5.1.2, in the COMMENTS column.

d. Compare the character dimensions and legend measurements for each character height recorded with criteria 6.3.3.5d(1) through d(6).

e. If all character heights and legends meet the criteria, check the YES column for these criteria in Appendix A.

f. If all character dimensions or legend measurements fail to meet the criteria, record on an HED report from the tile coordinates, character height implicated, and a description of the failure. Include the code number TP-3.1B5.1.2 in the data collection description. For criteria 6.3.3.5d(1) through d(6) in Appendix A, check the NO column and record the HED report number and the code number TP-3.1B5.1.2, in the COMMENTS column.

APPENDIX B5.2
MEASUREMENTS ANALYSIS

2. SOUND MEASUREMENTS (AUDIBLE SIGNALS)

2.1 Annunciator Audible Alarms - 6.3.2.1a.

a. Obtain the average ambient noise level in db(A) from the Ambient Noise Survey Task Report (TR-1.6) and record below:

Average noise level: ________________ db(A)

b. Based upon the below adjustment factors, reduce each measured annunciator alarm level and record in Table 2.1b.

Absolute Difference Between Measured Level (Lm) And Average Noise Level (Ln)	Subtract This Amount From Measured Level (Lm) And and Record In Table 2.1b
4	2.2
5	1.7
6	1.3
7	1.0
8	.8
9	.6
10	.4
11	.3
12	.3
13	.2
14	.2
15	.1

TABLE 2.1b

	MCB							
	Alarm Loc	Safety Systems Pos 1	Safety Systems Pos 2	Reac Cont	Turb Gen	Elec Dist	Rad Mon Console	Op's Desk
1.	____	____	____	____	____	____	____	____
2.	____	____	____	____	____	____	____	____
3.	____	____	____	____	____	____	____	____
4.	____	____	____	____	____	____	____	____
5.	____	____	____	____	____	____	____	____

APPENDIX B5.2
MEASUREMENTS ANALYSIS

c. Compare all adjusted dB(A) levels in Table 2.1b to the average noise level.

d. If all adjusted audible alarm levels are at least 10 dB(A) above the average noise level check the YES column for criterion 6.3.2.1a in Appendix A.

e. If any adjusted alarm levels are less than 10 dB(A) above the average noise level, record each occurrence on an HED report form. Include the code number TP3.1B5.2.1 in the data collection description. For criterion 6.3.2.1a in Appendix A, check the NO column and record the HED report number and the code number, TP3.1B5.2.1 in the COMMENTS column.

APPENDIX B5.3
MEASUREMENTS ANALYSIS

3. LIGHT MEASUREMENTS (TILE FLASH CHARACTERISTICS)

3.1 Alarmed Flash Characteristics - 6.3.3.2b.

a. From the recorded data, determine if the alarmed flash rate is between 3 to 5 flashes per second and that the on-off ratio is approximately 1:1.

b. If both parameters meet the criteria, check the YES column for criterion 6.3.3.2b in Appendix A.

c. If either parameter fails to meet the criteria, record the discrepancy on an HED report form. Include the code number TP-3.1B5.3.1 in the data collection description. For criterion 6.3.3.2b in Appendix A check the NO column and record the HED number and the code number, TP-3.1B5.3.1, in the COMMENTS column.

3.2 Cleared Flash Rate - 6.3.1.5b(1).

a. From the recorded data, determine if the cleared flash rate is approximately double or 1/2 the alarmed flash rate.

b. If the cleared flash rate passes the criterion, check the YES column for criteria 6.3.1.5b(1) in Appendix A.

c. If the cleared flash rate fails to meet the criterion, record the discrepancy on a HED report form. Include the code number TP-3.1B5.3.2 in the data collection description. For criterion 6.3.1.5b(1) in Appendix A, check the NO column and record the HED number and the code number, TP-3.1B5.3.2, in the COMMENTS column.

APPENDIX B.6
OPERATOR INTERVIEW ANALYSIS

1. GENERAL

   a. Review all questionnaires for completeness of biographical information and question responses.

   b. Delete incomplete and unusable questionnaires from the data base. If required by contract reschedule these interviews for correction/completeness.

   c. When the data base assembly is complete perform the analysis, below.

2. BIOGRAPHICAL DATA

   a. Assemble biographical data and determine ranges and distributions for all relevant dimensions.

   b. Using appropriate statistics, determine the distribution (or its approximation) for this data.

3. RESPONSE DATA

   a. Summarize all responses and determine percent frequency response for each negative answer.

   b. Obtain the control copy of Appendix A - Criteria from the Conventions Task Plan (TP-8.1) for use in the next steps.

   c. For each positive answer, check the YES column for that criteria in Appendix A of this task plan. Do the same in the Conventions Task Plan Appendix A for criteria 6.5.1.6b(2) and c(2).

   d. Also add the data collection code number, TP-3.1B6n (with n the question number), in the REMARKS column of the Conventions Task Plan Appendix A.

   e. For each negative answer, initiate Preliminary HEDs (PHEDs) for discrepancy review. Record response frequency data, 0700 criteria number, and data collection code number on each PHED.

   f. The 0700 criteria numbers are contained in List 3b.

   g. For each negative answer, check the NO column and record the data collection code number and PHED number in the REMARKS column for the appropriate criteria in Appendix A of this task plan. Do the same for the Conventions Task Plan Appendix A for the criteria listed in c, above.

   h. Submit all PHEDs to your immediate supervisor.

   i. Subsequent verification, validation, and disposition of all PHEDs will be conducted per TP-10.1 (HED Review Procedure).

APPENDIX B6
OPERATOR INTERVIEW
ANALYSIS

LIST 3b

1. 6.3.1.3a(3)
2. 6.3.1.3a(2)
3 6.3.3.1b(1)
4. 6.3.3.1b(2)
5. 6.3.1.4b(1)

6. 6.5.1.6b(2) & e(1)
7. 6.5.1.6a
8. 6.5.1.6c(1)
9. 6.5.1.6c(2)
10. 6.5.1.6c(2)

11. 6.5.1.6b(1)
12. 6.5.1.6e(1)
13. 6.3.1.4b(2) & 6.3.2.2b
14. 6.3.2.1f

15. 6.3.2.2a(1)
16. 6.3.2.2a(2)
17. 6.3.2.1c
18. 6.3.2.1d
19. 6.3.4.1a(1) & (2)

20. 6.3.4.1b(1)
21. 6.3.4.1b(2)
22. 6.3.4.1c(1)
23. 6.3.4.1c(2)
24. 6.3.4.1c(3)

25. 6.3.4.2c
26. 6.3.4.1d(1)
27. 6.3.4.1d(2)
28. 6.3.3.2e
29. 6.3.3.2f

30. 6.3.3.3e
31. 6.3.3.2c
32 6.3.1.2a(1)
33. 6.3.1.2a(2)
34. 6.3.3.1a

35. 6.3.4.3a
36. 6.3.1.2b(1)
37. 6.3.3.4b
38. 6.3.1.2b(2)
39. 6.3.1.2d(1)

40. 6.3.1.2d(2)
41. 6.3.3.4c
42. 6.3.1.2c(3)
43. 6.3.1.2c(2)
44. 6.3.1.2c(2)
45. 6.3.1.2c(2)

APPENDIX B7
OBSERVATIONS ANALYSIS

1. For each checklist item checked YES, also check the YES column for that criteria in Appendix A and enter the date collection code number, TP-4.1B3.n (where n is the checklist item number) in the COMMENTS column.

2. For each checklist item checked NO, initiate an HED report. Enter the HED report number in the COMMENTS column of the checklist for that item. Include all necessary information on the HED report concerning identification of the discrepancy and the criteria (checklist item) not met.

3. Find the appropriate criterion or criteria in Appendix A from the reference number in the checklist item. Check the NO column and enter the HED number and the data collection code number in the COMMENTS column for that criterion or criteria.

APPENDIX B8
DOCUMENTATION REVIEW ANALYSIS

1. For each checklist item checked YES also check the YES column for the appropriate criteria in Appendix A. Enter the data collection code number TP4.1B4.n (n is the checklist item number) in the COMMENTS column.

2. For each checklist item checked NO, initiate an HED report. Enter the HED report number in the COMMENTS column of the checklist for that item. Include all necessary information on the HED report concerning identification of the discrepancy and the criteria (checklist item) not met.

3. Find the appropriate criterion or criteria in Appendix A from the reference number in the checklist item. Check the NO column and enter the HED number and the data collection code number in the COMMENTS column for that criterion or criteria.

4. When reviewing task report data, do not initiate duplicate HED reports. When an HED report has already been initiated for a specific discrepancy during the conduct of another task, update that HED report with the relevant information from this task data. Also update and cross-reference the criteria lists in Appendix A of both sets of task documentation.

APPENDIX B9
HUMAN ENGINEERING DISCREPANCY (HED) REPORT

____
PLANT/UNIT

ORIGINATOR: ______________________ HED NO.: ______________

VALIDATED BY: ______________________ DATE: ______________

a) HED TITLE: ____

____

b) ITEMS INVOLVED:

c) PROBLEM DESCRIPTION AND 0700 PARA. NUMBER:

d) DATA COLLECTION DESCRIPTION AND CODE NUMBER:

e) SPECIFIC HUMAN ERROR(s):

APPENDIX B9
HED REPORT (CONTINUED)

______________ HED NO.: ________

f) SUGGESTED BACKFIT:

REVIEW AND DISPOSITION:

APPENDIX C
CRITERIA MATRIX

APPENDIX C
CRITERIA MATRIX

Criteria Distributed Across Data Collection Methods

Notes:

1. The following codes apply to the matrix columns:

   M - Measurement (instruments and or measuring devices required)

   O - Observations (observation notes taken)

   I - Interview

   D - Document Review (documentation review to include engineering drawings, CWDs, etc.)

   A - Auditory Criteria

   V - Visual Criteria

   C - Controls Criteria (physical characteristics)

   L - Location/Arrangement

   P - General Physical

   F - Functional Criteria (usually requires some operational data for verification)

   Data sources listed are suggested. Alternatives should be used when those listed are not available or are not adequate.

APPENDIX C
CRITERIA MATRIX

CRITERIA NUREG-0700 para number	CRITERIA Crit type	DATA COLLECTION METHODS M	O	I	D	SUGGESTED DATA SOURCES	REMARKS
6.3.1.1	F				X	SFTA Rpt	also in RP-9.0 (SFTA)
6.3.1.2a(1)	F			X		Ops	
a(2)	F			X		Ops	
b(1)	F			X		Ops	
b(2)	F			X		Ops	
c(1)	F				X	Ann Resp Procs	
c(2)	F			X		Ops	
c(3)	F			X		Ops	
d(1)	F			X		Ops	
6.3.1.3a(1)	PF		X			Pnl	
a(2)	PF			X		Ops	
a(3)	PF			X		Ops	
b	PF		X			Pnl	
c	PF		X			Pnl	
d	PF		N/A			All	see text para. 4.2a
6.3.1.4a(1)	PF		X			Pnl	
a(2)	PF			X		SFTA Rpt	also in RP-9.0 (SFTA)
b(1)	F		X	X		Pnl	
b(2)	F		X			Pnl	
	F		X			Pnl	
	F	X	X			Pnl	
	F		X			Pnl	
b(3)	F		X			Pnl	
6.3.2.1a	F	X				CR	
b	F		X		X	CR, Admin Procs	
c	F		X	X		CR, Ops	
d	F		X	X		CR, Ops	
e	F		X			CR	
f	F		X	X		CR, Ops	
6.3.2.2a(1)	PF			X		Ops	
a(2)	F			X		Ops	
b	F			X		Ops	
6.3.3.1a	P		X			Pnl	
b(1)	P		X			Pnl	
b(2)	P	X				CR	
c(1)	P		N/A				in TP-1.8 (Maint)
c(2)	P		N/A				in TP-1.8 (Maint)
c(3)	P		N/A				in TP-1.8 (Maint)

APPENDIX C
CRITERIA MATRIX

CRITERIA NUREG-0700 para number	Crit type	DATA COLLECTION METHODS M	O	I	D	SUGGESTED DATA SOURCES	REMARKS
6.3.3.2a	F		X			Pnl	
b	F	X				Pnl,Comp Spc	
c	F		X			Pnl	
d	P		X			Pnl	
e	PF		X			Pnl, Ops	
f(1)	PF		X	X		Pnl, Ops	
f(2)	PF				X	Admin Proces	
6.3.3.3a	P		X			Pnl	
b	PF				X	SFTA Rpt	also in RP-9.0 (SFTA)
c(1)	P		X			Pnl	
c(2)	P		X			Pnl	
c(3)	P		X			Pnl	also in TP-6.1 (Labels)
d(1)	P		X			Pnl	
d(2)	PF				X	SFTA Rpt	also in TP-9.1 (SFTA)
e	F			X		Ops	
f	F		X			Pnl	
6.3.3.4a	P		X		X	Pnl, SFTA	also in RP-9.0 (SFTA)
b	PF			X		Ops	
c	PF		X	X	X	Pnl, Ops, SFTA Rpt	also in RP-9.0 (SFTA)
6.3.3.5a	P		X			Pnl	
a(1)	P	X				Pnl	
a(2)	P	X				Pnl	
b(1)	P		X			Pnl	
b(2)	P		X			Pnl	
b(3)	P		X			Pnl	
c	P		X			Pnl	
c(1)	P		X			Pnl	
c(2)	P		X			Pnl	
d(1)	P	X				Pnl	
d(2)	P	X				Pnl	
d(3)	P	X				Pnl	
d(4)	P	X				Pnl	
d(5)	P	X				Pnl	
d(6)	P	X				Pnl	

APPENDIX C
CRITERIA MATRIX

CRITERIA NUREG-0700 para number	Crit type	DATA COLLECTION METHODS M	O	I	D	SUGGESTED DATA SOURCES	REMARKS
6.3.4.1a(1)	P		X	X		Pnl, Ops	
a(2)	PF		X	X		Ops	
b(1)	F		X	X		Pnl, Ops	
b(2)	F			X		Ops	
c(1)	F		X	X		Pnl, Ops	
c(2)	F			X		Ops	
c(3)	F			X		Ops	
d(1)	F			X	X	Pnl, Ops	
d(2)	F			X	X	Ops, Admin Procs	
6.3.4.2a	P		X			Pnl	
b(1)	P		X			Pnl	
b(2)	P		X			Pnl	
b(3)	P		X			Pnl	
b(4)	P		X			Pnl	
c	P		X	X		Pnl, Ops	
6.3.4.3a	P		X	X	X	CR, Ops, SFTA Rpt	also in RP-9.0 (SFTA)
6.5.1.6a	F			X		Ops	(see Note 1)
b(1)	P			X		Ops	(see Note 1)
b(2)	P			X		Ops	(see Notes 1 and 2)
c(1)	F			X		Ops	(see Note 1)
c(2)	F			X		Ops	(see Notes 1 and 2)
6.5.1.6d(1)	P		N/A				in TP-8.1 (Conv)
d(2)	P		N/A				in TP-8.1 (Conv)
d(3)	F		N/A				in TP-8.1 (Conv)
e(1)	P		X			Ops	(see Note 1)
e(2)	P	X				Pnl	(see Note 1)
e(3)	P	X				Pnl	(see Note 1)
6.6.6.2a(1)	F		X		X	Pnl,SFTA Rpt	also in RP-9.0 (SFTA)
a(2)	F		X		X	Pnl,SFTA Rpt	also in RP-9.0 (SFTA)
a(3)	F		X		X	Pnl,SFTA Rpt	also in RP-9.0 (SFTA)
b	VC		X			Pnl	also in TP-6.1 (Labels)
c	P		X			Pnl	also in TP-6.1 (Labels)

APPENDIX C
CRITERIA MATRIX

NOTES:

1. These criteria also in the following task plans:

TP-4.1	Controls Survey
TP-5.1	Displays Survey
TP-6.1	Labels Survey
TP-7.1	Computers System Review
RP-9.0	SFTA (in TP-9.9, CR Function Validation).

2. These criteria also in TP-8.1, Conventions.

APPENDIX D
TASK PLAN CRITIQUE

APPENDIX D
TASK PLAN CRITIQUE

INSTRUCTIONS

1. Attach a copy of Section 4.0.
2. Fill in the required information and answer all questions.
3. Explain all NO answers in detail.
4. When complete, turn in to your immediate supervisor.

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1. Name of Respondent: ______________________________
2. Name of Plant: ______________________________
3. Date of Survey: ______________________________
4. Were all of the criteria correct and appropriate for this task (do not explain criteria that were N/A because System/CR did not have that design feature)? YES NO

5. Did the task plan instructions present the easiest and best methodology for performing the assessment? YES NO

6. Were the data collection forms adequate? YES NO

APPENDIX C

RESUMES OF THE REVIEW TEAM

RESUMES OF

RMS PROJECT TEAM MEMBERS

Richard L. Barnett

Education

B.S. Degree in Chemical Engineering, University of Washington, Seattle, Washington, 1971

U.S. Navy Nuclear Propulsion Training (Enlisted), 1963
U.S. Navy Nuclear Propulsion Training (Officer), 1971

Work History

January 1985 - Present

Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, South Carolina

Maintenance Supervisor-Instrumentation and Control. Supervision of the Instrumentation and Control and Electrical Maintenance foremen. Responsible for the maintenance, repair, and surveillance testing of all Instrumentation and Control and Electrical Equipment for Unit 2.

October 1983 - December 1984

Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, South Carolina

Principal Specialist - Maintenance. Supervised maintenance engineers and planners. Responsible for planning and parts procurement of all maintenance work for Unit 2. Developed maintenance repair procedures, and Preventative Maintenance Procedures. Responsible for machinery trend program and maintenance regulatory issues.

1982 - 1983

U.S. Navy, Naval Nuclear Power Training Unit, West Milton, New York .

Senior Evaluation Officer - Directed three Lieutenant Commanders as head of the Plant Performance Evaluation Activity at this General Electric managed, Navy operated training facility. Responsible for assisting General Electric management in evaluating all aspects of the performance of four nuclear prototypes in the areas of operations, training, testing, and maintenance. Interfaced with General Electric and Navy management to develop programs to improve operational performance and the quality of student training.

1978 - 1982

U.S. Navy, USS Narwhal SSN 671
Engineer Officer

Directed up to 70 enlisted men and 5 officers in the testing, operation and maintenance of the nuclear power plant and submarine engineering systems of this submarine. Stood watch as Officer of the Deck during special submarine operations. Trained on the latest submarine sonar and weapons systems. Coordinated shipyard and ship's force efforts during two years of refueling overhaul and critical testing. Top Secret clearance and indoctrinated for Special Intelligence.

1975 - 1978

U.S. Navy, Naval Nuclear Power Training Unit, West Milton, New York

Staff Training Officer - Directed up to 80 staff enlisted and officer staff operators during new construction and acceptance testing of a unique reactor plant at the S7G prototype. Responsible for the training and performance level of the staff operators.

1971 - 1975

U.S. Navy, USS Abraham Lincoln SSBN 602

Division Officer - Assignments included Damage Control Assistant and Reactor Controls Officer. Directed up to 20 men in the operation and maintenance of the nuclear propulsion plant during a refueling overhaul and underway operations.

1963 - 1967

U.S. Navy
Nuclear Enlisted Machinist Mate

John F. Benjamin

Education

B.S. Degree in Systems Engineering, United States Naval Academy, Annapolis, Maryland, 1973

Naval Nuclear Power School and Prototype - Completed six months of college and graduate level courses covering all aspects of reactor theory, construction and operation followed by six months of operational training at the S3G Prototype in West Milton, New York. Also, completed five weeks of management, leadership and technical courses at the Submarine Officer Indoctrination Course, New London, Connecticut, June 1973 - September 1974.

Senior Reactor Operator License, H.B. Robinson Nuclear Project Unit No. 2, July 1982

Affiliations

American Nuclear Society

Westinghouse Owners Group Operations Subcommittee - Robinson Site Contact

Work History

March 1982 - Present

Operations Support Supervisor, Carolina Power and Light Co., H.B. Robinson Nuclear Project, Unit 2, 700 MWe Westinghouse Pressurized Water Reactor.

Responsible for the Shift Technical Advisors, Fire Protection Staff, and the Operations Engineering Staff for the Robinson Plant, Unit 2 (20 people).

Supervised the development of a Post Trip/Safeguards Event Review process for use at Robinson, Unit 2.

Served on the Westinghouse Owners Group Procedures Subcommittee during the development of the Basic and Revision 1 versions of the Emergency Recovery Guidelines.

Assisted in the review, development and implementation of C.P. & L.'s projects for the Safety Parameter Display System, Emergency Response Facility Information System, and Regulatory Guide 1.97 Requirements for Robinson, Unit 2.

Served as the project manager for the investigation of a reactor trip and loss of off site AC power event which occurred on January 28, 1986. The investigation was conducted and problems resolved to the satisfaction of the company and the NRC. This was accomplished during a refueling outage without adversely impacting the outage schedule.

Supervised the detailed Control Room Design Review Project for H.B. Robinson, Unit 2.

Served as acting Operating Supervisor, Unit 2, during the 1984 Steam Generator Replacement Outage in addition to the responsibilities as Operations Support Supervisor. Major accomplishments during this period included:

-Supervised the development and implementation of the Steam Generator, Reactor Coolant System, and Steam Generator differential pressure hydrostatic tests.

-Supervised the rewrite of the operations portion of the plant operating manual.

-Supervised the development of the Plant Specific Emergency Operating Procedures based on Revision 1 of the Westinghouse Owners Group Emergency Recovery Guidelines.

January 1979 - March 1982

Carolina Power and Light Co., H.B. Robinson Nuclear Plant, Unit 2

Engineer in the nuclear operations department. Promoted to senior engineer in July 1980.

Served as Project coordinator on several occasions for the following types of Projects:

Turbine Outage Coordinator
Steam Generator Eddy Current and Tube Plugging Project Coordinator
Refueling Outage Coordinator

Successfully resolved on schedule several short term NRC requirements resulting from the event at Three Mile Island, (TMI). These include: The initial revision of the Emergency Operating Procedures, Control Room Access, Shift Foreman Responsibilities, and limitations on the use of overtime.

Assisted with the development and implementation of the updated Emergency Plan and the Emergency Plan Procedures following the event at TMI.

January 1977 - January 1979

U. S. Navy, Naval Nuclear Power Training Unit, D1G Prototype. Operated for the United States Department of Energy by the Knolls Atomic Power Laboratory of the General Electric Company.

Leading Engineering Officer of the Watch. Naval Officer in charge of an operating shift crew section. Supervised the operations, training, and maintenance of the crew section (35 men) and training of students assigned to the section (eight officers and 40 enlisted students per class). A total of 30 officers and 140 enlisted students were assigned in a 20 month period. Had operational, leadership, and administrative responsibilities to the Commanding Officer and the Plant Manager.

Qualified as Engineering Officer of the Watch (EOOW) on three Naval Nuclear Propulsion Plants. The EOOW is the senior nuclear propulsion plant watch station during plant operation.

October 1974 - December 1976

U.S. Navy, U.S.S. Francis Scott Key (SSBN-657). A Nuclear Powered Fleet Ballistic Missile Submarine.

Electrical and Reactor Controls Division Officer. An officer working directly for the Chief Engineer, responsible for proper operation and maintenance of reactor controls instrumentation for the nuclear reactor and the electrical generation and distribution equipment throughout the ship. Supervised two division, a total of 19 men.

Qualified as Officer of the Deck and Ship's Duty Officer onboard the USS FRANCIS SCOTT KEY. The Officer of The Deck is directly responsible to the Commanding Office for the safety of the crew and safe operation of the entire ship while on watch underway. The Ship's Duty Officer is responsible for the safety and security of the ship and crew while in port to the Commanding Officer who may or may not be on board.

Certified as Chief Engineer of a Naval Nuclear Propulsion Plant by the Director, Division of Naval Reactors, United States Department of Energy. This qualification includes an eight hour comprehensive written examination and three one hour technical interviews. The results of the examination were personally reviewed and approved by Admiral H.G. Rickover.

William M. Blaisdell

Education

U.S. Navy Schools:
- Engineman School
- Nuclear Power School
- Nuclear Prototype
- Engineering Laboratory Technician School

Senior Reactor Operator License, H.B. Robinson Nuclear Project Unit No. 2, July 1977.

Spring Garden Institute, Auto Mechanic & Engine Rebuilding, Philadelphia, Pennsylvania, 1961

Affiliations

American Nuclear Society

Work History

January 1980 - Present

Carolina Power & Light Company, H.B. Robinson Nuclear Project , Hartsville, South Carolina

Senior Specialist-Training, responsible for various projects related to licensed operator initial and requalification training. Assisted in the development of the training lesson plans presently being used for operator training.

Specialist-Training, responsible for various projects related to licensed operator initial and requalification training.

Responsible for the implementation of the H.B. Robinson, Unit No. 2 Simulator.

March 1971 - December 1979

Carolina Power & Light Company, H.B. Robinson Nuclear Project, Hartsville, South Carolina

Senior Control Operator responsible for supervising control room auxiliary operators. Licensed as a senior reactor operator.

Control Operator responsible for direct manipulation of reactivity controls as a licensed reactor operator.

Auxiliary Operator responsible for operation of auxiliary equipment under the direction of the control room staff.

August 1961 - April 1971

U.S. Navy
Diesel Engine Mechanic, Engineering Lab Technician and Instructor, AIW Plant

Engineering Lab Technician, in charge of reactor and steam plant chemistry and radiological controls aboard U.S.S. Longbeach.

Shift Supervisor in charge of radiological control for reactor plant maintenance aboard U.S.S. Hunley AS 31 Submarine Tender.

1959 - 1960

Service Station Operator and Mechanic
Greens Sunoco
Cherry Hill, New Jersey

William T. Gainey, Jr.

Education

Senior Reactor Operator License, H.B. Robinson Nuclear Project, Unit No. 2, 1972.

Reactor Operator License, H.B. Robinson Nuclear Project, Unit No. 2, 1970.

Reactor Operator License, Georgia Institute of Technology, 1967.

DeKalb Tech., Clarkston, Georgia, 1968

Reactor Operator License, Carolinas Virginia Nuclear Power Assoc., Inc. (CVNPA), 1965.

University of South Carolina, Richland Tech, Columbia, South Carolina, 1962

Work History

September 1983 - Present

Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, South Carolina

Mechanical Maintenance Supervisor, H.B. Robinson Unit No. 2 responsible for supervision and coordination of comprehensive maintenance program. Responsible for the mechanical maintenance input into modification development, acceptance and outage planning.

March 1980 - August 1983

Carolina Power and Light Co.
Nuclear Operations Department, Raleigh, North Carolina

Project Specialist - Special Projects with the following responsibilities:

Primary Project - Managing and providing operations input to the detailed human factors control room design review for three nuclear plants.

Corporate TMI Coordinator - Responsibility for coordination of all TMI projects at CP&L nuclear plants (including budgeting, reporting, and licensing interfaces).

Westinghouse Owners Group Procedures Subcommittee. Participated in the development of the generic System Review and Task Analysis (SRTA) report procedures for the basic version of the Emergency Recovery Guidelines.

August 1978 - February 1980

Carolina Power and Light Co.
Generation Department, Raleigh, North Carolina
Project Administration Specialist

Responsible for administrative duties for Generation Department such as: plant statistics and reporting, recruiting, contracts, various departmental reports to Group Executives, and testimony preparation for Executives to Utility Commissions.

September 1976 - July 1978

Carolina Power and Light Co.
Operations QA Department, Raleigh, North Carolina
Senior QA Specialist

Performed numerous surveillances at nuclear plants to determine compliance with regulations.

July 1969 - August 1976

Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, South Carolina
Shift Foreman, H.B. Robinson Unit 2

Approximately 7000 hours supervising operation of HBR-1 (coal-fired) and Unit 2 (nuclear).

Control Operator, H.B. Robinson Unit 2

Approximately 2000 hours console time, performed initial criticality, participated in hot functional and low power physics testing.

May 1967 - June 1969

Georgia Institute of Technology
Reactor Operator (NO. OP-2356)

Approximately 2000 hours console time, 116 start-ups, and 50 shutdowns.

January 1963 - April 1967

CVNPA, Inc.
Reactor Operator (NO. OP-1946)

Approximately 4000 hours console time, 150 start-ups, and 20 shutdowns. Participated in initial core loading and criticality, three refueling or fuel shuffles, and various physics tests.

Also qualified as a Health Physics Technician and a Chemistry Technician.

Frederick L. Lowery

Education

Senior Reactor Operator License, H.B. Robinson Nuclear Project Unit 2, May 1975.

U.S. Navy 1962 - 1971
Electrician's Mate Class "A" School - 14 weeks, class standing 3 of 36.

Submarine School - 8 weeks
Basic Nuclear Power - 6 months, class standing 17 of 269.

Advanced Nuclear Power Training Unit - 6 months, class standing 5 of 54.

Electrician's Mate Class "B" - 22 weeks, class standing 1 of 16.

Cleveland Institute of Electronics, Electronics Technology, 1969

Union College, Schenectady, New York, 9 semester hours in Semi-Conductor Electronics

Work History

July 1984 - Present

Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, S.C.

Manager - Operations, responsible for managing the nuclear operations staff including nuclear operators, fire protection personnel, radwaste operators, and operations engineering staff including shift technical advisors. Member of the Plant Nuclear Safety Committee and responsible for final acceptance of plant modifications for operations.

November 1979 - June 1984

Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, S.C.

Operating Supervisor - Unit 2

Assisted with the initial Control Room Design Review project for Robinson, Unit 2. This review was performed in 1980-1981 to the guidance provided by NUREG-1580.

Served as acting Manager - Operations and Maintenance, during the 1984 steam generator replacement outage. Managed the involvement of operations and maintenance personnel in the outage activities. Managed the rewrite of the operations and maintenance portions of the Plant Operating Manual.

May 1977 - October 1979

Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, S.C.

Generation Specialist - Served as the training coordinator for Robinson, Unit 2. Responsible for licensed operator and general employee training.

May 1971 - April 1977

Carolina Power and Light Co.
H.B. Robinson Nuclear Plant, Hartsville, S.C.

Shift Foreman, responsible for directing the operations staff for both fossil and nuclear plants.

Senior Control Operator, responsible for supervising control room and auxiliary operators. Licensed as a senior reactor operator.

Control Operator, responsible for direct manipulation of reactivity controls as a licensed reactor operator.

Auxiliary Operator, responsible for operation of auxiliary equipment under the direction of the control room staff.

1967 - 1971

U.S. Navy, Nuclear Power Training Unit

Qualified Electrical Operator - Instructor on the S3G Land-based Nuclear Prototype; Electrical Division Shift Leading Petty Officer - Training of Enlisted Men and Officers in Theory, Operation and Casualty Control of the Electric Plant. Responsible for Preventive and Corrective Maintenance of Electrical Systems.

1962 - 1967

U.S. Navy, U.S.S. Barb SSN 596 and USS Trigger SSN 564

Electrical Watch Stations, Shutdown Maneuvering Watch, operations and maintenance of electrical systems.

Ralph S. McGirt

Education

Advanced Electronics School, U.S. Navy, 1951
Electronics Class A School, U.S. Navy, 1951

Work History

September 1977 - Present

Carolina Power and Light Co., Hartsville, South Carolina

Senior Generation Specialist in the Technical Support group of the H.B. Robinson Nuclear Project.

Provide Electrical and Instrumentation and Control technical support as required to assist plant operations, maintenance, construction and outage functions.

1. Evaluate system problems and make recommendations to resolve these problems in a safe, reliable and cost effective manner.

2. Provide technical direction and coordination in implementation of technical support projects, maintenance, operations, and outage activities including planning, scheduling, and budgeting.

3. Provide coordination and direction of acceptance tests and recommend readiness for turnover and operation of systems following major maintenance and modifications.

4. Provide engineering studies and reports relating to plant design, operation, and maintenance based on review of system component trends, operating history, test results and periodic inspections.

November 1969 - August 1977

Instrument & Control Foreman at H.B. Robinson Nuclear Project, Hartsville, South Carolina

First line supervisor for the Electrical and I & C technicians during construction and the first six years of commercial operation of H.B. Robinson, Unit 2.

December 1966 - October 1969

Electric Foreman, Cape Fear Plant
Moncure, North Carolina

First line supervisor of the technicians involved with maintenance of electrical and I&C equipment of a multi-unit fossil fueled electric generating plant.

March 1960 - November 1966

Electrician at H.B. Robinson Plant, Unit 1, Hartsville, S.C.

Maintained electrical and I&C equipment.

November 1955 - February 1960

Helper/Painter and Pipe Coverer at Weatherspoon Plant
Lumberton, North Carolina

Maintained piping insulation and structure painting.

1950 - 1954

Electronics Technician, U.S. Navy

Maintained electronics communication gear, navigation aides and radar equipment.

Edward V. Paine

Education

B.S. Degree in Mechanical Engineering, University of Rhode Island, Kingston, Rhode Island, 1976

Affiliations

American Society of Mechanical Engineers

Registered Engineer (In Training) with American Society for Professional Engineers

Work History

January 1984 - Present

Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, South Carolina

Project Engineer-Plant Systems
Supervisory position in the Technical Support Unit with responsibilities including:

1. Modification development and implementation coordination

2. Specification of technical and QA requirements on procurement documents

3. Investigation of equipment problems

4. Investigation of system and equipment reliability and operational problems.

August 1978 - December 1984

Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, South Carolina

Engineer in the Technical Support Group of the Robinson Nuclear Project.

