Docket No. 50-245
B13368

Attachment 1

Millstone Nuclear Power Station, Unit No. 1

Executive Summary

Control Room Design Review

Summary Report

NUREG-0737, Supplement 1, NRC Task Action Plan, requests all licensees of nuclear power plants and applicants for operating licenses to conduct a Control Room Design Review. This is Northeast Nuclear Energy Company's report for Millstone Unit No. 1

October 1989

MILLSTONE UNIT NO. 1

CONTROL ROOM DESIGN REVIEW

SUMMARY REPORT

NUREG 0737, Supplement 1, NRC Task Action Plan requests all licensees of nuclear power plants and applicants for operating licenses to conduct a Control Room Design Review. This is Northeast Nuclear Energy Company's report for its Millstone Unit No. 1 plant.

TABLE OF CONTENTS

LIST OF FIGURES

EXECUTIVE SUMMARY

This Executive Summary discusses the Control Room Design Review (CRDR) Summary Report for the Millstone Unit No. 1 Plant, (MP-1). Performance of the CRDR and submittal of this report are in response to NUREG 0737, Supplement 1. The objective of the CRDR is to improve the ability of the control room operators to prevent accidents or cope with accidents if they occur by improving the information provided to them. The MP-1 CRDR commenced with the development of the Implementation Plan and its submittal to the Nuclear Regulatory Commission (NRC) on March 2, 1987.

The MP-1 CRDR was performed in accordance with the Implementation Plan and the E. J. Mroczka letter to the NRC staff dated February 28, 1989, except as explained in the introduction to this Summary Report (page 3).

A total of 676 Human Engineering Discrepancies (HEDs) have been identified as a result of the design review and task analysis efforts. These discrepancies involve, control panel design aspects identified as noncompliant with specific NUREG-0700 design criteria and potential operator task performance problems. These HEDs were assessed by the CRDR Core Team against the specified criteria, resolutions were developed and the HEDs were dispositioned. During the dispositioning of the HEDs, approximately 389 individual discrepancies were identified which require some type of corrective action.

This summary report provides justification for safety significant Human Engineering Discrepancies identified by the CRDR which will be partially corrected or left uncorrected.

Figure 1 provides an overview of the MP-1 process, starting with the plan and concluding with this summary report.

INTRODUCTION

This document constitutes the Control Room Design Review (CRDR) Summary Report for the Millstone Unit No. 1 Plant, submitted to the Nuclear Regulatory Commission (NRC) per NUREG-0737, Supplement 1. This report follows the schedule and methodology discussed in the Implementation Plan submitted to the NRC on March 2, 1987, except as described below.

The following describes changes to the CRDR Implementation Plan.

Prior to the start of the Task Analysis Phase of the Control Room Design Review, (CRDR), Millstone Unit No. 1 committed to an Emergency Operating Procedure, (EOP) revision to conform to Revision 4 of the BWROG Emergency Procedure guidelines (EPGs). Due to this, the Core Team utilized a plant specific draft of the new, BWROG Revision 4, Based EOPs for performance of the Task Analysis.

The validation phase of the CRDR was performed with a final draft form of the BWROG Revision 4, EPG Based EOPs.

Due to Revision 4, EOP Operator Training and the 1989 refueling outage schedule, it was necessary to utilize several, licensed Operators, for performance of the Task Analysis and Validation phases. The resumes for these individuals are attached as Figure 4.

The report consists of five major sections:

1.0 Methodology
2.0 General Findings
3.0 Corrections
4.0 Implementation/Scheduling
5.0 Integration

The Methodology section consists of seven subsections. It provides a general description of each method used to carry out the CRDR and describes in detail, any deviations from the plan.

Section 1.1: Overview, provides a synopsis of the Implementation Plan.

Section 1.2: Management and Staffing, discusses the interaction and responsibilities of the review team and consultant personnel, and any manpower reallocations.

Section 1.3: Investigation, discusses the process and criteria used for the design review and the type of discrepancies that were generated.

Section 1.4: Assessment and Correction, describes the process by which discrepancies were evaluated and categorized for resolution.

Section 1.5: Verification and Validation, describes the process by which the corrections were reviewed to verify and validate their appropriateness.

Section 1.6: Implementation, describes the methodology utilized to determine the schedule for implementation of control room corrections.

The General Findings section of the report identifies the twelve (12) types of discrepancies found and discusses the findings. These discrepancy types include:

Section 2.1: The Experience Review (Q).*

Section 2.2: The Workspace Review (6.1).*

Section 2.3: The Communication Review(6.2).*

Section 2.4: The Annunciator Review (6.3).*

Section 2.5: The Controls Review (6.4).*

Section 2.6: The Display Review (6.5).*

Section 2.7: The Label Review (6.6).*

Section 2.8: The Computer Review (N/A)

Section 2.9: The Panel Arrangement and Control/Display Integration Review (6.8 & 6.9).*

Section 2.10: The Task Analysis findings (T/A)* and Information and Controls Characteristics Review (ICCR)*.

Section 2.11 The Verification Review (V)*

Section 2.12 The Validation Review (VD)*

*Used to denote identification on HED forms.

The Corrections section summarizes the disposition of the discrepancies and consists of three subsections.

Section 3.1: Overall Panel Improvements (Enhancement): Discusses the criteria and approach to HED corrections through the use of enhancements, color, demarcation, mimics,

swapping or relocations and hierarchical labeling.

Section 3.2: Individual and Class Improvements
Describes corrections made to various classes of components, annunciators, controls, and displays, as well as individual corrections for equipment evaluated for its singular application.

Section 3.3: Procedure/Training Corrections
Identifies discrepancies that were found in the procedures, the use of Administrative Controls, and those indicative of a need for additional operators' training.

Section 4: Schedule and Implementation
Identifies the proposed schedule for implementation of corrective actions. Reviews the the schedule development in light of the ISAP evaluations.

Section 5: Integration with Other Activities
Describes the integration of the review with other NUREG requirements and plant modifications.

1.0 METHODOLOGY

1.1 OVERVIEW

This section presents the methods, criteria, and processes utilized in the conduct of the various phases of the MP-1 CRDR. The subsections herein follow the Implementation Plan directly. Each major block from Investigation through Implementation shown on Figure 1 will be expanded to illustrate the methodology used.

A key feature to point out is that the Implementation Plan including changes identified in this Summary Report were followed during performance of the CRDR. A detailed reiteration of the Implementation Plan is not included herein.

1.2 MANAGEMENT AND STAFFING

Management and staffing for the CRDR multi-disciplined review team are described in the Implementation Plan with the exception of the use of five licensed Operators for performance of the Task Analysis and Validation phases of the review and follow the recommendations of the NRC's NUREG-0801. Due to schedule conflicts with operator training and a refueling outage, it was necessary to

utilize five different operators. This contributed significantly to the review as it involved more operating personnel and gave a wider sample of operator input. The core team consisted of representatives from: architectural engineering, human factors, control systems and operations. Supplementing the core team as needed were personnel from operations, training, nuclear, mechanical and electrical engineering disciplines, licensing and computer operations. The interaction and responsibilities of the review team and consultant personnel are as described in the implementation plan.

The project organization is shown in Figure 2 and their resumes are included in the Implementation Plan. The additional operator resumes are included as Figure 4.

Other organizations utilized in the course of the MP-1 CRDR on an as needed basis were operating plant instrument and controls (I&C) and engineering personnel, and various equipment manufacturers.

Operating plant engineering, operations, maintenance and I&C personnel were utilized by members of the core team to obtain additional input for the identification and disposition of HEDs. When requested, they assisted the core team members in obtaining greater understanding of

plant operating and maintenance philosophies. The equipment manufacturers provided the core team with technical information to assist in the resolution of HEDs, i.e. meter scales etc.

1.3 INVESTIGATION (Figure 3, Investigation Process)

Three primary technical work efforts were initiated: the detailed control room survey, the experience review, and task analysis. In summary, the review items consisted of the following:

- o Construction of a full scale, plant-specific mock-up of the control room panels.

- o Completion of an operating experience review.

- o Completion of a control room survey using NUREG-0700 guidelines.

- o Completion of the task analysis of the Emergency Operating Procedures (EOPs) which are based upon Revision 4 of the BWROG Emergency Procedure Guidelines and included the independent development of I&C requirements by a Consultant Firm (Information and Controls Characteristics Review, ICCR) and the comparison (by the core team) of these requirements with the equipment utilized at MP-1 to satisfy these requirements.

- o Development of a control room inventory for emergency equipment to supplement the complete inventory that existed.

- o Identification and documentation of HED's resulting from the control room survey, experience review, and task analysis.

1.3.1 Control Room Survey

1.3.1.1 Inventory

A computerized control room data base inventory was developed from review of the Architect/Engineer's Bill of Materials, the actual control boards and in progress plant modifications.

The full scale mock-up was designed from this inventory, the design drawings and scaled photographs of the actual control boards.

The emergency-utilized equipment inventory was developed during the Task Analysis phase by comparing the MP-1 information displays and controls utilized by operators performing EOPs, to the requirements independently developed by a Contracted Consultant.

Their development and utilization is discussed further in the Task Analysis and Assessment sections of this report.

1.3.1.2 Survey

The control room survey was conducted on all control room panels and in accordance with the methodology discussed in the Implementation Plan. Checklists (see Figure 5) were developed using the Section 6 guidelines of NUREG-0700, to administer the control room survey.

Figure 6 is a detailed criteria matrix between NUREG-0700, Section 6 criteria, and the appropriate investigation phase to which it is applied. Human factors personnel from the team administered the checklists at the control room or simulator. The items found to deviate from NUREG-0700 or those in question were classified and recorded as HEDs for later assessment and reviewed by the team. The Findings section of this report discusses these in further detail.

1.3.2 Operating Experience Review

As described in the Implementation Plan this portion of the CRDR included four aspects; a historical document review, an operator questionnaire, a standards review, and follow-up operator interviews.

1.3.2.1 Historical Screening and Document Review

The historical document review is an ongoing assessment of operational events by NU for plants within the NU system as well as other plants identified by the Institute of Nuclear Power Operation (INPO).

The NUSCO Nuclear Safety Engineering (NSE) Branch reviews all Licensee Event Reports (LERs) for the Haddam Neck Plant and Millstone Units No. 1, 2 and 3 in Waterford, Connecticut. In addition, they review all Significant Operating Experience Reports (SOERs) and Significant Event Reports (SERs) distributed by the INPO for applicability to the four nuclear plants involved in the NU system. This review process is described in the MP-1 Implementation Plan and has been in place since 1981.

Historical information was also available from operations personnel on a first hand basis as the average experience level of the MP-1 operators is >6 years. Many staff, training, maintenance and other positions are presently filled by original operators of the plant. Because all problems identified by operators and NSE are reviewed at the time of identification and because solutions to these problems are subsequently devised, it was concluded by the core team that a re-review of all events was not necessary.

Instead the NSE files were examined and a list of significant events (including SOERs and SERs) that might have significance for the CRDR effort was prepared. Each item on the list was evaluated and HEDs prepared where further review by the core team was indicated.

1.3.2.2 Operating Personnel Survey

The operator questionnaire was administered by the core team as described in the Implementation Plan. Follow-up operator interviews were conducted with six operators and one training instructor for items needing clarification. A summary of the resulting

data was written as Experience Review type HEDs for further review and assessment by the core team. Although written as HEDs, many items were solely informational in nature and were not necessary to be included. They were included, however, to insure they were not overlooked by the core team during the assessment process. Those HEDs applicable to other aspects of the review were deferred to that phase for further investigation and/or substantiation.

1.3.2.3 Standards Review

To assist in the identification of deviations from the conventions utilized in the design of the control boards, the review team examined the files applicable to the main control boards. From this review the standards were identified for inclusion in the survey; e.g., color utilization for lights; switch types for controls; abbreviations for labels and annunciators; etc. Where no standards existed or were outdated, they were created or revised (i.e., Acronym & Abbreviation List).

The deviations from these standards were noted as HEDs and are discussed further in the Findings section of this report, Section 2.0.

1.3.3 Task Analysis

The Task Analysis of the Emergency Operating Procedures was performed in accordance with the methodology presented in the Implementation Plan.

1.3.3.1 Methodology (Figure 7, Task Analysis Process)

An outside consulting firm, (Proto-Power Engineering), independent of the core team, generated generic and plant specific information characteristics and control requirements (ICCR) for performance of the MP-1 EOPs as shown in Figure 17.

Concurrently, the Core Team recorded the individual task requirements of each step in the EOPs (see Figure 8) on the Task Data Forms, (Figure 9).

Upon receipt of the ICCR report from Proto-Power, the core team compared the Proto-Power developed requirements with the devices identified by the operators as being used to accomplish the EOP step.

These devices were inserted on to the Proto-Power form and discrepancies identified as HEDs (Figure 17). The utilized instruments and controls were also inserted on the Task Data Forms for the individual tasks (Figure 9). Missing or inadequate information or control needs were recorded as HEDs on the forms.

Using the EOPs (Figure 8) and the Task Data Forms (Figure 9) the walk/talk-thru process of Task Analysis was performed for identification of the dynamic aspects of the operator's task per Figure 10.

HEDs were recorded on the Task Data Forms for any questionable tasks or discrepancies found by the core team, all of whom participated in the process.

Following this, the ICCR report (Figure 16) was utilized to record the instrument and control characteristics of the equipment used, for comparison to the required characteristics (e.g. range, accuracy, response, etc.). Discrepancies were recorded as HEDs on the form (Figure 11).

Finally, the I&C representative of the core team examined the elementary and loop diagrams for status vs. demand criteria for the main control board instruments and controls. Demand items were recorded as HEDs for further assessment.