Responsible for the following projects and functions:

Modification development and coordination of installation activities.

Investigation of NRC IE Notice applicability to H.B. Robinson Plant.

Plant equipment failure analysis and Licensee Event Report preparation.

Coordination of outage activities including RCP disassembly and repair and S/G modifications, eddy current inspection, and sludge removal.

Steam Generator eddy current inspection including inspection sample selection, coordination of inspection activities, analysis of inspection results, and preparation of the return to power justification.

Advanced from Junior Engineer to Senior Engineer during this period.

January 1977 - July 1978

Ohio Edison Company
Associate Engineer

Review of system design packages for the Erie Nuclear Project Implementation of NPDES permit modification at fossil units.

Elery M. Shoemaker

Education

B.S. Degree in Mechanical Engineering, University of Kentucky, Lexington, Kentucky, 1980

B.A. Degree in Physics, Thomas More College, Covington, Kentucky, 1979

Senior Reactor Operator License, H.B. Robinson Nuclear Project, Unit No. 2, March 1983

Engineer In Training Certification, Kentucky, January 1980

Professional Affiliations

American Society of Mechanical Engineers
American Nuclear Society
Westinghouse Owners Group Operations Subcommittee

Work History

January 1983 - Present

Senior Operations Engineer, Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, S.C.

Responsible for the overall coordination of operations related projects. This includes nuclear power plant procedure development, preparation of regulatory audit responses, supervision of operations technicians, and operations contact for plant modification development.

Specific areas of responsibility include:

-Site Operations Coordinator for Detailed Control Room Design Review project, including scheduling and implementation of program plan and preparation of final summary report.

-Emergency Operating Procedures Coordinator responsible for the implementation of the Westinghouse Owners Group Emergency Response Guidelines Rev. 1 into plant specific procedures, including documentation provided in the Transition Document.

-Westinghouse Owners Group Operations Subcommittee representative working with other utility representatives on generic operations issues and maintenance of the generic Emergency Response Guidelines.

-Site Operations Coordinator for Unit No. 2 Control Room modifications including review and tracking of modification packages related to implementation of NUREG 0737, Supplement 1 issues.

May 1980 - January 1983

Shift Technical Advisor, Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, S.C.

Responsible for nuclear power plant operations support during normal and abnormal conditions. This includes an advisory role during transient situations to the plant operators, upgrading procedures in the Plant Operating Manual, and performing safety reviews of plant modifications.

Specific areas of responsibilities included:

-Implementation of the Westinghouse Owners Group recommendations for Natural Circulation Cooldown as described in the Emergency Response Guidelines Basic Version.

-Documentation of various plant transients including post trip reviews and preparation of operating experience reports.

-Implementation of improvements recommended by the Control Room Staff Utilization Study.

-Provide various levels of support in plant outages ranging from individual project coordination to shift outage coordinator.

July 1978 - May 1980

Assistant Manager, Randall's Super-Valu
Lexington, Kentucky

Supervisory position responsible for store closing procedures, general stocking, inventory and general accounting.

August 1973 - July 1978

Assistant Manager, Cherokee IGA
Independence, Kentucky

Supervisory position responsible for stocking crew, store closing procedures, general accounting and inventory procedures.

Carol Ann Harris-Young

Education

B.S. Degree in Electrical Engineering Technology, South Carolina State College, Orangeburg, South Carolina, 1983

Work History

June 1986 - Present

Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, South Carolina

Engineer in the Design Engineering Section, responsibilities and duties include writing plant modification project proposals, and procedure changes for control room and fire protection modifications.

December 1983 - June 1986

Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, South Carolina

Engineering Technician in the Nuclear Project Department and later transferred to the Design Engineering Section. Responsibilities and duties included: closeout of plant modification, writing plant modifications, modification manager in charge of miscellaneous projects relating to engineering support.

January 1982 - May 1982 and
May 1983 - August 1983

Carolina Power and Light Co.
H.B. Robinson Nuclear Project, Hartsville, South Carolina

Co-op Student Technician in the Technical Support Unit

Responsibilities and duties included the following: closeout of plant modifications, field verification of plant drawings, development of miscellaneous plant drawings, plant modification development, and assisting in refueling outages.

RESUMES OF

RMS PROJECT TEAM MEMBERS

Danna M. Beith

Education

University of California Santa Barbara
B.A., Psychology - 1976

Affiliations

Human Factors Society, Member

Work History

1985 to Present

RMS Associates, Inc. - Director, Human Factors Services

Currently managing the (NUREG-0700) Control Room Design Review for Carolina Power and Light Company at the H. B. Robinson, Brunswick, and Shearon Harris Nuclear Power Plants. Duties include Task Analysis, Verification and Validation, SPDS Review, Control Room Surveys, HED evaluation, preparation of Final Reports, and assistance in implementation of control room modifications. Authorized the program plan for the operating plants and the summary report for Shearon Harris.

1980 to 1985

ESSEX CORPORATION

Staff Scientist. Participated in the Control Room Design Review for Virginia Electric Power Company at the North Anna, Units 1 and 2 Nuclear Power Plant and the Surry, Units 1 and 2 Nuclear Power Plant. Duties included conducting an operating experience review which consisted of writing operator questionnaires, interviewing operators, data reduction and a document review of plant documentation; such as License Event Reports. Also assisted in the writing of the VEPCO program plan and the photographing for control panel photo mosaics.

Research Scientist. Directed the on-site data collection for Toledo Edison's Control Room Design Review for the Davis-Besse Nuclear Power Station. Duties included an operating experience review, the conduct of control room surveys, an SPDS review, and a human factors review of upgraded EOPs. Also assisted in photographing and construction of a control panel photo mosaic, data reduction and preparation of final reports.

Research Scientist. Performed the human factors evaluation of the South Texas Project main control panel and control room for Bechtel/Houston Lighting and Power (subcontract through Torrey Pines Technology). Activities included an evaluation of a full-scale, three dimensional mockup prior to fabrication of the operational system and the setup of a computer program for sorting and reporting data.

Research Scientist. Project manager for the development and production of approximately 300 nuclear power plant surveillance/test procedures for South Carolina Electric and Gas Company. Work involved technical review and editing of developed procedures, technical direction of all project staff, and coordination of the production of the procedures for initial writing through final word processing. Responsible for the technical work and personnel affairs of a staff composed of 6 to 8 technical writers, two editors, two nuclear plant operations specialists, and 8 word processors.

Research Scientist. On-site supervisor for the rewriting/formatting of nuclear power plant emergency, normal and standard operating procedures at South Carolina Electric and Gas Company's Virgil C. Summer Nuclear Station. Procedure formats were reviewed using criteria concerned with readability, legibility, and consistency.

Research Scientist. Directed the Human Factors evaluation of the on-site data collection for the Commanche Peak 1 Nuclear Power Plant control room. This evaluation included criteria specified in NUREG/CR-1580 and NUREG-0700. Duties also included documenting and identifying Human Engineering discrepancies and backfits.

Research Associate. Participated in the (NUREG/CR-1580) Human Factors evaluation of three Nuclear Power Plants for Carolina Power & Light. One plant evaluation included a control board assessment of engineering drawings for a plant under construction. Duties consisted of procedures developed for control room evaluation and identifying, reporting and suggesting suitable backfits for Human Engineering Discrepancies found in the control room.

1978 - 1980

XEROX CORPORATION

Associate Human Factors Designer. Support to the Human Factors Department in the Business Machine and Copier/Duplication Divisions. Duties included control system design, behavioral testing and new product assessments. Also, wrote machine operating procedures and developed dialogues used for operator assistance.

1978

CANYON RESEARCH GROUP, INC.

Assistant Researcher. Contract research assistant to Xerox Corp., Industrial Design/Human Factors Department. Support to the Human Factors Department in the Business Machines Division. Duties consisted of control system design and behavioral testing.

1976 - 1978

BIO TECHNOLOGY, INC.

Field Investigator. Northern California and Northern Nevada. Conducted a "Large Truck Accident Study" for the Federal Highway Administration of the Department of Transportation. Supervised Field Investigators conducting interviews with truck owners, drivers and California Highway Patrol officers and analyzed accident sites and accident reports. Conducted highway surveys involving road characteristics, traffic density and speed data using remote control cameras and radar equipment.

Marianne Grannan

Education

The Ohio State University, Columbus, Ohio
B.S. Industrial & Systems Engineering, June 1986
Concentration in computer science and human factors

Affiliations

Institute of Industrial Engineers
National Society of Women Engineers

Work History

June 86 - present

RMS Associates, Inc.
Cary, North Carolina

Industrial Engineer. Engineering and Human Factors consulting for the power industry. Assisting in the control room design reviews for two nuclear power plants, which include data input and debugging of a task analysis data base, control room surveys, data analysis and the documentation of human engineering discrepancies.

August 85 - September 85

Milliman & Robertson, Inc.
Consulting Actuaries
Radnor, PA

Actuarial student assistant. Performed statistical analysis and forecasting for automotive insurance and medical malpractice insurance clients.

July 84 - September 84

State of Ohio Disaster Services Agency
Worthington, Ohio

Co-op Engineer. Federally certified as a Shelter Survey Technician. Evaluated buildings in Northern Ohio for possible use as radioactive fallout shelters. Performed structural and feasibility analyzes on commercial and public buildings. Worked independently, responsible for all documentation; assigned a State Vehicle.

Greg W. Hill

Education

Ph.D. Candidate in Psychology, North Carolina State University, anticipated completion date May 1988.

M.S. Psychology, May 1986, North Carolina State University.

B.A. Psychology, 1982, University of North Carolina at Charlotte.

Affiliations

Human Factors Society, student affiliate, 1983-1986.

Graduate Association of Students in Psychology, Ergonomic Representative, 1984-1986.

NCSU Student Chapter of Ergonomics, Member, 1985-1986.

Work History

July 1986-present

North Carolina State University, Raleigh, N.C.,

Research Assistant - Full responsibility for research project on spatial perception & aging. Project funded by National Institute of Health.

August 1986-present

National Institute Of Occupational Safety & Health,

Apprenticeship - Stipend provided for completing a minimum number of courses in occupational safety and for having a safety related research orientation.

May 1986-present

RMS, Associates, Cary, N.C.

Research Assistant - Assisted in the Human Factors Control Room Design Review of H.B. Robinson Nuclear Project and the Brunswick Steam and Electric Power Plant, Unit 1 & Unit 2. Responsible for data collection and generation of Human Engineering Discrepancy Reports (HEDS).

August 1985-February 1986

Profile Associates , Raleigh, N.C.

Lab Manager - responsible for laboratory equipment and set-up, data collection, and supervision of on-staff nurse. Project funded by NIAAA for the development of a divided attention computer task used for the assessment of behavioral impairment due to low doses of alcohol.

January 1985-May 1986

North Carolina State University , Raleigh, N.C.

Instructor, Psychology 300 (Perception) - Responsible for 3 sections of approximately 25 students each. Introduction to basic anatomy and physiology of major sensory systems, their relation to central structures, and basic problems in psychophysics. The major emphasis is on visual and auditory spacial perception.

August 1983-May 1985

North Carolina State University , Raleigh, N.C.

Teaching Assistant - Psychology 200 Introduction Psychology, Assisted sutdents outside of class, proctored exams, tabulated grades, and assisted in general course maintenance.

May 1983-September 1983

North Carolina State University , Raleigh, N.C.

Research Assistant - Responsible for lab set-up and data collection. Investigated effects of viewing distance of CRTs on visual fatique and oculomotor function (funded by Systems Research Corp.).

August 1981-May 1982

University of North Carolina , Charlotte, N.C.

Research Assistant - Responsible for lab set-up and data collection. Investigation of variables that would assist older adults' remembering (funded by NIA).

August 1980-May 1982

University of North Carolina , Charlotte, N.C.

Lab Instructor - Taught 7 sections with an average class size of 30 students. Discussed experimental design and superived students conducting experiments.

January 1980-December 1980

University of North Carolina , Charlotte, N.C.

Teaching Assistant - Psychology 240 (Research Methods in Experimental Design). Assisted students in conceptualizing experimental methods and conducting experiments.

Patrick L. McMurtry

Education

North Carolina State University
M.S., Psychology - In progress - course work completed - Area of study - Ergonomics: Emphasis in Perception, Safety, Systems Evaluation and Human Performance, Minor - Industrial Engineering

Louisiana State University
B.S., Psychology - 1980

Affiliations

Human Factors Society, Associate Member

Work History

July 84 - Present

RMS Associates,Inc.

Team Leader in the human factors SPDS evaluation efforts for Carolina Power & Light's Shearon Harris Nuclear Power Plant and H.B. Robinson Steam Electric Plant. Duties include development of the SPDS task plan encompassing 0700 and 0696 reviews, Human Factors verification and validation, coordination with Engineering on SPDS test plan and overall V&V.

Human Factors Specialist supporting the Control Room Design Reviews for Carolina Power & Light's three nuclear power plants. Duties include task analysis, Verification of Human Performance, Validation of Control Room Functions, preparation of Procedure Generation Packages, assistance in the development of a data base to support task analysis and control room inventory.

1981 - 1984

Teaching Assistant, Psychology Department, N.C. State University. Worked on a one-quarter to one-half time basis teaching Perception at an undergraduate level and assisting in the instruction of Introductory Psychology.

1983

Fast-food employee at Burger King.

1982 - 1983

Research Assistant, Industrial Engineering Department, N.C. State University. Worked on call as a graduate assistant on a study of the effects of aging on egress behavior under simulated fire emergency conditions under contract with the National Bureau of Standards.

1982

Research Assistant, Psychology Department, N.C. State University. Worked as a full time graduate assistant on the effects of reverberation cues on auditory distance localization under contract with the National Science Foundation.

1981

Apprentice Painter, independent contractor, Waverly, Tennessee. Worked, on call, as a painter and remodeler for Leo Lowden, an independent contractor in Waverly, Tennessee.

1976 - 1980

Research Assistant, Zoology and Physiology Department, Louisiana State University. Worked as an undergraduate assistant on various projects concerning blood ion transportation in fresh-water mussels.

Kimberly Ray

Education

North Carolina State University, B.A. Psychology, 1985.

Affiliations

Human Factors Society
  Student Affiliate, 1984-85
  Associate Member, 1985-86

Work Experience

October 85 to Present

RMS Associates Inc.,
Human Factors Division, Research Assistant

Assisted in Carolina Power and Light Company's Human Factor Control Room Design Review at Brunswick Steam Electric Plant, Unit I & II; H.B. Robinson, Unit 2 Nuclear Power Plant and Shearon Harris Nuclear Power Plant. Assisted in control room inventory documentation, control room surveys, data analysis and Human Engineering Discrepancies (HEDs) report generation.

August 84 to August 85

Anders Art and Drafting, Sales Assistant
Assisted with various sales and inventory duties.

1984 - 1985

North Carolina State University , Research Assistant

Responsible for the pre-screen interviews and scheduling of subjects participating in an Aging and Perceptual Processes project at the NCSU psychology department.

Robert M. Shepard Jr.

Education

University of Florida - 1973;
B. S., Nuclear Engineering Sciences

University of Pittsburgh
M. S., Course Work, Engineering Management

Various Management Courses - Westinghouse

Work History

Present RMS Associates - Program Manager
Cary, North Carolina

Currently the program manager for the CRDR effort at Carolina Power and Light (Robinson, Harris and Brunswick). Providing Equipment Qualification Services to Mississippi Power and Light and CP&L. Providing SPDS Design and Review Services to Harris, Brunswick and Robinson. Providing work space design on Brunswick and Harris. Providing drafting support to Brunswick and Robinson (Control Board Drawings).

Managed the CP&L EOP effort for H. B. Robinson and Shearon Harris. Assisted the CP&L corporate personnel in Operations, Engineering and Licensing in the NUREG-0737 Supplement I response. Managed the preparation of system descriptions, lesson plans and training aids for two utilities at three separate plant sites.

1981 to 1982

Quadrex Corporation, Tulsa, Oklahoma

Field assignment at the corporate office of Mississippi Power and Light, assisting the Supervisor of Nuclear Safety in the area of PRA Program Development, Systems Review and Interaction, Emergency Planning, Commitment Tracking, and Hydrogen Control, specifically in the Containment Design and Analysis, Program Management, Equipment Survivability, ACRS Presentation(s), and Documentation.

1980 to 1981

Stafco, Inc., Washington, D.C.

Project Manager responsible for contract work in the areas of licensing, SAR review and rewrite, ACRS and NRC interface, and SRP compliance. Also responsible for general review and development, training and implementation of utility emergency plans.

1973 to 1980

Westinghouse Electric Corporation, Pittsburgh, Pa.

Progressed from licensing and evaluation engineer to Manager, Nuclear Installation and Service Department.

Manager, Nuclear Installation and Service Department. Established Westinghouse service function in Sweden, including five-year strategic plan and organizational structure.

Manager, Manufacturing, Planning and Control. Managed inventory control and manufacturing schedules. Forecasted long-range production plans, manpower requirements, production levels and raw material requirements.

Program Manager of Nuclear Steam Generator Design Programs. Managed program planning, funding scheduling and R&D. R&D programs consisted of correcting present S.G. problems and updating to new designs/concepts(i.e. heat treatment of tubing)

Lead Project Licensing Engineer for South Texas Project and responsible for all licensing aspects of RESAR-414 and 41. Coordinator for FSAR and operating plant seminar. Lead Engineer for all licensing aspects on 15 PWRs, with five personnel under technical supervision.

Licensing and Evaluation Engineer. Responsible for aspects of loss-of-coolant accident providing SAR write-up and analytical model defense, including containment design calculations. Co-author of WCAP-8264 "Mass and Energy Releases for Containment Design".

1962 to 1970

U. S. Navy

Leading Petty Officer (MM1(SS)) for the S1C Prototype. ELT on a Nuclear Submarine (USS Casimir Pulaski) as well as supervisor of balance of plant maintenance. Qualified electrical/diesel operator on a conventional submarine (USS Barracuda) (EM3(SS)).

Eleanor M. Talley

Education

Rutgers University, New Brunswick, New Jersey
B.A., Experimental Psychology

Affiliation

Human Factors Society, Member
International Society for Information Displays

Work History

Present

RMS Associates, Inc.

Human Factors Specialist, Level I, for Carolina Power & Light Company's Control Design Review update for the Shearon Harris Nuclear Power Plant, the Brunswick Steam Electric Plant Unit I & II, and the H. B. Robinson Steam Electric Plant using NUREG-0700 Guidelines. Responsible for the on-site interview of licensed reactor operators, the analysis of all interview data, and the generation of Human Engineering Discrepancies Reports (HEDs). Responsible for the data collection, data analysis, and HED report generation for all environmental, work space, control, displays, annunciator system, conventions, and anthropometrics surveys and assistance in implementation of control room modifications.

1981 - 1984

ESSEX CORPORATION

Staff Scientist for Virginia Power & Light, North Anna Nuclear Power Plant and Surrey Nuclear Power Plant Control Room Design Review. Responsible for conducting on-site interviews of licensed reactor operators, the analysis of all interview data, and the generation of Human Engineering Discrepancy Reports (HEDs).

Staff Scientist for American Electric Power Company, D.C. Cook Power Station, Control Design Review. Responsible for the on-site interviews of licenses reactors, operators, the analysis of all interview data, and the generation of Human Engineering Discrepancy Reports (HEDs).

Staff Scientist for Carolina Power & Light Company continued Control Room Design Review and the RAD Waste Control Room Design Review at Shearon Harris Nuclear Power Plant, Unit I. Responsible for the data collection, data analysis, and HED report generation for all environmental, work space, controls, displays, annunciator system, conventions, and anthropometrics surveys. Assisted in the operability analysis of the control room back panels, Remote Hot Shutdown Facility, and the RAD Waste Control Room.

Research Scientist - Assistant project manager/chief editor for the development and production of approximately 300 nuclear power plant surveillance/test procedures for South Carolina Electric and Gas Company. Work involved technical review and editing to ensure that technical content and human factors criteria are correct and appropriately incorporated in all developed procedures. Directly responsible to the Project Manager for the technical work of 6 to 8 technical writers, one editor, one coordinator and 8 word processors. This required the technical direction of all project staff and the coordination of all project activities on a daily basis.

Research Scientist - As a member of the writing staff for the rewriting/formatting of nuclear power plant emergency, general and standard operating procedures at South Carolina Electric and Gas Company's Virgil C. Summer Nuclear Station. Procedure formats were reviewed using criteria concerned with readability, legibility, and consistency.

Research Associate - Performed data collection and reduction activities in the Human Engineering evaluation of Texas Utilities Generating Company's Comanche Peak Nuclear Power Plant control room. Responsible for the generation of Human Engineering Discrepancy (HED) reports on identified discrepancies. Familiarity with Industry and NRC guidelines for design and evaluation of NPP control rooms was required.

1981

KINTON, INC.

Research Associate - As a member of the writing staff, wrote chapters one and four of a five-chapter training and reference guide (the Indian Housing Desk Reference Handbook - HUD). This guide is a set of procedural steps used daily by HUD Indian Housing Office managers in performance of their nationwide liaison activities with the Indian Housing Authorities. Was also responsible for the development of all self-test questions and answers for these chapters,plus all financial questions and answers for the complete guide. Duties included the conduct of literature searches of existing government documents, and attendance at HUD-scheduled review meetings to determine the accuracy, reliability, and timeliness of all included material.

1980 - 1981

ESSEX CORPORATION

Research Associate - Performed data collection and reduction activities and assisted in report preparation during the Human Factors Engineering evaluation of Carolina Power and Light Company's Shearon Harris, H. B. Robinson, and Brunswick NPP control rooms. Familiarity with current Industry and NRC evaluation and design guidelines was required.

1979 - 1980

MANUSCRIPT TYPING SERVICES

Manuscript Typist - Furnished manuscript typing services to students attending Rutgers University (New Brunswick, New Jersey) and New Mexico State University (Alamogordo, New Mexico).

1977 - 1978

BIO/DYNAMICS INC.

Laboratory Technical (Carcinogenic Research) - Supervised technician's dissection accuracy in the Department of Necropsy. Weighed and recorded tissue samples using manual and computerized equipment. Introduced new technicians to department policies and use of equipment.

1971 - 1976

ADMINISTRATIVE AND EXECUTIVE SECRETARY

Secretary - Performed general office administrative work and executive secretarial duties for various employers while completing undergraduate requirements. All employment was full-time. Details furnished on request.

1970

AEROMED RESEARCH LABORATORY

Laboratory Assistant (Department of Neuropsychology - Psychophysiological Research) - Assisted in conducting learning and behavioral studies using hypocampal-leisioned animals. Shaped naive animals using hand-operated and computerized equipment.

Walter T. Talley

Education

1977 - M.S. Applied Psychology, Stevens Institute of Technology

1974 - B.A. General Experimental Psychology, New Mexico State University

1972 - A.A. Arts and Sciences, New Mexico State University

Military Training in Electronics

1962 - Refresher Course in Electronics Fundamentals

1960 - Radar Fire Control and Bombing Computer Systems, Republic Aviation Corporation

1955 - Radar Fire Control and Bombing Systems

Affiliations

Member of Psi Chi, Psychology National Honor Society
Member of the Human Factors Society

Work History

December 1978 - Present

ESSEX CORPORATION
Alexandria, Virginia

September 1981 - Present

Manager, Systems Analysis Branch, Process Control Systems Department- Provide management and technical direction for conduct of all systems analysis projects for the PCS Department. Have primary technical responsibility for the adaption and development of applied methodology. Serve as technical resource for the development of human factors criteria for specific assessment applications. Responsible for the technical review of client deliverables.

Provide management review in concert with other branch managers of project plans, technical scope, and resource estimates for the PCS Department projects.

As branch manager, supervise human factors specialists assigned to the Systems Analysis Branch. Assign appropriate personnel to client projects, as needed. Develop solicited and unsolicited proposals for new and existing clients.

Project Director for major procedures development and production project for South Carolina Electric and Gas (SCE&G) Company's V.C. Summer Nuclear Station (NTOL). Initial project involved rewriting and reformatting all emergency, abnormal, general, and standard operating procedures. As a result of the project team's performance, an additional project was awarded for the development and production of approximately 300 surveillance/test procedures. Developed the project plan and technical work scope for the coordinated rewrite, reformat, technical review, editing, and production of these procedures. Work involved the development of an integrated project team and its functions. Team members included Essex and SCE&G operators specialists, procedures writers, editors, and word processors.

Project Director for SCE&G's V.C. Summer Nuclear Station control room backfit project. Work involved technical and managerial support to the assigned project staff for a year-long effort to incorporate human factors requirements into the control room such as component relocation, display scale redesigns, labeling content and locations, demarcation and mimic requirements, and environmental concerns.

Project Director for Baltimore Gas and Electric (BG&E) Company's Calvert Cliffs Nuclear Power Plant control room human factors evaluation. Provided technical support and managerial direction to the Project Manager and project staff.

At Raleigh, North Carolina, Project Manager for a human factors engineering evaluation contract with Carolina Power and Light Company. Directed the work of one Research Scientist, three Research Associates, one Research Assistant and one contract consultant in the human factors engineering evaluation of four nuclear power plant control rooms (three existing and one under construction). Duties consisted of the planning and coordination of all contract activities which included scheduling between two Essex offices and three customer field locations; the development of evaluation plans which incorporated modified existing procedures and newly developed procedures tailored to this particular customer's requirements; and general customer interface activities such as conduct of monthly project review meetings, submittal of monthly progress reports, and the development and planning of special studies. Also responsible for the development of all final reports for the evaluation and the development and delivery to the customer of comprehensive evaluation files which serve as a detailed record of the total contract performance.

At White Sands Missile Range, New Mexico, responsible for the conduct of the human factors engineering evaluation of the U.S. Army Patriot Air Defense System. Directed the work of one Research Associate in the development of a detailed test plan, various interim reports and new field evaluation techniques and procedures applied to the Patriot System testing. Performed the first non-supplier safety study on the Patriot System and produced the Interim Safety Release Study Report which was essential for the continued evaluation of the system.

At Fort Hauchuca, Arizona, as a member of the Essex quick-response team, assisted in the initial contract phases of U.S. Army Communications System Test and Evaluation projects. Duties consisted of the performance of human factors engineering evaluations of current and prototype communications equipment and satellite telecommunications systems. Collected and evaluated human performance, environmental, and hardware data. Wrote final reports concerning the compliance of various equipment to existing military human factors specifications and requirements.

As a member of the Essex human factors staff, analyzed work performance data and developed a summary report for the AT&T Company's Human Performance Laboratory concerning corrective maintenance task times for telephone company central office switchworkers. Assisted in writing the technical areas of contract proposals for the evaluation of Army weapons systems.

July 1978 - November 1978

ALLEN CORPORATION OF AMERICA
Alexandria, Virginia (White Sands, New Mexico)

<u>Senior Human Factors Engineer</u> - As the project manager of the Corporation's White Sands Office, directed the work of two Senior and one Junior Human Factors Engineers, and one Secretary/Clerk. Work consisted of Human Factors evaluation of current and prototype U.S. Army Weapons systems. Test plans were developed which established the methodology and scheduling of complete human factors evaluations of operation, maintenance and transportability for tactical and strategic weapons.

September 1974 - June 1978

BELL TELEPHONE LABORATORIES
Piscataway, New Jersey

Member of Technical Staff - As a member of computer software development groups, developed specifications for the human interface requirements of large computer-based data management systems used throughout the Bell Telephone System. Designed and implemented the specific human interface functions from the aforementioned requirements. Developed the performance standards and operational (human performance) definitions of the functional allocations for both the human and the machine in these software systems.

May 1971 - August 1974

DYNALECTRON CORPORATION
Land-Air Division, White Sands Test Facility - NASA
Las Cruces, New Mexico

Electro/Mechanical Designer - Developed various new designs and modifications to existing designs for facilities structures, and equipment used for destructive and nondestructive materials and testing. Produced structural, mechanical, and electrical designs on the modifications to cyrogenic storage and pumping systems. Also produced drafted drawings and technical illustrations to NASA standards for use in documenting the facility's configuration and for use in test reports.

February 1970 - April 1971

DYNALECTRON CORPORATION
Land-Air Division, Holloman Air Force Base, New Mexico

Medical Illustrator - Produced illustrations for publications and technical reports. Illustrations were in the following categories: Line Graphs, Charts, Cumulative Records, Equipment Layouts and Anatomy Drawings. Using autopsy procedures, produced preliminary drawings of thoracic musculature of the baboon. Developed comparative Sacrolumbar, and lower trunk comparative anatomical drawings of the human, baboon, and chimpanzee.

September 1968 - January 1970

A. G. SCHOONMAKER COMPANY, INC.
Sausalito, California

Project Engineer - Developed all phases of detailed design requirements for diesel and gas turbine powered generator sets. Set capabilities were usually in the range of 5000 volt, 2000 kilowatt outputs. Also coordinated total design packages including all mechanical aspects of the units and developed electrical requirements and cost analysis for contract bids. Electrical design details involved the evaluation of customer contract requirements, translation of them into specific components, ordering the components and materials and designing the circuits, bus connections, enclosures, front panels and controls. Some technical writing was required in the area of maintenance and operating instructions.

September 1967 - August 1968

ELECTRONICS CONSULTING FIRMS
San Francisco, California

Electronics Technician, Research and Development - Performed a broad range of technician/designer duties as a job-shop employee. Most work was involved in the build-up, modification and checkout of production test equipment for testing missile guidance systems. Additional work performed in the construction and testing of U.S. Army field telecommunications equipment.

August 1962 - August 1967

DOUGLAS AIRCRAFT COMPANY, INC.
Santa Monica and Huntington Beach, California

Electronics Technician, Research and Development - Worked in vehicle checkout areas at Santa Monica and Huntington Beach on the initial installation of the Ground Support Equipment for the Saturn SIV and SIV-B Space Vehicles. Performed scheduled periodic maintenance and assisted engineering in troubleshooting, modification, calibration and functional checkout of this equipment. SIV Ground Support Equipment was manually operated, SIV-B equipment was computer controlled.

May 1955 - June 1962

UNITED STATES AIR FORCE

Supervisor of Fire Control Section, R&D - At the Fighter Weapons Squadron, Nellis AFB, Las Vegas, Nevada, had charge of five technicians in the Research and Development section. Work involved the design and packaging of R&D projects relating to the testing, modification and extension of Radar Fire Control and Bombing Computer Systems' capabilities on the then current fighter aircraft; the F-100D and F-105D fighter/bombers. Rocket and missile systems which were modified and tested consisted of conventional 2.5, 2.75 and 3.25 air-to-air rockets, sidewinder (infrared guided) rockets and the GAM-83 air-to-ground BULLPUP missile. (1961-1962).

Fire Control Technician, R&D - Worked in the Research and Development section of the Fighter Weapons Squadron, Nellis Air Force Base, Las Vegas, Nevada. Technical work responsibilities were the same as those listed above. (1959-1961).

Fire Control Technician - Maintained Radar Fire Control Systems in fighter aircraft at Turner Air Force Base, Albany, Georgia. (1958-1959).

Test Equipment Technician - At the USAF Standards Laboratory in Chateauroux, France, worked on all phases of repair and calibration of general and special purpose electronics test equipment. Designed and built test and calibration benches for new types of equipment as needed. Maintained bench stock supply of all necessary spare parts. (1955-1958).

Technical Reports

Talley, W.T., Haher, J., Farbry, J., Amerson, T.A., Beith, D. and Justice, T. Human Factors Design Evaluation Report for the Shearon Harris Unit 1 Control Room. Essex Corporation, September 1981.

Talley, W.T., Haher, J., Amerson, T. A., Beith, D. and Justice, T. Human Factors Evaluation Report for the H.B. Robinson Unit 2 Control Room. Essex Corporation, September 1981.

Talley, W.T. A Final Report on the Human Factors Engineering Analysis of the SHNPP Unit 1 Control Room Equipment Arrangement. Essex Corporation, February 1981.

Talley, W.T. A Human Factors Review of the Proposed Harris 1 CR Radiation Monitoring Equipment. Essex Corporation, November 1980.

Talley, W.T.and Wenger, W. Interim Safety Release Study, Patriot Missile System, Tecom Project DAAD07-79-C-0063, Essex Corporation, October 1979.

Talley, W.T. and Eile, D.R. Human Factors Evaluation of the Communication Satellite Ground Control Terminal (AN/TSC-85), Final Technical Report under Contract DAE18-79-C-0029, Essex Corporation, March 1979.

Talley, W.T. and Aikens, R. C. Human Engineering Report, Development Test II (PQT/G) for the Enhanced Cobra Armament Program (Interim). Tecom Project DAAD07-78-C-127, Allen Corporation, November 1978.

Talley, W.T. and Aikens, R. C. Human Engineering Report, Development Test II (PQT/G) for the Lightweight Launcher (LWL). Tecom Project DAAD07-78-C-127, Allen Corporation, October 1978.

Talley, W.T. and Aikens, R. C. Human Engineering Report, Development Test II (PQT/G) for the XM1 Tank System. Tecom Project DAAD07-78-C-127, Allen Corporation, October 1978.

6.2.7

Radio System Replacement Project - Complete by the end of 1987.

HEDs to be resolved: 2 Total

1200-0203
1200-0210

6.2.8

Dedicated Shutdown Panel (Secondary Control Panel, 4160 Room Panel, and Charging Pump Room Panel) Project. - Complete by the end of outage 12 (1988).

HEDs to be resolved: 18 Total

12DS-1310	12DS-11164
12DS-2149	12DS-11167
12DS-2150	12DS-11168
12DS-2261	12DS-11169
12DS-2262	12DS-11170
12DS-3282	12DS-11171
12DS-11152	12DS-11172
12DS-11154	12DS-11173
12DS-11155	12DS-11178

6.2.9

AFW Control Valves Project. - Complete by the end of outage 12 (1988).

HED to be resolved: 1 Total

1200-5045

6.2.10

Vacuum Exhaust Valve Indication Project. - Complete by end of outage 12 (1988).

HED to be resolved: 1 Total

1200-5043

6.2.11

Emergency Bus Volt Meter Project - Complete by end of outage 12 (1988).

HED to be resolved: 1 Total

12D1-5004

6.2.12

Recorder Scale Replacement Project. - Complete by the end of 1988.

HEDs to be resolved: 6 Total

1200-2409	12E6-2423	1200-2428
1200-2422	12E0-2426	1200-2429

6.2.13

Meter Scale Replacement Project. - Complete by the end of 1988.

HEDs to be resolved: 18 Total

1200-1143	1200-2242	12D1-5020
12D1-2217	12E7-2247	12A1-5022
12C1-2222	12A1-2252	12D1-5023
12C1-2237	12A1-2254	12A1-5024
1200-2240	12D1-2257	12D1-5025
12E7-2241	1200-2260	12D1-5035

6.2.14

Legend Light Re-engraving Project. - Complete by the end of 1988.

HEDs to be resolved: 5 Total

12D1-1117	12A1-1120	1200-11143
12A1-1118	1200-2316	

6.2.15

Line Panel Project - Complete by the end of 1988.

HED to be resolved: 1 Total

12E5-5006

6.2.16

Core Exit Thermocouple Panel Project - Complete by the end of 1988.

HEDs to be resolved: 2 Total

12E1-2239
12E1-3304

6.2.17

Color Coordination Project - Complete by the end of 1989.

HEDs to be resolved: 12 Total

12E1-1301	1200-1314
12E6-1302	1200-1315
12E1-1304	1200-1316
12E1-1305	1200-1317
12E1-1309	1200-1318
1200-1313	1200-1319

6.2.18

RCP Temperature Indication Project. - Complete by end of outage 13 (1990)

HEDs to be resolved: 2 Total

12A1-5002
1200-5041

6.2.19

Addition of FW Isolation Logic Indication to the RTGB.- Complete by the end of outage 13 (1990).

HEDs to be resolved: 2 Total

1200-3415
1200-5042

6.2.20

PZR Safety Relief Valve Monitors Project. - Complete by the end of outage 13 (1990).

HEDs to be resolved: 5 Total

12E6-1155
12E6-1168
12E6-1308
12E6-3101
1200-11101

6.2.21

Annunciator Project - Complete by the end of outage 13 (1990).

HEDs to be resolved: 15 Total

1200-2101	1200-2111	12E5-2145
12E4-2104	1200-2121	1200-2153
12E4-2107	1200-2133	12E8-2143
12E4-2108	1200-2138	1200-5046
1200-2110	12E6-2144	1200-5047

6.2.22

Annunciator Response Switch Addition Project - Complete by the end of outage 13 (1990).

HED to be resolved: 1 Total

12A1-3306

6.2.23

Emergency Lighting in Unit 2 Control Room Project.- Complete by the end of 1990.

HEDs to be resolved: 3 Total

1200-0002
1200-0014
1200-0018

6.2.24

ERFIS Project - Will be complete with the installation of the ERFIS modification.

HEDs to be resolved: 10 Total

12G1-0108	12G1-0306	12G1-1701
12G1-0302	12G1-0308	12G1-1711
12G1-0303	12G1-1192	1200-2425
12G1-0305		

6.2.25

Control Room HVAC Project - Will be completed per CP&Ls response to the Control Room Habitability issue (submitted to NRC by CP&L Letter LAP-83-912, June 9, 1983).

HED to be resolved: 1 Total

1200-0008

6.2.26

Post Accident Monitoring Panel Project - Correction of the HEDs associated with this panel has been coordinated with the planned addition of the new Core Exit Thermocouple and Excore Neutron Flux Detector System which make up the Post Accident Monitoring Project. These additions are required per CP&L's commitments to REG-GUIDE 1.97 (submitted to NRC by NLS-84-509, December 31, 1984).

A review will be performed after installation of the Post Accident Monitor Panel to ensure HEDs are corrected and to verify the panel conforms with the human factors criteria established for H.B. Robinson, Unit 2. This review will be documented and included in the CRDR project files.

HEDs resolved: 6 Total

12E7-1402	12E7-1419	12E7-11125
12E7-1407	12E7-5039	12E7-11126

6.2.27

Development and Implementation of a Human Factors Design Guide. - Complete by the end of 1987.

6.2.28

Computer Survey - Will be completed after the installation of ERFIS. This review will be documented and included in the CRDR Project files.

SECTION 7.0 CONCLUSION

Although the CRDR was specifically directed toward evaluating the control room (including the dedicated shutdown panels), CP&L recognized the interface between the CRDR and other related activities, such as the design of a Safety Parameter Display System (SPDS), implementation of Reg. Guide 1.97 requirements, development of Emergency Operating Procedures (EOPs), operator training and the implementation of Emergency Response Facilities (ERF). This report demonstrates the coordination of the CRDR with these related efforts. These items highlight the effort by CP&L to ensure a high quality interface between the operator, the procedures and plant equipment.

This Final Summary Report is submitted as evidence of CP&L's compliance to NUREG - 0737, Supplement 1 and NUREG - 0700.

APPENDIX A

HED SUMMARY

HBR HED SUMMARY

WORKSPACE

APPENDIX A-1

A1-1. **HED NO:** 1200-0101
HED TITLE: OPERATOR'S VIEW OF THE FIRE PANELS, AND THE AUX FW FLOW INDICATION IS OBSTRUCTED BY THE UNIT 1 CONTROL PANEL/FURNITURE ARRANGEMENT.

PRIORITY: 3
DISPOSITION: THE AUX FW FLOW INDICATIONS HAVE BEEN MOVED TO THE MAIN CONTROL BOARD. THE UNIT 1 CONTROL BOARD WAS REMOVED FROM THE CONTROL ROOM WHICH GIVES MORE ROOM FOR VIEWING, MOVEMENT AND INCREASED COMMUNICATION CAPABILITIES AROUND THE FIRE ALARM PANELS.

A1-2. **HED NO:** 12G3-0102
HED TITLE: OPERATORS HAVE DIFFICULTY UNDERSTANDING THE SHIFT FOREMAN'S INSTRUCTIONS ACROSS GLASS HALF-DOOR PARTITION.

PRIORITY: 3
DISPOSITION: AN IMPROVED COMMUNICATION LINK IS BEING PROVIDED WITH THE SHIFT FOREMAN'S OFFICE PROJECT.

A1-3. **HED NO:** 1200-0103
HED TITLE: THE CONTROL ROOM DESK AND CONSOLE CHAIRS ARE NOT ADEQUATELY CUSHIONED OR TOTALLY ADJUSTABLE.

PRIORITY: 3
DISPOSITION: NEW CHAIRS THAT ARE ADJUSTABLE AND WELL CUSHIONED HAVE BEEN PROVIDED IN THE CONTROL ROOM. THE DESK MEETS HUMAN FACTORS CRITERIA FOR SURFACE SPACE AND DESK HEIGHT.

A1-4. **HED NO:** 1200-0104

HED TITLE: CONTROL ROOM CARPETING DOES NOT LESSEN OPERATOR FATIGUE WHILE STANDING OR WALKING.

PRIORITY: 3

DISPOSITION: THE CARPETING HAS AS MUCH PADDING AS ACCEPTABLE TO MEET FIRE CODES. ADDING ADDITIONAL PADDING WOULD CAUSE THE CONTROL ROOM TO BECOME UNINSULATABLE WHICH IS AN UNACCEPTABLE FINANCIAL RISK TO THE COMPANY.

A1-5. **HED NO:** 1200-0105

HED TITLE: OPERATOR ACCESS IS OBSTRUCTED BY THE CROWDED CONTROL ROOM.

PRIORITY: 3

DISPOSITION: THE CONTROL ROOM WAS REARRANGED AS A RESULT OF A CONTROL ROOM UTILIZATION STUDY. MAJOR MODIFICATIONS TO THE CONTROL ROOM INCLUDE REMOVING THE UNIT 1 CONTROL BOARD, MOVING THE SHIFT FOREMAN OUT OF THE PRIMARY OPERATING AREA AND THE ADDITION OF ROOM DIVIDERS.

A1-6. **HED NO:** 12B1-0106

HED TITLE: METAL PLATES PRODUCE GLARE ON CONTROL BOARD.

PRIORITY: 5

DISPOSITION: THE CONTROL ROOM LIGHTING IMPROVEMENTS REDUCED THE MAJOR GLARE PROBLEMS. THE RE-PAINTING OF THE CONTROL BOARDS SHOULD REDUCE MORE GLARE BECAUSE A FLAT BEIGE COLOR PAINT WILL BE USED.

A1-7. **HED NO:** 12E2-0107

HED TITLE: DISTANCE BETWEEN NIS AND RELAY PANELS CAUSES READING DIFFICULTIES OF LOWER METERS ON THE NIS PANEL.

PRIORITY: 3

DISPOSITION: REDUNDANT INDICATION IS AVAILABLE ON THE MAIN CONTROL BOARD. INDICATIONS CAN BE READ IF THE OPERATOR STOOPS DOWN. THE LOWEST INDICATORS ARE 36 INCHES ABOVE THE FLOOR.

A1-8. **HED NO:** 12G1-0108

HED TITLE: DISTANCE BETWEEN COMPUTER PRINTER AND THE CLEARANCE DESK CAUSES DIFFICULTY IN RELOADING PRINTER PAPER.

PRIORITY: 3

DISPOSITION: PROBLEM WILL BE RESOLVED WITH THE ERFIS MODIFICATIONS. PRINTERS WILL BE ON A FREE STAND WITH OPEN AREAS UNDERNEATH IT.

A1-9. **HED NO:** 1200-0109

HED TITLE: CWDs AND DRAWINGS ARE NOT STORED IN SAME AREA, CAUSING DIFFICULTY IN SELECTING DRAWINGS.

PRIORITY: 5

DISPOSITION: A SUBSET OF LOGIC DRAWINGS ARE READILY AVAILABLE TO THE OPERATOR. CWDs, WHICH ARE VERY DETAILED WIRING DRAWINGS, ARE INTENTIONALLY STORED AWAY FROM THE OTHER DRAWINGS TO REDUCE CLUTTER.

A1-10. **HED NO:** 1200-0110

HED TITLE: THE DISTANCE BETWEEN THE CONTAINMENT FIRE PROTECTION SYSTEM PANEL AND THE OPPOSING WALL IS LESS THAN CRITERIA OF 50 INCHES: DISTANCE IS 47 INCHES.

PRIORITY: 5

DISPOSITION: ADEQUATE ROOM IS AVAILABLE TO VIEW THE ANNUNCIATORS. THE ONLY CONTROLS LOCATED ON THE PANEL ARE THE ANNUNCIATOR RESPONSE CONTROLS. THE OPERATORS HAVE NO PROBLEMS ACCESSING THESE CONTROLS.

A1-11. **HED NO:** 1200-0111

HED TITLE: THE DISTANCE BETWEEN THE CONTROL ROOM AUXILIARY ANNUNCIATOR PANEL AND OPPOSING EQUIPMENT (SRO's CHAIR AND DESK) IS LESS THAN CRITERIA OF 50 INCHES: DISTANCE IS 26 INCHES.

PRIORITY: 5

DISPOSITION: THE LIMITED SPACE AVAILABLE IN THE CONTROL ROOM DOES NOT ALLOW FOR A GREATER DISTANCE BETWEEN THE SRO's DESK AND THE PANEL. WITHIN THE CONTROL ROOM UTILIZATION STUDY THE CONTROL ROOM TRAFFIC PATTERNS FOR THIS AREA OF THE CONTROL ROOM WERE IMPROVED. THE ANNUNCIATOR CAN BE READ FROM THE SRO's DESK AND OPERATORS HAVE NO PROBLEMS ACCESSING THE ANNUNCIATOR RESPONSE CONTROLS.

A1-12. **HED NO:** 1200-0112

HED TITLE: DISTANCE BETWEEN THE LINE PANEL AND THE EDGE OF THE COMPUTER CONSOLE IS LESS THAN CRITERIA OF 50 INCHES: DISTANCE IS 35 INCHES.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS ACCESSING THE LINE PANEL. THERE ARE NO PROBLEMS MOVING UP AND DOWN THE PANEL. BECAUSE THERE ARE NO EMERGENCY OPERATIONS PERFORMED AT THIS PANEL, THE LIMITED SPACE IN THE CONTROL ROOM AND THE EXISTING CABLING PENETRATIONS PREVENT MOVING THE COMPUTER ANYWHERE ELSE, THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A1-13. **HED NO:** 1200-0113

HED TITLE: LABELING FOR TECHNICAL MANUALS USED BY OPERATORS ON SHIFT DUTY IS NOT ADEQUATE FOR QUICK SELECTION.

PRIORITY: 5

DISPOSITION: THE BOOKS HAVE BEEN ARRANGED IN NUMERICAL ORDER TO PROVIDE A CONTROL MECHANISM TO ENSURE UPDATED INFORMATION IS IN THE BINDERS. A REFERENCE LIST HAS BEEN PROVIDED WHICH INDEXES THE CONTENTS OF EACH BINDER.

HBR HED SUMMARY

ANTHROPOMETRICS

APPENDIX A-2

A2-1. **HED NO:** 12E6-1401
HED TITLE: DISPLAYS ARE LOCATED TOO LOW ON THE RMS PANEL.

PRIORITY: 3
DISPOSITION: UNDER NORMAL OPERATIONS DAILY LOGS ARE TAKEN OFF THESE METERS. THE DISPLAYS LOCATED BELOW 41 INCHES ARE 39.5 INCHES TO 10.75 INCHES ABOVE THE FLOOR.

THERE IS MINIMAL INTERFACE IN EMERGENCY OPERATIONS WITH THE MONITORS. THERE IS PLENTY OF ROOM TO STOOP DOWN IN FRONT OF THE PANEL. THEREFORE, THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-2. **HED NO:** 12E7-1402
HED TITLE: DISPLAYS ARE LOCATED TOO LOW ON THE CORE COOLING MONITOR PANEL.

PRIORITY: 5
DISPOSITION: THE DISPLAYS ARE BEING RELOCATED/INCORPORATED INTO THE PLASMA DISPLAY WITH THE POST ACCIDENT MONITORING PANEL PROJECT. THE CURRENT PROPOSED DESIGN IS SUCH THAT DISPLAYS WILL NOT BE LOCATED BELOW 34 INCHES ON THE REARRANGED PANEL WITH THE EXCEPTION OF TWO RECORDERS (WHICH WILL BE LOCATED 24 INCHES ABOVE THE FLOOR).. THESE RECORDERS WILL BE USED FOR HISTORICAL TRENDING PURPOSES ONLY.

A2-3. **HED NO:** 12B1-1405
HED TITLE: CONTROLS ON THE MAIN CONTROL PANEL ARE LOCATED OUT-OF-REACH OF OPERATORS.

PRIORITY: 5
DISPOSITION: CONTROLS ARE PURPOSELY LOCATED ON THE VERTICAL SECTION TO DECREASE THE PROBABILITY OF ACCIDENTAL ACTIVATION. THE CONTROLS ARE 1.42 INCHES BEYOND THE 5TH PERCENTILE FEMALE FUNCTIONAL REACH REQUIREMENTS AND ARE WELL WITHIN THE EXTENDED FUNCTIONAL REACH.

A2-4. **HED NO:** 12E6-1406
HED TITLE: CONTROLS ARE LOCATED BELOW 34 INCHES ABOVE THE FLOOR ON THE RMS PANEL.

PRIORITY: 3
DISPOSITION: THE ONLY CONTROLS THAT ARE LOCATED TOO LOW ON THE PANEL THAT THE OPERATORS INTERFACE WITH IS THE SCALE MULTIPLIER AND THE RANGE CONTROLS, WHICH ARE USED DURING EMERGENCY OPERATIONS. THESE CONTROLS ARE LOCATED APPROXIMATELY 13.5 INCHES ABOVE THE FLOOR. THE OTHER CONTROLS ARE USED FOR SURVEILLANCE/MAINTENANCE FUNCTIONS ONLY.

THE OPERATOR HAS PLENTY OF ROOM TO STOOP DOWN IN FRONT OF THE PANEL. THEREFORE, THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-5. **HED NO:** 12E7-1407
HED TITLE: CONTROLS ARE LOCATED TOO LOW ON CORE COOLING MONITOR PANEL.

PRIORITY: 3
DISPOSITION: THE CONTROLS ARE BEING RELOCATED OR REPLACED WITHIN THE POST ACCIDENT MONITORING PANEL PROJECT. THE CURRENT PROPOSED DESIGN IS SUCH THAT THE LOWEST CONTROL ON THE MODIFIED PANEL WILL BE LOCATED HIGHER THAN 34 INCHES ABOVE THE FLOOR.

A2-6. **HED NO:** 12E5-1408

HED TITLE: CONTROLS AND DISPLAYS LOCATED ON THE LINE PANEL ARE LOCATED TOO LOW.

PRIORITY: 5

DISPOSITION: THE LOWEST CONTROL IS LOCATED 22 3/4 INCHES ABOVE THE FLOOR. THE OTHERS ARE LOCATED 31 1/2 INCHES ABOVE THE FLOOR. BECAUSE THERE ARE NO EMERGENCY OPERATIONS PERFORMED AT THIS PANEL AND THE MAJORITY OF THE CONTROLS ON THE PANEL ARE NOT USED BY THE OPERATORS, THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-7. **HED NO:** 12E0-1409

HED TITLE: CONTROLS AND ASSOCIATED INDICATOR LIGHTS ON THE TURBINE STARTUP PANEL ARE LOCATED TOO HIGH ON THE VERTICAL PANEL.

PRIORITY: 3

DISPOSITION: THE CONTROLS ARE LOCATED 73 TO 82 INCHES ABOVE THE FLOOR. THE INDICATOR LIGHTS ARE LOCATED 81 INCHES ABOVE THE FLOOR. THERE IS NO ROOM TO RELOCATE THE CONTROLS AND ASSOCIATED INDICATOR LIGHTS.

CONTROLS ARE USED FOR THE FUNCTION RESTORATION PROCEDURES WITHIN EMERGENCY OPERATIONS BUT IS NOT CRITICAL IN TERMS OF TIME FRAME.

A STOOL IS AVAILABLE IN THE CONTROL ROOM FOR THE SHORTER OPERATORS WHO HAVE TROUBLE REACHING THE CONTROLS.

A2-8. HED NO: 12E5-1410

HED TITLE: CONTROLS AND DISPLAYS ON THE LINE PANEL ARE LOCATED TOO HIGH ON VERTICAL PANELS.

PRIORITY: 5

DISPOSITION: THE CONTROLS AND DISPLAYS ARE LOCATED 73 INCHES AND 75 INCHES ABOVE THE FLOOR.

THESE CONTROLS ARE ASSOCIATED WITH SWITCHYARD EQUIPMENT AND HAVE NO SAFETY CONSEQUENCE IF OPERATED INCORRECTLY. THE CONTROLS ARE NOT USED DURING EMERGENCY OPERATIONS. RELOCATION OF THE CONTROLS WOULD NOT BE PRACTICAL.

A2-9. HED NO: 12E2-1411

HED TITLE: CONTROLS AND DISPLAYS ON THE NIS PANEL ARE LOCATED TOO HIGH ON VERTICAL PANELS.

PRIORITY: 3

DISPOSITION: THE CONTROLS ARE LOCATED 78 INCHES TO 83 INCHES ABOVE THE FLOOR. THE METERS ARE LOCATED 74 INCHES ABOVE THE FLOOR. THE INDICATOR LIGHTS ARE LOCATED 81 TO 86 INCHES ABOVE THE FLOOR.

THE CONTROLS ARE USED TO TAKE A CHANNEL OUT OF SERVICE. IF AN OPERATOR TOOK THE WRONG CHANNEL OUT OF SERVICE, HE WOULD HAVE TO IGNORE ANNUNCIATORS TO ADVERSELY EFFECT PLANT OPERATIONS.

A2-10. HED NO: 12E1-1412

HED TITLE: CONTROLS AND DISPLAYS ON THE INCORE MONITORING PANEL ARE LOCATED TOO HIGH ON THE VERTICAL PANELS.

PRIORITY: 5

DISPOSITION: THE CONTROLS ARE LOCATED 74 TO 78 INCHES ABOVE THE FLOOR. THE DISPLAYS (INDICATOR LIGHTS AND COUNTERS) ARE LOCATED 71 TO 83 INCHES ABOVE THE FLOOR.

THE CONTROLS ARE NOT USED IN EMERGENCY OPERATIONS, THEY ARE USED FOR SURVEILLANCE PURPOSES ONLY, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-11. HED NO: 12E6-1413

HED TITLE: CONTROLS AND DISPLAYS ON THE RADIATION MONITORING PANEL ARE LOCATED TOO HIGH ON THE VERTICAL PANELS.

PRIORITY: 5

DISPOSITION: THE CONTROLS ARE LOCATED 76 INCHES TO 79 INCHES ABOVE THE FLOOR. THE DISPLAYS ARE LOCATED 71 TO 81 INCHES ABOVE THE FLOOR.

THERE IS NO SAFETY CONSEQUENCE IF THE CONTROLS ARE OPERATED INCORRECTLY. THE CONTROLS ARE NOT USED DURING EMERGENCY OPERATIONS, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-12. HED NO: 12E1-1414

HED TITLE: CONTROLS AND DISPLAYS ON THE APDMS PANEL ARE LOCATED TOO HIGH ON VERTICAL PANELS.

PRIORITY: 5

DISPOSITION: THE CONTROL IS LOCATED 78 INCHES ABOVE THE FLOOR AND THE DISPLAYS ARE LOCATED 78 INCHES ABOVE THE FLOOR.

THERE IS NO SAFETY CONSEQUENCE IF THE CONTROLS ARE OPERATED INCORRECTLY. THE CONTROLS ARE NOT USED DURING EMERGENCY OPERATIONS, THEY ARE USED FOR SURVEILLANCE PURPOSES ONLY, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-13. HED NO: 1200-1415

HED TITLE: THE TOP ROW OF METERS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET THE CRITERIA FOR THE 5TH PERCENTILE FEMALE'S VIEWING ANGLE OF 45 DEGREES.

PRIORITY: 3

DISPOSITION: MAKING ADJUSTMENTS TO THE METERS HAS BEEN DETERMINED TO BE IMPRACTICAL. THE OPERATORS HAVE ANNUNCIATORS TO PROVIDE FEEDBACK ON VARIABLES THAT REQUIRE IMMEDIATE RESPONSE.

A2-14. **HED NO:** 12F2-1416

HED TITLE: DISPLAYS ON THE GENERATOR PANEL ARE LOCATED TOO HIGH AND TOO LOW ON THE VERTICAL PANEL.

PRIORITY: 5

DISPOSITION: DISPLAYS ARE RELAYS AND ARE 72 TO 83 INCHES ABOVE THE FLOOR. THE RELAYS LOCATED TOO LOW ARE LOCATED 24 TO 38 INCHES ABOVE THE FLOOR.

OPERATORS HAVE NO INTERFACE WITH THE RELAYS LOCATED TOO HIGH OR TOO LOW, THEREFORE, THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-15. **HED NO:** 12E0-1417

HED TITLE: CONTROLS AND DISPLAYS ON THE TURBINE SUPERVISORY PANEL ARE LOCATED TOO LOW ON THE VERTICAL PANEL.

PRIORITY: 5

DISPOSITION: CONTROLS ARE LOCATED 17 TO 35 INCHES ABOVE THE FLOOR. DISPLAYS ARE LOCATED 19 TO 33 INCHES ABOVE THE FLOOR. THERE IS NO ROOM TO RELOCATE THE CONTROLS AND DISPLAYS.

THE CONTROLS AND DISPLAYS ARE NOT USED DURING EMERGENCY OPERATIONS, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-16. **HED NO:** 12E1-1418

HED TITLE: CONTROLS AND DISPLAYS LOCATED ON THE INCORE MONITORING PANEL ARE LOCATED TOO LOW ON THE VERTICAL PANEL.

PRIORITY: 5

DISPOSITION: CONTROLS ARE LOCATED 16 TO 20 INCHES ABOVE THE FLOOR. DISPLAYS ARE LOCATED 31 TO 39 INCHES ABOVE THE FLOOR.

THE CONTROLS AND DISPLAYS ARE NOT USED DURING EMERGENCY OPERATIONS, THEY ARE USED FOR SURVEILLANCE FUNCTIONS ONLY, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-17. HED NO: 12E7-1419

HED TITLE: CONTROLS AND DISPLAYS ON THE CORE COOLING MONITOR PANEL ARE LOCATED TOO HIGH ON THE VERTICAL PANELS.

PRIORITY: 3

DISPOSITION: THE POST ACCIDENT MONITORING PANEL PROJECT WILL LOCATE THE CONTROLS AND DISPLAYS WITHIN THE 70 INCH CRITERIA.

A2-18. HED NO: 12E3-1420

HED TITLE: CONTROLS AND DISPLAYS (INDICATOR LIGHTS) ON THE APDMS PANEL ARE LOCATED TOO LOW ON THE VERTICAL PANELS.

PRIORITY: 5

DISPOSITION: CONTROLS ARE LOCATED 30 TO 34 INCHES ABOVE THE FLOOR. DISPLAYS ARE LOCATED 29 TO 38 INCHES ABOVE THE FLOOR.

THE CONTROLS AND DISPLAYS ARE NOT USED DURING EMERGENCY OPERATIONS, THEY ARE USED FOR SURVEILLANCE FUNCTIONS ONLY. THEREFORE, THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-19. HED NO: 12E2-1421

HED TITLE: DISPLAYS ON THE NIS PANEL ARE LOCATED TOO LOW ON THE VERTICAL PANELS.

PRIORITY: 5

DISPOSITION: THE DISPLAYS ARE FUSES, POWER ON, AND CHANNEL TEST INDICATORS. THEY ARE LOCATED 36 TO 47 INCHES ABOVE THE FLOOR.

THESE INDICATORS ARE EASILY VIEWABLE IN THEIR CURRENT LOCATIONS, AND THE CONTROLS AND DISPLAYS ARE NOT USED DURING EMERGENCY OPERATIONS. THEREFORE, THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-20. **HED NO:** 12E8-1422
HED TITLE: CONTROLS AND DISPLAYS ON THE CONTAINMENT FIRE PROTECTION PANEL ARE LOCATED TOO LOW AND TOO HIGH ON THE VERTICAL PANELS.

PRIORITY: 5
DISPOSITION: THE ANNUNCIATOR LIGHT BOX IS LOCATED 80 INCHES ABOVE THE FLOOR. THE CONTROLS ARE LOCATED 31 TO 35 INCHES ABOVE THE FLOOR AND THE DISPLAYS (INDICATOR LIGHTS) ARE LOCATED 38 INCHES ABOVE THE FLOOR.

BECAUSE THE DEVIATION FROM CRITERIA IS MINIMAL, THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A2-21. **HED NO:** 12DS-1423
HED TITLE: A CONTROL LOCATED ON THE (DEDICATED SHUTDOWN) 4160 ROOM PANEL IS BELOW 34 INCHES.

PRIORITY: 5
DISPOSITION: THERE IS NO ROOM TO MOVE THE CONTROL TO A HIGHER LOCATION. BECAUSE THERE IS SUFFICIENT ROOM DIRECTLY IN FRONT OF THE PANEL FOR THE OPERATORS TO BEND DOWN THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-22. **HED NO:** 12DS-1424
HED TITLE: RELAY DISPLAYS LOCATED ON THE (DEDICATED SHUTDOWN) 4160 ROOM PANEL ARE LOCATED BELOW 41 INCHES.

PRIORITY: 5
DISPOSITION: THERE IS NO ROOM TO MOVE THE RELAYS TO A HIGHER LOCATION. BECAUSE THERE IS SUFFICIENT ROOM DIRECTLY IN FRONT OF THE PANEL FOR THE OPERATORS TO BEND DOWN THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A2-23. **HED NO:** 12DS-1426

HED TITLE: A CONTROL AND DISPLAY LOCATED ON THE (DEDICATED SHUTDOWN) CHARGING PUMP ROOM PANEL ARE LOCATED ABOVE 70 INCHES FROM THE FLOOR.

PRIORITY: 5

DISPOSITION: THERE IS NO ROOM TO MOVE THE CONTROL AND METER TO A LOWER LOCATION. THE CONTROL IS LOCATED 71 INCHES ABOVE THE FLOOR, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

HBR HED SUMMARY

EMERGENCY EQUIPMENT

APPENDIX A-3

A3-1. **HED NO:** 1200-0502
HED TITLE: OPERATOR COMMUNICATION MAY BE IMPAIRED BY FACE MASKS.

PRIORITY: 3
DISPOSITION: OPERATORS ARE WELL PRACTICED THROUGH FIRE BRIGADE TRAINING THAT COMMUNICATION IS DIFFICULT WHILE WEARING SCOTT AIR PACKS. THEREFORE THE HEDAT TEAM DETERMINED NO ACTION IS REQUIRED.

A3-2. **HED NO:** 1200-0503
HED TITLE: FIRE EXTINGUISHER LOCATIONS NOT APPARENT AND ARE NOT ADEQUATELY LABELED.

PRIORITY: 2
DISPOSITION: FIRE FIGHTING EQUIPMENT HAS BEEN PROPERLY RELOCATED AND IS ACCESSIBLE AT LOCATIONS WHERE FIRES ARE MOST PROBABLE. FIRE EXTINGUISHERS ARE IDENTIFIED BY TYPE (A, B, C, AND ETC.). TYPES OF FIRES AND EXTINGUISHERS TO BE USED ARE COVERED IN TRAINING.

A3-3. **HED NO:** 1200-0504
HED TITLE: SUPPLY OF EMERGENCY BREATHING EQUIPMENT MAY NOT BE ADEQUATE FOR CONTROL ROOM PERSONNEL.

PRIORITY: 5
DISPOSITION: AN ADEQUATE SUPPLY OF BREATHING EQUIPMENT HAS BEEN PROVIDED IN THE CONTROL ROOM.

A3-4. **HED NO:** 1200-0506

HED TITLE: PROTECTIVE CLOTHING IN ALL SIZES MAY NOT BE AVAILABLE FOR OPERATOR'S USE IN THE CONTROL ROOM.

PRIORITY: 5

DISPOSITION: AN ADEQUATE SUPPLY OF PROTECTIVE CLOTHING IS AVAILABLE IN THE CONTROL ROOM.

HBR HED SUMMARY

ILLUMINATION

APPENDIX A-4

A4-1. **HED NO:** 1200-0002
HED TITLE: AC EMERGENCY LIGHTING IS INADEQUATE TO DISCERN COLORS AND NO MANUAL SWITCH OVER CONTROL IS AVAILABLE.

PRIORITY: 1
DISPOSITION: EMERGENCY LIGHTING WILL BE UPGRADED WITH THE EMERGENCY LIGHTING IN UNIT 2 CONTROL ROOM PROJECT.

A4-2. **HED NO:** 1200-0006
HED TITLE: SHIFT FOREMAN'S DESK AREA IS TOO BRIGHT RELATIVE TO REDUCED LIGHTING ATMOSPHERE OF THE CONTROL ROOM.

PRIORITY: 5
DISPOSITION: ILLUMINATION LEVELS WERE MEASURED AT 56 FOOT CANDLES IN THE FOREMAN'S OFFICE WHICH IS WITHIN CRITERIA.

A4-3. **HED NO:** 1200-0009
HED TITLE: BLUE LIGHTS IN BISTABLE STATUS PANELS ARE DIFFICULT TO SEE WHEN ILLUMINATED UNDER NORMAL LIGHTING.

PRIORITY: 3
DISPOSITION: THE LIGHTS ARE USED FOR STATUS INDICATION ONLY. THESE LIGHTS DO NOT SERVE AS THE PRIMARY INDICATION, THERE IS REDUNDANT INDICATION FOR EACH LIGHT ON THE MAIN CONTROL BOARD.

A4-4. **HED NO:** 1200-0010
HED TITLE: GLARE INTERFERES WITH THE READABILITY OF DISPLAYS.

PRIORITY: 3
DISPOSITION: CONTROL ROOM LIGHTING IMPROVEMENTS HAVE REDUCED THE MAJOR GLARE PROBLEMS WITH THE ADDITION OF DIFFUSUER PANELS.

A4-5. **HED NO:** 12DS-0011
HED TITLE: EMERGENCY LIGHTING LOCATED OVER THE (DEDICATED SHUTDOWN) 4160 ROOM PANEL DOES NOT WORK.