1.4 Assessment & Corrections

The assessment process was performed by a triage or preliminary assessment (see Figure 12 a&b), and a final assessment.

The priority assigned to each HED during this assessment was determined by:

- Its consequences upon the safety of operation (emergency and normal) for a simulated error.
- Its applicability to the emergency inventory of instruments and controls.
- Its applicability to the operators comments of the experience review.

- The origin of the HED (from the investigation phase of the review)

- Its duplication among the three investigation phases of the review.

- The unanimous agreement of the core team.

The triage methodology allowed the team to resolve the HEDs with obvious implications and/or solutions to reduce the number requiring more in-depth considerations during the final assessment.

The triage was performed by members of the core team. Each HED was openly discussed by the team members first for its impact upon the safety of both normal and emergency operations using the guidance of Section 4 of NUREG-0801.

Dissenting opinions as stated in the plan, would have been recorded but none developed. All HEDs were initially classified as one of the four (4) priorities during this initial or triage stage.

The correction of many HEDs became an integral part of assessment during the triage, due to their obvious resolutions (e.g., wrong meter scales, incorrect switch

application, inaccurate labels and abbreviations, etc.). Consequently, the resolution was included on the HED form with the appropriate resolution code identified as outlined in the Implementation Plan.

The core team's final assessment of HEDs was performed after the triage was completed for those HEDs held in abeyance for further study and resolvement.

They included HEDs that were not obvious as to their consequences (e.g., involved discussion with supplemental disciplines concerning their implications and/or involved consideration with other HEDs from an overall viewpoint).

Some of the initial priorities were corrected in view of the fuller understanding of the problem.

Appropriate corrections were then selected by the team for installation on the mock-up and the verification as explained below.

The summary of the assessment and correction phases is included as figure 14.

1.5 Verification and Validation

1.5.1 Verification

The verification phase was an integral part of the overall correction phase.

The improvements were conceived by the team and detailed on computer aided scale drawings (CAD). Following review of the drawings, the corrections were installed on the full scale mock-up for the "field" review and verification that they indeed resolved the HED and did not introduce a new HED. Operations personnel were included in this process and the comments received by all were reviewed by the core team and put into the final recommended HED resolutions. In total, this process involved some two or three iterations to reach the final recommendations. Seven additional HEDs were generated as a result of this evolution.

1.5.2 Validation

The validation was accomplished by the performance of a walk-thru of selected Draft emergency procedures by licensed operators from the operations

department on the mock-up of the enhanced and corrected control boards. The operators utilized were freshly trained on the BWROG, Revision 4, EPG Based EOPs.

During this validation the emphasis of the core team was to ensure the HEDs were resolved and did not introduce new HEDs. In total this process resulted in the Documentation of nine HEDs.

1.6 Schedule and Implementation

With the overall knowledge of the changes to be made, the core team has recommended to management an implementation schedule that addresses the priorities of the changes, the manpower allocations necessary and the operational constraints that are imposed.

Those HEDs categorized as priority 1 and dispositioned for no corrective action are included as Figure 13. There are 104 individual discrepancies which fall into this category. Justification of no corrective action for each discrepancy is provided on the respective HED form.

Figure 15 is a Summary of the HEDs to be corrected, sorted by priority assignment. A copy of this, the applicable HEDs and the enhancement drawings are to be placed in the control room prior to implementation.

In addition the operators are to be briefed on the changes and made aware of the proposed installation dates. The Nuclear Training Department will receive this same information so that they may implement their appropriate actions in a timely manner.

In this manner all parties will be advised of the problems and the corrective actions to be taken.

In summary, the HEDs found were deficiencies in the methods to accomplish tasks, not the inability to do so. The corrections will make the operators tasks easier and/or more efficient, rather than possible. Consequently, in the interim, the operators will continue using the current methods to overcome the equipment's shortcomings.

2.0 GENERAL FINDINGS

2.0 This section highlights the findings obtained from the control room survey and task analysis efforts. There are eleven (11) subsections which are listed below. These subsections conform in general to the human engineering guideline categories of NUREG-0700, Section 6. The categories and the HEDs found include:

Category	No. of HEDs
Experience (Q)	124
Workspace (6.1)	37
Communications (6.2)	8
Annunciators (6.3)	25
Controls (6.4)	35
Displays (6.5)	233
Labels (6.6)	35
Panel (6.8 & 6.9)	42
Task Analysis (TA)	112
ICCR	19
Verification	7
Validation	9

A summary of discrepancies identified within the above categories is discussed. Each HED sheet contains the stand-alone documentation of the noted discrepancies.

All of the HED documentation sheets are not provided since that level of detail is not intended for this report.

From the onset, a HED was written if any deviation from the guidelines was observed. In addition, HEDs were generated if an item was questionable or the reviewer was unsure of its classification. The purpose was to ensure thorough review by the core team during assessment.

Secondly, a HED may involve many instruments and controls as in meter scale discrepancies. Rather than write a HED for each instrument, one HED was generated with an attachment provided to identify all instruments involved.

2.1 Experience Review (Q)

The Experience Review identified items that involved control panel layout concerns, location or lack of controls and displays, the environment, communications, annunciators, labeling and meter scale problems. Additional HEDs were identified by the operators in the correction and verification iterations.

2.2 Workspace (6.1)

An overall evaluation of control room workspace was conducted using anthropometric guidelines from NUREG-0700. Findings identified during this review centered around control actuation/movement and reach distances. All controls mounted on the vertical portion of the boards, above the reach distance of the 5th percentile male operator, (50th percentile female), were moved to a lower position on the boards.

2.3 Communications (6.2)

This portion of the review disclosed many problems in the operators ability to communicate with selected areas throughout the plant. Control Room internal communications were found satisfactory.

2.4 Annunciators (6.3)

There are some 800 annunciator windows in the control room. These annunciators relate to the controls and indications on the benchboard and vertical sections of the main control board and local system panels. HEDs were written concerning location, consistency of abbreviations and terminology, and legibility along with nuisance alarms.

2.5 Controls (6.4)

This review consisted of an evaluation of main board control handles, pushbuttons, and various other manipulative components. The types of problems identified were both peculiar to specific components and inconsistencies with conventions. Deviations from guidelines consisted of lack of activation feedback on pushbuttons, pushbutton surface finish, layout of functionally related legend pushbuttons, differing operation of apparently identical control switches, and deviations in colors, handle shapes, etc.

2.6 Displays (6.5)

An examination of indicators and recorders using the guidelines set forth in NUREG-0700 was conducted for this portion of the review. The most predominant design deficiencies were indicator and recorder scale inconsistencies as well as resolution requirements.

2.7 Labels (6.6)

This review involved analysis of panel and component label identifiers on both an individual and integrated basis. An overall deficiency in panel labeling was identified; i.e., the lack of hierarchical labeling within the control room, and inconsistencies between procedures and control panel nomenclature. Certain labels were excessively worded and unclear in their meaning. Deficiencies in character size, legibility, and spacing were documented as well as inconsistencies in the use of acronyms and abbreviations.

2.8 Computer (6.7)

Section 6.7 of NUREG-0700 (Computers) was not performed as the MP-1 Plant computer has been replaced with an Integrated Computer System (ICS) combining processing and SPDS.

The criteria of NUREG-0700 were administrated into the design of the ICS/SPDS by the human factors member of the core team.

2.9 Panel Layout and Integration

This review consisted of a review of the control room panels from an overall arrangement, and individual panel perspective. The criteria utilized came primarily from NUREG-0700, Sections 6.8 and 6.9.

Main Control Panel 903 was found to be deficient in that the low pressure coolant injection and isolation condenser systems had no mimic representation of the respective system flow paths. Panel 903 was also found to lack several indications which were located on Auxiliary Control Room Panels outside the primary operating area.

Main Control Board 904 evidenced a few problems in the functional grouping of related instruments and controls.

Main Control Panel 906 had a poor representation and functional layout of the Steam Jet Air Ejector Controls which was repetitively documented in the operator questionnaires.

Main Control Panel 908 was found lacking in the use of color to provide ease of electrical system bus identification.

2.10 Task Analysis (TA)/ICCR

The HEDs found during this aspect in most cases substantiated the findings of the survey and experience review, particularly in the area of labeling, arrangement, lack of information, etc. In addition, the functions of the instruments and controls were better examined which revealed some feedback problems as well as problems with location and display correlation. Deficiencies in procedural items, and administrative control, and operator training aspects were also revealed. The ICCR identified deficiencies in meter scales along with the lack of information displays.

2.11 Verification (V)

This phase of the review verified the adequacy of the corrections implemented on the full scale mock-up. The HEDs found, identified oversights in the enhancement design and errors in panel mimic.

2.12 Validation

This phase of the review ensured that the resolution of HEDs did not introduce new HEDs. The HEDs written identified concerns with the enhancement design such as:

a) Lack of Indication

b) Incorrect Labels

c) Enhancement Design Errors

3.0 CORRECTIONS

This section discusses the modifications recommended by the review team to improve control panel design. These recommendations were based on the core team's assessment of discrepancies generated during the investigation phase of the review, and are grouped into three broad improvement categories: Enhancements, Class and Individual Improvements, and Procedure/Training Corrections.

Upon completion of the survey phase, the triage methodology was performed on the 415 HEDs found with approximately 80% being resolved. For the T/A phase, 271 HEDs were found, with the triage resolving 90%. The remaining (10%) HEDs were deferred to the final assessment. Seven HEDs were found and resolved during verification.

The final corrections of the remaining HEDs were defined following further investigation and/or assistance provided by support disciplines for their disposition.

Of the 686 HEDs generated, 54 were recognized as being duplicates of other HEDs and were documented as such. Thirty-eight were considered non-HEDs by the core team, as they were questionable items during the investigation phase and written as HEDs for further review. Fifty-two were categorized by the review team as being non-significant

or as having no safety or operating implications, such as the lack of slip resistant or concave surfaces on certain push-buttons. One hundred four HEDs were considered justifiable by the review team. These involved HEDs which upon assessment were felt to be discrepancies (such as the lack of feedback) but where a change was felt unnecessary as appropriate alternative feedback information from other sources existed.

Four hundred one HEDs were referred to management for corrective action and primarily were generated during the survey and task analysis, involving control board deficiencies, operating procedures, administrative control and training.

See figure 14 for a collation of HEDs by disposition categories (MP-1 HED Summary).

3.1 Overall Panel Enhancements

The analysis of HEDs indicated that 169 were in the area of meter scales, mimicking, labeling and arrangement of components, which could be corrected with control panel enhancements. To ensure that the overall panel enhancements would be designed for improved operator performance, a philosophy was established regarding the operational population (i.e., level of expertise), which would ensure that the enhanced panels be designed for a newly licensed

operator, with minimal operating experience. With agreement on this basic issue, a general design criteria of enhancements was arrived at.

Enhancements would:

- o Functionally group control board components
- o Add and/or improve mimics to assist and provide useful information for the operators
- o Employ hierarchical labeling for ease in system and component location, grouping and legibility
- o Meet accepted human engineering principles
- o Be consistent with NUREG-0700 guidelines
- o Establish consistent application of color use, and standardize acronym and abbreviation usage.

To make the groupings and overall enhancements design effective, a number of component relocations have been included.

3.1.1 Methodology

The enhancement design developed requires extensive modification to Main Control Board 903. Considerable operator input for system and functional aspects of plant operation were included in the enhanced control board design.

Three techniques have been used for the design. First, an overall functional grouping to be accomplished by encompassing a technique using relocation of components shading, boxing, etc. The second technique is the use of shading, demarcation and hierarchical labeling. The third technique is the shade coding of controls switch handles.

An initial design for each panel was made, and implemented on the mock-up. The core team reviewed this design and then made modifications in accordance with the comments. Following several iterations, the modified board was then reviewed by both the core team and groups of operators. The design was again modified to incorporate all applicable comments. Another review, including the verification that the design resolved the applicable HEDs, was then established as the final design.

3.1.2 Panel Labeling

In conjunction with the enhancement effort, hierarchical labeling was adapted to improve the legibility and functional relationship of components. The entire board will be relabeled. Prior to determining the specific label content, a list of standardized acronyms and abbreviations was developed for present and future use.

3.1.3 Color Use

Color shading was utilized for control switch handles as the core team found it assisted the operator in distinguishing pump from valve controls. In situations where the relationship between instruments required clarification, shading and demarcation are used.

Inconsistencies in indicator light colors have been corrected to conform with standards.

Color for mimics is primarily used for separation clarification and does not necessarily depict a specific system.

3.1.4 Mimics

Control panel mimics are being added and improved. Using P&IDs as the source material, the flow paths depicted by the mimic lines were made more obvious by directional arrows. The size of the lines was altered to differentiate major and minor flow paths. Mimic origins and termination points have been clarified to reduce identification difficulties.

Additional demarcation lines, to improve functional grouping of components, are unique and used sparingly as they clutter the panels and could be confused as mimic lines.

3.1.5 Enhancement Implementation

As stated in Section 3.1.1, the enhancements were implemented on the full-scale mock-up. Operations personnel were formally involved in reviewing and commenting on the enhancements throughout the correction phase. Operations personnel were also formally involved in the verification process.

With the mock-up implementation complete, a transmittal of the computer aided design drawings and modifications shall be made to the Project Manager for incorporation on the actual control boards along with the individual HEDs requiring the changes.

See Section 4.0 for scheduling.

3.2 Class and Individual Improvements

The use of enhancement techniques will correct many panel discrepancies. In addition to enhancements, other

approaches to solving discrepancies are necessary. The combination of minor changes to a particular type of control or display may correct an entire class of problems. This correction method is referred to as a Class Improvement. Specific class improvements and individual improvements are discussed below.