PRIORITY: 3
DISPOSITION: A WORK REQUEST HAS BEEN SUBMITTED TO REPAIR EMERGENCY LIGHTING.

A4-6. **HED NO:** 1200-0014
HED TITLE: DC EMERGENCY LIGHTING NOT ADEQUATE IN THE CONTROL ROOM.

PRIORITY: 1
DISPOSITION: THE EMERGENCY LIGHTING WILL BE FURTHER EVALUATED AND ADJUSTMENTS MADE, IF REQUIRED, BY THE EMERGENCY LIGHTING IN THE UNIT 2 CONTROL ROOM PROJECT.

A4-7. **HED NO:** 1200-0015
HED TITLE: LIGHT LEVELS DO NOT MEET CRITERIA FOR SOME AREAS IN THE CONTROL ROOM.

PRIORITY: 5
DISPOSITION: CRITERIA IS 20 FOOTCANDLES. THE AREA AROUND THE INCORE PANEL AND THE CORE COOLING MONITOR IS 13 TO 16 FOOTCANDLES. BECAUSE THE OPERATORS HAVE NO PROBLEMS WITH THE LIGHTING IN THIS AREA AND THE CONCERN THAT ANY HIGHER LEVEL WOULD CREATE MORE GLARE PROBLEMS, THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A4-8. **HED NO:** 1200-0016

HED TITLE: LIGHT LEVELS DO NOT MEET CRITERIA FOR ONE AREA IN THE CONTROL ROOM.

PRIORITY: 5

DISPOSITION: CRITERIA IS 20 FOOTCANDLES. THE AREA AROUND THE C PANEL IS 16 FOOTCANDLES ON THE BENCHBOARD AND 19 FOOTCANDLES FOR THE VERTICAL PANELS. BECAUSE THE OPERATORS HAVE NO PROBLEMS WITH THE LIGHTING IN THIS AREA AND THE CONCERN THAT ANY HIGHER LEVEL WOULD CREATE MORE GLARE PROBLEMS, THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A4-9. **HED NO:** 1200-0018

HED TITLE: EMERGENCY LIGHTING WAS INADEQUATE DURING A LOSS OF OFFSITE POWER EVENT.

PRIORITY: 1

DISPOSITION: EMERGENCY LIGHTING WILL BE UPGRADED WITHIN THE UNIT 2 CONTROL ROOM EMERGENCY LIGHTING PROJECT.

HBR HED SUMMARY

AMBIENT NOISE

APPENDIX A-5

A5-1. **HED NO:** 1200-0001
HED TITLE: OPERATORS REPORT THAT THE CONTROL ROOM NOISE LEVEL IS TOO HIGH ON DAY SHIFT.

PRIORITY: 3
DISPOSITION: THE AMBIENT NOISE LEVELS MEASURED IN THE CONTROL ROOM DURING THE DAY SHIFT RANGED FROM 59 TO 69 dB (A). BECAUSE THE AMOUNT OF DEVIATION FROM CRITERIA IS MINOR, AND BECAUSE THE OPERATORS HAVE THE OPTION OF CLEARING THE CONTROL ROOM OF UNNECESSARY PERSONNEL ANY TIME NOISE LEVELS ARE HIGH, THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A5-2. **HED NO:** 1200-0017
HED TITLE: THE AMBIENT NOISE LEVELS AT THE SRO's DESK AND THE CONTROL OPERATOR'S DESK EXCEED CRITERIA OF 65 dB (A).

PRIORITY: 3
DISPOSITION: THE AMBIENT NOISE LEVELS AT THE SRO's DESK IS 68 dB (A) AND 69 dB (A) AT THE CONTROL OPERATOR'S DESK. BECAUSE THE AMOUNT OF DEVIATION FROM CRITERIA IS MINOR, AND BECAUSE THE OPERATORS HAVE THE OPTION OF CLEARING THE CONTROL ROOM ANY TIME NOISE LEVELS ARE HIGH, THE HEDAT DETERMINED NO ACTION IS REQUIRED.

HBR HED SUMMARY

HEATING, VENTILATION, AND AIR CONDITIONING

APPENDIX A-6

A6-1. **HED NO:** 1200-0008
HED TITLE: TEMPERATURE AND AIR VELOCITY ARE NOT CONSTANT IN ALL AREAS OF THE CONTROL ROOM.

PRIORITY: 3
DISPOSITION: WILL BE CORRECTED UNDER THE CONTROL ROOM HVAC PROJECT.

HBR HED SUMMARY

MAINTAINABILITY

APPENDIX A-7

A7-1. **HED NO:** 12G1-1701
HED TITLE: THE PROGRAMMER'S KEY AND THE OPERATOR'S KEY FOR THE KEY-LOCKED-OUT FUNCIONS ON THE COMPUTER IS ON THE SAME KEY RING, THEREFORE THERE IS A POTENTIAL FOR THE KEY TO BE UNAVAILABLE TO OPERATORS.

PRIORITY: 3
DISPOSITION: PROBLEM WILL BE RESOLVED WITH THE ERFIS PROJECT. THE PROGRAMMERS AND OPERATORS WILL HAVE THEIR OWN SET OF KEYS TO THE KEY-LOCKED-OUT FUNCTIONS.

A7-2. **HED NO:** 1200-1702
HED TITLE: INDICATOR LIGHTS AND LEGEND INDICATOR LIGHTS HAVE NO BULB TEST CAPABILITY.

PRIORITY: 3
DISPOSITION: IT HAS BEEN DETERMINED THAT THERE ARE NO SINGLE BULB INDICATOR LIGHTS USED IN THE CONTROL ROOM THAT INDICATE A CHANGE IN STATUS.

THE "PUSH TO TEST" FEATURE FOR THE CONTROL ROOM INDICATOR LIGHTS HAS BEEN DETERMINED TO BE COST PROHIBITIVE.

A7-3. **HED NO:** 1200-1703
HED TITLE: TOOLS FOR BULB AND FUSE REPLACEMENT ARE NOT AVAILABLE IN THE CONTROL ROOM.

PRIORITY: 3
DISPOSITION: THE OPERATORS ARE INSTRUCTED TO CALL MAINTENANCE FOR ANY BULB REPLACEMENT THAT REQUIRE BULB PULLERS.

A7-4. **HED NO:** 12E5-1704
HED TITLE: INDICATOR LIGHT BULB FAILURE IS NOT APPARENT FOR SINGLE INDICATOR LIGHTS ON THE LINE PANEL.

PRIORITY: 3
DISPOSITION: THE OPERATORS HAVE MINIMAL INTERFACE WITH THESE INDICATOR LIGHTS. THE FUNCTIONS ASSOCIATED WITH THESE LIGHTS ARE CONTROLLED BY THE DISPATCHER. THESE LIGHTS AND CONTROLS ON THIS PANEL ARE NOT USED IN EMERGENCY PROCEDURES, THEREFORE THE HEDAT DETERMINED NO ACTION REQUIRED.

A7-5. **HED NO:** 12E6-1705
HED TITLE: SINGLE BULB INDICATOR LIGHTS HAVE NO LAMP TEST CAPABILITY ON RMS PANEL.

PRIORITY: 3
DISPOSITION: ALL BUT TWO LIGHTS WILL BE REMOVED DURING THE UNUSED CONTROLS REMOVAL PROJECT. THE TWO LIGHTS REMAINING (SAFE←GUARDS RELAY V-1 AND V-2), ARE USED FOR SURVEILLANCE PURPOSES ONLY, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A7-6. **HED NO:** 12B1-1706
HED TITLE: NO BULB-TEST FUNCTION FOR INCREASING/DECREASING ROD SPEED INDICATION.

PRIORITY: 5
DISPOSITION: THE ROD SPEED INDICATOR HAS FOUR BULBS/DUAL BULB INDICATION, THEREFORE NO ACTION IS REQUIRED.

A7-7. **HED NO:** 12E0-1707
HED TITLE: SINGLE BULB INDICATOR LIGHTS ON THE TURBINE SUPERVISORY PANEL HAVE NO BULB TEST FUNCTION.

PRIORITY: 2
DISPOSITION: THE INDICATOR LIGHTS ARE POWER ON INDICATOR LIGHTS AND ARE ALWAYS ON, THEREFORE THE OPERATOR KNOWS THAT THE BULB IS BURNT OUT IF THE LIGHT IS NOT LIT.

A7-8.	**HED NO:**	12E1-1708	
	HED TITLE:	STRIP CHART RECORDER PENS LOCATED ON THE INCORE PANEL BLEED ON PAPER.	
	PRIORITY:	5	
	DISPOSITION:	ENGINEERING PROVIDES REGULAR MAINTENANCE ON RECORDERS AND OPERATORS WRITE WORK REQUESTS TO REPAIR RECORDERS ON AN AS NEEDED BASIS.	

A7-9. **HED NO:** 12E1-1709

HED TITLE: DECIMAL POINT IS NOT ILLUMINATED ON NIXIE TUBE PROJECTION DISPLAY ON THE INCORE MONITORING PANEL.

PRIORITY: 5

DISPOSITION: THE DISPLAY IS NOT USED IN EMERGENCY OPERATIONS, IT IS USED FOR SURVEILLANCE FUNCTIONS ONLY. A WORK REQUEST HAS BEEN SUBMITTED TO REPAIR THE NON-LIT DECIMAL POINT.

A7-10. **HED NO:** 12E1-1710

HED TITLE: ONE NUMERAL IS NOT ILLUMINATED ON NIXIE TUBE PROJECTION DISPLAY ON THE INCORE MONITORING PANEL.

PRIORITY: 5

DISPOSITION: THE DISPLAY IS NOT USED IN EMERGENCY OPERATIONS, IT IS USED FOR SURVEILLANCE FUNCTIONS ONLY. A WORK REQUEST HAS BEEN SUBMITTED TO REPAIR THE NON-LIT NUMERAL.

A7-11. **HED NO:** 12G1-1711

HED TITLE: COMPUTER SYSTEM PROJECTION DISPLAY BRIGHTNESS VARIES DUE TO BURNT-OUT BULBS.

PRIORITY: 3

DISPOSITION: THE PROJECTION DISPLAY IS BEING REPLACED WITH THE ERFIS PROJECT.

A7-12. HED NO: 12C1-1712

HED TITLE: LEGEND PUSHBUTTONS ON HAGAN PROCESS CONTROLLERS ARE DIFFICULT TO REMOVE AND MAINTAIN AND HAVE NO BULB TEST CAPABILITY.

PRIORITY: 5

DISPOSITION: LEGEND PUSHBUTTONS ARE MAINTAINED PER WORK REQUEST WRITTEN BY OPERATORS WHEN NEEDED.

A7-13. HED NO: 1200-1713

HED TITLE: SUPPLY OF EXPENDABLE ITEMS IS NOT ADEQUATE IN THE CONTROL ROOM.

PRIORITY: 5

DISPOSITION: A CLERK IS ASSIGNED TO MAINTAIN AN ADEQUATE SUPPLY OF EXPENDABLE ITEMS IN THE CONTROL ROOM.

A7-14. HED NO: 1200-1714

HED TITLE: LADDER USED TO CHANGE BULBS IN UPPER PORTION OF CONTROL BOARD PANELS IS NOT ADEQUATE.

PRIORITY: 4

DISPOSITION: A NEW LADDER HAS BEEN PROVIDED IN THE CONTROL ROOM.

A7-15. HED NO: 1200-1716

HED TITLE: PROCEDURE FOR PERIODIC OPERABILITY TESTING OF COMMUNICATIONS SYSTEMS IS NOT AVAILABLE IN THE CONTROL ROOM.

PRIORITY: 3

DISPOSITION: A CHECKLIST HAS BEEN PROVIDED FOR PERIODIC TESTING.

A7-16. **HED NO:** 12E1-1717
HED TITLE: INDICATOR LIGHTS HAVE ONE BULB AND NO TEST CAPABILITY ON THE INCORE MONITOR PANEL.

PRIORITY: 3
DISPOSITION: THE INDICATOR LIGHTS ARE NOT USED IN EMERGENCY OPERATIONS, THEY ARE USED IN SURVEILLANCE FUNCTIONS ONLY.

A7-17. **HED NO:** 12E8-1719
HED TITLE: INDICATOR LIGHTS HAVE ONE BULB AND NO BULB TEST CAPABILITY ON THE CONTAINMENT FIRE PROTECTION PANEL.

PRIORITY: 5
DISPOSITION: THE LIGHTS ARE LARGE AMBER LIGHTS WHICH ARE ALWAYS ON, SO THE OPERATOR KNOWS WHEN A BULB IS BURNED OUT, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A7-18. **HED NO:** 1200-1720
HED TITLE: LEGEND PUSHBUTTONS ON HAGAN CONTROLLERS ARE NOT KEYED TO PREVENT LENS REPLACEMENT ERRORS.

PRIORITY: 3
DISPOSITION: AN ADMINISTRATIVE PROCEDURE WILL BE PUT IN PLACE THAT INSTRUCTS OPERATORS TO CHANGE ONE BULB AT A TIME.

A7-19. **HED NO:** 12E1-1721
HED TITLE: INCORRECT BULBS HAVE BEEN PLACED IN THE INDICATOR LIGHT SOCKETS ON THE INCORE MONITORING PANEL CAUSING THE LIGHTS TO APPEAR OFF WHEN THEY ARE ON.

PRIORITY: 5
DISPOSITION: LIGHTS HAVE BEEN CORRECTED.

HBR HED SUMMARY

COMMUNICATIONS

APPENDIX A-8

A8-1. **HED NO:** 1200-0202

HED TITLE: PA SYSTEM MAY BE INADEQUATE FOR INPLANT COMMUNICATION. OPERATORS REPORT THAT THE SYSTEM HAS BUZZING AND BLEEDOVER ON LINES, SOME LINES FADE OUT, AND CHANNEL SELECTOR SWITCHES DO NOT ALWAYS WORK.

PRIORITY: 3

DISPOSITION: THE PA SYSTEM HAS BEEN UPGRADED AND A PROCEDURE HAS BEEN PUT IN PLACE THAT RESERVES LINE ONE FOR OPERATORS.

A8-2. **HED NO:** 1200-0203

HED TITLE: WALKIE-TALKIE PORTABLE RADIO SYSTEM MAY BE INADEQUATE. OPERATORS REPORT THAT MORE REPEATERS ARE NEEDED IN SOME AREAS IN THE PLANT AND THAT HEADSETS WITH VOLUME ADJUSTMENT SPEAKERS ARE NEEDED.

PRIORITY: 3

DISPOSITION: THE RADIO SYSTEM REPLACEMENT PROJECT WILL PROVIDE PORTABLE RADIOS WHICH SHOULD ENHANCE THE OPERATORS COMMUNICATIONS CAPABILITIES.

A8-3. **HED NO:** 1200-0206

HED TITLE: THE CONVENTIONAL TELEPHONE SYSTEM OCCASIONALLY LOCKS UP AND OPERATORS LOSE ITS USE IN THE CONTROL ROOM.

PRIORITY: 3

DISPOSITION: PHONE LOCK UP IS A PROBLEM WITH THE BELL PHONE SYSTEM. A REPAIR PERSON IS READILY AVAILABLE TO REPAIR THE PHONES. A SEPARATE REDUNDANT TELEPHONE SYSTEM HAS BEEN PROVIDED FOR EMERGENCY COMMUNICATIONS.

A8-4. **HED NO:** 1200-0208

HED TITLE: SOUND-POWERED TELEPHONE SYSTEM IS UNRELIABLE DUE TO POOR MAINTENANCE ON THE SYSTEM.

PRIORITY: 3

DISPOSITION: WORK REQUESTS ARE SUBMITTED TO REPAIR THE PROBLEMS WITH THE SOUND-POWERED TELEPHONE SYSTEM WHEN NECESSARY. SOUND-POWERED TELEPHONES ARE BACKED UP BY THE EXISTING TWO-WAY RADIO SYSTEM. THE RADIO SYSTEM REPLACEMENT PROJECT SHOULD ENHANCE THIS RADIO BACK UP CAPABILITY.

A8-5. **HED NO:** 1200-0210

HED TITLE: SUPPLY OF REPLACEMENT BATTERIES FOR WALKIE-TALKIES IS INADEQUATE IN THE CONTROL ROOM.

PRIORITY: 3

DISPOSITION: THE RADIO SYSTEM REPLACEMENT PROJECT WILL PROVIDE REPLACEMENT BATTERIES FOR THE WALKIE-TALKIES. A CHECKLIST PERIODICALLY VERIFIES RADIO OPERABILITY. RADIOS AND BATTERIES ARE REPAIRED/REPLACED WHEN FOUND DEFECTIVE.

HBR HED SUMMARY

ANNUNCIATOR SYSTEM

APPENDIX A-9

A9-1. **HED NO:** 1200-2101
HED TITLE: ANNUNCIATOR TILE ENGRAVINGS HAVE VARIED FONT HEIGHTS AND STYLES ON THE MAIN CONTOL BOARD.

PRIORITY: 3
DISPOSITION: ANNUNCIATOR TILES WILL BE RE-ENGRAVED WITHIN THE ANNUNCIATOR PROJECT.

A9-2. **HED NO:** 12E4-2104
HED TITLE: FIRE ALARM PANEL ANNUNCIATOR TILE MESSAGES ARE TOO CROWDED AND STROKE WIDTHS OF LETTERS ARE TOO NARROW.

PRIORITY: 3
DISPOSITION: ANNUNCIATOR TILES WILL BE CORRECTED WITHIN THE ANNUNCIATOR PROJECT.

A9-3. **HED NO:** 12E4-2107
HED TITLE: UPPER-CASE, BLOCK STYLE LETTERING NOT USED ON ANNUNCIATOR TILE MESSAGES ON FIRE ALARM PANELS.

PRIORITY: 3
DISPOSITION: ANNUNCIATOR TILES WILL BE CORRECTED WITHIN THE ANNUNCIATOR PROJECT.

A9-4. **HED NO:** 12E4-2108
HED TITLE: ANNUNCIATOR TILE LEGENDS NOT ENGRAVED, AND NOT CENTERED IN TILE FRAMES ON FIRE ALARM PANEL A.

PRIORITY: 3
DISPOSITION: ANNUNCIATOR TILES WILL BE CORRECTED WITHIN THE ANNUNCIATOR PROJECT.

A9-5. **HED NO:** 1200-2109

HED TITLE: MECHANISM FOR DETECTION OF FLASHER FAILURE IS NOT AVAILABLE WITHIN THE ANNUNCIATOR SYSTEM.

PRIORITY:

DISPOSITION: FLASHER FAILURE CAN BE DETECTED WITH THE TESTING OF THE ANNUNCIATORS. ANNUNCIATORS ARE TESTED ONCE PER SHIFT.

A9-6. **HED NO:** 1200-2110

HED TITLE: TWO ANNUNCIATOR TILES ARE NOT FUNCTIONALLY GROUPED WITHIN ANNUNCIATOR PANELS.

PRIORITY: 3

DISPOSITION: THE ANNUNCIATOR TILES WILL BE RELOCATED TO THE APPROPRIATE ANNUNCIATOR LIGHT BOXES WITHIN THE ANNUNCIATOR PROJECT.

A9-7. **HED NO:** 1200-2111

HED TITLE: ANNUNCIATOR ALARMS AND RELATED CONTROLS AND DISPLAYS ARE NOT FUNCTIONALLY GROUPED.

PRIORITY: 2

DISPOSITION: THE ANNUNCIATOR TILES WILL BE RELOCATED TO THE APPROPRIATE ANNUNCIATOR LIGHT BOXES WITHIN THE ANNUNCIATOR PROJECT.

A9-8. **HED NO:** 1200-2113

HED TITLE: COORDINATE LABELS ARE NOT PROVIDED ON THE ANNUNCIATOR PANELS.

PRIORITY: 3

DISPOSITION: OPERATORS HAVE NO PROBLEMS LOCATING ANNUNCIATORS. ANNUNCIATOR RESPONSE PROCEDURES REFERENCE ANNUNCIATORS BY CONSECUTIVE NUMBERING. A DRAWING AT THE FRONT OF THE PROCEDURES PROVIDES THE TILE ENGRAVING AND TILE NUMBER FOR EACH ANNUNCIATOR, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A9-9. HED NO: 1200-2115

HED TITLE: NO VISUAL PRIORITY CODING USED ON ANNUNCIATOR SYSTEM.

PRIORITY: 5

DISPOSITION: FIRST OUT ANNUNCIATORS ARE COLOR CODED. WHITE LETTERS ON BLACK ARE USED IN ONE ANNUNCIATOR LIGHT BOX TO INDICATE NORMALLY ENERGIZED DURING NORMAL OPERATIONS. OPERATORS DO NOT HAVE ANY PROBLEMS WITH THIS LEVEL OF CODING, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A9-10. HED NO: 12A1-2116

HED TITLE: UNNECESSARY USE OF COLOR CODING FOR RX COOLANT PUMP BEARING TEMPERATURE ALARMS ON APP-001.

PRIORITY: 5

DISPOSITION: THE HEDAT DETERMINED THE COLOR CODING OF THE FOUR ANNUNCIATORS IS NECESSARY. THE FOUR ALARMS COME IN WHEN THE TEMPERATURE IS HIGH AND THE RCPs NEED TO BE TRIPPED. THE OPERATORS NEED TO TAKE IMMEDIATE ACTION TO AVOID PUMP DAMAGE UPON ANNUNCIATION OF THESE ALARMS.

A9-11. HED NO: 1200-2117

HED TITLE: NO AUDITORY SIGNAL PRIORITY CODING IS USED ON ANNUNCIATOR SYSTEM.

PRIORITY: 5

DISPOSITION: AUDITORY CODING OF ANNUNCIATORS IS BASED ON PANELS. THE LINE PANEL, FIRE PROTECTION PANEL, INCORE MONITOR AND THE RMS PANEL HAVE SEPARATE ALARMS. THERE IS ONLY ONE LEVEL OF CODING FOR THE MAIN CONROL BOARD, BUT THIS WAS DETERMINED NOT TO BE A PROBLEM BY THE HEDAT DUE TO THE SMALL SIZE OF THE MAIN CONTROL BOARD.

A9-12. HED NO: 1200-2118

HED TITLE: OPERATORS REPORT THAT THE CONTAINMENT FIRE PROTECTION AND INCORE MONITOR PANEL ALARMS ARE TOO LOUD AND HAVE A HIGH PITCH THAT STARTLES THEM.

PRIORITY: 5

DISPOSITION: A WORK REQUEST HAS BEEN SUBMITTED TO ADJUST THE AUDITORY SIGNALS.

A9-13. HED NO: 1200-2120

HED TITLE: OPERATORS REPORT THAT TWO ALARMS OCCUR SO FREQUENTLY THAT OPERATORS CONSIDER THEM A NUISANCE.

PRIORITY: 5

DISPOSITION: ADJUSTMENTS HAVE BEEN MADE TO THESE ANNUNCIATORS IN THE NUISANCE ALARM REDUCTION EFFORT. THE SET POINTS HAVE BEEN SET AS HIGH AS POSSIBLE.

A9-14. HED NO: 1200-2121

HED TITLE: ANNUNCIATOR TILE LEGENDS ARE NOT SPECIFIC; ONE TILE USED FOR DUAL MESSAGES.

PRIORITY: 3

DISPOSITION: THE HEDAT DETERMINED THE DUAL MESSAGE ANNUNCIATOR FOR A SINGLE PARAMETER (i.e. HI/LOW TEMP) ANNUNCIATORS ARE NOT A PROBLEM BECAUSE THE OPERATOR RESPONSE/ACTION IS THE SAME FOR EACH CONDITION SPECIFIED WITHIN THE MESSAGE. DUAL MESSAGE/MULTIPLE PARAMETER MESSAGES WILL BE ADDRESSED IN THE ANNUNCIATOR PROJECT WHEN PRACTICAL.

IT SHOULD BE NOTED THAT THE WORD "TROUBLE" IS RESERVED FOR CONDITIONS THAT REQUIRE THE OPERATOR TO DISPATCH SOMEONE TO A LOCAL PANEL TO TAKE ACTION.

A9-15. HED NO: 1200-2122

HED TITLE: SPECIFIC EQUIPMENT IS NOT IDENTIFIED ON MULTI-INPUT ANNUNCIATOR ALARMS.

PRIORITY: 5

DISPOSITION: EACH ANNUNCIATOR MESSAGE WAS EVALUATED BY THE HEDAT AND IT WAS DETERMINED THAT THE OPERATOR RESPONSE/ACTION TO THE ANNUNCAITOR IS THE SAME, THEREFORE IDENTIFYING SPECIFIC EQUIPMENT IS NOT NECESSARY FOR THESE ANNUNCIATORS.

A9-16. HED NO: 1200-2123

HED TITLE: AN ALARM PRINTOUT IS NOT PROVIDED FOR MULTI-INPUT ALARMS.

PRIORITY:

DISPOSITION: DURING NORMAL OPERATIONS WHEN AN ANNUNCIATOR IS LOCKED IN, IT IS LOGGED IN BY THE OPERATORS IN THE ANNUNCIATOR ACCOUNTABILITY LIST. ERFIS WILL PROVIDE PARAMETER INFORMATION FOR DIAGNOSTIC PURPOSES.

A9-17. HED NO: 1200-2124

HED TITLE: CUES FOR PROMPT RECOGNITION OF OUT-OF-SERVICE ALARMS ARE NOT DESIGNED INTO THE ANNUNCIATOR SYSTEM.

PRIORITY: 3

DISPOSITION: A DEFICIENCY TAGGING PROCEDURE IS NOW IN PLACE. THE OPERATOR PUTS A SMALL BLUE LABEL ON OUT-OF-SERVICE ANNUNCIATOR TILES.

A9-18. HED NO: 1200-2130

HED TITLE: ANNUNCIATOR TILES THAT HAVE WHITE CHARACTERS ON BLACK BACKGROUND ARE DIFFICULT TO READ FOR THE NONILLUMINATED TILES.

PRIORITY: 5

DISPOSITION: WHITE ON BLACK ANNUNCIATORS IS A CODING METHOD FOR NORMALLY LIT ANNUNCIATORS DURING NORMAL POWER OPERATIONS. WHEN THE ANNUNCIATOR COMES IN THE OPERATOR IS TAKING ACTION AND EXPECTS THE ANNUNCIATOR TO COME IN. THESE ANNUNCIATORS ARE READ WHEN ILLUMINATED, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A9-19. HED NO: 1200-2131

HED TITLE: THE ANNUNCIATOR RESPONSE CONTROLS DO NOT INCLUDE A SEPARATE SILENCE CONTROL ON THE FIRE DOOR PANEL AND THE FIRE ALARM PANEL A & B.

PRIORITY: 5

DISPOSITION: THERE ARE SO FEW ANNUNCIATORS ON THIS PANEL THAT OPERATORS HAVE NO PROBLEMS SILENCING THE HORN AND ACKNOWLEDGING THE ANNUNCIATOR AT THE SAME TIME.

A9-20. HED NO: 1200-2133

HED TITLE: THE TURBINE GENERATOR SYSTEM HAS NO FIRST OUT PANEL ON THE ANNUNCIATOR SYSTEM.

PRIORITY: 3

DISPOSITION: THERE IS NO FIRST OUT PANEL FOR THE TURBINE BUT THE TURBINE ANNUNCIATORS WILL BE GROUPED AS PART OF THE ANNUNCIATOR PROJECT.

A9-21. HED NO: 12E8-2137

HED TITLE: A PANEL IDENTIFICATION LABEL AND A SUMMARY LABEL IS NOT PROVIDED ON THE FIRE DOOR PANEL.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE PAINTING AND RELABELING PROJECT.

A9-22. HED NO: 1200-2138

HED TITLE: DEMARCATION HAS NOT BEEN APPLIED TO ANNUNCIATOR PANELS ON THE MAIN CONTROL BOARD.

PRIORITY: 5

DISPOSITION: THE DESIGN OF THE ANNUNCIATOR LIGHT BOXES DOES NOT LEND ITSELF TO DEMARCATION LINES AROUND TILES. THE TILES WITHIN EACH BOX ARE FUNCTIONALLY GROUPED, WITH THE EXCEPTION OF A FEW MISPLACED TILES THAT WILL BE RELOCATED WITHIN THE ANNUNCIATOR PROJECT. THEREFORE THE HEDAT DETERMINED THAT DEMARCATION IS NOT REQUIRED.

A9-23. HED NO: 12E8-2143

HED TITLE: DIFFERENT LETTER HEIGHTS ON ANNUNCIATOR TILES AND THE TILE ENGRAVINGS DO NOT MEET READABILITY CRITERIA ON CONTAINMENT FIRE PROTECTION PANELS.

PRIORITY: 5

DISPOSITION: ANNUNCIATORS WILL BE RE-ENGRAVED WITHIN THE ANNUNCIATOR PROJECT.

A9-24. HED NO: 12E6-2144

HED TITLE: ANNUNCIATOR TILE ENGRAVING DOES NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE FOR THE D.S./F.P. ANNUNCIATORS.

PRIORITY: 5

DISPOSITION: ANNUNCIATORS WILL BE CORRECTED WITHIN THE ANNUNCIATOR PROJECT.

A9-25. HED NO: 12E5-2145

HED TITLE: TILE ENGRAVINGS DO NOT MEET READABILITY CRITERIA AND LETTER HEIGHTS ARE NOT IDENTICAL ON THE CONTROL ROOM AUX ANNUNCIATOR CONTROL PANEL.

PRIORITY: 5

DISPOSITION: TILES WILL BE RE-ENGRAVED WITHIN THE ANNUNCIATOR PROJECT.

A9-26. HED NO: 12E4-2147

HED TITLE: ANNUNCIATOR TILE LEGEND LETTERS ARE WORN OFF OR MISSING ON FIRE ALARM PANEL A.

PRIORITY: 5

DISPOSITION: A WORK REQUEST HAS BEEN SUBMITTED TO CORRECT THE FIRE ALARM ANNUNCIATOR LEGENDS.

A9-27. HED NO: 1200-2148

HED TITLE: INCONSISTENT WORDING OF ANNUNCIATOR RESPONSE CONTROLS ON THE CONTROL ROOM BACK PANELS.

PRIORITY: 3

DISPOSITION: CONSISTENT LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A9-28. HED NO: 12DS-2149

HED TITLE: NO PANEL LABEL HAS BEEN PROVIDED FOR THE ANNUNCIATOR ON THE (DEDICATED SHUTDOWN) 4160 ROOM PANEL.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED IN THE DEDICATED SHUTDOWN PANEL PROJECT.

A9-29. HED NO: 12DS-2150

HED TITLE: INCONSISTENT WORDING OF THE ANNNUNCIATOR RESPONSE CONTROLS ON THE (DEDICATED SHUTDOWN) 4160 ROOM PANEL.

PRIORITY: 5

DISPOSITION: LABELS WILL BE CORRECTED WITHIN THE DEDICATED SHUTDOWN PROJECT.

A9-30. HED NO: 1200-2153

HED TITLE: ANNUNCIATOR TILE ENGRAVINGS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET READABILITY CRITERIA.

PRIORITY: 3

DISPOSITION: ANNUNCIATORS WITH MULTIPLE PROBLEMS WILL BE IMPROVED WITH THE ANNUNCIATOR PROJECT. THE READABILITY CRITERIA CANNOT BE TOTALLY MET UNLESS THE ANNUNCIATOR PANELS ARE REPLACED WHICH IS IMPRACTICAL.

HBR HED SUMMARY

CONTROLS

APPENDIX A-10

A10-1. HED NO: 1200-3009
HED TITLE: NO SHAPE CODING HAS BEEN APPLIED TO CONTROLS ON THE MAIN CONTROL BOARD.

PRIORITY: 5
DISPOSITION: SHAPE CODING HAS NOT BEEN INCORPORATED INTO THE HBR CONTROL BOARD. ALL PUMPS AND VALVES ARE THE SAME TYPE OF SWITCH. THE OPERATORS HAVE BEEN INSTRUCTED TO READ LABELS BEFORE OPERATING THE SWITCHES.

A10-2. HED NO: 12DS-3010
HED TITLE: A FUSE IS BROKEN ON THE (DEDICATED SHUTDOWN) CHARGING PUMP ROOM PANEL.

PRIORITY: 5
DISPOSITION: A WORK REQUEST HAS BEEN SUBMITTED TO REPAIR THE FUSE.

A10-3. HED NO: 12E6-3101
HED TITLE: POTENTIAL FOR ACCIDENTAL ACTIVATION OF CONTROLS ON PZR SAFETY RELIEF VALVE VIBRATION MONITORS LOCATED ON THE RMS PANEL DUE TO THE SIZE OF THE CONTROL MODULE AND THE MINIMUM SEPARATION BETWEEN CONTROLS.

PRIORITY: 5
DISPOSITION: THE CONTROLS ARE USED FOR MAINTENANCE PURPOSES ONLY AND ARE NOT USED IN EMERGENCY OPERATIONS. THE CONTROLS WILL BE REMOVED OUTSIDE THE CONTROL ROOM AS PART OF THE PZR SAFETY RELIEF VALVE MONITOR REMOVAL PROJECT.