3.2.1 Controls

The control switches for valves and small equipment were not easily distinguishable from switches for pumps and major equipment items, i.e.: pumps. All pumps and large equipment items will be provided with oval shaped, color coded handles to distinguish them from other equipment which shall utilize "J" type handles.

3.2.1.1 Pushbuttons

Circular pushbuttons throughout the control room were not consistently color coded. All buttons including the recommended sleeve guard, will be colored in accordance with the following code:

Function	Color
Emergency Trip or Emergency Activation	Red
Reset, Test, Stop, Acknowledge Bypass, and All Others	Silver

3.2.1.2 Indicators

Large electrical equipment which utilize a separate control power supply, i.e.: DC control power, were found to cause operator problems in the event of a loss of the equipment's respective electrical bus. In this event, the equipment, although de-energized and not available for use, would indicate the equipment status to be that condition which existed when the loss of power occurred. For all such equipment white lights will be added to indicate power available to the respective equipment power supply.

3.2.1.3 Reverse Acting Controllers

Controllers which were found to be not consistent with population stereotype of clockwise to open were found to be reverse acting controllers. These controllers increase output signal to close their respective valves. These controllers shall be labeled "Reverse Acting", as changing the controllers to conform to population stereotypes would misrepresent the process controlled (i.e., reverse acting temperature controller will increase output signal to increase process temperature which is accomplished by closing a cooling water supply valve.)

3.2.2 Displays

3.2.2.1 Indicators and Recorders

With the receipt of the Proto-Power Information Characteristics and Control Requirements (ICCR), a complete review of all analog indicator, recorder and controller scales was made. This review assures that all scales conform to both operational and human factors criteria. Meter scales will be revised to conform to Human Factors, Operational Criteria and comply with resolution requirements.

3.2.3 Annunciators

In general, annunciator panels related well to the corresponding instrumentation on the control boards. The acronyms and abbreviations will be corrected to conform to the standards. Some relocation of tiles will be made to functionally group them with relocated equipment for better association with their corresponding instruments and controls.

3.2.4 Regulatory Guide 1.97 Instruments

Instruments that meet Regulatory Guide 1.97 criteria are located throughout the control room. Each 1.97 instrument will be marked by a red label on the component and engraved "PAM" to enable operators to quickly identify the 1.97 instruments.

3.2.5 Individual Corrections

Those discrepancies that could not be resolved using either enhancement or class improvement techniques were reviewed on an individual basis and specific solutions developed. An example of this would be the relocation of the RBCCW controls and indication to main control panel 904.

3.3 Procedure/Training Corrections

Thirty-seven (37) discrepancies were classified as Procedure/Training Corrections as outlined earlier and are of three types.

- o Training
- o Operational Procedures
- o Administrative Control

3.3.1 Training

There are seven (7) HEDs in this category. These HEDs were identified in Task Analysis. They were transmitted to the Operation and Training Departments for emphasis during training.

3.3.2 Operational Procedures

During the task analysis, the Core Team expressed significant concerns about the layout, format and complexity of the new EOPs.

The EOPs used for the Task Analysis were in first draft form and the operations staff were not yet trained on them. Due to this the Core Team decided that these concerns would be better addressed during the validation phase of the CRDR.

In the interim the Human Factors Engineering, (HFE), representative on the Core Team worked with the EOP writers to provide HFE input and ensure the Core Teams' concerns were addressed during their development.

The validation phase of the CRDR was performed with a final draft of the BWROG Revision 4, EPG based EOPs and the operations staff had received training on them.

The validation phase of the CRDR verified that all but one major concern had been addressed. This concern was the requirement for simultaneous execution of a number of EOPs. As a result of this concern, the normal once per year EOP Operator Training will be supplemented by performance of training on at least one EOP in every training cycle for which simulator training is scheduled.

Nineteen (19) discrepancies previously identified as HEDs documenting inconsistencies, questions or corrections to the draft EOPs were transmitted to the Operations Department for resolution.

3.3.3 Administrative Control

Twelve discrepancies of this type were transmitted to the Operations Department for their action to apply administrative controls for certain functions (e.g., control of the keys for key lock switches, cleaning of the labels, etc.). Development of procedures for the installation of jumpers, bypasses and fuse removals.

4.0 SCHEDULING AND IMPLEMENTATION

The MP-1 CRDR was evaluated as part of the Integrated Safety Assessment Program (ISAP) under Topic No. 1.07. The ISAP evaluation resulted in a moderate ranking. Accordingly, NNECO has currently scheduled the HED corrections over three consecutive refueling outages beginning with the 1991 outage. However, NNECO is carefully considering the appropriateness of performing the various HED corrections. As part of this continuing review, NNECO plans to perform an ISAP evaluation of the proposed corrections for individual or groups of HEDs. NNECO will inform the NRC Staff of any resulting scope or schedule changes in future periodic ISAP/IIS update submittals to the Staff. The following is a schedule and breakdown for HED corrections as currently planned.

4.1 Implementation Schedule

Figure 18 lists all HEDs which are to be corrected and identifies the refueling outage during which they will be accomplished. The outages are identified as #'s 1 through 3 with #1 being the 1991 refueling outage. In order to ensure an orderly implementation, corrections are planned concurrently with major changes to their respective control board section. These corrections are listed

as being performed in outages 1, 2, and 3.

Two major considerations in developing the schedule were the relative safety significance of the individual corrections and the logistics of performing such control room changes. In several instances the logistics of accomplishing the modifications had to be considered as earlier implementation of other changes would present unacceptable temporary control board layouts and cause significant training problems.

5.0 INTEGRATION WITH OTHER ACTIVITIES

The CRDR integration has been an ongoing process since the review's conception. Members of the team include personnel involved with the other facets of Supplement 1 to NUREG-0737; e.g.:

- The control operators in the development of the T/A Charts and ICCR equipment.
- The Human Factors Specialist and Operations Eng. in the development of the SPDS.
- The training Supervisor as a discipline support of Review.

Additionally, the CRDR provided design input to on-going plant modifications (i.e., RBCCW isolator valve additions, etc.).

The findings of HEDs are indicative of their integration; e.g.:

- Sequential task identification for the assessment of crew structure.
- The need for administrative control for certain devices and/or equipment.

Finally, the solutions for HEDs use all encompassing methods of integration; e.g.:

- Highlighting Regulatory Guide 1.97 instruments and controls in the enhancement design.

- Identification of Training and Procedure modifications or emphasis as necessary.

- Staffing and Crew Structure.

Finally, the validation of the review was performed using operating personnel performing a selected group of time-sensitive procedural steps at the mock-up. As explained in the validation methodology, the items forwarded to the applicable departments (e.g., procedures and training) will be reviewed as a part of this validation. The validation process has identified 9 HEDs.

CONTROL ROOM DESIGN REVIEW -- BLOCK DIAGRAM

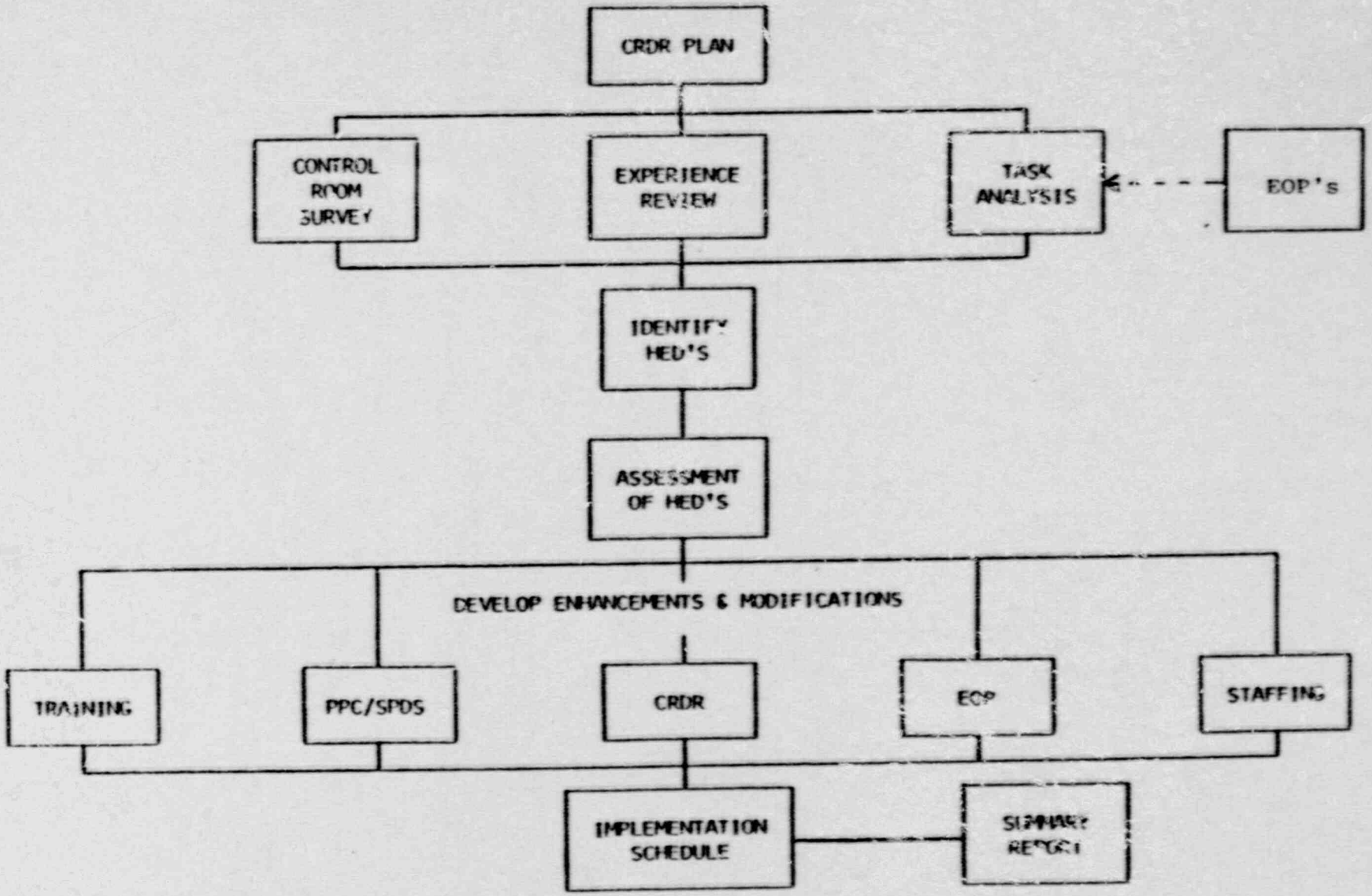


Figure 1

FIGURE 2

PROJECT ORGANIZATION

Senior Vice President
Nuclear Engineering & Operations
E. J. MROCZKA

Vice President
Generation Engineering and Design Department
R. P. WERNER

Director
Generation Engineering & Design Department
G. L .JOHNSON

System Manager
Generation Electrical Engineering
A. R. ROBY

CRDR Program Manager
Manager I&C Engineering
T. A. SHAFFER

CRDR Project Engineer
Specialist I&C Engineering
R. K. MCCARTHY

CORE REVIEW TEAM

R. K. McCarthy, I&C Eng.
T. S. Thull, Unit 1 Staff Asst.
A. M. Stave, H. F. Spec.
R. L. Lueneberg, Operator Trng. Supvr.
D. Reed, Unit 1 Operations Staff*
W. Spahn, Unit 1 Operations Staff*
E. Pelish, Unit 1 Operations Staff*
D. D'Bate, Unit 1 Operations Staff*
D. Chatfield, Unit 1 Operations Staff*

* Consultants

DISCIPLINE SUPPORT

R. P. Perkins, Licensing Engrg.
R. L. Beveridge, PRA/Safety Analysis
R. E. McMullen, Mechanical Engrg.
M. Parikh, Computer Serv.
M. T. Smaga, Electrical Engrg.
N. Jain, Nuclear Engrg.

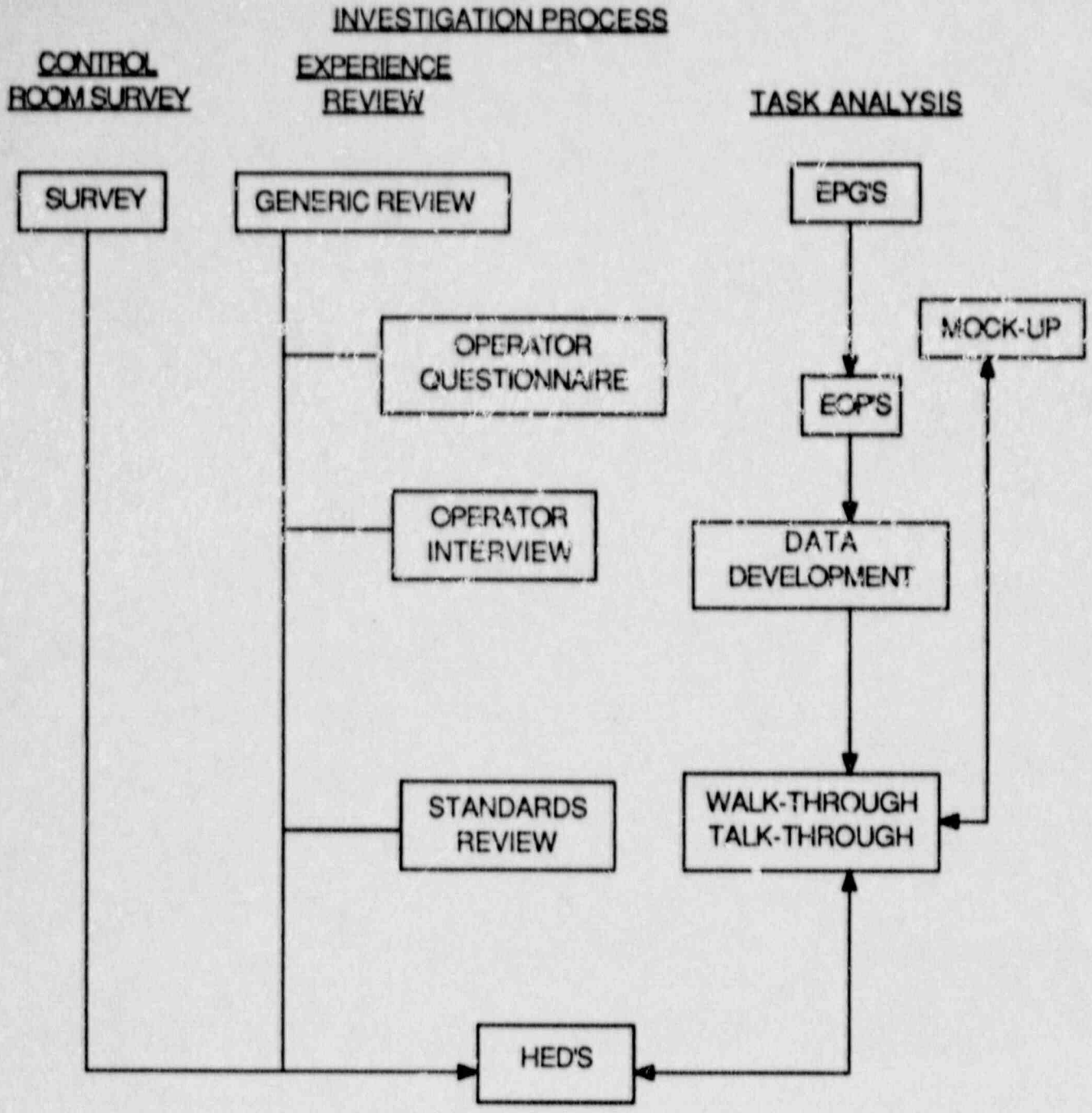

INVESTIGATION PROCESS
CONTROL ROOM SURVEY
EXPERIENCE REVIEW
TASK ANALYSIS
SURVEY
GENERIC REVIEW
EPG'S
MOCK-UP
OPERATOR QUESTIONNAIRE
ECP'S
OPERATOR INTERVIEW
DATA DEVELOPMENT
STANDARDS REVIEW
WALK-THROUGH TALK-THROUGH
HED'S

FIGURE 3

Resume of

Eric H. Pelish

1975 to present:	Northeast Nuclear Energy Company, Millstone Unit 1 Operations Department
1979 to present:	Northeast Nuclear Energy Company, Millstone Unit 1 Control Operator
1977:	Reactor Operators license
1964 to 1971:	United States Navy Nuclear Power Program
1964	Graduate Patchogue High School, Patchogue, Long Island, New York

FIGURE 4A

Resume of

David P. Chatfield
28 North Bridebrook Rd.
Niantic, Ct. 06357

Formal Education:

Received N. Y. States Regents High School Diploma from James E. Sperry High School in 1975

Attended The Citadel in Charleston, S. C. from 8/75 to 5/76

Presently taking courses from University of Connecticut toward obtaining a Nuclear Technology degree.

Technical Background and Experience

Enlisted in U. S. Navy in June 1977]
Successfully completed the following training programs:
Electricians Mate 'A' School
Naval Nuclear Power School
Nuclear Prototype Training
Naval Electric Motor Rewind School

Attained the following qualifications:

Electrical Operator (S3G Prototype)
Electrical Switchboard Operator (U.S.S. Enterprise)
Electrical Load Dispatcher (U.S.S. Enterprise)
Received Honorable Discharge on June 21,1983

Employed by Northeast Utilities on February 13, 1984
Successfully completed the following training programs:
Fire Brigade Member and Fire Brigade Leader Training
Plant Equipment Operator
Reactor Operator (Licensed by NRC on January 30, 1987

FIGURE 4B

Resume of

William E. Spahn

U. S. Navy:	September 1973 to January 1979
Electic Boat:	February 1979 to May 1979 (Technical Writer)
Millstone Unit 1:	May 1979 to Present
NEO:	May 1979 to January 1982
Control Operator:	January 1982 to Present
Reactor Operator license:	January 1982 to May 1983
Senior Reactor Operator:	May 1983 to Present

Associates Degree Nuclear Technology, Thames Valley State Technical College, June 1989

FIGURE 4C

EXPERIENCE SUMMARY

NAME: REED, PAUL DAVID

AGE: 30 years

POSITION: MILLSTONE ONE Senior Licensed Plant Equipment Operator

EDUCATION/EXPERIENCE:

JUNE 1977: Graduated High School Scholastics Program
SEPT. 1977: Enlisted US Navy Nuclear Power Program
FEB. 1977: Graduated Machinist Mate "A" School
DEC. 1978: Graduated Navy Nuclear Power School
JULY 1979: Graduated Navy S7G Prototype; Qualified Navy Nuclear Operator (Machinist Mate)
JULY 1979: Retained for STAFF Instructor at S7G (MARF) PROTOTYPE
OCT. 1981 - SEPT. 1985: Assigned to SSBN 626 Daniel Webster
APR. 1984: Graduated Machinist Mate "C" School
NOV. 1985: Employed with Northeast Utilities Millstone One Training Department
JAN. 1987: Received Senior Reactor Operator License from NRC
DEC. 1988: Transferred to Millstone One Operations Department
JULY 1989: Peer Evaluator Pilgrim Station during 2 week Simulator/ Station INPO EVALUATION
OCT. 1989: Successfully completed NRC Evaluated Licensed Requal Examination for SRO

Figure 4D

EXPERIENCE SUMMARY

NAME: D'ABATE, DON

AGE: 40 Years

POSITION: MILLSTONE ONE Control Operator, Reactor Operator licensed

EDUCATION/EXPERIENCE:

1967:	Graduated High School
1967:	Enlisted US Navy
1967:	Machinist Mate school graduate
1968:	Navy Nuclear Power school
	Navy Nuclear Power Prototype
	Submarine school
1969:	Navy Welding school
1969:	Assigned to Submarine and qualified these watchstations:
	Engine Room Supervisor
	Engineering Watch Supervisor
1973:	Discharged US Navy
1973:	Auto Mechanic
1979:	Aux. Equipment Operator (Fossil)
1981:	Plant Equipment Operator (Nuclear) at Millstone
1984:	Granted Reactor Operators License
1988:	Promoted to Control Operator

Figure 4E

COMPLIANCE CHECKLIST

N/A	Yes	No	Reference/Comment
	✓		
	✓		
		✓	
	✓		
	✓		
	✓		

6.4.4.5 ROTARY SELECTOR CONTROLS (Cont'd)

e. **DIMENSIONS**—Recommended dimensions for rotary selector switches are as follows (see Exhibit 6.4-13):

(1) Length (L) (inches)
Minimum 1.0

(2) Width (W) (inches)
Maximum 1.0

(3) Diameter (D) (inches)
Minimum 1.0

(4) Depth (H) (inches)
Minimum 0.625

(5) Resistance (inch/pounds)
Minimum 1.0
Maximum 6.0

f. **MOMENTARY-CONTACT ROTARY SELECTOR CONTROLS**—Knobs for spring-loaded momentary contact rotary selector controls should be large enough to be easily held against the spring torque, without fatigue, for as long as necessary to accomplish the control action.

Figure 5a

NORTHEAST UTILITIES

MILLSTONE UNIT 1
CONTROL ROOM DESIGN REVIEW
CONTROL ROOM SURVEY FORM

Checklist Item: 6.4.4.5 (CR) M/U SIM

Surveyed by: R Sabet Date 4-29-87 HED No: 6.4.018

Checklist Element	Board/ Console	Panel	REMARKS/COMMENTS
6.4.4.5 e(3)	924	D4	TIC 20-2005, TIC 20-1005 temp controllers less than 1" Diameter & FIC/20/21, FIC 19/20, LIC/20/5 LIC/20/6 A2B SJAE GAS FLOW, A2B DFF GAS CONDENSER LEVEL GE Controllers less than 1" Diameter
	937	D4	less than 1" Diameter Meter function controls for LPRM GP1, GP2, APRM Channel 4, 1, 5, 2, 6 & 3 RBM CH 7, 8
	913	D4	less than 1" Diameter on: DW TC Drive Control Channels 1, 2, 5 & 4
	911	D4	Power supply area monitor DW TC for ranges (1-10), (11-20), (21-30)

Reference Data:

Photo No:

Figure 5b

NORTHEAST UTILITIES

MILLSTONE UNIT 1
CONTROL ROOM DESIGN REVIEW
CONTROL ROOM SURVEY FORM

Checklist Item: 6.4.4.5 (CR) M/U SIM

Surveyed by: RSL Date 9-29-87 HED No: 6.4.018

Checklist Element	Board/ Console	Panel	REMARKS/COMMENTS
6.4.4.5 e(3) Cont'd	910	D4	upscale High & Hi Hi on channels Rad waste effluents
	ATWS CRP 980-1 980-2	D4	ATI self test controls for trip out - 4 and 4

Reference Data:

Photo No:

Figure 5c

DETAILED CONTROL ROOM DESIGN REVIEW

GUIDELINE MATRIX

6.1 Control Room Workspace

NUREG-0700		DATA COLLECTION METHOD			COMMENTS/REFERENCE
6.1.2	Work Station Design	OER	CRS	TA	
6.1.2.1	Anthropometric Basis for Equipment Dimensions		P		
6.1.2.2	Stand-up Console Dimensions		P	S	6.1.2.2. c, d, f: Use 28 inches to accomodate extended functional reach and related to 6.1.2.3. c, d, f
6.1.2.3	Sit-down Console Dimensions		P		6.1.2.3. c, d, f: Related to 6.1.2.2. c, d, f 6.1.2.3: Related to 6.7.2.3. e
6.1.2.4	Sit-stand Work Stations		P		
6.1.2.5	Vertical Panels		P	S	6.1.2.5 a(2), b(2): Determination of frequently used controls/displays to be determined by TA
6.1.2.6	Use of Procedures and other Reference Materials at Consoles		P		

* P refers to Primary Source for obtaining data
** S refers to Secondary Source for obtaining data

FIGURE 6

TASK ANALYSIS PROCESS

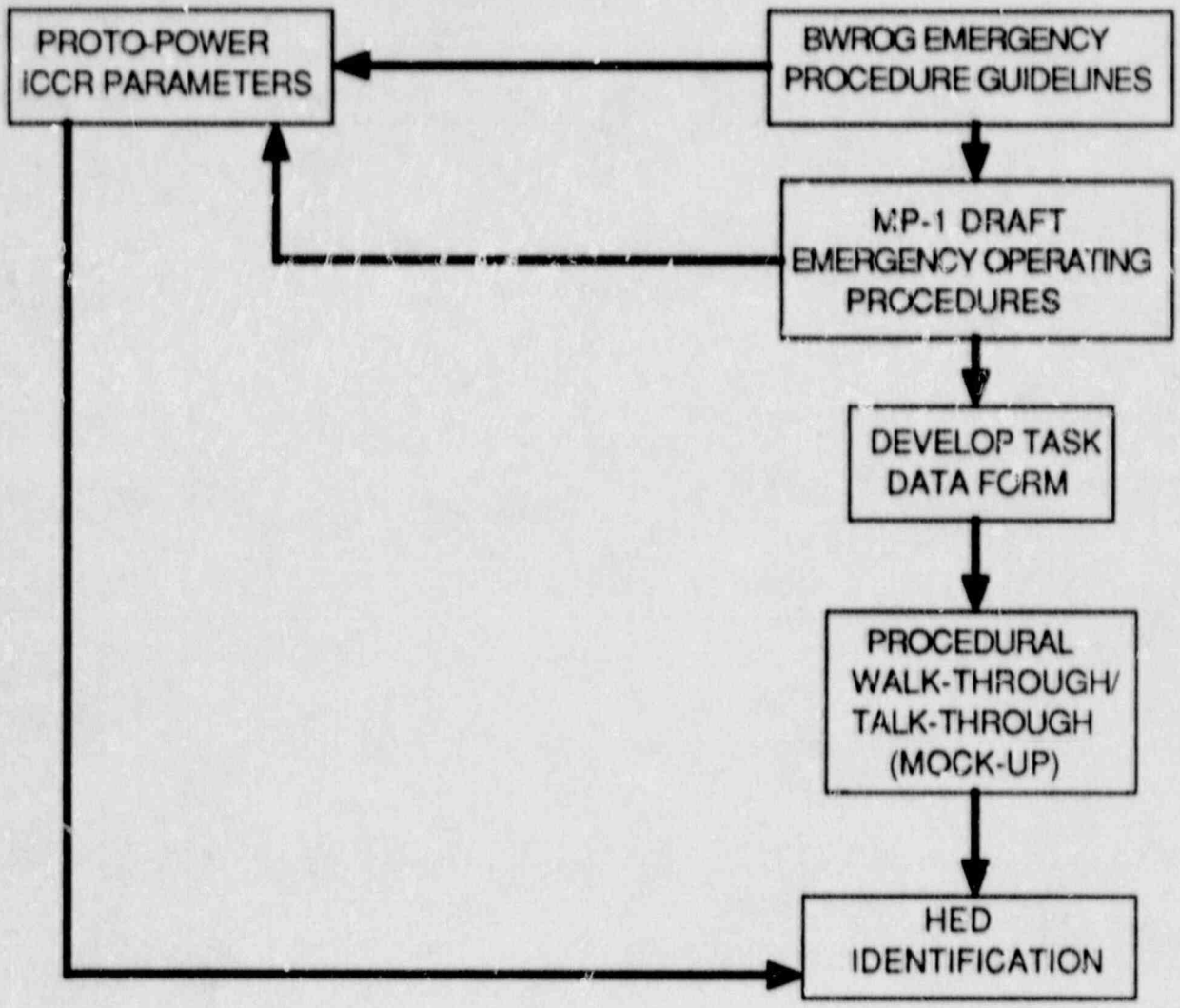


FIGURE 7

MILLSTONE UNIT 1

PRIMARY CONTAINMENT CONTROL

Page No.	Rev.
1 to 27	0

A. PURPOSE

The purpose of this procedure is to:

- Maintain Primary Containment integrity, and
- Protect equipment in the Primary Containment.