A10-4. **HED NO:** 12D1-3106

HED TITLE: DIRECTION OF "INCREASE" IS INCONSISTENT FOR THE SET POINT POSITION ON THE HORIZONTAL SCALES ON THE HAGAN PROCESS CONTROLLERS .

PRIORITY: 2

DISPOSITION: A LABEL WILL BE PROVIDED FOR ALL THE CONTROLLERS THAT DO NOT HAVE THE OPEN POSITION INDICATED AS PART OF THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A10-5. **HED NO:** 1200-3111

HED TITLE: MANUFACTURER'S TRADEMARK IS DISPLAYED ON PROCESS CONTROLLER FACES.

PRIORITY: 5

DISPOSITION: THE HEDAT DETERMINED THAT THE TRADEMARK DOES NOT INTERFERE WITH READING THE SCALES ON THE CONTROLLERS.

A10-6. **HED NO:** 1200-3116

HED TITLE: METERS ON PROCESS CONTROLLERS DO NOT MEET READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: THE METERS ON THE PROCESS CONTROLLERS EXCEED STROKE WIDTH CRITERIA BY 20%. BECAUSE OPERATORS HAVE NO PROBLEMS READING THE METERS AND THE METERS SERVE AS REDUNDANT INDICATION, THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-7. **HED NO:** 1200-3117

HED TITLE: CONTINUOUS ROTARY CONTROLS ON THE HAGAN CONTROLLERS DO NOT MEET SIZE CRITERIA OF 1/2 INCH.

PRIORITY: 5

DISPOSITION: KNOB HEIGHT DEVIATES FROM CRITERIA BY LESS THAN 1/4 INCH. OPERATORS HAVE NO PROBLEMS OPERATING THE DEVICES, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-8. **HED NO:** 1200-3118

HED TITLE: LEGEND PUSHBUTTONS ON THE PROCESS CONTROLLERS DO NOT MEET SIZE CRITERIA.

PRIORITY: 5

DISPOSITION: PUSHBUTTONS DEVIATE FROM CRITERIA BY 1/10 OF AN INCH. OPERATORS HAVE NO PROBLEMS OPERATING THESE PUSHBUTTONS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-9. **HED NO:** 1200-3119

HED TITLE: DISTANCE BETWEEN PUSHBUTTONS IS LESS THAN CRITERIA OF 1/2 INCH ON PROCESS CONTROLLERS.

PRIORITY: 5

DISPOSITION: SEPARATION IS 1/4 INCH. IF THE PUSHBUTTONS ARE ACCIDENTALLY ACTIVATED THE OPERATOR CAN JUST SELECT THE CORRECT PUSHBUTTON TO CORRECT THE INCORRECT SELECTION.

A10-10. **HED NO:** 1200-3209

HED TITLE: SEPARATION BETWEEN ROTARY CONTROL SWITCHES IS LESS THAN CRITERIA OF ONE INCH: SEPARATION IS 5/8 TO 3/4 OF AN INCH.

PRIORITY: 3

DISPOSITION: MOST OF THE CONTROLS ARE NOT SPRING RETURN SWITCHES, THEREFORE THEY ARE NOT LIKELY TO BE INADVERTENTLY ACTIVATED. DUE TO SPACE LIMITATIONS ON THE MAIN CONTROL BOARD, SEPARATION IS IMPRACTICAL. NO DOCUMENTED ERRORS HAVE BEEN FOUND TO INDICATE THIS IS A PROBLEM.

A10-11. **HED NO:** 12E1-3218

HED TITLE: ROTARY SELECTOR SWITCHES ON THE INCORE MONITORING PANEL HAVE UNUSED, BUT MARKED, SWITCH POSITIONS.

PRIORITY: 5

DISPOSITION: THE SWITCH POSITIONS WILL BE LABELED "SPARE" IN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A10-12. HED NO: 12B1-3220

HED TITLE: ROTARY SELECTOR SWITCHES FOR THE NIS CHANNEL SELECTOR AND THE ROD GROUP SELECTOR HAVE UNUSED DETENT POSITIONS.

PRIORITY: 3

DISPOSITION: OPERATORS GET FEEDBACK FROM THE SELECTION AND HAVE REDUNDANT INDICATION IF THE SWITCH IS IN THE WRONG POSITION. IF THE SWITCH IS IN THE BLANK POSITION IT WILL DEACTIVATE THE CONTROL. THEREFORE, THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A10-13. HED NO: 12D1-3229

HED TITLE: SPRING-LOADED ROTARY CONTROL SWITCHES ARE MISALIGNED WITH THE FACE PLATE CAUSING SOME CONTROLS TO POINT TO LABELED POSITIONS OTHER THAN THE CENTER.

PRIORITY: 3

DISPOSITION: CONTROLS WILL BE REALIGNED SO THAT THE CONTROL RETURNS TO A STRAIGHT CENTER POSITION WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A10-14. HED NO: 12E6-3232

HED TITLE: DIRECTION OF MOVEMENT FOR PUMP CONTROL SWITCHES DO NOT CONFORM TO THE STOP-LEFT, START-RIGHT CONVENTIONS.

PRIORITY: 3

DISPOSITION: THE SWITCHES HAVE BEEN CORRECTED TO CONFORM TO DIRECTION OF MOVEMENT CONVENTIONS.

A10-15. HED NO: 12A1-3238

HED TITLE: CONTROLS ARE KEY-OPERATED CONTROLS WITH NO SECURITY JUSTIFICATION FOR THAT SWITCH TYPE.

PRIORITY: 5

DISPOSITION: THE CONTROLS ARE EQ QUALIFIED TO BE CYCLED ONLY ONE TIME DURING AN ACCIDENT SCENARIO, THEREFORE, THE SWITCHES ARE KEY-OPERATED TO ENSURE THE VALVES ARE NOT ACCIDENTLY OR INCORRECTLY SELECTED.

A10-16. **HED NO:** 12E5-3243
HED TITLE: CONTROL POSITIONS ARE NOT APPARENT BECAUSE LINES/ARROWS HAVE WORN OFF.

PRIORITY: 3
DISPOSITION: POINTERS HAVE BEEN REPAINTED.

A10-17. **HED NO:** 12E0-3248
HED TITLE: DIRECTION OF MOVEMENT FOR EMERGENCY OIL PUMP CONTROL ON THE TURBINE STARTUP PANEL IS OPPOSITE FROM CONVENTION.

PRIORITY: 1
DISPOSITION: THE SWITCH HAS BEEN CORRECTED TO CONFORM TO THE DIRECTION OF MOVEMENT CONVENTION.

A10-18. **HED NO:** 1200-3249
HED TITLE: CONTROL SWITCHES ARE MISALIGNED WITH MODULE FACE PLATES.

PRIORITY: 3
DISPOSITION: SWITCHES WILL BE REALIGNED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A10-19. **HED NO:** 12D1-3250
HED TITLE: POINTER IS MISSING ON ROTARY CONTROL KNOB.

PRIORITY: 5
DISPOSITION: THE POINTER HAS BEEN REPLACED.

A10-20. **HED NO:** 12E5-3255
HED TITLE: CONTROL SWITCHES ON THE LINE PANEL HAVE MARKED, UNUSED SWITCH POSITIONS.

PRIORITY: 3
DISPOSITION: SWITCHES ARE CONTROLLED BY DISPATCHER AND ARE NOT USED BY THE CONTROL ROOM OPERATORS. THE SWITCH WOULD HAVE TO BE REPLACED WHICH IS IMPRACTICAL. THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-21. HED NO: 12E1-3266
HED TITLE: SWITCH POSITION NOT APPARENT ON ROTARY CONTROL SELECTOR SWITCH ON THE PATH DISPLAY PANEL LOCATED ON THE INCORE MONITORING PANEL.

PRIORITY: 5
DISPOSITION: THE SWITCH IS NOT USED IN EMERGENCY OPERATIONS. IT IS USED FOR ENGINEERING SURVEILLANCE PURPOSES ONLY, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-22. HED NO: 12A1-3268
HED TITLE: POTENTIAL FOR ACCIDENTAL ACTIVATION OF LETDOWN LINE VLV DUE TO SWITCH POSITION AT EDGE OF BENCHBOARD.

PRIORITY: 1
DISPOSITION: THE CONTROLS ARE 3 1/4 INCHES FROM THE EDGE OF THE PANEL. A RED ZONE HAS BEEN PROVIDED IN FRONT OF THE MAIN CONTROL BOARD TO MINIMIZE TRAFFIC AROUND THE PANELS. OPERATORS HAVE BEEN INSTRUCTED NOT TO SIT ON THE EDGE OF THE BOARD.

A10-23. HED NO: 12A1-3269
HED TITLE: CONTROL SWITCHES CAN BE POSITIONED BETWEEN DETENTED POSITIONS.

PRIORITY: 3
DISPOSITION: THE SWITCHES HAVE LIMITED USES, THEY ARE USED TO REMOVE CONTROL CHANNELS FROM SERVICE. OPERATORS HAVE NO PROBLEMS OPERATING THE SWITCHES, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-24. HED NO: 1200-3270
HED TITLE: KNOBS FOR SPRING-LOADED CONTROL SWITCHES MAY NOT BE LARGE ENOUGH TO HOLD AGAINST THE SWITCH TORQUE.

PRIORITY: 3
DISPOSITION: A REPLACEMENT KNOB OR EXTENSION CAPS ARE NOT AVAILABLE FOR THESE SWITCHES.

A10-25. HED NO: 12D1-3271

HED TITLE: LINE DISCONNECT SWITCH DOES NOT CONFORM TO THE DIRECTION OF MOVEMENT CONVENTION.

PRIORITY: 3

DISPOSITION: THE SWITCH HAS BEEN CORRECTED TO CONFORM TO THE DIRECTION OF MOVEMENT CONVENTIONS.

A10-26. HED NO: 12D1-3272

HED TITLE: KEYS USED FOR KEY OPERATED CONTROLS CAN BE REMOVED IN ANY POSITION.

PRIORITY: 3

DISPOSITION: SWITCHES ARE USED BY MAINTENANCE TO TEST TURBINE FUNCTIONS. PROCEDURES INSTRUCT THE OPERATOR ON REPOSITIONING AND KEY REMOVAL DURING THE TESTING PROCESS.

A10-27. HED NO: 1200-3273

HED TITLE: KEY OPERATED SWITCHES WITH SINGLE ROWS OF TEETH HAVE TEETH POINTING DOWNWARD.

PRIORITY: 5

DISPOSITION: KEY SWITCHES ARE NOT USED IN TIME CRITICAL FUNCTIONS. IF THE KEY DOESN'T FIT IN THE SLOT, THE OPERATOR NEED ONLY TURN THE KEY OVER TO INSERT THE KEY.

A10-28. HED NO: 12E4-3274

HED TITLE: LOCKS ON KEY OPERATED SWITCHES ARE ORIENTED SO THAT THE OFF POSITION IS TO THE RIGHT.

PRIORITY: 5

DISPOSITION: THESE KEY SWITCHES ARE OPERATED BY FIRE PROTECTION PERSONNEL ONLY. POSITION LABELS ARE CLEARLY IDENTIFIABLE, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-29. HED NO: 1200-3275

HED TITLE: CONTROL ARM EXTENSION LENGTHS AND CLEARANCES ON J-HANDLES LOCATED ON THE BACK PANELS DO NOT MEET SIZE CRITERIA.

PRIORITY: 5

DISPOSITION: CRITERIA APPLIES TO HIGH TORQUE J-HANDLES. THESE SWITCHES DO NOT REQUIRE HIGH TORQUE, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-30. HED NO: 12E2-3276

HED TITLE: ROTARY CONTROL SELECTOR SWITCH POSITIONS INCREASE IN BOTH LEFT AND RIGHT DIRECTIONS ON NIS PANEL.

PRIORITY: 5

DISPOSITION: THE SELECTOR SWITCH IS USED TO SELECT ONE OF FOUR CHANNELS. THE SWITCH POSITION IS CLEARLY LABELED AND THE OPERATORS HAVE NO PROBLEMS WITH THE CONTROL, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-31. HED NO: 1200-3277

HED TITLE: CONTROL POSITIONS ARE NOT OBVIOUS DUE TO CHIPPED OFF PAINT ON ARROWS/LINES OR BROKEN POINTERS ON BACK PANELS.

PRIORITY: 5

DISPOSITION: A WORK REQUEST HAS BEEN SUBMITTED TO REPAIR THE CONTROLS.

A10-32. HED NO: 1200-3278

HED TITLE: DISPLACEMENT FOR KEY-OPERATED SWITCHES IS LESS THAN CRITERIA OF 80 DEGREES ON THE MAIN CONTROL BOARD.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS WITH THESE SWITCHES. THE SWITCHES ARE CLEARLY LABELED, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-33. HED NO: 1200-3279
HED TITLE: ROTARY CONTROL SWITCHES ARE MISALIGNED WITH CONTROL POSITION LABELS ON BACK PANELS.

PRIORITY: 3
DISPOSITION: CONTROLS WILL BE REALIGNED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A10-34. HED NO: 12DS-3282
HED TITLE: DIRECTION OF MOVEMENT OF CONTROLS LOCATED ON THE (DEDICATED SHUTDOWN) SECONDARY CONTROL PANEL DOES NOT CONFORM TO CONVENTIONS.

PRIORITY: 3
DISPOSITION: WILL BE CORRECTED WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A10-35. HED NO: 12E1-3304
HED TITLE: CENTER-LOADED TOGGLE SWITCHES FOR THERMOCOUPLE SELECTORS ON THE INCORE MONITORING PANEL ARE HELD INTO POSITION WITH RUBBER BANDS.

PRIORITY: 3
DISPOSITION: THE EXISTING THERMOCOUPLE SYSTEM WILL BE TAKEN OUT OF SERVICE WITHIN THE CORE EXIT THERMOCOUPLE PANEL PROJECT.

A10-36. HED NO: 12E2-3305
HED TITLE: TOGGLE SWITCH ARM ON THE NIS PANEL IS LESS THAN CRITERIA OF 1/2 INCH IN LENGTH: TOGGLE IS 15/32".

PRIORITY: 5
DISPOSITION: THESE TOGGLES ARE NOT USED IN EMERGENCY OPERATIONS. THEY ARE USED FOR MAINTENANCE PURPOSES ONLY, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-37. HED NO: 12A1-3306

HED TITLE: ANNUNCIATOR SWITCH NEEDED AT LEFT END OF MAIN CONTROL BOARD.

PRIORITY: 3

DISPOSITION: SWITCH WILL BE ADDED WITHIN THE ANNUNCIATOR RESPONSE SWITCH ADDITION PROJECT.

A10-38. HED NO: 1200-3312

HED TITLE: THE SWITCH DESIGN FOR THE ANNUNCIATOR RESPONSE SWITCHES MAKE IT POSSIBLE FOR THE OPERATOR TO ACKNOWLEDGE AN ALARM BEFORE SILENCING THE ALARM HORN.

PRIORITY: 3

DISPOSITION: ON THE JOB TRAINING RE-ENFORCES THE CORRECT OPERATION OF THE SWITCHES. OPERATORS HAVE NOT FOUND THIS TO BE A PROBLEM, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-39. HED NO: 12E7-3313

HED TITLE: TOGGLE SWITCHES MOVE LEFT FOR THE "ON" POSITION ON THE CORE COOLING MONITOR PANEL.

PRIORITY: 5

DISPOSITION: THE SWITCH IS USED FOR CALIBRATION PURPOSES ONLY, AND IS NOT USED IN EMERGENCY OPERATIONS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-40. HED NO: 1200-3414

HED TITLE: PUSHBUTTON CONTROLS THAT ACTIVATE CRITICAL FUNCTIONS DO NOT HAVE REMOVABLE COVERS OR GUARDS.

PRIORITY: 5

DISPOSITION: THESE PUSHBUTTONS ARE LOCATED AWAY FROM CONTROL ROOM TRAFFIC AT THE LOWER VERTICAL SECTION OF THE PANEL AND THE UPPER PORTION OF THE BENCHBOARD. THE PUSHBUTTONS ARE ALSO SLIGHTLY RECESSED IN FIXED PROTRUDING GUARDS, AND THE FORCE REQUIRED TO ACTIVATE THEM IS GREATER THAN 5 IN/LBS, WHICH REDUCES THE PROBABILITY OF ACCIDENTAL ACTIVATION. THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A10-41. HED NO: 1200-3415

HED TITLE: FEEDBACK IS NOT AVAILABLE TO LET OPERATORS KNOW THAT PUSHBUTTONS HAVE BEEN ACTIVATED.

PRIORITY: 3

DISPOSITION: INDICATIONS WILL BE PROVIDED WITHIN THE FW ISOLATION LOGIC INDICATION PROJECT AND THE ANNUNCIATOR PROJECT.

A10-42. HED NO: 1200-3416

HED TITLE: THE DIAMETER OF THE ROUND PUSHBUTTONS DO NOT MEET CRITERIA OF .75 INCHES: DIAMETER IS .50 INCHES.

PRIORITY: 5

DISPOSITION: THE PUSHBUTTONS ARE ENCASED IN THEIR OWN GUARDED BARRIERS. OPERATORS HAVE NO PROBLEMS OPERATING THESE PUSHBUTTONS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-43. HED NO: 1200-3417

HED TITLE: LEGEND PUSHBUTTONS ON THE EH TURBINE CONTROL PANEL MATRICES DO NOT MEET SIZE CRITERIA OF .75 INCHES: PUSHBUTTONS ARE .625 INCHES.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS OPERATING THESE PUSHBUTTONS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-44. HED NO: 1200-3418

HED TITLE: ROUND PUSHBUTTONS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET RESISTANCE CRITERIA OF 40 oz: RESISTANCE IS GREATER THAN 5 lbs.

PRIORITY: 5

DISPOSITION: THE RESISTANCE ON THESE PUSHBUTTONS ARE INTENTIONALLY HIGH TO PREVENT ACCIDENTAL ACTIVATION. OPERATORS HAVE NO PROBLEMS WITH THESE SWITCHES BECAUSE IF THEY ARE SELECTED IT IS A VERY DELIBERATE ACTION.

A10-45.HED NO: 12B1-3419

HED TITLE: MINIMUM SEPARATION BETWEEN PUSHBUTTON CONTROLS IS LESS THAN CRITERIA OF .5 INCH: SEPARATION IS 1/8 OF AN INCH.

PRIORITY: 5

DISPOSITION: THE PUSHBUTTONS ARE OPERATED AT THE SAME TIME AND ARE LOCATED NEXT TO EACH OTHER FOR THIS REASON. THE PUSHBUTTONS ARE USED IN STARTUP OPERATIONS AND THE OPERATORS HAVE NO PROBLEMS OPERATING THEM.

A10-46.HED NO: 1200-3420

HED TITLE: RECTANGULAR PUSHBUTTON SIZE IS LESS THAN CRITERIA OF .75 INCH ON BACK PANELS.

PRIORITY: 5

DISPOSITION: PUSHBUTTONS DEVIATE FROM CRITERIA BY 58% AND 60%. THERE IS NO SAFETY CONSEQUENCE OF ACCIDENTAL ACTIVATION. THE PUSHBUTTONS ARE USED FOR SURVEILLANCE TEST PURPOSES ONLY, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A10-47.HED NO: 1200-3421

HED TITLE: PUSHBUTTON DIAMETER IS LESS THAN CRITERIA OF .385 INCH ON BACK PANELS.

PRIORITY: 5

DISPOSITION: PUSHBUTTONS DEVIATE FROM CRITERIA BY 76% TO 19%. THERE IS NO SAFETY CONSEQUENCE OF ACCIDENTAL ACTIVATION OF THESE PUSHBUTTONS. THE MAJORITY OF THE PUSHBUTTONS ARE USED FOR SURVEILLANCE TEST FUNCTIONS. THE OPERATORS HAVE NO PROBLEMS OPERATING THESE PUSHBUTTONS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

HBR HED SUMMARY

DISPLAYS

APPENDIX A-11

A11-1. HED NO: 12E5-2201
HED TITLE: CIRCULAR METERS LOCATED ON THE LINE PANEL DO NOT FAIL OFF-SCALE.

PRIORITY: 5
DISPOSITION: METERS ARE NOT USED IN EMERGENCY OPERATIONS, THEY ARE USED FOR MAINTENANCE PURPOSES ONLY, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-2. HED NO: 1200-2202
HED TITLE: POINTERS PARTIALLY OBSCURE NUMBERS ON SCALES ON THE CIRCULAR METERS.

PRIORITY: 5
DISPOSITION: HEDAT DETERMINED THAT THE PARTIALLY OBSCURED NUMBERS ARE NOT SIGNIFICANT ENOUGH TO INTERFERE WITH READINGS, THEREFORE NO ACTION IS REQUIRED.

A11-3. HED NO: 12D1-2206
HED TITLE: THE GEN HYDROGEN PRESS/HYDROGEN PURITY VERTICAL METER IS A MULTISCALE METER AND IS DIFFICULT TO READ ACCURATELY.

PRIORITY: 3
DISPOSITION: THE METER NORMALLY INDICATES AT OR NEAR 100% HYDROGEN WHICH IS LOW ON THE SCALE. THIS INDICATION IS BACKED UP BY ANNUNCIATION. ANY OTHER VALUE DURING NORMAL OPERATION WOULD CAUSE THE OPERATORS TO INITIATE AN INVESTIGATION AND CORRECTIVE ACTION. THEREFORE, THE METER SCALE IS ADEQUATE FOR ITS PURPOSE.

A11-4. HED NO: 1200-2215

HED TITLE: POINTERS PARTIALLY OBSCURE NUMBERS ON SCALES ON VERTICAL METERS.

PRIORITY: 5

DISPOSITION: HEDAT DETERMINED THAT THE PARTIALLY OBSCURED NUMBERS ARE NOT SIGNIFICANT ENOUGH TO INTERFERE WITH READINGS, THEREFORE NO ACTION IS REQUIRED.

A11-5. HED NO: 1200-2216

HED TITLE: POINTERS ON THE MAIN CONTROL BOARD METERS AND RECORDERS DO NOT FAIL OFF-SCALE AS A MEANS OF ENHANCING DISPLAY FAILURE.

PRIORITY: 3

DISPOSITION: IT WAS DETERMINED DURING VALIDATION THAT THE VALUES THAT MUST BE READ DURING EMERGENCY OPERATIONS ARE SIGNIFICANTLY GREATER THAN ZERO OR THAT REDUNDANT INDICATION IS AVAILABLE ON THE MAIN CONTROL BOARD FOR THE PRIMARY PARAMETERS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-6. HED NO: 12D1-2217

HED TITLE: THE X 2 MULTIPLIER IS MISSING ON THE GLAND STEAM PRESSURE METER.

PRIORITY: 3

DISPOSITION: METER SCALE WILL BE REPLACED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A11-7. HED NO: 12B1-2218

HED TITLE: SCALE PROGRESSIONS ON ROD POSITION INDICATORS ARE IN 3 INCH INCREMENTS WITH NUMBERED MARKS PROGRESSING BY VALUES OF 24 INCHES. OPERATORS REPORT THAT THE SCALES ARE HARD TO READ.

PRIORITY: 3

DISPOSITION: BASED ON THE READINGS THAT THE OPERATORS ARE REQUIRED TO MAKE USING THESE SCALES THE HEDAT DETERMINED THAT THE SCALE IS ADEQUATE. THE OPERATORS ARE REQUIRED TO VERIFY ALL THE SCALES ARE AT ZERO DURING EMERGENCY OPERATIONS.

A11-8. HED NO: 12C1-2222

HED TITLE: READABILITY OF INTERNAL LABELS ON VERTICAL METERS LOCATED ON THE MAIN CONTROL BOARD IS POOR.

PRIORITY: 2

DISPOSITION: METER SCALES WILL BE ENHANCED AS MUCH AS PRACTICAL WITHIN THE METER SCALE REPLACEMENT PROJECT.

A11-9. HED NO: 12A1-2225

HED TITLE: NARROW RANGE INDICATION IS NOT AVAILABLE FOR RHR AND CCW FLOWS.

PRIORITY: 3

DISPOSITION: THE METER SCALE IS SIZED FOR EMERGENCY OPERATIONS. EXPANDING THE RANGE OF THESE INDICATIONS IS NOT PRACTICAL.

A11-10. HED NO: 1200-2226

HED TITLE: A COMBINED TOTAL LEAK RATE INDICATION REQUIRED FOR TECH. SPEC. READINGS IS NOT AVAILABLE IN THE CONTROL ROOM.

PRIORITY: 5

DISPOSITION: SEPARATE LEAK RATES FOR THE FOUR INDICATIONS ARE REQUIRED FOR DIAGNOSTIC PURPOSES. PROVIDING A SUM TOTAL OF THE LEAK RATES WOULD NOT BE PRACTICAL. THE OPERATORS RECORD THE SUM OF THE FOUR INDICATIONS EVERY FOUR HOURS. BECAUSE THE SUMS ARE EASY TO ADD (VALUES ARE TYPICALLY 5, 15, 20, ETC.) THE HEDAT DETERMINED THAT THE REQUIREMENT FOR THE OPERATORS TO ADD THE SUM IS NOT A PROBLEM AND FURTHER ACTION IS NOT REQUIRED.

A11-11. HED NO: 1200-2236

HED TITLE: CIRCULAR METER LABELS AND SCALES DO NOT MEET READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: FINE OR PRECISE READINGS ARE NOT REQUIRED USING THESE METERS. OPERATORS DO NOT HAVE A PROBLEM READING THESE SCALES, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-12. HED NO: 1200-2237

HED TITLE: VERTICAL METER LABELS AND SCALES DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: LABELS ARE AS LARGE AS POSSIBLE CONSIDERING THE SIZE OF THE METERS. THE MAJORITY OF THE METERS DEVIATE FROM CHARACTER HEIGHT CRITERIA BY 14%. METER FACES WITH OTHER PROBLEMS WILL BE REPLACED AND LABELS WITHIN THESE METERS WILL BE ENHANCED AS MUCH AS POSSIBLE WITHIN THE METER SCALE REPLACEMENT PROJECT.

A11-13. HED NO: 12E6-2238

HED TITLE: FRONT-FACED METER SCALES AND LABELS ON RMS PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: FINE OR PRECISE READINGS ARE NOT REQUIRED USING THESE METERS. OPERATORS DO NOT HAVE A PROBLEM READING THESE SCALES, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-14. HED NO: 12E1-2239

HED TITLE: A MOVING SCALE FIXED POINTER TYPE METER IS USED TO MONITOR THERMOCOUPLE RANGES ON THE INCORE MONITORING PANEL.

PRIORITY: 5

DISPOSITION: THIS METER WILL BE REMOVED FROM THE PANEL AS PART OF THE CORE EXIT THERMOCOUPLE PANEL PROJECT.

A11-15. HED NO: 1200-2240

HED TITLE: MINUS SIGNS ARE MISSING FOR NEGATIVE NUMBERS ON VERTICAL METER SCALES.

PRIORITY: 3

DISPOSITION: MINUS SIGNS WILL BE PROVIDED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A11-16. HED NO: 12E7-2241

HED TITLE: NUMERAL ORIENTATION ON HORIZONTAL SCALES LOCATED ON THE CORE COOLING MONITOR IS INCONSISTENT WITH THE REMAINDER OF SCALES IN THE CONTROL ROOM.

PRIORITY: 5

DISPOSITION: THE METERS WILL BE DELETED OR REPLACED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A11-17. HED NO: 1200-2242

HED TITLE: NUMERALS ON METER SCALES LOCATED ON THE MAIN CONTROL BOARD ARE MISALIGNED WITH GRADUATION MARKS.

PRIORITY: 5

DISPOSITION: METER SCALES WILL BE REPLACED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A11-18. HED NO: 1200-2243

HED TITLE: POINTER TIPS CONCEAL GRADUATION MARKS OR NUMERALS ON METER SCALES LOCATED ON MAIN CONTROL BOARD METERS AND INCORE MONITORING PANEL METERS.

PRIORITY: 5

DISPOSITION: HEDAT DETERMINED THAT THE PARTIALLY OBSCURED NUMBERS ARE NOT SIGNIFICANT ENOUGH TO INTERFERE WITH READINGS, THEREFORE NO ACTION IS REQUIRED.

A11-19. HED NO: 1200-2244

HED TITLE: MANUFACTURER'S TRADEMARK IS PRINTED ON METER SCALE FACES.

PRIORITY: 5

DISPOSITION: THE MANUFACTURER'S TRADEMARK DOES NOT INTERFERE WITH THE READING OF METER SCALES, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-20. HED NO: 12E2-2245

HED TITLE: SCALES ON VERTICAL METERS ON THE NIS PANEL ARE GREEN ON A WHITE BACKGROUND.

PRIORITY: 5

DISPOSITION: THE OPERATORS HAVE NO PROBLEMS READING SCALES, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-21. HED NO: 12E1-2246

HED TITLE: FRONT-FACED METER SCALES AND LABELS ON THE INCORE MONITOR DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: THE METERS ARE NOT USED IN EMERGENCY OPERATIONS, THEY ARE USED FOR SURVEILLANCE TEST FUNCTIONS ONLY. BECAUSE THERE IS NO OPERATOR INTERFACE WITH THESE METERS, THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-22. HED NO: 12E7-2247

HED TITLE: METER SCALES AND LABELS ON CORE COOLING MONITORING PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: TWO OF THE METERS WILL BE MODIFIED OR REPLACED WITHIN THE METER SCALE REPLACEMENT PROJECT.

THE CV PRESSURE METERS DEVIATE FROM LETTER HEIGHT CRITERIA FOR THE UNITS LABEL BY 43% AND THE HEIGHT OF GRADUATION MARKS CRITERIA BY 9% TO 29%. THE OPERATORS HAVE NO PROBLEMS READING THESE METERS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED FOR THESE METERS.

THE H2 ANALYZER CHANNEL 1 AND 2 FRONT-FACED METERS DEVIATE FROM LETTER HEIGHT AND NUMBER HEIGHT CRITERIA BY 43% TO 72%. THE GRADUATION MARKS DEVIATE FROM HEIGHT CRITERIA BY 26% TO 43%. THE VALUES THAT ARE READ IN EMERGENCY OPERATIONS IS .5 AND 3 % H2. THESE VALUES CAN BE READ WITH THE CURRENT SCALE CONFIGURATION, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED FOR THESE METERS.

A11-23. HED NO: 12E2-2248

HED TITLE: METER SCALES AND LABELS ON NIS PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 3

DISPOSITION: THE DETECTOR VOLTS FRONT-FACED METERS DEVIATE FROM LETTER HEIGHT AND NUMERAL HEIGHT CRITERIA BY 27% AND 17%. THE MINOR GRADUATION MARKS DEVIATE FROM HEIGHT CRITERIA BY 17%. THESE METERS ARE USED IN EMERGENCY OPERATIONS FOR BACK UP INDICATION. THE OPERATOR WOULD DETERMINE IF THE METERS ARE READING ON OR OFF SCALE THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

THE REMAINING FRONT-FACED METERS (17 TOTAL) DEVIATE FROM LETTER HEIGHT AND NUMERAL HEIGHT CRITERIA BY 17%. THE MINOR GRADUATION MARKS DEVIATE FROM CRITERIA BY 17%. OPERATORS HAVE NO PROBLEMS READING THESE SCALES THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

THE (A),(B),(C) RCP VIBRATION VERTICAL METERS DEVIATE FROM NUMERAL HEIGHT CRITERIA BY 48%, NUMERAL WIDTH CRITERIA BY 31% AND NUMERAL STROKE WIDTH CRITERIA BY 22%. THE MAJOR AND MINOR GRADUATION MARKS DEVIATE FROM HEIGHT CRITERIA BY 59% AND 58%. THE PRIMARY INDICATION FOR THESE METERS IS AN ANNUNCIATOR ON THE MAIN CONTROL BOARD. PRIMARY READINGS ON THESE METERS IS 5 MILS, WHICH IS READABLE WITHIN THE CURRENT SCALE CONFIGURATION, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-24. HED NO: 12E5-2249

HED TITLE: METER SCALES AND LABELS ON LINE PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: THE FOUR MW/MVARS CIRCULAR METERS DEVIATE IN NUMERAL STROKE WIDTH BY 17%. OPERATORS HAVE NO PROBLEMS READING THESE METERS. THEREFORE, THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

THE DARLINGTON SPCA KILOVOLTS IN COMING AND SUMTER KILOVOLTS RUNNING CIRCULAR METERS DEVIATE FROM CHARACTER WIDTH CRITERIA ON NUMERALS AND LABELING BY 20% AND 40%. THE SPACE BETWEEN NUMERALS DEVIATE FROM CRITERIA BY 25%. OPERATORS HAVE NO PROBLEMS READING THESE METERS, THEREFORE, THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

THE FOUR MILLAMPERES CIRCULAR METERS DEVIATE FROM NUMERAL AND UNIT LABEL STROKE WIDTH CRITERIA BY 56%. THE MINOR GRADUATION MARKS DEVIATE FROM HEIGHT CRITERIA BY 17%. OPERATORS HAVE NO PROBLEMS READING THESE METERS. THEREFORE, THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-25. HED NO: 12E2-2250

HED TITLE: SCALE PROGRESSIONS ON THE DETECTOR CURRENT METERS LOCATED ON THE NIS PANEL DO NOT MEET CRITERIA: MORE THAN NINE GRADUATION MARKS BETWEEN NUMERALS.