B. ENTRY CONDITIONS

Any of the following conditions require entry to this EOP:

- Torus water: temperature above **90°F**
  level above **13.3 ft**
  level below **13.5 ft**
- Drywell: bulk temperature above **155°F**
  pressure above **2.0 psig**
- Primary Containment H_2 concentration above **2.0%**

MP1 TASK DATA FORM (TDF)

EOP NO. 580 **REV.** 0 **TITLE** Primary Containment Control

STEP NO. ___ **STEP TITLE** Entry Conditions

TASK REQUIREMENT			PLANT EQUIPMENT USED					
NO.	VERB	TASK	DEVICE	PLANT I.D.	LOC.	RANGE	STATE	RED NO.
1	OB	Torus Temp	Temp Ind.	1603-51A,B	903		>90°F	
2	OB	Drywell Bulk Temp	Temp Ind.	TI-1602-6A,B	903		>150°F	
3	OB	Drywell Press.	Press Ind. Press Recorder	1601-10 1602-1	903 903		>2.0 psig	
4	OB	Torus Water Level	Lvl Rcdr Lvl Ind. Computer	Torus Lvl LI-1602-2A,B	925 925		>13.8 ft.	TA-48 TA-49
5	OB	Torus Water Level (See Pg. 1 #4)					<13.5 ft.	
6	OB	Primary Ctmt H_2 Concent.	H_2/O_2 RCDR Ind. Lt.	H2 Concent. H_2O 0-10%	925 925		>2.0% Lit	TA-50

FIGURE 9

TASK ANALYSIS HED PRINCIPLES

1. Are all the controls and displays required to perform this task presen. in the control room?

   6111a 6411b 6125

2. Are the controls and displays grouped by sequence, function, or use for the requirements of this task?

   6515d 6811 6821
   6911c 6921b

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

   6514e & f 6633c

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

   6113c(2) 6122e(2) & f 6125a(2) & b(2)
   6542b(2) 6911a

5. Do the controls and displays give the operator direct, readily useable information if required? (e.g.:

   Parameter values

   Range, band and limits

   Trend information

   Rate of change

   Percentage information

   Digital or analog information

   Status of demand information

   Precision and feedback information

   6411a & b 6511 6512
   6541g 6931c 6932

6. Is the control room arranged and staffed to accommodate the requirments of this task?

   6111b 6112 6113d

FIGURE 10

Figure 11

HUMAN ENGINEERING DISCREPANCY

HED NO. _____

TITLE: _____ RIORITY: _____

COMMENT:

Reviewer Date Ref. Source

IDENTIFICATION: Panel:

Component Name:

ID or No.:

DESCRIPTION:

POSSIBLE SOLUTIONS:

RESOLUTION: (Code)

Approved Signature: _____ Date: _____

/ / Additional page(s) attached

Millstone Unit 1

CONTROL ROOM DESIGN REVIEW

ASSESSMENT TRIAGE METHODOLOGY

Considering the safety and operational significance of each HED, every HED will be reviewed as follows:

1. Is the HED truly a deficiency?
2. Is the HED in the process of resolution with an existing design change?
3. Is the HED a logical candidate for management resolution? (e.g., training/procedures/PC display)
4. Is the HED part of a larger, duplicate or generic HED?
5. Are surface enhancements the logical resolution?
6. Is the HED resolution obvious and minor for change to both the control room and the simulator?
7. Does the HED require further study and assessment?

FIGURE 12a

MILLSTONE UNIT 1

CONTROL ROOM DESIGN REVIEW (CRDR)

ASSESSMENT TRIAGE FLOW CHART

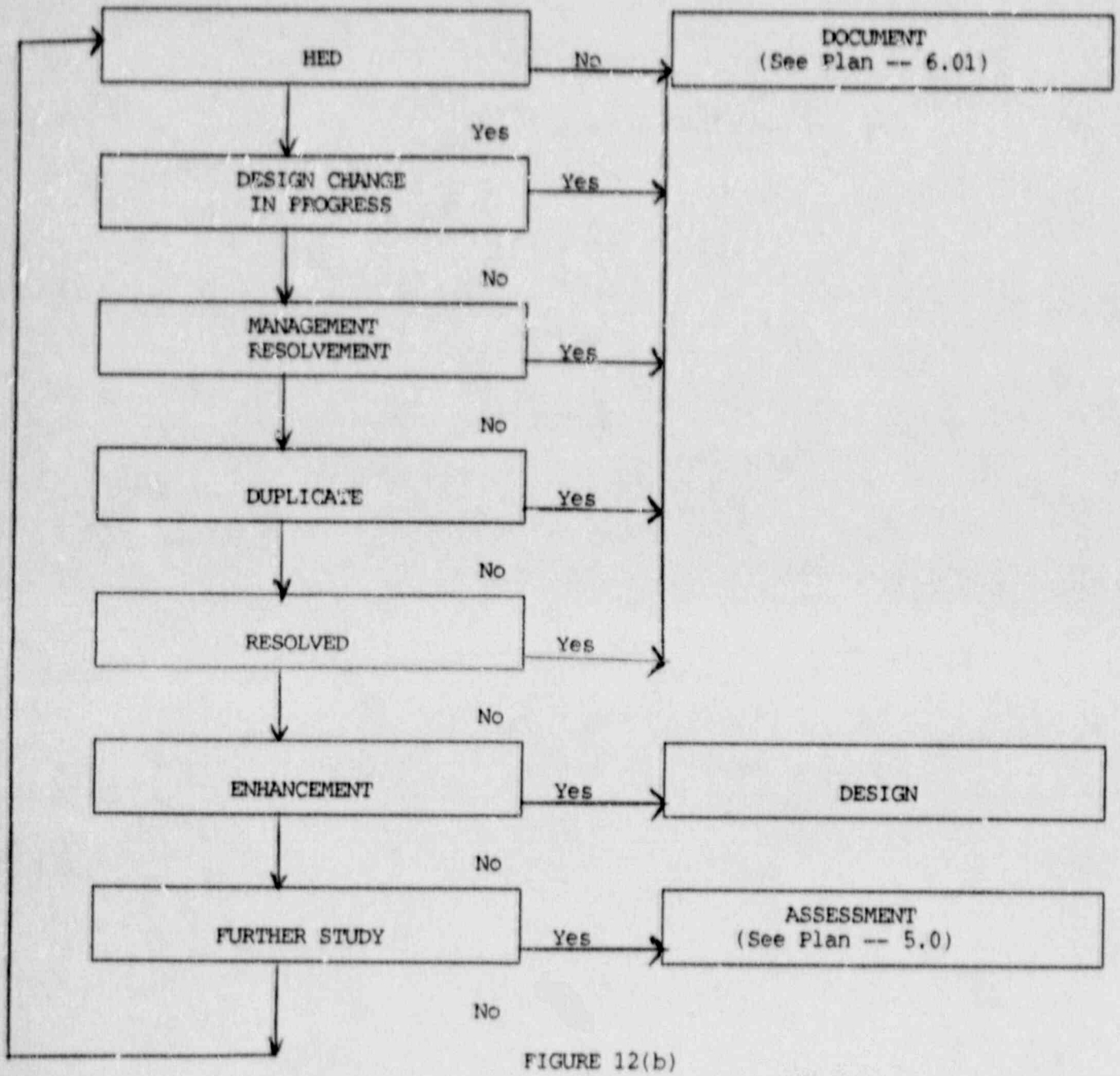


FIGURE 12(b)

FIGURE 13

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
3	6.1.009B	I	E	IV
4	6.1.010	I	E	IV
5	6.1.012B	I	E	IV
6	6.1.012C	I	E	IV
7	6.1.012D	I	E	IV
8	6.1.012E	I	E	IV
9	6.1.012F	I	E	IV
10	6.1.012G	I	E	IV
11	6.1.012H	I	E	IV
12	6.1.012I	I	E	IV
13	6.1.012J	I	E	IV
14	6.1.012K	I	E	IV
15	6.1.012L	I	E	IV
16	6.1.014	I	E	IV
17	6.1.015	I	E	IV
18	6.1.016	I	E	IV
19	6.1.017	I	E	IV
20	6.3.002	I	E	IV
21	6.3.006	I	E	IV
22	6.3.017	I	E	IV
23	6.4.002	1	A	IV
24	6.4.003D	1	E	IV
25	6.4.003E	1	E	IV
26	6.4.003F	1	E	IV
27	6.4.003G	1	E	IV
28	6.4.003H	1	E	IV
29	6.4.003I	1	E	IV
30	6.4.003J	1	E	IV
31	6.4.003K	1	E	IV
32	6.4.003L	1	E	IV
33	6.4.008	1	E	IV
34	6.4.009	1	E	IV
35	6.4.014	1	E	IV
36	6.4.015	1	E	IV
37	6.4.016	1	E	IV
38	6.4.017	1	E	IV
39	6.4.018	1	E	IV
40	6.4.020	1	E	IV
41	6.5.007C	1	E	IV
42	6.5.007E	1	E	IV
43	6.5.007F	1	E	IV
44	6.5.007G	1	E	IV
45	6.5.007H	1	E	IV
46	6.5.007I	1	E	IV
47	6.5.009E	1	E	IV
48	6.5.013E	1	E	IV
49	6.5.019A	1	E	IV

FIGURE 13

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
50	6.5.019D	1	E	IV
51	6.5.019E	1	E	IV
52	6.5.019F	1	E	IV
53	6.5.019G	1	E	IV
54	6.5.024A	1	E	IV
55	6.5.024B	1	E	IV
56	6.5.024C	1	E	IV
57	6.5.024D	1	E	IV
58	6.5.024E	1	E	IV
59	6.5.024F	1	E	IV
60	6.5.024G	1	E	IV
61	6.5.024H	1	E	IV
62	6.5.024I	1	E	IV
63	6.5.024J	1	E	IV
64	6.5.024K	1	E	IV
65	6.5.024L	1	E	IV
66	6.5.028	1	E	IV
67	6.5.032D	1	E	IV
68	6.5.032F	1	E	IV
69	6.5.032O	1	E	IV
70	6.5.032P	1	E	IV
71	6.5.032Q	1	E	IV
72	6.8.001B	1	E	IV
73	6.8.001C	1	E	IV
74	6.8.001D	1	E	IV
75	6.8.001E	1	E	IV
76	ICCR-3	1	E	IV
77	ICCR-5	1	E	IV
78	ICCR-7	1	E	IV
79	ICCR-15	1	E	IV
80	ICCR-19	1	E	IV
81	Q-27B	1	E	IV
82	Q-27H	1	E	IV
83	Q-32D	1	E	IV
84	Q-3A	1	E	IV
85	Q-3E	1	E	IV
86	Q-3L	1	E	IV
87	Q-7C	1	E	IV
88	TA-103	1	E	IV
89	TA-104	1	E	IV
90	TA-106	1	E	IV
91	TA-109	1	E	IV
92	TA-110	1	E	IV
93	TA-112	1	E	IV
94	TA-22	1	E	IV
95	TA-24	1	E	IV
96	TA-27	1	E	IV

FIGURE 13

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
97	TA-29	1	E	IV
98	TA-68	1	E	IV
99	TA-81	1	E	IV
100	TA-83	1	E	IV
101	TA-88	1	E	IV
102	TA-89	1	E	IV
103	TA-90	1	E	IV
104	TA-96	1	E	IV

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.1.009

CONTROL ROOM WORKSPACE

TITLE:
Stand-up Console Control Height

PRIORITY: 1/2

COMMENT:
Controls above 56 inches height level

Reviewer	Date	Ref.	Source
Sabeh/Trump	7-21-87	6.1.2.2 b(1)	Control Room Survey

IDENTIFICATION: Panel: 905, 907

Component Name: See Attachment

ID or No.: NA

DESCRIPTION:

See attachment for controls above 56 inches in height

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

A plant specific exception/guideline is applied such that all controls will accommodate the 5% male and 50% female.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

MP1
ATTACHMENT FOR:

HED# 6.1.009 GUIDELINE REF# 6.1.2.2B (1) DATE 7/21/87

	PRIORITY	PANEL	SUB PANEL	DESCRIPTION
A)	2	905	"2"	channel selector switches 21 thru 24 (2 finger type rotary switches #23
B)	1	907	"2"	turbine bearing temp (R-46) and turbine vibr (R-47) clear + speed (Toggle control switch) and pushbuttons for Emerg. Trip 5T & 6T, 7T & 8T.

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.1.010

CONTROL ROOM WORKSPACE

TITLE:
Benchboard Slope & Control Distance

PRIORITY: 1

COMMENT:
Benchboard slope and control distance beyond 28 inches from front edge of console.