PRIORITY: 5

DISPOSITION: THESE METERS ARE NOT USED DURING EMERGENCY OPERATIONS, THEY ARE USED DURING NORMAL SURVEILLANCE PROCEDURES. OPERATORS HAVE NO PROBLEMS READING THESE SCALES, THEREFORE, THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-26. HED NO: 12A1-2252

HED TITLE: SCALE PROGRESSIONS ON THE LOOP 1 (2),(3) CONTROL AND PROTECTION TAVG METERS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET CRITERIA: MORE THAN NINE GRADUATION MARKS BETWEEN NUMERALS.

PRIORITY: 3

DISPOSITION: SCALES WILL BE CORRECTED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A11-27. HED NO: 12D1-2254

HED TITLE: SCALE PROGRESSIONS ON THE MAIN STEAM HEADER PRESSURE METERS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET CRITERIA: MORE THAN NINE GRADUATION MARKS BETWEEN NUMERALS AND THE SCALE PROGRESSION IS BY 25.

PRIORITY: 3

DISPOSITION: SCALES WILL BE CORRECTED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A11-28. HED NO: 12E1-2255

HED TITLE: SCALE PROGRESSIONS ON THE DETECTOR DC CURRENT METERS LOCATED ON THE INCORE MONITORING PANEL DO NOT MEET CRITERIA: MORE THAN NINE GRADUATION MARKS BETWEEN NUMERALS.

PRIORITY: 5

DISPOSITION: THE METERS ARE NOT USED IN EMERGENCY OPERATIONS, THEY ARE USED FOR ENGINEERING SURVEILLANCE PURPOSES ONLY, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-29. HED NO: 12A1-2256

HED TITLE: SCALE PROGRESSIONS ON THE SPRAY HDR FLOW AND THE BORIC ACID BYPASS FLOW METERS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET CRITERIA: SCALES PROGRESS BY 30 GPM AND 3 GPM.

PRIORITY: 5

DISPOSITION: THE METERS HAVE LOG SCALES AND ARE SET UP TO PROVIDE NUMBERED GRADUATIONS AT THE NORMAL READINGS OF 60, 120 AND 960. OPERATORS HAVE NO PROBLEMS READING SCALES, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-30. HED NO: 12D1-2257

HED TITLE: PROGRESSION OF VALUES ON EMERG BUS VOLT METERS LOCATED ON THE MAIN CONTROL BOARD DOES NOT MEET CRITERIA: SCALES PROGRESS BY 8 VOLTS.

PRIORITY: 5

DISPOSITION: SCALES WILL BE CORRECTED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A11-31. HED NO: 12E7-2259

HED TITLE: PROGRESSION OF VALUES ON THE CONTAINMENT WATER LEVEL CHANNEL 1 (2) METER SCALES LOCATED ON THE CORE COOLING MONITORING PANEL DO NOT MEET CRITERIA: SCALES PROGRESS BY 6 INCH INCREMENTS.

PRIORITY: 5

DISPOSITION: THE SIX INCH INCREMENTS ARE MEANINGFUL PROGRESSIONS TO THE OPERATORS, THEREFORE THE HEDAT DETERMINED THAT CHANGING THE SCALE PROGRESSION IS NOT REQUIRED.

A11-32. HED NO: 1200-2260

HED TITLE: SCALES ARE DIVIDED BY MAJOR AND MINOR GRADUATION MARKS AND HAVE NO INTERMEDIATE MARKS ON THE TURBINE SHAFT SPEED, GENERATOR ELECTRICAL LOAD, AND THE RESID HX TOTAL FLOW.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS READING THE TURBINE SHAFT SPEED AND THE GENERATOR ELECTRICAL LOAD METERS. THE RESID HX TOTAL FLOW METER SCALE WILL BE REPLACED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A11-33. HED NO: 12DS-2261

HED TITLE: USE OF GRADUATION MARKS DO NOT MEET CRITERIA ON THE PORV-(1),(2), (3) SCALES LOCATED ON THE (DEDICATED SHUTDOWN) SECONDARY CONTROL PANEL: SCALES ARE DIVIDED BY MAJOR AND MINOR GRADUATION MARKS AND HAVE NO INTERMEDIATE MARKS.

PRIORITY: 5

DISPOSITION: SCALES WILL BE CORRECTED WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A11-34. HED NO: 12DS-2262

HED TITLE: USE OF GRADUATION MARKS DOES NOT MEET CRITERIA ON METER SCALES LOCATED ON THE (DEDICATED SHUTDOWN) SECONDARY CONTROL PANEL: SCALES HAVE MORE THAN NINE GRADUATIONS SEPARATING NUMERALS.

PRIORITY: 5

DISPOSITION: SCALES WILL BE CORRECTED WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A11-35. HED NO: 12A1-2303

HED TITLE: TYPE STYLES ARE NOT CONSISTENT ON LEGEND LIGHT ENGRAVING FOR LIGHTS LOCATED ON THE MAIN CONTROL BOARD.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS READING THE LEGEND LIGHTS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-36. **HED NO:** 12A1-2316

HED TITLE: INCONSISTENT USE OF ABBREVIATIONS USED ON INDICATOR LIGHT ENGRAVING AND ITS ASSOCIATED CONTROL LABELS FOR THE LETDOWN VCT DEMINERALIZER/DEBORATOR CONTROLS.

PRIORITY: 5

DISPOSITION: LEGEND LIGHTS WILL BE RE-ENGRAVED WITHIN THE LEGEND LIGHT RE-ENGRAVING PROJECT.

A11-37. **HED NO:** 12E5-2322

HED TITLE: MEANING OF ILLUMINATED INDICATOR LIGHTS ON THE LINE PANEL IS NOT APPARENT AND NOT LABELED.

PRIORITY: 3

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A11-38. **HED NO:** 1200-2325

HED TITLE: ENGRAVING ON INDICATOR LIGHTS NOT LEGIBLE UNDER AMBIENT ILLUMINATION.

PRIORITY: 3

DISPOSITION: LEGIBILITY OF THE INDICATOR LIGHTS HAS BEEN IMPROVED UNDER THE CONTROL ROOM LIGHTING ENHANCEMENT PROJECT.

A11-39. **HED NO:** 12E5-2326

HED TITLE: MEANING OF ILLUMINATED INDICATOR LIGHTS ASSOCIATED WITH CARRIER TEST CONTROL ON THE LINE PANEL IS NOT APPARENT.

PRIORITY: 3

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A11-40. HED NO: 12D1-2327

HED TITLE: CODING TO DISTINGUISH LEGEND LIGHTS FROM PUSHBUTTONS IS MISSING ON SOME LEGEND LIGHTS ON THE EH TURBINE CONTROL PANEL.

PRIORITY: 3

DISPOSITION: A WORK REQUEST HAS BEEN SUBMITTED TO CORRECT THE LIGHTS.

A11-41. HED NO: 1200-2329

HED TITLE: LEGEND PLATES ARE NOT CODED TO PREVENT INTERCHANGING OF LEGEND PLATES.

PRIORITY: 3

DISPOSITION: GUIDANCE WILL BE PROVIDED BY THE ADMINISTRATIVE PROCEDURES PROJECT.

A11-42. HED NO: 12A1-2335

HED TITLE: GREEN "POWER ON" INDICATOR LIGHT ON THE REACTOR VESSEL HEAD PRESSURE METER DOES NOT COMPLY WITH COLOR-CODING CONVENTIONS.

PRIORITY: 5

DISPOSITION: THE INDICATOR LIGHT IS VERY SMALL AND DOES NOT OBSCURE THE METER IN ANY WAY. ALSO, BECAUSE THIS IS THE ONLY METER THAT HAS A LIGHT ASSOCIATED WITH IT, THE OPERATORS ARE NOT LIKELY TO MISINTERPRET ITS MEANING.

A11-43. HED NO: 12E0-2337

HED TITLE: MEANING OF INDICATOR LIGHTS ASSOCIATED WITH CONTROLS ON THE TURBINE SUPERVISORY PANEL IS NOT APPARENT.

PRIORITY: 2

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A11-44. HED NO: 1200-2341

HED TITLE: THE BISTABLE STATUS LIGHT AND THE BYPASS PERMISSIVE STATUS LIGHTS LOCATED ON THE MAIN CONTROL BOARD CONTAIN MORE THAN THREE LINES OF TEXT.

PRIORITY: 5

DISPOSITION: THE LIGHTS ARE USED FOR STATUS INDICATION ONLY. THESE LIGHTS DO NOT SERVE AS PRIMARY INDICATION; THERE IS REDUNDANT INDICATION FOR EACH LIGHT ON THE MAIN CONTROL BOARD, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-45. HED NO: 12E3-2342

HED TITLE: INDICATOR LIGHT LENS HAS BEEN BROKEN AND HAS NOT BEEN REPLACED ON APDMS PANEL.

PRIORITY: 5

DISPOSITION: A WORK REQUEST HAS BEEN SUBMITTED TO FIX THE BROKEN COMPONENTS.

A11-46. HED NO: 12E1-2403

HED TITLE: NO PEN IDENTIFICATION LABELS FOR STRIP CHART RECORDERS ON THE INCORE MONITORING PANEL.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A11-47. HED NO: 1200-2409

HED TITLE: INCOMPATIBILITY BETWEEN RECORDER SCALES AND PAPER SCALES ON STRIP CHART RECORDERS.

PRIORITY: 5

DISPOSITION: INCORRECT SCALES WILL BE REPLACED WITHIN THE RECORDER SCALE REPLACEMENT PROJECT. THE CORRECT PAPER HAS BEEN PROVIDED IN THE RECORDERS.

A11-48. HED NO: 1200-2410

HED TITLE: IMPACT RECORDERS DO NOT PRODUCE LEGIBLE TRENDS; NUMBERS ARE TOO LIGHT AND PRINT OVER EACH OTHER.

PRIORITY: 5

DISPOSITION: A WORK REQUEST HAS BEEN SUBMITTED TO REPAIR THE RECORDERS.

A11-49. HED NO: 1200-2412

HED TITLE: TRENDS ON IMPACT RECORDERS ARE PARTIALLY OBSCURED BY WINDOW FRAMES.

PRIORITY: 5

DISPOSITION: OPERATORS CAN OPEN COVERS IF THEY HAVE PROBLEMS READING SCALES. THE HEDAT DETERMINED THAT FURTHER ACTION IS NOT REQUIRED, SINCE RECORDERS ARE USED FOR HISTORICAL TRENDING AND NOT PRIMARY INDICATIONS.

A11-50. HED NO: 1200-2414

HED TITLE: UNITS OF MEASURE NOT LABELED ON STRIP CHART RECORDERS.

PRIORITY: 5

DISPOSITION: UNIT LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A11-51. HED NO: 12E6-2416

HED TITLE: MULTIPLE-SCALE RADIATION MONITOR RECORDER LOCATED ON THE RMS PANEL IS DIFFICULT TO READ AND INTERPRET.

PRIORITY: 3

DISPOSITION: RECORDERS ARE USED FOR HISTORICAL PURPOSES AND PROVIDE TRENDING INFORMATION FOR POST EVENT DIAGNOSTICS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-52. HED NO: 1200-2418
HED TITLE: OPERATORS REPORT THAT SOME OF THE RECORDERS ON THE MAIN CONTROL BOARD AND TURBINE SUPERVISORY PANEL ARE THE ONLY SOURCE OF INDICATION AVAILABLE TO OPERATORS IN THE CONTROL ROOM.

PRIORITY: 2
DISPOSITION: THE OPERATORS HAVE THE CAPABILITY TO RETREIVE THE INFORMATION ON THE COMPUTER, OR THE INFORMATION CAN BE OBTAINED THROUGH LOCAL MEASUREMENTS.

A11-53. HED NO: 1200-2419
HED TITLE: CLOGGED PENS IN THE HAGAN RECORDERS MAKE IT DIFFICULT TO READ THE TRENDS.

PRIORITY: 3
DISPOSITION: OPERATORS SUBMIT A WORK REQUEST WHEN MAINTENANCE IS REQUIRED ON THESE RECORDERS.

A11-54. HED NO: 12A1-2420
HED TITLE: POWER RANGE RECORDER AND THE DELTA FLUX RECORDER FREQUENTLY HANG UP AT HIGH END OF THE SCALE.

PRIORITY: 5
DISPOSITION: PROBLEMS ARE HANDLED BY OPERATORS SUBMITTING A WORK REQUEST.

A11-55. HED NO: 1200-2422
HED TITLE: RECORDER SCALES AND SCALE LABELING FOR RECORDERS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 3
DISPOSITION: RECORDER SCALES WITH MULTIPLE PROBLEMS WILL BE CORRECTED WITHIN THE RECORDER SCALE REPLACEMENT PROJECT.

A11-56. HED NO: 12E6-2423

HED TITLE: RECORDER SCALES AND LABELS ON THE RMS PANEL DO NOT MEET CHARACTER HEIGHT OF READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 3

DISPOSITION: RECORDER SCALES WITH MULTIPLE PROBLEMS WILL BE CORRECTED WITHIN THE RECORDER SCALE REPLACEMENT PROJECT.

A11-57. HED NO: 1200-2424

HED TITLE: LABELS ON MULTI-PEN RECORDERS DO NOT IDENTIFY INK COLOR WITH PENS OR PARAMETERS.

PRIORITY: 3

DISPOSITION: LABELS WILL BE PROVIDED WITH CONTROL ROOM PAINTING AND RELABELING PROJECT.

A11-58. HED NO: 1200-2425

HED TITLE: COMPUTER TREND RECORDER POINTERS DO NOT MOVE OFF SCALE WHEN THE COMPUTER SYSTEM IS INOPERABLE.

PRIORITY: 3

DISPOSITION: COMPUTER TREND RECORDERS WILL HAVE LIMITED USE DUE TO THE IMPROVED TRENDING CAPABILITIES OF THE ERFIS COMPUTER.

A11-59. HED NO: 12E0-2426

HED TITLE: RECORDER SCALES AND LABELS ON TURBINE SUPERVISORY PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: RECORDERS ARE NOT USED IN EMERGENCY OPERATIONS. THE TRENDED INFORMATION IS USED FOR HISTORICAL PURPOSES ONLY. OPERATORS HAVE NO PROBLEMS READING THE RECORDER SCALES. SCALES WITH MULTIPLE PROBLEMS WILL BE REPLACED WITHIN THE RECORDER SCALE REPLACEMENT PROJECT.

A11-60. HED NO: 1200-2428

HED TITLE: GRADUATIONS DO NOT MEET CRITERIA FOR RECORDER SCALES LOCATED ON THE MAIN CONTROL BOARD: MORE THAN NINE GRADUATION MARKS BETWEEN NUMBERED MARKS.

PRIORITY: 5

DISPOSITION: RECORDER SCALES WILL BE REPLACED WITHIN THE RECORDER SCALE REPLACEMENT PROJECT.

A11-61. HED NO: 1200-2429

HED TITLE: GRADUATIONS DO NOT MEET CRITERIA FOR RECORDER SCALES LOCATED ON THE TURBINE SUPERVISORY AND RMS PANELS: MORE THAN NINE GRADUATION MARKS BETWEEN NUMBERED MARKS.

PRIORITY: 5

DISPOSITION: SCALES WILL BE REPLACED WITHIN THE RECORDER SCALE REPLACEMENT PROJECT.

A11-62. HED NO: 1200-2432

HED TITLE: SOME STRIP CHARTS WERE DEENERGIZED IN THE LOSS OF OFFSITE POWER EVENT.

PRIORITY: 2

DISPOSITION: REDUNDANT INDICATION WAS AVAILABLE FOR ALL THE FAILED RECORDERS. INFORMATION WAS RETRIEVED FOR DIAGNOSTIC PURPOSES FROM THE COMPUTER PRINTOUTS.

A11-63. HED NO: 1200-2503

HED TITLE: DRUM STYLE COUNTERS LOCATED ON THE MAIN CONTROL BOARD AND CONTROL ROOM BACKPANELS DO NOT HAVE MATT FINISH.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS READING THE COUNTERS. THERE ARE NO OBSERVED GLARE PROBLEMS WITH THESE COUNTERS. THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-64. **HED NO:** 1200-2504

HED TITLE: NUMERALS ON DRUM STYLE COUNTERS LOCATED ON THE CONTROL ROOM BACK PANELS DO NOT MEET READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: THE COUNTERS ARE NOT USED IN EMERGENCY OPERATIONS, THEY ARE USED FOR SURVEILLANCE TEST/MAINTENANCE PURPOSES ONLY. THEREFORE, THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-65. **HED NO:** 1200-2505

HED TITLE: NUMERALS ON DRUM STYLE COUNTERS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: THE BORIC ACID TOTALIZERS ARE THE ONLY COUNTERS USED IN EMERGENCY OPERATIONS. OPERATORS HAVE NO PROBLEMS READING THESE COUNTERS. THESE COUNTER DEVIATE FROM CHARACTER WIDTH CRITERIA BY 40%.

THE OTHER 14 COUNTERS ARE NOT USED IN EMERGENCY OPERATIONS AND THE OPERATORS HAVE NO PROBLEMS READING THESE COUNTERS. THESE COUNTERS DEVIATE FROM CHARACTER WIDTH CRITERIA BY 40% AND 28%. THEREFORE, THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-66. **HED NO:** 12E3-2708

HED TITLE: LOW BRIGHTNESS AND CONTRAST FOR PROJECTION DISPLAYS LOCATED ON THE SEQUENCE CONTROL PANEL LOCATED ON THE APDMS.

PRIORITY: 5

DISPOSITION: A WORK REQUEST HAS BEEN SUBMITTED TO CORRECT THESE DISPLAYS.

A11-67. HED NO: 12E7-2710

HED TITLE: A GROUP OF MORE THAN FOUR DIGITS ON THE DIGITAL COUNTER LOCATED ON THE NIS PANEL IS NOT SEPARATED BY A DECIMAL OR COMMA.

PRIORITY: 5

DISPOSITION: ADDING A DECIMAL OR COMMA WOULD REQUIRE REPLACING THE COUNTER. SINCE THE DISPLAYED VALUES ARE READ IN WHOLE NUMBERS THE HEDAT DETERMINED THAT REPLACING THE COUNTER WOULD NOT BE PRACTICAL.

A11-68. HED NO: 1200-2711

HED TITLE: NUMERALS ON ELECTRONIC DISPLAYS LOCATED ON THE CONTROL ROOM BACK PANELS DO NOT MEET READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: ONE COUNTER LOCATED ON THE NIS PANEL IS USED IN EMERGENCY OPERATIONS. IT IS A SOURCE RANGE, COUNTS PER SECOND COUNTER. OPERATORS HAVE OTHER PRIMARY INDICATION ON THE MAIN CONTROL BOARD TO DETERMINE SOURCE RANGE NEUTRON FLUX. THE NUMERALS DEVIATE FROM CRITERIA BY 14%, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

THE OTHER COUNTERS ARE USED FOR SURVEILLANCE PURPOSES ONLY, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A11-69. HED NO: 1200-2712

HED TITLE: NUMERALS ON ELECTRONIC COUNTERS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: THE TWO COUNTERS ARE NOT USED IN EMERGENCY PROCEDURES. THE NUMERALS DEVIATE FROM CRITERIA BY 14%. OPERATORS HAVE NO PROBLEMS READING THE COUNTERS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

HBR HED SUMMARY

LABELS AND LOCATION AIDS

APPENDIX A-12

A12-1. **HED NO:** 1200-1101
HED TITLE: THE USE OF THE WORD "CLOSE" ON POSITION LABELS IS NOT CONSISTENT; "CLOSE" IS USED FOR POSITION LABELS AND "SHUT" IS USED ON CORRESPONDING INDICATORS.

PRIORITY: 5
DISPOSITION: THE CONVENTION USED ON THE MAIN CONTROL BOARD IS TO USE OPEN/CLOSE FOR VALVE POSITION LABELS AND "SHUT/OPEN" FOR INDICATOR LIGHTS. THIS CONVENTION IS CONSISTENTLY APPLIED, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A12-2. **HED NO:** 1200-1103
HED TITLE: IMPERMANENT LABELS ARE USED THROUGHOUT THE CONTROL ROOM.

PRIORITY: 3
DISPOSITION: IMPERMANENT LABELS WILL BE REMOVED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-3. **HED NO:** 12A1-1104
HED TITLE: THREE VERTICAL METERS ON THE MAIN CONTROL BOARD ARE MISLABELED.

PRIORITY: 3
DISPOSITION: THE METERS HAVE BEEN RELABELED WITH THE CORRECT LABELS.

A12-4. **HED NO:** 12A1-1105
HED TITLE: LEGEND LIGHT IS NOT ENGRAVED WITH THE CORRECT ACCUMULATOR.

PRIORITY: 3
DISPOSITION: THE LEGEND LIGHT HAS BEEN CORRECTED.

A12-5. HED NO: 12B1-1106
HED TITLE: COMPONENT LABEL PRINT TOO SMALL TO READ ON THE ROD SPEED INDICATOR.

PRIORITY: 5
DISPOSITION: THE COMPONENT LABEL HAS BEEN REPLACED WITH A NEW LABEL.

A12-6. HED NO: 12E2-1111
HED TITLE: LABELS ARE MISSING ON ROTARY SWITCHES ON THE DETECTOR CURRENT COMPARATOR LOCATED ON THE NIS PANEL.

PRIORITY: 3
DISPOSITION: THE SWITCHES HAVE BEEN LABELED SPARE.

A12-7. HED NO: 12D1-1113
HED TITLE: OPERATORS STATED THAT PUSHBUTTON FUNCTION LABELS ARE NEEDED ON THE TURBINE EHC PANEL LOCATED ON THE MAIN CONTROL BOARD.

PRIORITY: 2
DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-8. HED NO: 12A1-1115
HED TITLE: OPERATORS STATE INFORMATION ON WARNING LABELS THAT ARE AFFIXED TO PANELS A AND D SHOULD BE PROVIDED IN PROCEDURES AND DELETED FROM THE CONTROL BOARD.

PRIORITY: 3
DISPOSITION: INFORMATION WILL BE PROVIDED IN THE APPROPRIATE PROCEDURES AND THE LABELS WILL BE DELETED FROM THE CONTROL BOARD WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-9. **HED NO:** 1200-1116

HED TITLE: OPERATORS STATE THAT THEY WOULD LIKE THE POWER SUPPLIES FOR CONTROLS IDENTIFIED ON CONTROL LABELS.

PRIORITY: 3

DISPOSITION: THIS INFORMATION WILL BE ADDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-10. **HED NO:** 12D1-1117

HED TITLE: INCORRECT VALVE NUMBER HAS BEEN ENGRAVED ON THE NW COND DUMP VALVE INDICATOR LIGHTS.

PRIORITY: 3

DISPOSITION: LEGEND LIGHTS WILL BE CORRECTED WITHIN THE LEGEND LIGHT RE-ENGRAVING PROJECT.

A12-11. **HED NO:** 12A1-1118

HED TITLE: LEGEND LIGHT ENGRAVING OF THE PRIMARY WATER PUMP A & RCS MAKEUP SYSTEM LIGHTS, LOCATED ON PANEL A, DO NOT MEET READABILITY CRITERIA: LIGHTS DEVIATE FROM STROKE WIDTH CRITERIA BY 34%.

PRIORITY: 5

DISPOSITION: LEGEND LIGHTS WITH MULTIPLE PROBLEMS WILL BE CORRECTED WITHIN THE LEGEND LIGHT RE-ENGRAVING PROJECT.

A12-12. **HED NO:** 1200-1119

HED TITLE: ENGRAVING OF LEGEND LIGHTS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET READABILITY CRITERIA: ENGRAVINGS EXCEED STROKE WIDTH CRITERIA BY 20%, DEVIATE FROM SPACE BETWEEN CHARACTERS CRITERIA BY 40% AND DEVIATE FROM SPACE BETWEEN LINES CRITERIA BY 20%.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS READING THE LEGENDS ON THE INDICATOR LIGHTS. LEGENDS WITH MULTIPLE PROBLEMS WILL BE CORRECTED WITHIN THE LEGEND LIGHT RE-ENGRAVING PROJECT.

A12-13. HED NO: 12A1-1120

HED TITLE: LARGER ENGRAVED CHARACTERS FOR LEGEND LIGHTS LOCATED ON PANEL A DO NOT MEET READABILITY CRITERIA: SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 50%; SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 33%.

PRIORITY: 5

DISPOSITION: LEGENDS WILL BE CORRECTED WITHIN THE LEGEND LIGHT RE-ENGRAVING PROJECT.

A12-14. HED NO: 12B1-1121

HED TITLE: CONTROL POSITION LABELS FOR THE NIS CHANNEL SELECTOR CONTROL MODULES DO NOT MEET READABILITY CRITERIA: CHARACTER WIDTH DEVIATED FROM CRITERIA BY 16%.

PRIORITY: 5

DISPOSITION: THE CONTROLS ARE USED FOR STARTUPS AND CONTROLLED SHUTDOWNS. THE SWITCHES WOULD HAVE TO BE REPLACED TO CORRECT THE LABELS, WHICH IS IMPRACTICAL. OPERATORS HAVE NO PROBLEMS READING THE POSITION LABELS, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A12-15. HED NO: 1200-1122

HED TITLE: POSITION LABELS FOR PROCESS CONTROLLERS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET READABILITY CRITERIA: STROKE WIDTH EXCEEDS CRITERIA BY 20%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 70%.

PRIORITY: 5

DISPOSITION: LABELS HAVE BEEN ADDED TO THE CONTROLLERS TO SERVE AS AN OPERATOR AID INDICATING THE OPEN AND CLOSE DIRECTION ON THE % OUTPUT METER. THE SIZE OF THE CONTROLLER LIMITS THE SIZE OF THE LABEL. OPERATORS HAVE NO PROBLEMS READING THE LABEL, THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A12-16. HED NO: 12B1-1123

HED TITLE: CONTROL POSITION LABELS FOR ROTARY CONTROLS, LOCATED ON PANEL B DO NOT MEET READABILITY CRITERIA: STROKE WIDTH EXCEEDS CRITERIA BY 20%; CHARACTER WIDTH DEVIATES FROM CRITERIA BY 17%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED SO THEY ARE CONSISTENT WITH OTHER POSITION LABELS ON THE MAIN CONTROL BOARD WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-17. HED NO: 12B1-1124

HED TITLE: COMPONENT LABELS FOR PUSHBUTTON CONTROLS, LOCATED ON PANEL B, DO NOT MEET READABILITY CRITERIA: STROKE WIDTH EXCEEDS CRITERIA BY 50%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 25%; SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 75%.

PRIORITY: 4

DISPOSITION: LABELS WILL BE REPLACED SO THEY ARE CONSISTENT WITH OTHER POSITION LABELS ON THE MAIN CONTROL BOARD WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-18. HED NO: 12D1-1125

HED TITLE: COMPONENT IDENTIFICATION LABELS FOR THE TURBINE EH CONTROL PANEL LOCATED ON PANEL D, DO NOT MEET READABILITY CRITERIA: STROKE WIDTH EXCEEDS CRITERIA BY 50%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-19. HED NO: 12D1-1126

HED TITLE: COMPONENT IDENTIFICATION LABELS FOR THE GOVERNOR VALVE CONTROL PANEL LOCATED ON PANEL D, DO NOT MEET READABILITY CRITERIA: STROKE WIDTH EXCEEDS CRITERIA BY 50%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-20. HED NO: 12A1-1127

HED TITLE: COMPONENT LABELS FOR THE CONTAINMENT ISOLATION PUSHBUTTONS LOCATED ON PANEL A, DO NOT MEET READABILITY CRITERIA: STROKE WIDTH EXCEEDS CRITERIA BY 100%; CHARACTER WIDTH DEVIATES FROM CRITERIA BY 33%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-21. HED NO: 12B1-1128

HED TITLE: COMPONENT LABEL FOR THE ROD SPEED METER LOCATED ON PANEL B, DOES NOT MEET READABILITY CRITERIA: STROKE WIDTH DEVIATES FROM CRITERIA BY 20%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 60%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-22. HED NO: 12B1-1129

HED TITLE: COMPONENT LABELS FOR CONTROLS LOCATED ON PANEL B DO NOT MEET READABILITY CRITERIA: STROKE WIDTH DEVIATES FROM CRITERIA BY 11%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 55%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 14%; AND SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 20% TO 57%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED SO THEY ARE CONSISTENT WITH OTHER POSITION LABELS ON THE MAIN CONTROL BOARD WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-23. HED NO: 12B1-1130

HED TITLE: COMPONENT LABELS FOR THE BORIC ACID TOTALIZER AND THE PRIMARY WATER TOTALIZER PROCESS CONTROLLERS LOCATED ON PANEL B DO NOT MEET READABILITY CRITERIA: STROKE WIDTH EXCEEDS CRITERIA BY 50%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 50%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 25%; AND SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 37%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-24. HED NO: 12A1-1131

HED TITLE: COMPONENT LABELS FOR PROCESS CONTROLLER LOCATED ON PANEL A DO NOT MEET READABILITY CRITERIA: STROKE WIDTH EXCEEDS CRITERIA BY 50%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-25. HED NO: 1200-1132

HED TITLE: INSTRUMENT LABELS FOR PROCESS CONTROLLERS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET READABILITY CRITERIA: STROKE WIDTH EXCEEDS CRITERIA BY 20%; CHARACTER WIDTH DEVIATES FROM CRITERIA BY 17%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-26. HED NO: 1200-1133

HED TITLE: COMPONENT LABELS FOR VERTICAL METERS LOCATED ON THE MAIN CONTROL BOARD, DO NOT MEET READABILITY CRITERIA: STROKE WIDTH DEVIATES FROM CRITERIA BY 20%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-27. HED NO: 1200-1134

HED TITLE: GROUP LABELS ABOVE METERS LOCATED ON THE MAIN CONTROL BOARD DO NOT MEET READABILITY CRITERIA: STROKE WIDTH DEVIATES FROM CRITERIA BY 33%; CHARACTER WIDTH DEVIATES FROM CRITERIA BY 16%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-28. HED NO: 12D1-1137

HED TITLE: GROUP LABEL FOR THE GOVERNOR VALVE CONTROL PANEL LOCATED ON PANEL D DOES NOT MEET READABILITY CRITERIA: STROKE WIDTH EXCEEDS CRITERIA BY 28%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 14% TO 20%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-29. HED NO: 12B1-1138

HED TITLE: CONTROL POSITION LABELS FOR THE ROD GROUP SELECTOR CONTROLS DO NOT MEET READABILITY CRITERIA: CHARACTER WIDTH DEVIATES FROM CRITERIA BY 16%.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS READING LABELS. THE SWITCH WOULD HAVE TO BE REPLACED TO CORRECT THE LABELS, WHICH IS IMPRACTICAL. THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A12-30. HED NO: 12B1-1139

HED TITLE: ROD MOTION LEVER CONTROL LABEL LOCATED ON PANEL B DOES NOT MEET READABILITY CRITERIA: CHARACTER WIDTH DEVIATES FROM CRITERIA BY 36%.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS READING THE LABEL. THE SWITCH WOULD HAVE TO BE REPLACED TO CORRECT THE LABELS, WHICH IS IMPRACTICAL. THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A12-31. HED NO: 1200-1140

HED TITLE: CHARACTER HEIGHT OF COMPONENT LABEL LETTERING ON THE MAIN CONTROL BOARD IS TOO SMALL BASED ON MAXIMUM VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED SO THEY ARE CONSISTENT WITH OTHER LABELS ON THE MAIN CONTROL BOARD, WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-32. HED NO: 12E6-1141

HED TITLE: TAPE IS USED TO COVER AN ANNUNCIATOR ENGRAVING ON THE DEDICATED SHUTDOWN ANNUNCIATOR PANEL LOCATED ON THE RMS PANEL.

PRIORITY: 3

DISPOSITION: THE TAPE HAS BEEN REMOVED AND A PERMANENTLY ENGRAVED ANNUNCIATOR TILE HAS BEEN PROVIDED.

A12-33. **HED NO:** 1200-1142

HED TITLE: LABELING WITHIN VERTICAL METERS IS ORIENTED VERTICALLY AND NO HORIZONTAL FUNCTIONAL LABELS ARE PROVIDED ON THE MAIN CONTROL PANEL.

PRIORITY: 5

DISPOSITION: SPACE PROHIBITS HORIZONTAL FUNCTIONAL LABELS FOR ALL THE VERTICAL METERS. GROUP LABELS ARE PROVIDED ABOVE EACH GROUP OF METERS. THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A12-34. **HED NO:** 1200-1143

HED TITLE: IMPERMANENT HANDWRITTEN SCALES USED ON METERS LOCATED ON THE MAIN CONTROL BOARD AND THE CORE COOLING MONITORING PANEL.

PRIORITY: 3

DISPOSITION: SCALES WILL BE REPLACED WITH THE METER SCALE REPLACEMENT PROJECT.

A12-35. **HED NO:** 12D1-1144

HED TITLE: NO HIERARCHICAL LABELING SCHEME USED ON THE GOVERNOR VALVE POSITION PANEL LOCATED ON PANEL D.