Reviewer	Date	Ref.	Source
Sabeh/Trump	7-21-87	6.1.2.2 c&d (2)	Control Room Survey

IDENTIFICATION: Panel: 903, 904, 905, 906, 907, 908

Component Name:

ID or No.:

DESCRIPTION:

Generic problem all controls on 2 section of stand-up console are beyond 28 inches from front edge of console. See Attachment.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

The NUREG 0700 Guideline does not allow for operator flexure to reach controls.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

HED1/87/12

MP1
ATTACHMENT FOR:

HED# 6.1.010 GUIDELINE REF# 6.1.2.2c&d (2) DATE 7/22/87

PANEL	SUB PANEL	DESCRIPTION
903	"2"	LPCI CONTROLLERS: ESW HX A, HX B, STM DRN SCV 1-2 , DRN TRAP BYP VLV, (Rotary Finger SW's)
		CONTROLLERS: N2 Flow 1-AC-16, 1-AC-41, 1-AC-40, and 4 ISOL VLVs (Rotary Finger SW) - 6 SW's unlabeled.
		CTMT PRES TORUS/DRYWELL CONTROLLER, (PB) GR 4 ISOL CONDENSER.
904	"2"	2 CONTROLS (PB): DW EQUIP. DRN. SUMP PP. CLN-UP TEMP CONTROL (7 POSITION SW),
		CONTROLLERS: DRN FLOW REG, CLNUP SYS CONTROLS (3)
		CLNUP PRES CONTROLLER, DW EQ DRN (2 HAND SWs)
905	"2"	ROD WORTH MIN (KEY CONTROL), PB's ATWS "A", TRN "A ORC", ATWS "C",
		(2 FINGER SW) CHANNEL SELECT 21 THRU 24
		(6 FINGER SW) CHANNEL SELECT, APRMs
		(2 PBs) RBM TRIP RESET, (6 PBs) CHANNEL SELECT AND APRMs
		(2 FINGER ROTARY SW) RX LVL SEL, VSL LVL CONTROL
		(3 PBs) ATWS, TRN B, TRN BED, TRN D
905	"2"	(18 HAND CONTROLS) RTN PPA, B, RF SEAL WTR PPA, B AND C; RF PP RECIRC A, B, C, M/V HW BYP 1MW9, 1CN69, COND A & B VLV, C AND D, COND A AND B XOVER VLV, C AND D INTAKE DEICING VLVs
		(6 FINGER ROTARY SW) RFP AUX OIL PPA, B, C, HW RECORDER, SJAE OVERRIDE (MO LABEL) STATION AIR.

MP1
ATTACHMENT FOR:

HED# 6.1.010 GUIDELINE REF# 6.1.2.2c&d (2) DATE 7/22/87
(cont'd)

PANEL	SUB PANEL	DESCRIPTION
906 cont'd		(6 PBs) OFF GAS REST, COND MI 2A, 2B
		(16 PBs) SJAE AR-4, SJAE A&B
		(8 PBs) STM TRAP BYP
907	"2"	(4 PBs) EXTR STM BYP
		(17 PBs) BYP VLV TRIP(2), VCM TRIP, LO VCM TRIP, RESET (2) VCM TRIP, EMERG TRIP, TURB TRIP (2), 5&6 EMERG TRIP (2), AMPLIDYNE VOL REDUCTION CONTROL
		(4 HAND CONTROLS) BYP VAC TRIP 1 & 2 EMERG GOV TRIP TEST, TORARY, GEN VOLT.
		(2 FINGER SW): ACCEL RANGE SEL., AUTO TRACK CUTOFF
908	"2"	(20 HAND SWs) STA BATT VOLT, RSS VOLT/AMP METERS, NSS TRANS/AMP METERS, MCC, EIRB-4, E2 2nd, E3 1st, E4 1st, E5 2nd, E6 3rd, FIRE PUMP HOSE, COND TR PUMP HOSE, F1 SERIES SAMS AS E SERIES -
		RX BLDG FRAME FIRE PUMP HOSE, COND TR PP
		DG VOLT M, GAS TURB GEN, ESS TRNAS AMPM,
		(5 PB's) DG EMERG (2), GAS TURB EMERG (2), GAS TURB PEAK RESERVE
		(KEY CONTROL) CT GOV MODE SW

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.1.012

CONTROL ROOM WORKSPACE

TITLE:
Display Horizontal Displacement

PRIORITY: 1

COMMENT:
Oblique angle of display from work position less than 45 degrees.

Reviewer	Date	Ref.	Source
Sabeh/Trump	7-22-87	6.1.2.2 e(2)	Control Room Survey

IDENTIFICATION: Panel: 903, 904, 905, 906, 907, 908

Component Name: See Attachment

ID or No.: NA

DESCRIPTION:

See attachment for displays less than 45 degrees from operator work position.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E, A) See Attached

The operator can place himself so as to operate the controls and view the display. He can also move one step to view display.

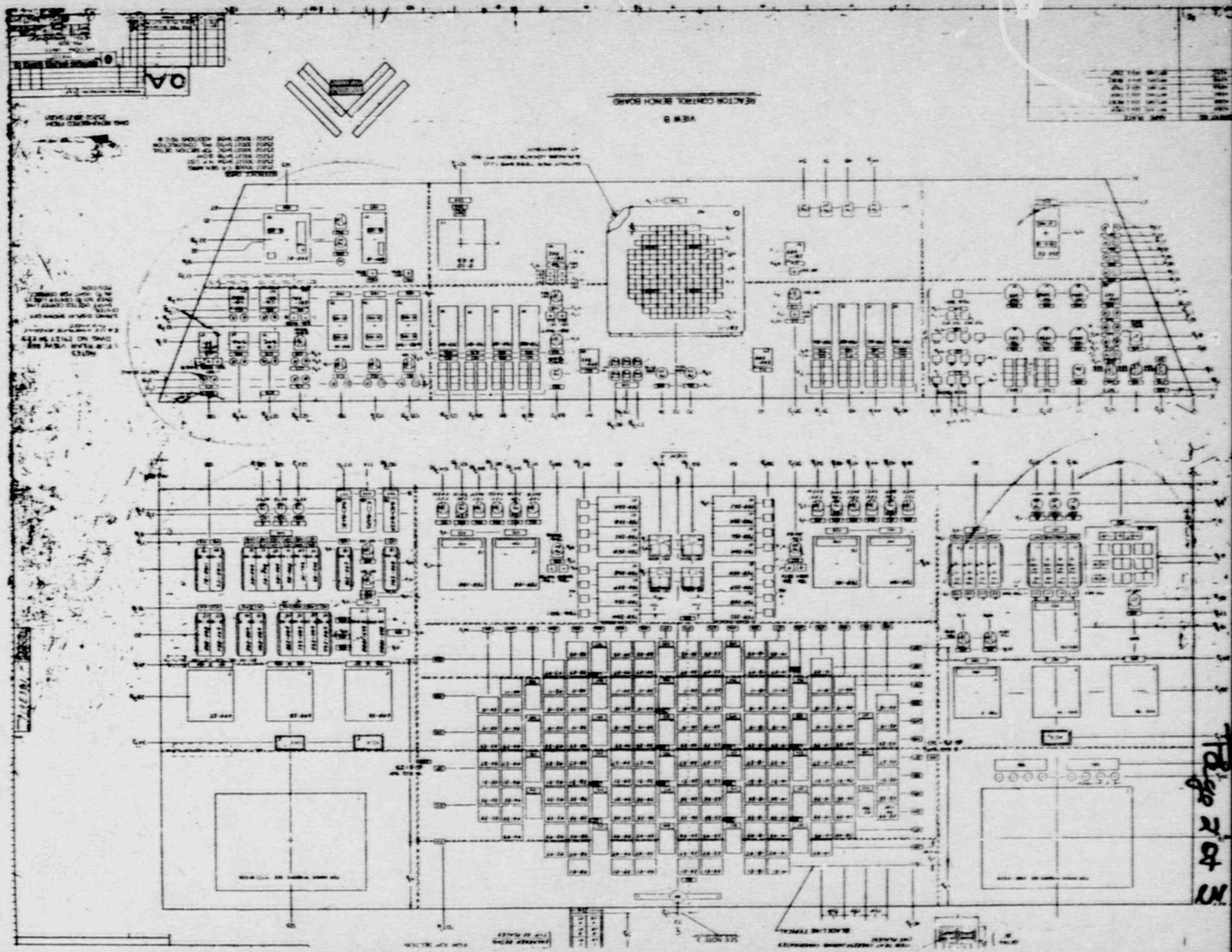
Approved Signature: T A Shaffer Date: 8/29/89

/ / Additional page(s) attached

MP1
ATTACHMENT FOR:

HED# 6.1.012 GUIDELINE REF# 6.1.2.2e (2) DATE 7/22/87

	RES CODE	PANEL	CORR CODE	SUB PANEL	DESCRIPTION
A)	A	903 add ACK, Test, Reset silence to 903 right side	IX	"1"	Right half of Annunciator Panel A-4 outside the 36 inch limit from the acknowledge control PB.
B)	E	904	IV	"1"	Right half of panel A-4 outside the limit guideline from the acknowledge PB.
C)	A	904	III	"2"	"DW floor sump pump" pushbutton beyond 24 inches fromwork position.
D)	E	904	IV	"3"	Master Controller away from "A Recirc Pump" and Panel "2".
E)	E	905	IV	"1"	Annunciator panels A-2 and A-3 outside the guideline limit from the acknowledge pushbutton.
F)	E	905	IV	"3"	Generic problem with this panel. All controls/displays on right and left sides of the panel beyond the guideline limits. See Attachment Page 2.
G)	E	906	IV	"1"	Right half of annunciator Panel A-2 outside guideline limit from the acknowledge PB.
H)	E	906	IV	"3"	Conductivity Recorder on Panel 906 out of reach from Rx FWS Position.



MP1
ATTACHMENT FOR:

HED# 6.1.012 GUIDELINE REF# 6.1.2.2e (2) DATE 7/22/87
(cont'd)

	RES CODE	PANEL	CORR CODE	SUB PANEL	DESCRIPTION
I)	E	907	IV	"1"	Right half of annunciator Panel A-2 outside guideline limits from acknowledge PB.
J)	E	907	IV	"2"	Turbine Control Position - Turbine VIB recorder and sync scope outside guideline limits.
K)	E	908	IV	"1"	Annunciator Panel A-2 outside guideline limits from acknowledge PB.
L)	E	908	IV	"2-3"	Sync scope for DG outside guideline. (note sync scope large). Selecting breakers on vertical panel 909 about 20 feet away.

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.1.014

CONTROL ROOM WORKSPACE

TITLE:
Lateral Spread of Controls & Displays

PRIORITY: 1

COMMENT:
The maximum spread of controls and displays should not exceed 72 inches.

Reviewer	Date	Ref.	Source
Sabeh/Trump	7-31-87	6.1.2.2 f	Control Room Survey

IDENTIFICATION: Panel: 905

Component Name: See Attached

ID or No.: NA

DESCRIPTION:

Controls and displays that exceed 72 inch lateral spread of a single-operator workstation.

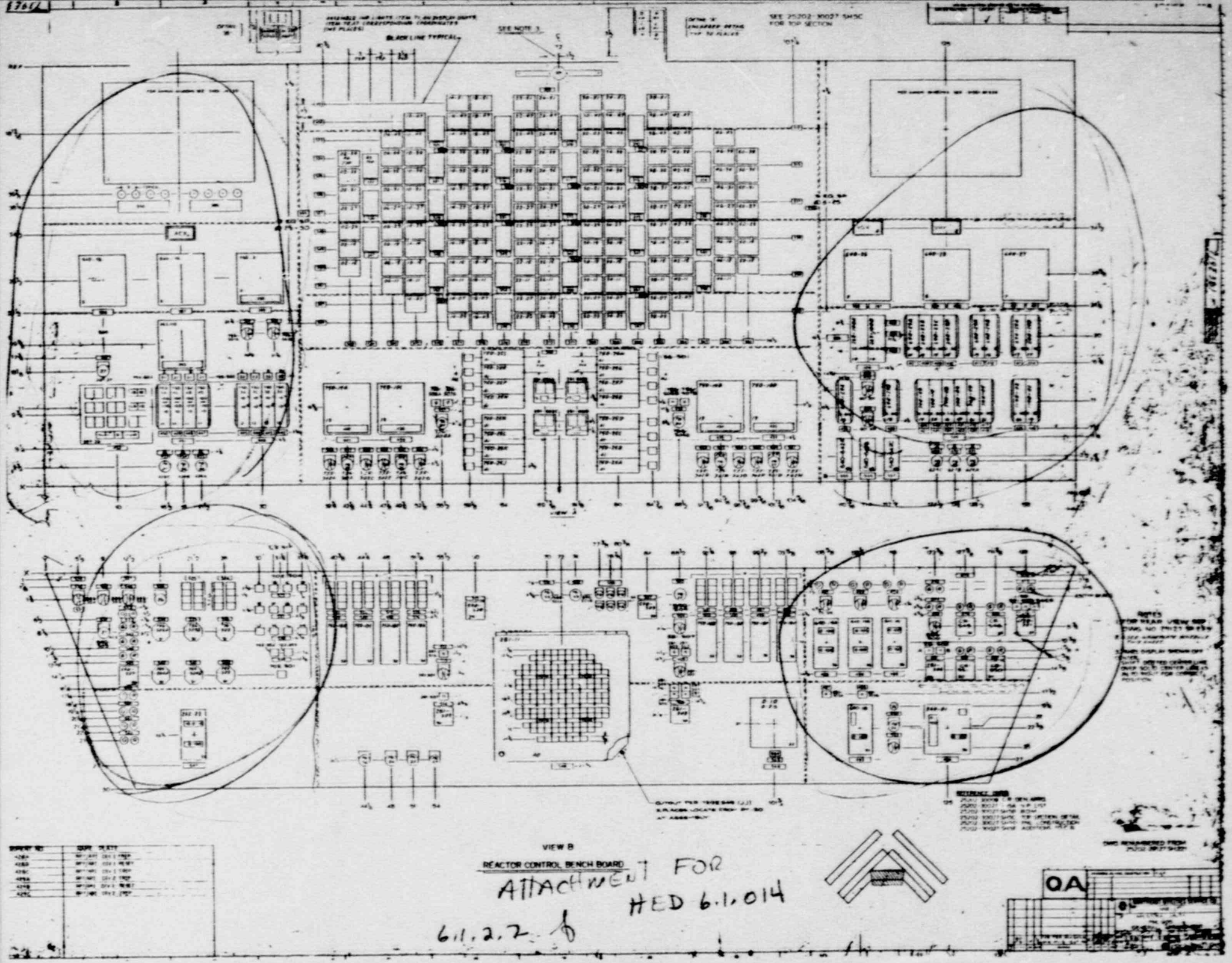
POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

Controls and displays are functionally grouped and do not cause operating problems.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached



ATTACHMENT FOR
HED 6.1.014

6.1.2.2-1

OA

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.I.015

CONTROL ROOM WORKSPACE

TITLE:
Control Heights

PRIORITY: 1

COMMENT:
Controls should be placed between 34 and 70 inches above the floor.