PRIORITY: 5

DISPOSITION: LABELS WILL BE CORRECTED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-36. **HED NO:** 12D1-1145

HED TITLE: FUNCTION ID LABELS FOR THE EXCITER AIR DISCHARGE TEMP METER AND THE GEN HYDROGEN PRESS METER LOCATED ON PANEL D IS NOT PROVIDED.

PRIORITY: 5

DISPOSITION: LABEL WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-37. **HED NO:** 1200-1146

HED TITLE: FUNCTION AND/OR EQUIPMENT IDENTIFICATION LABEL IS NOT PROVIDED FOR A METER LOCATED ON PANEL B.

PRIORITY: 5

DISPOSITION: LABEL WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-38. **HED NO:** 12E5-1147

HED TITLE: FUNCTION LABELS ARE MISSING FOR CIRCULAR METERS LOCATED ON THE LINE PANEL.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-39. **HED NO:** 12E6-1148

HED TITLE: INCONSISTENT USE OF ABBREVIATIONS FOR UNITS LABELS BETWEEN METERS LOCATED ON THE RMS PANEL.

PRIORITY: 5

DISPOSITION: BOTH ABBREVIATIONS USED MEAN THE SAME THING ON THIS PANEL. CONFUSING MR/HR AND mR/h IS NOT LIKELY TO OCCUR. THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A12-40. **HED NO:** 12A1-1149

HED TITLE: ROMAN NUMERALS ARE INCONSISTENTLY USED AS CHANNEL IDENTIFIERS IN LABELS; NOT ALL CHANNEL IDENTIFIERS ARE DESIGNATED IN ROMAN NUMERALS.

PRIORITY: 5

DISPOSITION: CHANNEL IDENTIFIERS WILL BE CHANGED TO ROMAN NUMERALS ON THE CORE COOL MONITORING PANEL TO CONFORM TO THE CONTROL ROOM CONVENTION OF USING ROMAN NUMERALS FOR CHANNEL IDENTIFIERS WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-41. HED NO: 12E1-1151

HED TITLE: LABELS FOR INDICATOR LIGHTS LOCATED ABOVE EYE LEVEL ON THE INCORE MONITORING PANEL ARE DIFFICULT TO READ.

PRIORITY: 5

DISPOSITION: LABELS WILL BE RELOCATED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-42. HED NO: 12E5-1152

HED TITLE: LOCATION LABELS ON THE LINE PANEL NEAR LEGEND LIGHTS ARE IMPERMANENT HANDWRITTEN LABELS.

PRIORITY: 3

DISPOSITION: PERMANENT, ENGRAVED LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-43. HED NO: 12E0-1153

HED TITLE: VIBRATION ALARM PANEL FUNCTION LABEL LOCATED ON THE TURBINE SUPERVISORY PANEL DOES NOT ADEQUATELY IDENTIFY EQUIPMENT MONITORED.

PRIORITY: 5

DISPOSITION: AN ANNUNCIATOR ALERTS THE OPERATOR TO THE PANEL. A LABEL WHICH PROVIDES THE INFORMATION REQUIRED TO INTERPRET THIS PANEL IS LOCATED ON AN ASSOCIATED RECORDER DIRECTLY ABOVE. OPERATORS HAVE NO PROBLEM WITH THE CURRENT LABEL. THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A12-44. HED NO: 12A1-1154

HED TITLE: LEGEND LIGHT ON THE SAFETY INJECTION BISTABLE PANEL LOCATED ON PANEL A IS AN IMPERMANENT, HANDWRITTEN LEGEND.

PRIORITY: 5

DISPOSITION: THE LEGEND LIGHT HAS BEEN REPLACED WITH AN ENGRAVED LEGEND LIGHT.

A12-45. HED NO: 12E6-1155

HED TITLE: FUNCTION LABELS ARE MISSING FOR THE GREEN POWER ON INDICATOR LIGHTS LOCATED ON THE PZR SAFETY RELIEF VALVE MONITOR MODULES ON THE RMS PANEL.

PRIORITY: 3

DISPOSITION: COMPONENTS WILL BE REMOVED WITHIN THE PZR SAFETY RELIEF VALVE MONITOR REMOVAL PROJECT.

A12-46. HED NO: 12E6-1156

HED TITLE: FUNCTIONAL RELATIONSHIP BETWEEN CONTROLS AND ASSOCIATED INDICATOR LIGHTS IS NOT OBVIOUS ON THE CHANNEL R11/R12 MODULE LOCATED ON THE RMS PANEL.

PRIORITY: 2

DISPOSITION: FUNCTIONAL RELATIONSHIP WILL BE CLARIFIED WITH LABELING AND DEMARCATION WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-47. HED NO: 1200-1157

HED TITLE: COORDINATE LABELS ARE NOT PROVIDED ON THE STATUS LIGHT BOXES LOCATED ON THE MAIN CONTROL BOARD.

PRIORITY: 5

DISPOSITION: THE INDIVIDUAL LIGHTS ARE NOT REFERENCED BY LOCATION; THEY ARE REFERENCED BY LEGEND TITLE, THEREFORE THE HEDAT DETERMINED THAT COORDINATE LABELS ARE NOT NECESSARY.

A12-48. HED NO: 12D1-1158

HED TITLE: LEGEND LIGHT ENGRAVINGS LOCATED ON PANEL D ARE VERTICALLY ORIENTED.

PRIORITY: 5

DISPOSITION: THE LEGEND LIGHTS HAVE BEEN RE-ENGRAVED WITH HORIZONTAL LABELS.

A12-49. HED NO: 12E6-1159
HED TITLE: LABELS ARE OBSCURED BY CONTROLS OR DISPLAYS LOCATED ABOVE OR BELOW EYE LEVEL ON THE RMS PANEL.

PRIORITY: 5
DISPOSITION: LABELS WILL BE MOVED BELOW CONTROLS/DISPLAYS FOR COMPONENTS LOCATED ABOVE EYE LEVEL AND LABELS WILL BE MOVED ABOVE THE CONTROLS FOR COMPONENTS LOCATED BELOW EYE LEVEL WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-50. HED NO: 1200-1160
HED TITLE: STRIP CHART RECORDERS LOCATED ON THE INCORE MONITORING PANEL AND THE TURBINE SUPERVISORY PANEL HAVE NO COMPONENT/FUNCTIONS LABELS.

PRIORITY: 5
DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-51. HED NO: 12B1-1161
HED TITLE: LABELS OBSCURE TRENDS ON NUCLEAR POWER RANGE RECORDER AND THE CONTROL BANK POSITION-RIL RECORDER LOCATED ON PANEL B.

PRIORITY: 5
DISPOSITION: NEW LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-52. HED NO: 12E5-1162
HED TITLE: COUNTERS ON THE LINE PANEL HAVE NO FUNCTION LABELS.

PRIORITY: 5
DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-53. HED NO: 12D1-1163

HED TITLE: MIMICS USED AS OPERATOR AIDS ON THE MAIN CONTROL BOARD DO NOT HAVE FUNCTION LABELS AND COLOR CODING.

PRIORITY: 5

DISPOSITION: COLOR CODING OF THESE MIMICS IS NOT APPLICABLE. FUNCTION LABELS WILL BE ADDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-54. HED NO: 12E5-1164

HED TITLE: LINE WIDTH DIFFERENTIATION AND DIRECTIONAL ARROWS ARE NOT INCLUDED FOR THE ELECTRICAL DISTRIBUTION MIMIC ON LINE PANEL.

PRIORITY: 5

DISPOSITION: LINES ARE USED TO INDICATE ELECTRICAL CONNECTIONS; DIFFERENTIAL LINE WIDTHS WOULD NOT BE APPLICABLE. ARROWS ARE NOT MEANINGFUL ON THIS MIMIC BECAUSE THE ELECTRICAL CURRENT CAN FLOW IN EITHER DIRECTION.

A12-55. HED NO: 12E3-1165

HED TITLE: FUNCTION LABELS ARE OBSCURED BY PROJECTION DISPLAYS LOCATED ABOVE EYE LEVEL ON THE APDMS.

PRIORITY: 5

DISPOSITION: LABELS WILL BE RELOCATED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-56. HED NO: 12E1-1166

HED TITLE: UNIT LABELS ARE NOT PROVIDED FOR THE DETECTOR READOUT PROJECTION DISPLAYS LOCATED ON THE INCORE MONITORING PANEL.

PRIORITY: 5

DISPOSITION: DISPLAYS ARE USED FOR SURVEILLANCE FUNCTIONS ONLY. THE DISPLAYS INDICATE RELATIVE POSITION ONLY, THEREFORE UNITS ARE NOT IMPORTANT. THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A12-57. HED NO: 12E2-1167
HED TITLE: LABELS ARE DIFFICULT TO ASSOCIATE WITH RELATED CONTROLS/DISPLAYS ON THE SCALER TIMER UNIT ON THE NIS PANEL.

PRIORITY: 5
DISPOSITION: LABELS WILL BE CORRECTED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-58. HED NO: 12E6-1168
HED TITLE: THE PZR SAFETY RELIEF VALVE MONITOR CONTROLS LOCATED ON THE RMS PANEL DO NOT HAVE FUNCTION LABELS.

PRIORITY: 5
DISPOSITION: THE MONITORS WILL BE REMOVED IN THE PZR SAFETY RELIEF VALVE MONITORS REMOVAL PROJECT.

A12-59. HED NO: 12C1-1169
HED TITLE: GROUP LABELS FOR THE PROCESS FLOW CONTROLLERS LOCATED ON PANEL C ARE NOT PROVIDED.

PRIORITY: 5
DISPOSITION: FUNCTIONAL LABELS HAVE BEEN ADDED TO THE CONTROLLERS. THERE IS NO SPACE AVAILABLE ON THE MAIN CONTROL BOARD FOR GROUP LABELS FOR THESE CONTROLLERS.

A12-60. HED NO: 12E2-1170
HED TITLE: THE PROCESS CONTROLLER ON THE OPERATION SELECTOR MODULE ON THE NIS PANEL DOES NOT HAVE A FUNCTION LABEL.

PRIORITY: 3
DISPOSITION: A FUNCTION LABEL HAS BEEN ADDED.

A12-61. HED NO: 12E1-1171

HED TITLE: RANGE OF CONTROL MOVEMENT LABELING IS NOT PROVIDED FOR THE DETECTOR READOUT, VOLTS ADJUST CONTROLS LOCATED ON THE INCORE MONITORING PANEL.

PRIORITY: 5

DISPOSITION: STOPS ARE BUILT INTO THE SWITCH. WHEN ADJUSTMENTS ARE MADE THE OPERATOR IS WATCHING A METER FOR THE AMOUNT OF INCREASE NEEDED, THEREFORE THE HEDAT DETERMINED THAT ADDITIONAL LABELING IS NOT NEEDED. THESE CONTROLS ARE USED FOR SURVEILLANCE FUNCTIONS ONLY AND ARE NOT USED IN EMERGENCY PROCEDURES.

A12-62. HED NO: 12E5-1172

HED TITLE: TAPE IS COVERING PORTIONS OF THE GOV FLUID RESERVOIR LEV LO LABEL LOCATED ON THE TURBINE SUPERVISORY PANEL.

PRIORITY: 5

DISPOSITION: TAPE HAS BEEN REMOVED.

A12-63. HED NO: 12E5-1173

HED TITLE: BREAKER IDENTIFICATION LABEL IS INCORRECT ON THE LINE PANEL AND THE OPERATORS HAVE FIXED THE LABEL WITH IMPERMANENT LABELING.

PRIORITY: 5

DISPOSITION: LABELS WILL BE CORRECTED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-64. HED NO: 12E5-1174

HED TITLE: EQUIPMENT IS NOT IDENTIFIED ADEQUATELY ON THE FUNCTION LABEL FOR THE VOLTMETER CONTROL LOCATED ON THE LINE PANEL.

PRIORITY: 5

DISPOSITION: LABELS WILL BE CORRECTED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-65. HED NO: 12E5-1175

HED TITLE: POSITION LABELS ARE OBSCURED BY CONTROLS ON THE LARGE ROTARY CONTROL SWITCHES LOCATED ON THE LINE PANEL.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE MINIMAL INTERFACE WITH THE MAJORITY OF THESE CONTROLS. THE CONTROLS USED FREQUENTLY ARE THE SYNCH SWITCHES AND THE WATTS/VARS SWITCHES. THE SYNCH. SWITCHES ARE USED FOR TESTING ONCE A SHIFT AND THE WATTS/VARS SWITCHES ARE USED FOR TESTING ONCE AN HOUR.

BECAUSE THE SWITCHES ARE CONSISTENT AND CAN BE VIEWED BY STEPPING TO THE SIDE OF THE CONTROL THE HEDAT DETERMINED THAT CHANGING THE SWITCH POSITION LABELS WOULD NOT BE PRACTICAL. SINCE CHANGING THE SWITCH PLATES WOULD REQUIRE THE REPLACEMENT OF THE SWITCHES.

A12-66. HED NO: 1200-1176

HED TITLE: SWITCH POSITION LABELS THAT READ "PULL OUT" INDICATES A PULL-TO-DEFEAT (LOCK) FUNCTION. THIS CONVENTION IS NOT CONSISTENTLY APPLIED TO ALL THE PULL-TO-LOCK SWITCHES ON THE LINE PANEL AND THE TURBINE SUPERVISORY PANEL.

PRIORITY: 3

DISPOSITION: THE SWITCH POSITION ON THE TURBINE SUPERVISORY PANEL WILL BE LABELED TO BE CONSISTENT WITH THE OTHER PULL-TO-LOCK SWITCHES WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-67. HED NO: 12D1-1177

HED TITLE: IMPERMANENT HANDWRITTEN POSITION INDICATION LABEL IS SMEARED AND UNREADABLE ON THE CONT RM FILTER & EXH FANS HVE 16 & 19 CONTROLS, LOCATED ON THE MAIN CONTROL BOARD.

PRIORITY: 3

DISPOSITION: THE POSITION LABEL HAS BEEN REPLACED WITH A PERMANENT, ENGRAVED LABEL.

A12-68. **HED NO:** 1200-1178

HED TITLE: LOCK SWITCH IS UNLABELED ON THE CONTINUOUS ROTARY CONTROLS (POTENTIOMETERS).

PRIORITY: 4

DISPOSITION: THE STANDARD PRACTICE IN THE OPERATION OF THESE CONTROLS IS TO UNLOCK THE SWITCH, ADJUST THE SWITCH AND RELOCK THE SWITCH. NONE OF THE SWITCHES ARE LOCATED ON THE EDGE OF THE PANELS. THEREFORE, THE HEDAT DETERMINED THAT THE POTENTIAL FOR ACCIDENTAL ACTIVATION IS NOT LIKELY.

A12-69. **HED NO:** 12D1-1179

HED TITLE: INCORRECT LABELING OF CONTROL POSITIONS ON THE EXHAUST HOOD SPRAY A (B) CONTROL SWITCHES LOCATED ON PANEL D.

PRIORITY: 3

DISPOSITION: THE LABELS WILL BE CORRECTED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-70. **HED NO:** 12C1-1180

HED TITLE: POSITION LABELS FOR RECORDER CHANNEL SELECTOR SWITCHES ARE LOCATED BELOW THE CONTROLS.

PRIORITY: 3

DISPOSITION: LABELS HAVE BEEN REPLACED AND ARE NOW LOCATED ABOVE THE CONTROLS.

A12-71. **HED NO:** 12E1-1181

HED TITLE: INCONSISTENCY BETWEEN PANEL LABELS AND PANEL SELECTOR SWITCH LABELS ON THE SWITCHOVER PANEL LOCATED ON THE INCORE MONITORING PANEL.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-72. HED NO: 12E1-1182

HED TITLE: ROTARY CONTROL SELECTOR SWITCHES LOCATED ON THE INCORE MONITORING PANEL HAVE NO FUNCTION LABELS.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-73. HED NO: 12D1-1183

HED TITLE: ROTARY CONTROL SWITCH LOCATED ON PANEL D HAS NO FUNCTION LABEL AND THE SWITCH PLATE OBSCURES THE POSITION LABELS.

PRIORITY: 3

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-74. HED NO: 1200-1184

HED TITLE: NO HIERARCHICAL LABELING SCHEME APPLIED TO FUNCTION AND POSITION LABELS.

PRIORITY: 3

DISPOSITION: HIERARCHICAL LABELING WILL BE INCORPORATED INTO THE RELABELING OF THE PANEL WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-75. HED NO: 12E5-1185

HED TITLE: NO HIERARCHICAL LABELING SCHEME HAS BEEN APPLIED TO LABELS ON THE LINE PANEL.

PRIORITY: 5

DISPOSITION: HIERARCHICAL LABELING WILL BE INCORPORATED INTO THE RELABELING OF THE PANEL WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-76. HED NO: 12E6-1186

HED TITLE: POSITION LABEL LOCATION FOR THE ROTARY CONTROL SWITCH PLATES LOCATED ON THE RMS PANEL VIOLATE CONVENTION.

PRIORITY: 5

DISPOSITION: LABEL HAS BEEN CORRECTED.

A12-77. HED NO: 12E5-1187

HED TITLE: FUNCTIONAL RELATIONSHIP BETWEEN VOLTMETER CONTROL AND CHART RECORDER LOCATED ON THE LINE PANEL IS NOT APPARENT.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-78. HED NO: 12E1-1188

HED TITLE: IMPERMANENT LABELS ARE USED ON THE INCORE MONITORING SYSTEM PANEL.

PRIORITY: 3

DISPOSITION: LABELS WILL BE REPLACED WITH ENGRAVED PERMANENT LABELS WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-79. HED NO: 12E5-1189

HED TITLE: FUNCTION LABELS FOR LOCKOUT CONTROLS LOCATED ON THE LINE PANEL ARE NOT PROVIDED.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-80. HED NO: 12E5-1190

HED TITLE: SERVICE AREA IS NOT IDENTIFIED ON FUNCTION LABEL FOR RECLOSER CUTOUT CONTROLS LOCATED ON THE LINE PANEL.

PRIORITY: 5

DISPOSITION: THE HEDAT DETERMINED THAT THE SERVICE AREA IS OBVIOUS BY SWITCH LOCATION AND NO ADDITIONAL LABELING IS NECESSARY.

A12-81.HED NO: 12D1-1191

HED TITLE: CLOSE POSITION NOT LABELED AND THE AUTO POSITION IS NOT LOCATED IN THE CENTER POSITION ON THE FEEDWATER PUMP A (B) RECIRC VALVE CONTROL SWITCHES.

PRIORITY: 5

DISPOSITION: LABELING IS CORRECT. VALVES ARE CONTROLLED AUTOMATICALLY BY A LOCAL PROCESSOR AND THE OPERATOR DOES NOT HAVE OR NEED THE CAPABILITY TO CLOSE THE VALVES MANUALLY FROM THE CONTROL ROOM.

A12-82.HED NO: 12G1-1192

HED TITLE: IMPERMANENT LABEL PARTIALLY OBSCURES POSITION LABELS ON KEY-OPERATED SECURITY SWITCH ON THE COMPUTER SYSTEM KEYBOARD.

PRIORITY: 5

DISPOSITION: CONSOLE WILL BE REPLACED WITH NEW ERFIS CONSOLE WITHIN THE ERFIS PROJECT.

A12-83.HED NO: 12E2-1193

HED TITLE: POSITION LABELS ON THE TOGGLE SWITCH FOR THE POWER TO SCALER TIMER UNIT LOCATED ON THE NIS PANEL ARE NOT PROVIDED.

PRIORITY: 5

DISPOSITION: LABEL WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-84.HED NO: 12E1-1194

HED TITLE: NO FUNCTION LABELS FOR THE TOGGLE SWITCHES ON THE DETECTOR READOUT PANELS LOCATED ON THE INCORE MONITORING PANEL.

PRIORITY: 5

DISPOSITION: FUNCTION LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-85. HED NO: 12E0-1195
HED TITLE: NO FUNCTION LABELS ON THE TIMER VALVE ASSEMBLY LOCATED ON THE TURBINE SUPERVISORY PANEL.

PRIORITY: 3
DISPOSITION: LABELS HAVE BEEN PROVIDED.

A12-86. HED NO: 12E5-1196
HED TITLE: NO FUNCTION LABELS FOR THE TOGGLE SWITCHES LOCATED ON THE LINE PANEL.

PRIORITY: 5
DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-87. HED NO: 12E3-1197
HED TITLE: LABELS ARE LOCATED BELOW COMPONENTS ON THE APDMS PANEL SO THAT THE LABELS ARE OBSCURED BY THE COMPONENT.

PRIORITY: 5
DISPOSITION: LABELS WILL BE RELOCATED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-88. HED NO: 12E6-1198
HED TITLE: PUSHBUTTON CONTROLS LOCATED ON THE RMS PANEL DO NOT HAVE FUNCTION LABELS.

PRIORITY: 3
DISPOSITION: LABELS HAVE BEEN ADDED.

A12-89. HED NO: 12A1-1199
HED TITLE: LABELS ARE PLACED TOO FAR ABOVE THE VIBRA RESET PUSHBUTTONS LOCATED ON PANEL A, THEREFORE THE ASSOCIATION IS NOT CLEAR.

PRIORITY: 5
DISPOSITION: LABELS WILL BE MOVED DOWN WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-90. HED NO: 12F2-11100

HED TITLE: RESET LEVERS ARE NOT LABELED ON RELAY MODULES LOCATED ON THE GENERATOR/AUXILIARY RELAY PANEL.

PRIORITY: 5

DISPOSITION: THE RELAYS ARE AN INDUSTRY STANDARD, AND THERE IS NO ROOM TO ADD ADDITIONAL LABELS. THE LEVERS ARE NOT USED BY OPERATORS, THEY ARE RESET BY THE ELECTRICIANS. THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A12-91. HED NO: 12E6-11101

HED TITLE: FUNCTIONAL RELATIONSHIP BETWEEN VALVE MONITOR PUSHBUTTONS AND INDICATOR LIGHTS LOCATED ON THE RMS PANEL IS NOT OBVIOUS.

PRIORITY: 5

DISPOSITION: THE MONITORS WILL BE REMOVED WITHIN THE PZR SAFETY RELIEF VALVE MONITOR REMOVAL PROJECT.

A12-92. HED NO: 12E1-11102

HED TITLE: FUNCTION LABELS DO NOT CONTAIN EQUIPMENT IDENTIFICATION INFORMATION FOR TEST PUSHBUTTONS LOCATED ON THE TURBINE SUPERVISORY PANEL.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-93.	**HED NO:**	1200-11103
	HED TITLE:	BISTABLE STATUS LIGHT ENGRAVING DOES NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: CHARACTER HEIGHT DEVIATES FROM CRITERIA BY 15%; SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 43%.
	PRIORITY:	5
	DISPOSITION:	OPERATORS HAVE NO PROBLEMS READING THE LEGENDS. TILES ARE A SIZE THAT WOULD REQUIRE DELETING CHARACTERS IF CHARACTER SIZE IS INCREASED. THE HEDAT DETERMINED THAT ALL THE INFORMATION WITHIN THE TILES IS NEEDED.
A12-94.	**HED NO:**	1200-11104
	HED TITLE:	BYPASS PERMISSIVE STATUS LIGHT ENGRAVING DOES NOT MEET READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 43% AND EXCEEDS CRITERIA BY 20%, SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 67% AND 76%, SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 17% AND 43%, AND SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 25% TO 43%.
	PRIORITY:	5
	DISPOSITION:	LIGHTS PROVIDE SPECIFIC INFORMATION FOR OTHER ANNUNCIATORS THAT HAVE COME IN, OR THEY PROVIDE STATUS OF CONTROL SYSTEMS. OPERATORS HAVE NO PROBLEMS READING THESE LEGENDS. THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A12-95. HED NO: 1200-11105

HED TITLE: ANNUNCIATOR PANEL ID AND SUMMARY LABELS DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: CHARACTER HEIGHT FOR THE SUMMARY LABEL DEVIATES FROM CRITERIA BY 15%; STROKE WIDTH DEVIATES FROM CRITERIA BY 69% AND 71%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 14% AND 58%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 40% AND 12%; AND SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 14% AND 15%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-96. HED NO: 1200-11106

HED TITLE: INCONSISTENCY BETWEEN WORDS AND ABBREVIATIONS USED ON COMPONENT LABELS AND ANNUNCIATOR TILE ENGRAVINGS.

PRIORITY: 5

DISPOSITION: ABBREVIATIONS WILL BE STANDARDIZED WITH THE RELABELING OF THE CONTROL BOARDS WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-97. HED NO: 12E0-11107

HED TITLE: LABELS ON TURBINE SUPERVISORY PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 42%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 42%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 28%; AND CHARACTER HEIGHT DEVIATES FROM CRITERIA BY 43% TO 49%.

PRIORITY: 5

DISPOSITION: THE LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-98. HED NO: 12EO-11108

HED TITLE: LABELS ON THE INCORE MONITORING PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 64% TO 24%; CHARACTER HEIGHT DEVIATES FROM CRITERIA BY 59% TO 18%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-99. HED NO: 12E6-11109

HED TITLE: LABELS ON THE RMS PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 50%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 75% AND 50%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 58% TO 17%; AND SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 62% TO 25%; CHARACTER HEIGHT DEVIATES FROM CRITERIA BY 75% TO 12%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-100. HED NO: 12E3-11111

HED TITLE: LABELS ON THE APDMS PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 33% TO 27%; CHARACTER HEIGHTS DEVIATES FROM CRITERIA BY 43% TO 9%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 39% TO 20%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-101. HED NO: 12E2-11112

HED TITLE: LEGEND LIGHT LABELING ON THE NIS PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 20%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 60%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 33%; AND SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 39%; CHARACTER HEIGHT DEVIATES FROM CRITERIA BY 19%; AND CHARACTER WIDTH DEVIATES FROM CRITERIA BY 33%

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS READING THE LEGEND LIGHTS. THE INDICATIONS ARE REDUNDANT FOR INDICATORS ON THE MAIN CONTROL BOARD. MOST OF THE LIGHTS ARE USED FOR SURVEILLANCE TEST PURPOSES ONLY. THEREFORE THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A12-102. HED NO: 12E6-11113

HED TITLE: LABELS ON THE NIS PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 140% TO 20%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 11% TO 60%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 88% TO 25%; AND SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 59% TO 27%; CHARACTER HEIGHT DEVIATES FROM CRITERIA BY 59% TO 29%; AND CHARACTER WIDTH DEVIATES FROM CRITERIA BY 40% TO 4%.

PRIORITY: 5

DISPOSITION: LABELS WITH SIGNIFICANT PROBLEMS WILL BE REPLACED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-103. HED NO: 1200-11114

HED TITLE: CONTROLS AND DISPLAYS LOCATED ON VARIOUS PANELS DO NOT HAVE COMPONENT LABELS.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-104. HED NO: 12E6-11116

HED TITLE: CONTROLS AND DISPLAYS LOCATED ON THE RMS PANEL HAVE COMPONENT LABELS AND POSITIONS LABELS THAT ARE IN LOWER CASE TYPE.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS READING THE LABELS. BECAUSE THERE IS NO ROOM WITHIN THE MODULES TO PROVIDE BIGGER LABELS THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A12-105. HED NO: 1200-11118

HED TITLE: COMPONENT AND GROUP LABELS LOCATED ON THE MAIN CONTROL BOARD AND VARIOUS BACK PANELS ARE PLACED BELOW THE ELEMENTS THEY DESCRIBE.

PRIORITY: 5

DISPOSITION: THE MAIN CONTROL BOARD GROUP LABELS ARE CONSISTENTLY LOCATED AT THE BOTTOM OF THE GROUP MODULE. LABELS BELOW EYE LEVEL ON THE BACK PANELS WILL BE MOVED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-106. HED NO: 12E8-11119

HED TITLE: LABELS ON THE CONTAINMENT FIRE PROTECTION PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 55% TO 22%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 61% TO 11%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 69% TO 20%; AND SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 36% TO 11%; CHARACTER HEIGHT DEVIATES FROM CRITERIA BY 45% TO 26%; AND CHARACTER WIDTH DEVIATES FROM CRITERIA BY 39% TO 24%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-107. HED NO: 12E5-11120

HED TITLE: LABELS ON THE LINE PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 69% TO 40%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 75% TO 40%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 75% TO 25%; AND SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 55% TO 10%; CHARACTER HEIGHT DEVIATES FROM CRITERIA BY 48% TO 26%; AND CHARACTER WIDTH DEVIATES FROM CRITERIA BY 50% TO 10%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-108. HED NO: 12E5-11121

HED TITLE: LEGEND LIGHT ENGRAVING ON THE LINE PANEL DOES NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 18%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 75% TO 18%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 31%; AND SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 17%; CHARACTER HEIGHT DEVIATES FROM CRITERIA BY 37% TO 17%; AND CHARACTER WIDTH DEVIATES FROM CRITERIA BY 31%.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS READING THE LEGENDS. THE LIGHTS HAVE LIMITED USE BY THE OPERATORS, WHEN A LIGHT COMES IN THE OPERATORS CALL THE DISPATCHER. BECAUSE THE LEGENDS ARE READ WHILE STANDING DIRECTLY IN FRONT OF THE PANEL, THE HEDAT DETERMINED NO ACTION IS REQUIRED.

A12-109. HED NO: 12F2-11122

HED TITLE: LABELS ON THE GENERATOR/AUXILIARY RELAY PANEL DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 35%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 35%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 32% TO 17%; AND SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 50%; CHARACTER HEIGHT DEVIATES FROM CRITERIA BY 34%; AND CHARACTER WIDTH DEVIATES FROM CRITERIA BY 45% TO 18%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-110. HED NO: 12E4-11123

HED TITLE: LABELS ON FIRE ALARM PANELS A AND B DO NOT MEET READABILITY CRITERIA BASED ON VIEWING DISTANCE: SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 75% TO 34%; AND CHARACTER WIDTH DEVIATES FROM CRITERIA BY 24% TO 17%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-111. HED NO: 12E7-11124

HED TITLE: LABELS ON THE CORE COOLING MONITOR DO NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 73% TO 11%; SPACE BETWEEN CHARACTERS DEVIATES FROM CRITERIA BY 73% TO 46%; SPACE BETWEEN WORDS DEVIATES FROM CRITERIA BY 55%; AND SPACE BETWEEN LINES DEVIATES FROM CRITERIA BY 73% TO 18%; CHARACTER HEIGHT DEVIATES FROM CRITERIA BY 59% TO 32%; AND CHARACTER WIDTH DEVIATES FROM CRITERIA BY 52% TO 17%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-112. HED NO: 12E7-11125

HED TITLE: LEGEND LIGHT ENGRAVING ON CORE COOLING MONITOR DOES NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE: STROKE WIDTH DEVIATES FROM CRITERIA BY 46%; CHARACTER HEIGHT DEVIATES FROM CRITERIA BY 18%; AND CHARACTER WIDTH DEVIATES FROM CRITERIA BY 32%.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE POST ACCIDENT MONITORING PANEL PROJECT.

A12-113. HED NO: 12E7-11126

HED TITLE: LEGEND PUSHBUTTON ENGRAVING ON CORE COOLING MONITOR DOES NOT MEET CHARACTER HEIGHT OR READABILITY CRITERIA BASED ON VIEWING DISTANCE.

PRIORITY: 5

DISPOSITION: PUSHBUTTONS WILL BE DELETED WITHIN THE POST ACCIDENT MONITORING PANEL PROJECT.

A12-114. HED NO: 12D1-11128

HED TITLE: FUNCTION LABELS LOCATED ON PANEL D ARE OBSCURED BY CONTROL KNOB ASSEMBLIES.

PRIORITY: 3

DISPOSITION: LABELS WILL BE CORRECTED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-115. HED NO: 12E6-11130

HED TITLE: PANEL IDENTIFICATION LABEL HAS NOT BEEN PROVIDED ON THE RMS PANEL.

PRIORITY: 5

DISPOSITION: LABEL WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-116. HED NO: 12E0-11131
HED TITLE: PANEL IDENTIFICATION LABEL HAS NOT BEEN PROVIDED ON THE TURBINE SUPERVISORY PANEL.

PRIORITY: 5
DISPOSITION: LABEL WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-117. HED NO: 12F2-11132
HED TITLE: PANEL IDENTIFICATION LABEL HAS NOT BEEN PROVIDED ON THE GENERATOR STARTUP/AUXILIARY RELAY PANEL.

PRIORITY: 5
DISPOSITION: LABEL WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-118. HED NO: 12E1-11133
HED TITLE: PANEL IDENTIFICATION LABEL HAS NOT BEEN PROVIDED ON THE INCORE MONITORING SYSTEM PANEL.

PRIORITY: 5
DISPOSITION: LABEL WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-119. HED NO: 1200-11134
HED TITLE: CURVED PATTERNS OF LABELING ARE USED ON THE CONTAINMENT FIRE PROTECTION PANEL AND THE RMS PANEL.

PRIORITY: 5
DISPOSITION: LABELS WILL BE CORRECTED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-120. HED NO: 1200-11135

HED TITLE: GROUP LABELS HAVE NOT BEEN PROVIDED FOR FUNCTIONALLY RELATED CONTROLS AND DISPLAYS ON THE MAIN CONTROL BOARD.