Reviewer	Date	Ref.	Source
Sabeh/Trump	7-31-87	6.1.2.5 a(1)	Control Room Survey

IDENTIFICATION: **Panel:** See Attached

Component Name: See Attached

ID or No.: See Attached

DESCRIPTION:

See attached for controls above 70 inches and below 34 inches.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

The operators can operate and/or view these controls and displays without undue problems by bending and flexure.

Approved Signature: T A Shaffer **Date:** 8/28/89

/ / Additional page(s) attached

MP1
ATTACHMENT FOR:

HED# 6.1.015 GUIDELINE REF# 6.1.2.5a(1) DATE 7/31/87

PANEL	SUB PANEL	DESCRIPTION
909	"4"	Controls above 70 inches are: Line select pushbutton(s) labeled 1 thru 4 and spare. Light pushbuttons labeled trip off, point cancel, close/on ISS, audible reset, flash reset, lamp test (6).
924	"4"	Controls above 70 inches are: ELE HTR 1A, HT Element Temp, ELE HTR 1A offgas output temp, ELE HTR 1B, HT Element Temp, ELE HTR 1B offgas output Temp, A Recomb Skin Temp, B Recomb Skin Temp.
918	"4"	Controls above 70 inches are: 6 GE Controllers, signal fail alarm, limiter Lo/Hi, Limiter Lo, Signal fail alarm, S/U Gen & Limiter. Controls below 34 inches are: Controller Rx Feed Flow Alarm Unit, Rx Level Reset Alarm Unit.
925	"4"	Controls above 70 inches are: S/D Cooling sample (High rotary control), control and S/D cooling Return (rotary), Pas U/V permissive (key SW). Controls below 34 inches are: Cooler Air Damper, Blower, Stdby Gas Treatment Xover, Cooling Air Damper, Blower, CTMT H_2O_2 (key SW), Analyzer Byp SW.
934	"4"	Controls above 70 inches are: FSL HV (4 controllers) Controls below 34 inches are: RF Pump (6 controllers)

MP1
ATTACHMENT FOR:

HED# 6.1.015 GUIDELINE REF# 6.1.2.5a(1) DATE 7/31/87
(cont'd)

PANEL	SUB PANEL	DESCRIPTION
945	"4"	Controls above 70 inches are: on Data equipment Panel toggle switch.
1AC-1	"4"	Controls above 70 inches are: Circuit Breaker Switch 1 thru 10 Controls below 34 inches are: Circuit Breaker Switch 59 thru 70
VAC-1	"4"	Controls above 70 inches are: Circuit Breaker Switch 1 thru 8 Controls below 34 inches are: Circuit Breaker Switch 63 thru 68
916	"4"	Controls above 70 inches are: Toggle Switches on Rows 39, 43, 47 and 51. Controls below 34 inches are: Toggle Switches on individual Rod Scram Timer Panel.
ATWS DIV 1&2	"4"	Controls above 70 inches are: Bi stable (PB) Controls below 34 inches are: 4 Power SW for channels A, B, C and D
902	"4"	Controls below 34 inches are: PB alarm acknowledge
910	"4"	Controls above 70 inches are: Closed cooling water effluents, SW effluents (chassis), power Supply Process Mon Ch 2, Rx Bldg Vent Exhaust, Iso Cond Vent Ch 2, Refuel Floor rad, stack sample room (Radiation Monitors). Controls below 34 inches are: Power Supply Pushbutton

MP1
ATTACHMENT FOR:

HED# 6.1.015 GUIDELINE REF# 6.1.2.5a(1) DATE 7/31/87
(cont'd)

PANEL	SUB PANEL	DESCRIPTION
911	"4"	Controls above 70 inches are: Supply area Mon and 4 indicator controls (1,2, 3, & 4) Controls below 34 inches are: Rad Monitors #25 thru 30 and 36 legend pushbuttons.
913	"4"	Controls above 70 inches are: Rad minimizer cursor controls. Controls below 3 inches are: Controls on valve control channels 1 thru 4.
DC 11A-1	"4"	Controls above 70 inches are: Breaker Controls 1 thru 13 Controls below 34 inches are: Normal and Emergency Pushbuttons
DC 11A-2	"4"	Same as DC 11A-1 (above)
921	"4"	Controls above 70 inches are: Control Rod Temp (toggle SW's)
919	"4"	Controls above 70 inches are: Controllers CA-9-110A, CA-9-110B, 340/2 Controls below 34 inches are: Bay A, B, C, D & E
922	"4"	Controls below 34 inches are: RSST S/U lockout relay (2 rotary controls).

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.1.016

CONTROL ROOM WORKSPACE

TITLE:
Emergency Controls

PRIORITY: 1

COMMENT:
Precise or emergency controls should be between 34 and 53 inches above the floor.

Reviewer	Date	Ref.	Source
Sabeh/Trump	7-31-87	6.1.2.5 a(2)	Control Room Survey

IDENTIFICATION: Panel: 910 and 907

Component Name: Rad Waste Effluents and 5T and 6T Emerg. Trip

ID or No.: NA

DESCRIPTION:

Precise or emergency controls outside the 34-53 inch height window are:

Panel 910 (4) 2 potentiometers "Rad waste effluents"
Panel 907 "2" 5T and 6T Emergency Trip (2 pushbuttons)

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

A plant specific exception/guideline is applied such that all controls will accommodate the 5% male and 50% female.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

HED1/87/18

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.I.017

CONTROL ROOM WORKSPACE

TITLE:
Display Heights

PRIORITY: 1

COMMENT:
Frequently or precisely read displays should be between 50 and 65 inches above the floor.

Reviewer	Date	Ref.	Source
Sabeh/Trump	7-31-87	6.1.2.5 b(2)	Control Room Survey

IDENTIFICATION: **Panel:** See Attached

Component Name: See Attached

ID or No.: See Attached

DESCRIPTION:

See attached for displays outside the 50 and 65 inch height window.

See Attached.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

A plant specific exception/guideline is applied such that all controls will accommodate the 5th% male and 50th% female.

Approved Signature: T A Shaffer **Date:** 8/28/89

/ / Additional page(s) attached

MP1
ATTACHMENT FOR:

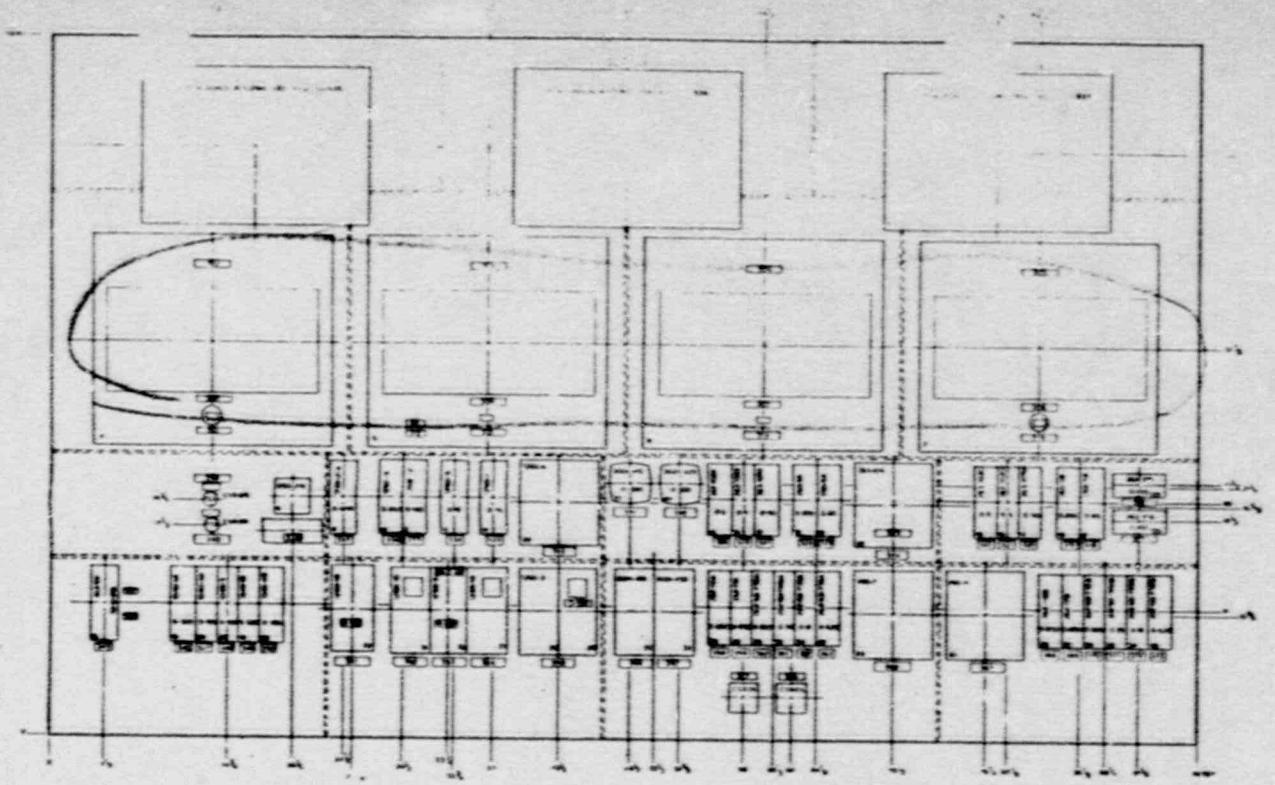
HED# 6.1.017 GUIDELINE REF# 6.1.2.5b(2) DATE 7/31/87

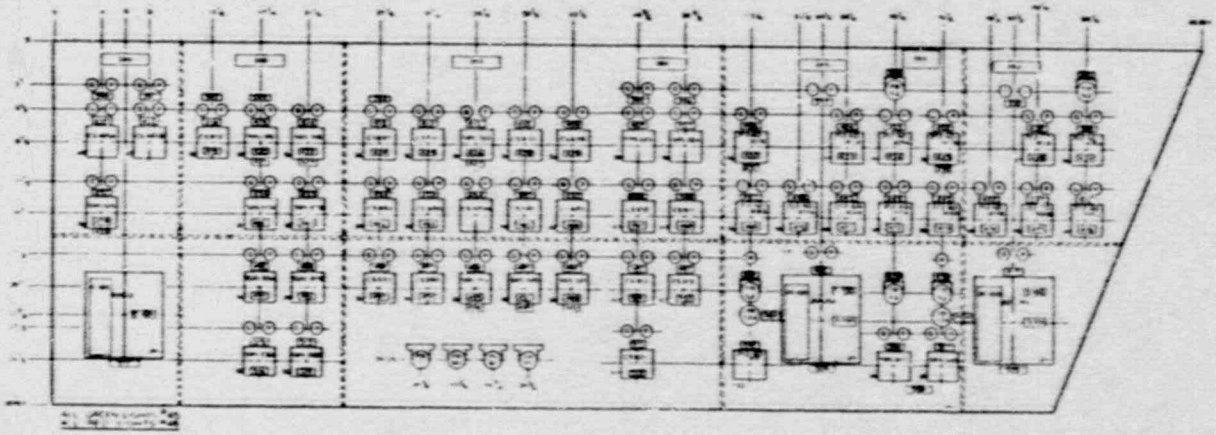
PANEL	SUB PANEL	DESCRIPTION
903	"2" (all above 65")	LPCI/ISOL Cond. Temp TR1540-5, LPCI/Flow, Rx Press, Fuel Pool 4 recorders.
904	"2" (all above 65")	TR1040-2, CR1290-3, CR262-32, CR262-19 Recorders (See attached Pg. 1)
905	"2" (all above 65")	2 Complete trend recorders, source range monitor recorder, Rx Wtr level, Total FW flow recorder, Rx Press Recorder, digital diaplays, Rx Recirc Loop Temp. Rx Press, Gen output large digitals.
906	"2" (all above 65")	See Attachment Page 2
907	"2" (all	Turb. bearing temp and turb. vibration eccentricity recorders R46 and R47 Cond. Vacuum Recorder.
909	"4"	Displays above 65 inches are: Trans & Gen lead temp recorders TR931-3, TR931-3, TR2-70, TR2-43 Displays below 50 inches are: Totalizers 4 and 5, gen. watt hours
925	"4"	Displays above 65 inches are: DW atmos temp recorder SPL/DW Press Recorder, DW temp recorders (top 3 recorders), SPL/DW Press LI630, PR1631A, SP Press & SPL/DW Press Recorder, H_2O_2 Conc Recorder.
921	"4"	Displays above 65 inches are: CRD temp Recorder TR340-16, 2 Torus Temp Recorders, i.e., TR1601-53B and TR1601-53A Safety and B/D Temp TR260-20 Recorder, X-K Bldg/Turb Bldg Meters.