PRIORITY: 5

DISPOSITION: GROUP LABELS WILL BE PROVIDED FOR THE DELTA FLUX METERS AND EH TURBINE CONTROL PUSHBUTTONS WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT. COMPONENT LABELING ADEQUATELY DESCRIBES THE RELATIONSHIP OF THE CONTROLS/INDICATIONS FOR THE REMAINING COMPONENTS.

A12-121. HED NO: 12E0-11136

HED TITLE: GROUP LABELS HAVE NOT BEEN PROVIDED FOR FUNCTIONALLY RELATED CONTROLS AND DISPLAYS ON THE TURBINE SUPERVISORY PANEL.

PRIORITY: 5

DISPOSITION: THE HEDAT DETERMINED GROUP LABELS ARE NOT REQUIRED FOR THESE CONTROLS. FUNCTIONAL LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-122. HED NO: 12E3-11138

HED TITLE: GROUP LABELS HAVE NOT BEEN PROVIDED FOR FUNCTIONALLY RELATED CONTROLS AND DISPLAYS ON THE APDMS PANEL.

PRIORITY: 5

DISPOSITION: THIS PANEL IS NOT USED IN EMERGENCY OPERATIONS, IT IS USED FOR SURVEILLANCE FUNCTIONS ONLY. BECAUSE OPERATORS DO NOT INTERFACE WITH THIS PANEL, THE HEDAT DETERMINED GROUP LABELS FOR THIS PANEL ARE NOT REQUIRED.

A12-123. HED NO: 1200-11141
HED TITLE: LABELS THAT CONTAIN DARK CHARACTERS ON A LIGHT BACKGROUND HAVE NOT BEEN PROVIDED ON BACK PANELS.

PRIORITY: 5
DISPOSITION: A LABEL COLOR CONVENTION WILL BE ESTABLISHED AND CONSISTENTLY APPLIED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-124. HED NO: 1200-11142
HED TITLE: LABELS THAT CONTAIN DARK CHARACTERS ON A LIGHT BACKGROUND HAVE NOT BEEN PROVIDED ON THE MAIN CONTROL BOARD.

PRIORITY: 5
DISPOSITION: A LABEL COLOR CONVENTION WILL BE ESTABLISHED AND CONSISTENTLY APPLIED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-125. HED NO: 1200-11143
HED TITLE: ENGRAVING ON INDICATOR LIGHT ASSOCIATED WITH FW PUMP A RECIRCULATION VLV CONTROL IS INCORRECT.

PRIORITY: 5
DISPOSITION: LEGEND LIGHT WILL BE CORRECTED WITH THE LEGEND LIGHT RE-ENGRAVING PROJECT.

A12-126. HED NO: 12E4-11150
HED TITLE: COMPONENT FUNCTION LABELS HAVE NOT BEEN PROVIDED FOR CONTROLS ON FIRE ALARM PANELS A AND B.

PRIORITY: 5
DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-127. HED NO: 12DS-11151

HED TITLE: COORDINATE LABELS ARE NOT PROVIDED ON APP-025 ANNUNCIATOR LIGHT BOX (DEDICATED SHUTDOWN) 4160 ROOM PANEL.

PRIORITY: 3

DISPOSITION: THE INDIVIDUAL LIGHTS ARE NOT REFERENCED BY LOCATION; THEY ARE REFERENCED BY LEGEND TITLE, THEREFORE THE HEDAT DETERMINED THAT COORDINATE LABELS ARE NOT NECESSARY.

A12-128. HED NO: 12DS-11152

HED TITLE: COMPONENT/EQUIPMENT LABEL ON THE ANNUNCIATOR LIGHT BOX LOCATED ON THE (DEDICATED SHUTDOWN) 4160 ROOM PANEL IS NOT PROVIDED.

PRIORITY: 5

DISPOSITION: LABEL WILL BE PROVIDED WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A12-129. HED NO: 12DS-11153

HED TITLE: POSITION LABELS ON THE VOLTMETER AND AMMETER SWITCHES LOCATED ON THE (DEDICATED SHUTDOWN) 4160 ROOM PANEL ARE ORIENTED VERTICALLY.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS READING THE LABELS. REPLACEING THE LABELS WOULD REQUIRE THE REPLACEMENT OF THE SWITCHES. THE HEDAT DETERMINED THAT REPLACING THE SWITCHES WOULD NOT BE PRACTICAL SINCE THE LABELS ARE READABLE.

A12-130. HED NO: 12DS-11154

HED TITLE: TITLE OF ANNUNCIATOR TILE LOCATED ON THE (DEDICATED SHUTDOWN) 4160 ROOM PANEL IS INCONSISTENT WITH PROCEDURES.

PRIORITY: 3

DISPOSITION: THE PROCEDURE AND TILE WILL BE MADE CONSISTENT WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A12-131. HED NO: 12DS-11155

HED TITLE: IMPERMANENT DYNOTAPE LABELS ARE USED ABOVE INDICATION LIGHTS LOCATED ON THE (DEDICATED SHUTDOWN) 4160 ROOM PANEL.

PRIORITY: 5

DISPOSITION: LABELS WILL BE REPLACED WITH PERMANENTLY ENGRAVED LABELS WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A12-132. HED NO: 12DS-11164

HED TITLE: PUSHBUTTON ON THE NEUTRON MONITOR LOCATED ON THE (DEDICATED SHUTDOWN) CHARGING PUMP ROOM PANEL IS UNLABELED.

PRIORITY: 5

DISPOSITION: LABEL WILL BE PROVIDED WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A12-133. HED NO: 12DS-11165

HED TITLE: GROUP LABELS ARE NOT PROVIDED ON THE (DEDICATED SHUTDOWN) CHARGING PUMP ROOM PANEL.

PRIORITY: 5

DISPOSITION: BECAUSE THE CONTROLS WILL BE PROVIDED WITH ADEQUATE FUNCTIONAL LABELS WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT, AND SINCE THE PANEL HAS ONLY A FEW CONTROLS, THE HEDAT DETERMINED THAT GROUP LABELS ARE NOT NECESSARY.

A12-134. HED NO: 12DS-11166

HED TITLE: CONTROL POSITION LABELS LOCATED ON THE (DEDICATED SHUTDOWN) CHARGING PUMP ROOM PANEL ARE NOT HORIZONTALLY ORIENTED.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS READING THE LABELS. REPLACING THE LABELS WOULD REQUIRE THE REPLACEMENT OF THE SWITCHES. THE HEDAT DETERMINED THAT REPLACING THE SWITCHES WOULD NOT BE PRACTICAL SINCE THE LABELS ARE READABLE.

A12-135. **HED NO:** 12DS-11167
HED TITLE: IMPERMANENT LABELS ARE USED ON DISPLAYS/CONTROLS ON THE (DEDICATED SHUTDOWN) CHARGING PUMP ROOM PANEL.

PRIORITY: 5
DISPOSITION: PERMANENTLY ENGRAVED LABELS WILL BE PROVIDED WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A12-136. **HED NO:** 12DS-11168
HED TITLE: CONTROL LABELS LOCATED ON THE (DEDICATED SHUTDOWN) CHARGING PUMP ROOM PANEL DO NOT DESCRIBE THE FUNCTION OF CONTROL.

PRIORITY: 5
DISPOSITION: FUNCTION LABELS WILL BE PROVIDED WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A12-137. **HED NO:** 12DS-11169
HED TITLE: SCALES ON METERS LOCATED ON THE (DEDICATED SHUTDOWN) CHARGING PUMP ROOM PANEL HAVE NO UNIT LABELS.

PRIORITY: 5
DISPOSITION: UNIT LABELS WILL BE PROVIDED WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A12-138. **HED NO:** 12DS-11170
HED TITLE: CONTROL LABELS LOCATED ON THE (DEDICATED SHUTDOWN) SECONDARY CONTROL PANEL DO NOT DESCRIBE THE FUNCTION OF THE CONTROLS.

PRIORITY: 5
DISPOSITION: FUNCTION LABELS WILL BE PROVIDED WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A12-139. **HED NO:** 12DS-11171
HED TITLE: A PANEL LABEL IS NOT PROVIDED ON THE (DEDICATED SHUTDOWN) SECONDARY CONTROL PANEL.

PRIORITY: 5
DISPOSITION: A PANEL LABEL WILL BE PROVIDED WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A12-140. HED NO: 12DS-11172

HED TITLE: LABELS ON THE PORV CONTROLS LOCATED ON THE (DEDICATED SHUTDOWN) SECONDARY CONTROL PANEL ARE NOT VISIBLE WHEN CONTROLS ARE IN USE BECAUSE OPERATORS HAVE TO OPEN THE CONTROL CABINET DOOR TO OPERATE THE CONTROLS AND LABELS ARE LOCATED ON THE CABINET DOORS.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED INSIDE THE CABINETS WITHIN THE DEDICATED SHUTDOWN LABEL PROJECT.

A12-141. HED NO: 12DS-11173

HED TITLE: INTERNAL LABELING ON METER SCALES LOCATED ON THE (DEDICATED SHUTDOWN) SECONDARY CONTROL PANEL ARE HANDWRITTEN.

PRIORITY: 5

DISPOSITION: SCALES WILL BE REPLACED WITHIN THE DEDICATED SHUTDOWN LABEL PROJECT.

A12-142. HED NO: 12DS-11176

HED TITLE: CONTROL POSITION LABELS LOCATED ON THE (DEDICATED SHUTDOWN) SECONDARY CONTROL PANEL ARE VERTICALLY ORIENTED.

PRIORITY: 5

DISPOSITION: OPERATORS HAVE NO PROBLEMS READING THE LABELS. REPLACEMENT OF THE LABELS WOULD REQUIRE THE REPLACEMENT OF THE SWITCHES. THE HEDAT DETERMINED THAT THE CORRECTION WOULD NOT BE PRACTICAL SINCE THE LABELS ARE READABLE.

A12-143. HED NO: 12DS-11178

HED TITLE: COMPONENT LABELS ARE NOT PROVIDED FOR METERS AND INDICATOR LIGHTS LOCATED ON THE (DEDICATED SHUTDOWN)SECONDARY CONTROL PANEL.

PRIORITY: 5

DISPOSITION: LABELS WILL BE PROVIDED WITHIN THE DEDICATED SHUTDOWN PANEL PROJECT.

A12-144. HED NO: 12F3-11180
HED TITLE: AMBER INDICATOR LIGHTS LOCATED ON THE CONTROL POWER DEFEAT PANEL DOES NOT CONFORM TO THE COLOR CODING SCHEME.

PRIORITY: 3
DISPOSITION: AN OPERATOR AID WILL BE PROVIDED TO DESCRIBE THE FUNCTION OF THE LIGHT WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-145. HED NO: 12E2-11182
HED TITLE: UNIT LABELS ARE MISSING FROM METER SCALES LOCATED ON THE NIS PANEL.

PRIORITY: 5
DISPOSITION: UNIT LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-146. HED NO: 1200-11185
HED TITLE: UNIT LABELS ARE NOT PROVIDED ON SCALES LOCATED ON THE MAIN CONTROL BOARD.

PRIORITY: 3
DISPOSITION: UNIT LABELS WILL BE PROVIDED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A12-147. HED NO: 1200-11187
HED TITLE: INADEQUATE LABELING OF THE EMERGENCY BUSES RESULTED IN THE LOSS OF "B" SI PUMP FOR 40 MINUTES BECAUSE THE OPERATOR MISTAKENLY STRIPPED CONTROL POWER FROM THE E-2/E-1 TIE BUS INSTEAD OF STRIPPING POWER TO JUST THE E-2 BUS COMPONENTS.

PRIORITY: 1
DISPOSITION: A LABEL HAS BEEN PROVIDED TO CLEARLY IDENTIFY TIE BUS COMPONENTS.

A12-148. HED NO: 12E2-11188

HED TITLE: INADEQUATE LABELS ON THE BACK OF THE NIS PANELS RESULTED IN A REACTOR TRIP BECAUSE A TECHNICIAN INADVERTENTLY OPENED THE CABINET AND TRIPPED THE WRONG CHANNEL.

PRIORITY: 1

DISPOSITION: COLOR COORDINATED COMPONENT LABELS HAVE BEEN PROVIDED ON THE BACK OF THE PANELS.

HBR HED SUMMARY

COMPUTER SYSTEM

APPENDIX A-13

A13-1. HED NO: 12G1-0302
HED TITLE: POTENTIAL FOR LOST DATA DUE TO UNRELIABILITY OF THE COMPUTER SYSTEM.

PRIORITY: 5
DISPOSITION: PROBLEM WILL BE RESOLVED WITHIN THE ERFIS PROJECT.

A13-2. HED NO: 12G1-0303
HED TITLE: OPERATORS REPORT THAT OPERATOR TRAINING FOR USE OF THE COMPUTER SYSTEM IS INADEQUATE.

PRIORITY: 3
DISPOSITION: FORMAL TRAINING ON THE ERFIS COMPUTER HAS BEEN PROVIDED IN OPERATOR TRAINING.

A13-3. HED NO: 12G1-0305
HED TITLE: COMPUTER PRINTER IS UNRELIABLE, TOO SLOW, TOO NOISEY, AND PAPER DOESN'T FEED THROUGH WELL.

PRIORITY: 3
DISPOSITION: THE PRINTER IS BEING REPLACED WITHIN THE ERFIS PROJECT.

A13-4. HED NO: 12G1-0306
HED TITLE: COMPUTER LANGUAGE IS NOT OPERATIONS ORIENTED AND TERMS ARE NOT FAMILIAR TO OPERATORS.

PRIORITY: 3
DISPOSITION: THE LANGUAGE HAS BEEN IMPROVED/CORRECTED WITHIN THE ERFIS PROJECT.

A13-5. **HED NO:** 12G1-0308

HED TITLE: OPERATORS CONSIDER THE AUDITORY ALARM ON THE COMPUTER SYSTEM PRINTER TO BE A NUISANCE; IT ALARMS TOO OFTEN.

PRIORITY: 3

DISPOSITION: PROBLEM WILL BE RESOLVED WITH THE ERFIS PROJECT.

HBR HED SUMMARY

CONVENTIONS

APPENDIX A-14

A14-1. HED NO: 12E1-1301
HED TITLE: COLOR CODING INCONSISTENCY ACROSS PANELS FOR LIGHTS INDICATING SAME FUNCTION

PRIORITY: 3
DISPOSITION: A COLOR CODING CONVENTION WILL BE ESTABLISHED AND IMPLEMENTED WHERE PRACTICAL WITHIN THE COLOR COORDINATION PROJECT.

A14-2. HED NO: 12E6-1302
HED TITLE: INDICATOR LIGHTS FOR ROTARY CONTROLS LOCATED ON THE RMS PANEL DO NOT CONFORM TO COLOR-CODING CONVENTIONS.

PRIORITY: 3
DISPOSITION: A COLOR CODING CONVENTION WILL BE ESTABLISHED AND IMPLEMENTED WHERE PRACTICAL WITHIN THE COLOR COORDINATION PROJECT.

A14-3. HED NO: 12E1-1304
HED TITLE: COMPONENTS WITH THE SAME FUNCTION DO NOT CONFORM TO COLOR-CODING CONVENTIONS FOR COMPONENTS LOCATED ON THE INCORE MONITORING PANEL.

PRIORITY: 3
DISPOSITION: A COLOR CODING CONVENTION WILL BE ESTABLISHED AND IMPLEMENTED WHERE PRACTICAL WITHIN THE COLOR COORDINATION PROJECT.

A14-4. **HED NO:** 12E1-1305
HED TITLE: INCONSISTENT APPLICATION OF COLOR-CODING ON INCORE MONITOR PANELS.

PRIORITY: 3
DISPOSITION: A COLOR CODING CONVENTION WILL BE ESTABLISHED AND IMPLEMENTED WHERE PRACTICAL WITHIN THE COLOR COORDINATION PROJECT.

A14-5. **HED NO:** 12E1-1307
HED TITLE: PATH DISPLAY NOT ORIENTED WITH NORTH AT THE CONVENTIONAL 12 O'CLOCK POSITION

PRIORITY: 3
DISPOSITION: THE DISPLAY CANNOT BE REORIENTED BUT THE ORIENTATION WILL BE CLEARLY LABELLED WITHIN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A14-6. **HED NO:** 12E6-1308
HED TITLE: THE HIGH/LOW ALARM POSITIONS ON THE PZR SAFETY RELIEF VALVE MONITORS DO NOT CONFORM TO THE LEFT TO RIGHT CONVENTIONS.

PRIORITY: 5
DISPOSITION: MONITORS WILL BE REMOVED WITHIN THE PZR SAFETY RELIEF VALVE MONITOR REMOVAL PROJECT.

A14-7. **HED NO:** 12E1-1309
HED TITLE: INCONSISTENT USE OF COLOR-CODING FOR INDICATOR LIGHT ASSOCIATED WITH CONTROLS LOCATED ON THE TURBINE SUPERVISORY PANEL.

PRIORITY: 3
DISPOSITION: A COLOR CODING CONVENTION WILL BE ESTABLISHED AND IMPLEMENTED WHERE PRACTICAL WITHIN THE COLOR COORDINATION PROJECT.

A14-8. HED NO: 12DS-1310

HED TITLE: CONTROL POSITION LABELING ON THE (DEDICATED SHUTDOWN) CHARGING PUMP ROOM PANEL DEVIATES FROM THE POSITION LABELING USED ON SIMILAR CONTROLS ON THE SAME PANEL.

PRIORITY: 2

DISPOSITION: WILL BE CORRECTED WITHIN THE DEDICATED SHUTDOWN THIS PROJECT.

A14-9. HED NO: 12DS-1311

HED TITLE: DIRECTION OF INCREASE FOR THUMBWHEEL LOCATED ON THE (DEDICATED SHUTDOWN) SECONDARY CONTROL PANEL IS IN A DOWNWARD MOTION.

PRIORITY: 5

DISPOSITION: LABELS AND ARROWS ARE PROVIDED NEXT TO THE THUMBWHEEL TO CLEARLY INDICATE THE DIRECTION OF MOVEMENT.

A14-10. HED NO: 1200-1313

HED TITLE: INCONSISTENT USE OF THE COLOR AMBER AS A MEANS OF CODING THROUGHOUT THE CONTROL ROOM.

PRIORITY: 3

DISPOSITION: A COLOR CODING CONVENTION WILL BE ESTABLISHED AND IMPLEMENTED WHERE PRACTICAL WITHIN THE COLOR COORDINATION PROJECT.

A14-11. HED NO: 1200-1314

HED TITLE: INCONSISTENT USE OF THE COLOR BLUE AS A MEANS OF CODING THROUGHOUT THE CONTROL ROOM.

PRIORITY: 3

DISPOSITION: A COLOR CODING CONVENTION WILL BE ESTABLISHED AND IMPLEMENTED WHERE PRACTICAL WITHIN THE COLOR COORDINATION PROJECT.

A14-12. HED NO: 1200-1315
HED TITLE: INCONSISTENT USE OF THE COLOR ORANGE AS A MEANS OF CODING THROUGHOUT THE CONTROL ROOM.

PRIORITY: 3
DISPOSITION: A COLOR CODING CONVENTION WILL BE ESTABLISHED AND IMPLEMENTED WHERE PRACTICAL WITHIN THE COLOR COORDINATION PROJECT.

A14-13. HED NO: 1200-1316
HED TITLE: INCONSISTENT USE OF THE COLOR YELLOW AS A MEANS OF CODING THROUGHOUT THE CONTROL ROOM.

PRIORITY: 3
DISPOSITION: A COLOR CODING CONVENTION WILL BE ESTABLISHED AND IMPLEMENTED WHERE PRACTICAL WITHIN THE COLOR COORDINATION PROJECT.

A14-14. HED NO: 1200-1317
HED TITLE: INCONSISTENT USE OF THE COLOR WHITE AS A MEANS OF CODING THROUGHOUT THE CONTROL ROOM.

PRIORITY: 3
DISPOSITION: A COLOR CODING CONVENTION WILL BE ESTABLISHED AND IMPLEMENTED WHERE PRACTICAL WITHIN THE COLOR COORDINATION PROJECT.

A14-15. HED NO: 1200-1318
HED TITLE: INCONSISTENT USE OF THE COLOR GREEN AS A MEANS OF CODING THROUGHOUT THE CONTROL ROOM.

PRIORITY: 3
DISPOSITION: A COLOR CODING CONVENTION WILL BE ESTABLISHED AND IMPLEMENTED WHERE PRACTICAL WITHIN THE COLOR COORDINATION PROJECT.

A14-16. HED NO: 1200-1319
HED TITLE: INCONSISTENT USE OF THE COLOR RED AS A MEANS OF CODING THROUGHOUT THE CONTROL ROOM.

PRIORITY: 3
DISPOSITION: A COLOR CODING CONVENTION WILL BE ESTABLISHED AND IMPLEMENTED WHERE PRACTICAL WITHIN THE COLOR COORDINATION PROJECT.

A14-17. HED NO: 12A1-1320
HED TITLE: PUSHBUTTON ON THE PRIMARY WATER FLOW DILUTE MODE FLOW CONTROLLER IS NOT CONSISTENT WITH THE OTHERS ON THE MAIN CONTROL BOARDS.

PRIORITY: 3
DISPOSITION: A WORK REQUEST HAS BEEN SUBMITTED TO CORRECT THE PUSHBUTTON.

HBR HED SUMMARY

VERIFICATION OF TASK PERFORMANCE CAPABILITIES
AND
VALIDATION OF CONTROL ROOM FUNCTIONS

APPENDIX A-15

A15-1. HED NO: 12A1-5001
HED TITLE: CHARGING FLOW CONTROLS AND DISPLAY NOT FUNCTIONALLY GROUPED

PRIORITY: 5
DISPOSITION: THE HEDAT DETERMINED THAT THE CURRENT ARRANGEMENT IS THE BEST ARRANGEMENT FOR OPERATOR USES DURING NORMAL OPERATIONS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A15-2. HED NO: 12A1-5002
HED TITLE: RCP BEARING TEMP ALARM SIGNAL SOURCE IS INAPPROPRIATE/UNRELIABLE

PRIORITY: 2
DISPOSITION: THE NECESSARY RCP TEMPERATURE INDICATION WILL BE PROVIDED NEAR THE RCP CONTROLS AS PART OF THE RCP TEMPERATURE INDICATION PROJECT.

A15-3. HED NO: 2100-5003
HED TITLE: INACTIVE/UNNECESSARY PZR CUBICLES HI/LO TEMP ANNUNCIATOR ALARM HAS NOT BEEN REMOVED FROM ANNUNCIATOR PANEL

PRIORITY: 3
DISPOSITION: THE ANNUNCIATOR HAS BEEN REMOVED.

A15-4. HED NO: 12D1-5004
HED TITLE: MAXIMUM VALUES EXCEED THE RANGE ON THE EMERGENCY BUS VOLT METERS.

PRIORITY: 3
DISPOSITION: METERS WILL BE REPLACED OR UPGRADED WITHIN THE E1 & E2 EMERGENCY BUS VOLT METER PROJECT.

A15-5. HED NO: 12A1-5005
HED TITLE: PRZ CUBICLE TEMP METERS THAT ARE NOT USED REMAIN ON THE MAIN CONTROL BOARD

PRIORITY: 3
DISPOSITION: METERS WILL BE REMOVED WITHIN THE UNUSED COMPONENTS REMOVAL PROJECT.

A15-6. HED NO: 12E5-5006
HED TITLE: INDICATOR LIGHTS THAT ARE NOT USED AND NOT IN SERVICE REMAIN ON THE LINE PANEL.

PRIORITY: 5
DISPOSITION: LIGHTS WILL BE REMOVED WITHIN THE LINE PANEL PROJECT.

A15-7. HED NO: 12E0-5008
HED TITLE: PROJECTION DISPLAY THAT IS NOT LABELED AND NOT IN SERVICE REMAINS ON THE TURBINE SUPERVISORY PANEL

PRIORITY: 5
DISPOSITION: THE PROJECTION DISPLAY WILL BE REMOVED WITHIN THE UNUSED COMPONENT REMOVAL PROJECT.

A15-8. HED NO: 1200-5009
HED TITLE: DISCONNECTED CONTROLS AND DISPLAYS REMAIN ON THE MAIN CONTROL BOARD

PRIORITY: 3
DISPOSITION: THE UNUSED COMPONENTS WILL BE REMOVED WITHIN THE UNUSED COMPONENT REMOVAL PROJECT.

A15-9. HED NO: 1200-5010
HED TITLE: DEMAND STATUS DISPLAYS NOT LABELED ON PROCESS CONTROLLERS

PRIORITY: 5
DISPOSITION: ALL THE PROCESS CONTROLLERS WORK THE SAME WAY AND IT IS UNDERSTOOD BY THE OPERATORS THAT THE METER INDICATES DEMAND STATUS.

BECAUSE LIMITED SPACE IS AVAILABLE ON THE CONTROLLERS THE HEDAT DETERMINED A LABEL WOULD CREATE CLUTTER.

A15-10. HED NO: 1200-5011
HED TITLE: ACTUAL SYSTEM/EQUIPMENT STATUS ASSOCIATED WITH PROCESS CONTROLLERS IS NOT INDICATED ON THE MAIN CONTROL BOARD

PRIORITY: 3
DISPOSITION: CONTROLLERS HAVE SECONDARY INDICATIONS TO PROVIDE OPERATOR FEEDBACK, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A15-11. HED NO: 12A1-5012
HED TITLE: UNUSED ROTARY CONTROL SWITCH AND ASSOCIATED INDICATOR LIGHT REMAINS ON THE MAIN CONTROL BOARD.

PRIORITY: 5
DISPOSITION: THE CONTROL AND ASSOCIATED INDICATOR LIGHT HAS BEEN REMOVED.

A15-12. HED NO: 12E3-5013
HED TITLE: STRIP CHART RECORDER ON THE APDMS PANEL IS NOT REQUIRED BUT REMAINS ON THE PANEL.

PRIORITY: 5
DISPOSITION: RECORDER WILL BE REMOVED WITHIN THE UNUSED COMPONENT REMOVAL PROJECT.

A15-13. HED NO: 12A1-5014

HED TITLE: CONTROL/DISPLAY ARRANGEMENT DOES NOT CONFORM TO THE STANDARD ARRANGEMENT ON THE MAIN CONTROL BOARD. THE INDICATOR LIGHT IS LOCATED TO THE RIGHT OF THE CONTROL INSTEAD OF OVER THE CONTROL.

PRIORITY: 5

DISPOSITION: THERE IS NO ROOM TO RELOCATE THE INDICATOR LIGHT OVER THE CONTROL. LABELS WILL BE PROVIDED OVER THE CONTROL AND INDICATOR LIGHT TO MAKE THE ASSOCIATION BETWEEN THE CONTROL AND LIGHT OBVIOUS. LABELS WILL BE PROVIDED IN THE CONTROL ROOM PAINTING AND RELABELING PROJECT.

A15-14. HED NO: 12E5-5015

HED TITLE: CARRIER CONTROLS HAVE NO FEEDBACK MECHANISM TO INDICATE THAT THEY ARE OPERATIONAL.

PRIORITY: 5

DISPOSITION: SWITCHES ARE CONTROLLED BY THE DISPATCHER AND ARE NOT USED BY THE CONTROL ROOM OPERATORS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A15-15. HED NO: 12A1-5019

HED TITLE: REACTOR VESSEL HEAD PRESS INDICATION NOT REQUIRED ON MAIN CONTROL BOARD

PRIORITY: 5

DISPOSITION: THE INDICATOR WAS PROVIDED AS PART OF A TMI MODIFICATION FOR VENTING HYDROGEN FROM THE REACTOR VESSEL AND IS NEEDED IN THE CONTROL ROOM.

A15-16. HED NO: 12D1-5020
HED TITLE: AUX FW FLOW INDICATION MAY BE MORE USEFUL TO OPERATORS IN GPM FLOW RATES RATHER THAN PERCENT

PRIORITY: 3
DISPOSITION: SCALE WILL BE REPLACED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A15-17. HED NO: 12B1-5021
HED TITLE: DELTA FLUX INDICATORS MAY BE DUPLICATED UNNECESSARILY ON PANEL B.

PRIORITY: 5
DISPOSITION: METERS ARE REQUIRED FOR MONITORING THE DELTA FLUX TECH. SPEC. LIMITS IN NORMAL OPERATIONS.

A15-18. HED NO: 12A1-5022
HED TITLE: NARROW RANGE CNMT PRESS INDICATOR IS DIFFICULT TO READ AND TO INTERPRET.

PRIORITY: 3
DISPOSITION: SCALE WILL BE REPLACED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A15-19. HED NO: 12D1-5023
HED TITLE: TURB BEARING OIL PRESS INDICATOR IS DIFFICULT TO READ AND TO INTERPRET.

PRIORITY: 3
DISPOSITION: SCALE WILL BE REPLACED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A15-20. HED NO: 12A1-5024
HED TITLE: ERROR IN NUMERAL PROGRESSIONS ON THE SCFM PENETRATION LEAKAGE METER SCALE

PRIORITY: 3
DISPOSITION: SCALE WILL BE REPLACED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A15-21. HED NO: 12D1-5025
HED TITLE: MENTAL CONVERSION REQUIRED OF OPERATORS TO COMPARE GEN AND EXCITER TEMPS TO COMPUTER PRINTOUTS

PRIORITY: 3
DISPOSITION: SCALE WILL BE REPLACED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A15-22. HED NO: 12D1-5026
HED TITLE: GEN WATTS INDICATOR IS DIFFICULT TO READ AND TO INTERPRET

PRIORITY: 3
DISPOSITION: THE METER SCALE HAS BEEN REPLACED. NUMBERS HAVE BEEN PROVIDED AT EACH MAJOR MARK.

A15-23. HED NO: 1200-5028
HED TITLE: THERMAL MONITORS ARE DIFFICULT TO READ AND TO INTERPRET

PRIORITY: 3
DISPOSITION: RECORDERS ARE USED FOR HISTORICAL PURPOSES AND PROVIDE TRENDING INFORMATION FOR POST EVENT DIAGNOSTICS, THEREFORE THE HEDAT DETERMINED THAT NO ACTION IS REQUIRED.

A15-24. HED NO: 12F2-5033

HED TITLE: GEN RELAY PANEL EQUIPMENT MAY NOT BE NECESSARY IN THE CONTROL ROOM.

PRIORITY: 5

DISPOSITION: SAME RELAYS ARE USED FOR DIAGNOSTIC PURPOSES AND OTHERS ARE USED ROUTINELY FOR DATA CORRECTION, THEREFORE THE HEDAT DETERMINED THE EQUIPMENT SHOULD STAY IN THE CONTROL ROOM.

A15-25. HED NO: 12D1-5035

HED TITLE: VERTICAL METER FOR GENERATOR FREQUENCY DISPLAY LOCATED ON PANEL D HAS UNNECESSARY INFORMATION ON THE SCALE FACE.

PRIORITY: 3

DISPOSITION: METER SCALE WILL BE REPLACED WITHIN THE METER SCALE REPLACEMENT PROJECT.

A15-26. HED NO: 12E6-5037

HED TITLE: SETTLING POND MONITORING SYSTEM IS NOT REQUIRED FOR USE BY OPERATORS BUT REMAINS LOCATED ON THE RMS PANEL.

PRIORITY: 5

DISPOSITION: MONITORS WILL BE REMOVED WITHIN THE UNUSED COMPONENT REMOVAL PROJECT.

A15-27. HED NO: 12E7-5039

HED TITLE: PANEL SECTIONS ON CORE COOLING MONITOR PANEL ARE MIRROR IMAGED.

PRIORITY: 5

DISPOSITION: THE PANEL WILL BE REARRANGED WITHIN THE POST ACCIDENT MONITORING PANEL PROJECT.

A15-28. HED NO: 1200-5040
HED TITLE: RWST AND SPRAY ADD. FIVE TANK METERS AND REDUNDANT INDICATIONS ARE NOT GROUPED TOGETHER.

PRIORITY: 3
DISPOSITION: METERS WILL BE RELOCATED WITHIN THE RWST AND SPRAY ADDITIVE TANK LEVEL METER REARRANGEMENT PROJECT.

A15-29. HED NO: 1200-5041
HED TITLE: RCP TEMPERATURE RECORDER LOCATED ON THE TURBINE SUPERVISORY PANEL IS NOT GROUPED WITH THE RCP CONTROLS LOCATED ON PANEL A.
PRIORITY: 2
DISPOSITION: THE NECESSARY RCP TEMPERATURE INDICATIONS WILL BE PROVIDED NEAR THE RCP CONTROLS (ON PANEL A) AS PART OF THE RCP TEMPERATURE INDICATION PROJECT.

A15-30. HED NO: 1200-5042
HED TITLE: FW ISOLATION LOGIC INDICATION IS NOT PROVIDED ON THE MAIN CONTROL BOARD.

PRIORITY: 2
DISPOSITION: THE INDICATION WILL BE PROVIDED WITHIN THE FW ISOLATION LOGIC INDICATION PROJECT.

A15-31. HED NO: 1200-5043
HED TITLE: VACUUM EXH. VALVE INDICATION IS NOT FUNCTIONALLY GROUPED WITH RELATED CONTROLS.
PRIORITY: 3
DISPOSITION: VACUUM EXH. INDICATION WILL BE MODIFIED WITHIN THE VACUUM EXHAUST VALVE INDICATION PROJECT.