MP1
ATTACHMENT FOR:

HED# 6.1.017 GUIDELINE REF# 6.1.2.5b(2) DATE 7/31/87

PANEL	SUB PANEL	DESCRIPTION
902	"4"	Displays above 65 inches are: Off-gas Rad Level Ch. 1&2 Recorder Stack Gas Rad Level Ch. 1&2 Recorder Displays below 50 inches are: X-K Bldg. Rad Recorder Stack Gas Recorder

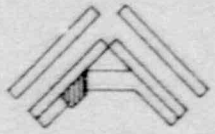


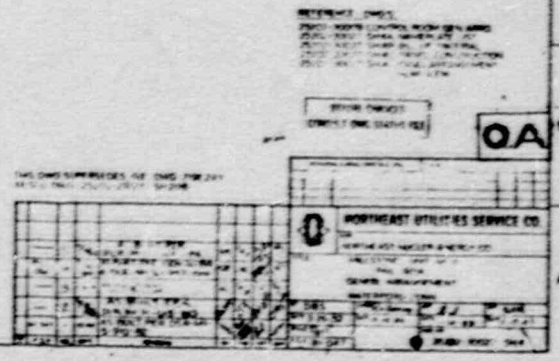


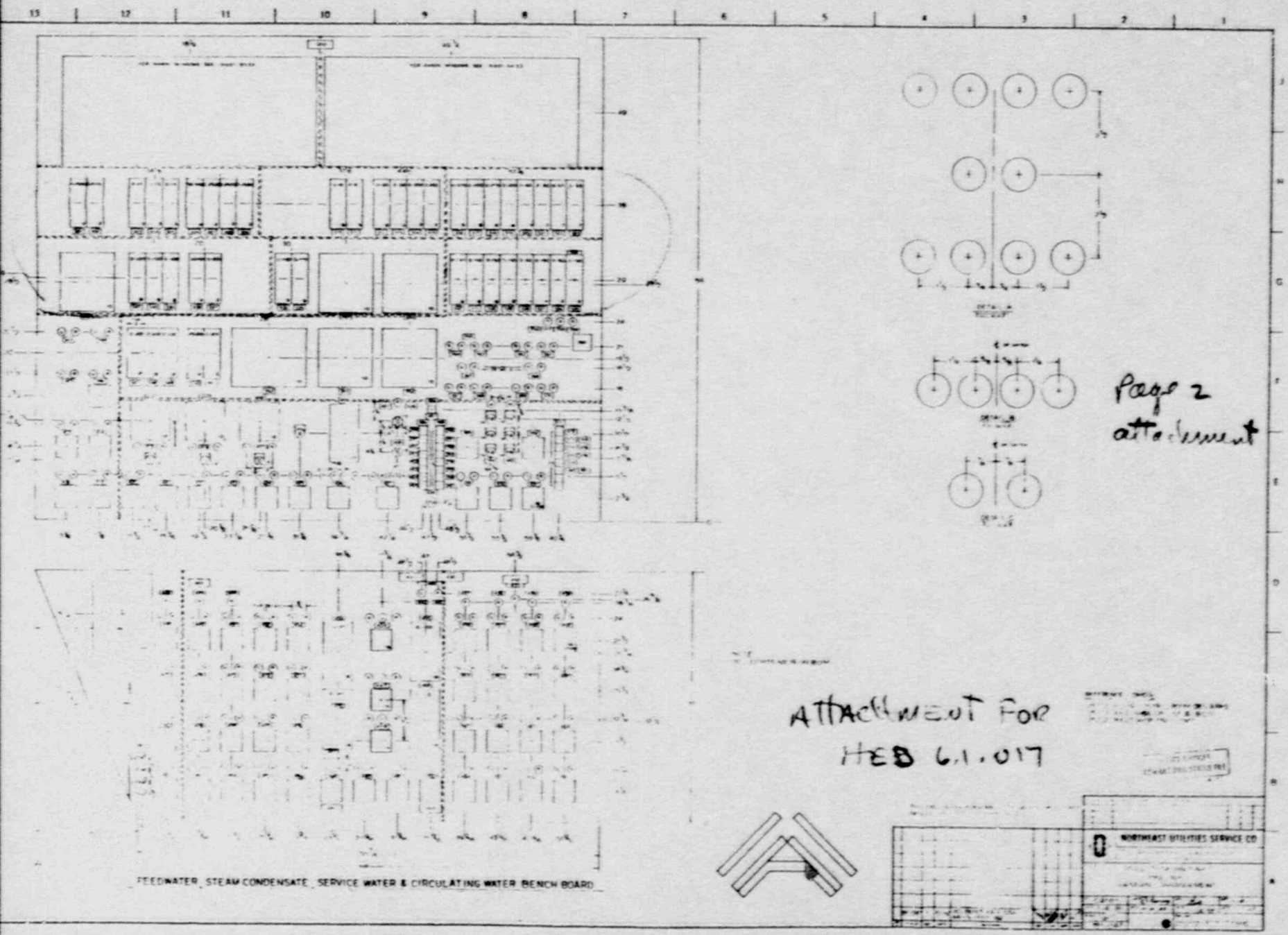
SHUTDOWN & HEAD COOLING CLEANUP & RECIRCULATING BENCH BOARD

Page 1
attachment

ATTACHMENT FOR
HED 6.1.017







Page 2
attachment

ATTACHMENT FOR
HEB 6.1.017

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.3.002

ANNUNCIATOR WARNING SYSTEMS

TITLE:
First Out Annunciator Panels

PRIORITY: 1

COMMENT:
Reactor System and Turbine Generator System "first out" Annunciator panels should be provided.

Reviewer	Date	Ref.	Source
R. Sabeh	7-24-87	6.3.1.3 a&b	Control Room Survey

IDENTIFICATION: Panel: NA

Component Name: First Out Annunciator Panels

ID or No.: NA

DESCRIPTION:

MP-1 does not leave first out annunciator panels.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

Trip annunciators on Panel 905 along with sequence of events recorder adequately serve the first out annunicator panel.

Approved Signature: T A Shaf Date: 8/28/89

/ / Additional page(s) attached

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.3.006

ANNUNCIATOR WARNING SYSTEMS

TITLE:
Number of Tiles Per Matrix

PRIORITY: 1

COMMENT:
The alarm tile matrix should be less than 50 tiles.

Reviewer	Date	Ref.	Source
R. Sabeh	7-24-87	6.3.3.3 d(1)	Control Room Survey

IDENTIFICATION: Panel: 903, 906, 907, 908

Component Name: Annunciator Matrices

ID or No.: See Below

DESCRIPTION:

The following annunciator panels have more than 50 tiles per matrix:

903/A-3 = 72 tiles
906/A-1, A-2 = 63 tiles
907/A-1, A-2 = 63 tiles
908/A-1, A-2 = 73 tiles

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

Enhancements to label axis and the existing alarm sequence allows operator to identify what is in alarm.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.3.017

ANNUNCIATOR WARNING SYSTEMS

TITLE:
Signal Intensity

PRIORITY: 1

COMMENT:
Nominal value should be 10dB(A) above the ambient noise.

Reviewer	Date	Ref.	Source
R. Sabeh	10-1-87	6.3.2.1 a	Control Room Survey

IDENTIFICATION: Panel: All

Component Name: Annunciator Signals

ID or No.: NA

DESCRIPTION:

The signal intensity is about 5dB(a) above the ambient noise level.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

Intensity is set to operator preference.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.4.002

CONTROLS

TITLE:
Controls No Longer In Use

PRIORITY: 1

COMMENT:
There should be a good reason to require a control

Reviewer	Date	Ref.	Source
R. Sabeh	7-30-87	6.4.1.1 b(1)	Control Room Survey

IDENTIFICATION: Panel: 906, 907

Component Name: Legend Pushbuttons

ID or No.: NA

DESCRIPTION:

Control legend pushbuttons no-longer in use are:

Panel 906 (2) Last 2 pushbuttons on STM TRAP BYP
Panel 907 (1) PB by EXTRA STM

POSSIBLE SOLUTIONS:

RESOLUTION: (Code A)
CORRECTION: (Code XIII)

Future Spares

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

HED1/87/56

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.4.003

CONTROLS

TITLE:
Direction of Movement

PRIORITY: 1

COMMENT:
Control movements that should conform with population stereotypes.

Reviewer	Date	Ref.	Source
R. Sabeh	7-30-87	6.4.2.1	Control Room Survey

IDENTIFICATION: Panel: 903, 904, 905, 906, 908, 924, 923, IAC, VAC-1, DC11A, DC11A-1, 937, 913, 906

Component Name: See Attachment

ID or No.:

DESCRIPTION:

See attachment for control movements that do not conform with the population stereotype.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code)

See Attached

Approved Signature: TA Shaffer Date: 8/29/89

/ / Additional page(s) attached

HED1/87/57

MP-1
ATTACHMENT FOR:

HED#6.4.003 GUIDELINE REF.#6.4.2.1 DATE 7-30-87

	RES CODE	PANEL	SUB PANEL	CORR CODE	DESCRIPTION
A)	A	905	3	XV	Disc. Vol. Iso Test (J Handles) Norm Isolate (Right) (Rewire so isolate position is on left)
B)	A	906	3	XV	Heater Drains Pumps A, B and C (J Handles) on (left) auto (center) off (right) Rewire so off (left) auto (center) on (right)
C)	A	908	3	I	ESST Disconnect (Rotary Switch) Open (left) close (right) Non-HED (Mod)
D)	E	924	4	IV	Off Gas Condenser Level (Controller) A&B Open (left) Close (right) Controllers operate reverse acting valves decrease signal to increase level.
E)	E	923	4	IV	Bypass VAS 1 thru 5 (Rotary Control) number increase 2, 4, 6, (10), 8 and Bypass VAS 6-10 1, 3, 5, (9), 7 Use only for testing.
F)	E	IAC	4	IV	Right side or breaker controls on (left) off (right) Normal Electrical Convention
G)	E	VAC	4	IV	Right side breaker controls on (left) off (right) Normal Electrical Convention
H)	E	DC11A	4	IV	Right side breaker controls on (left) off (right) Normal Electrical Convention
I)	E	DC11A-1	4	IV	Right side breakers on (left) off (right) Normal Electrical Convention

MP-1
ATTACHMENT FOR:

HED#6.4.003 GUIDELINE REF.#6.4.2.1 DATE 7-30-87
(cont'd)

	RES CODE	PANEL	SUB PANEL	CORR CODE	DESCRIPTION
J)	E	937	4	IV	LPRM GP1 and GP4 Channel 1, 5, 2, 6, 3 and 2 (all the same units) A, B, C, D] Counter Clockwise Movement (Rotary Control)
K)	E	913	4	IV	Drive control chassis 1, 2, 3 4 (all the same units) Main Valve Control Open (left) close (right) Used only for testing.
L)	E	906	3	IV	SJAE A and B Element Throttle Valve V 2-601/IAR 601 and V2-602/IAR 602 open (left) close (right) Reverse acting controllers.
M)	A	903	3	V	Key Control (SW) Pump 1A/1C inhibit override - start (left) stop (right) Change stop label to "Auto".
N)	A	903	3	I	BCS LPSI VLV Closure Permissive Normal (left) Close (right) Switch is selector switch labelled normal (left) close permissive (right)

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.4.008

CONTROLS

TITLE:
Legend Pushbutton Barriers

PRIORITY: 1

COMMENT:
Barriers should be used to prevent activating two or more pushbuttons.

Reviewer	Date	Ref.	Source
R. Sabeh	7-30-87	6.4	Control Room Survey

IDENTIFICATION: Panel:

Component Name:

ID or No.:

DESCRIPTION:

Barriers are not used with legend pushbuttons.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

Operators have experienced no problems with legend pushbutton controls.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.4.009

CONTROLS
TITLE:
Pushbutton Surface

PRIORITY: 1

COMMENT:
Surface of pushbuttons should be slip resistant

Reviewer	Date	Ref.	Source
R. Sabeh	10-2-87	6.4.3.1 c	Control Room Survey

IDENTIFICATION: **Panel:** 905, 906, 907

Component Name: Pushbuttons

ID or No.:

DESCRIPTION:

This is a generic problem with the legend pushbuttons, they do not have slip resistance surfaces:

Board	Panel	Legend Pushbuttons	Number
905	3	SR, IR and control detector	14
	3	Rod Select Pushbuttons	145
	3	Feedwater lockup Reset Switch	1
906	2	SJAE VV Control Switch	17
	2	SJAE Bypass (6 active)	8
907	3	Main Stm Leads Byp	4

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

Operators have never had problems with pushbuttons.

Approved Signature: T A Shaffer **Date:** 8/22/89

/ / Additional page(s) attached

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.4.014

CONTROLS

TITLE:
Key Operated Controls

PRIORITY: 1

COMMENT:
Off-Position for key operated controls should be vertical.

Reviewer	Date	Ref.	Source
R. Sabeh	10-2-87	6.4.4.3 d	Control Room Survey

IDENTIFICATION: Panel: 905

Component Name: Standby Liquid Control

ID or No.: NA

DESCRIPTION:

"Off" position is not vertical.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

Operation of this component is not time sensitive and does not present problems to the operator.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.4.015

CONTROLS
TITLE:
Key Removal

PRIORITY: 1

COMMENT:
Key should not be removable in the on position

Reviewer	Date	Ref.	Source
R. Sabeh	10-2-87	6.4.4.3 e	Control Room Survey

IDENTIFICATION: Panel: 903 (3), 905 (3)

Component Name: Drywell Press, CTMT Spray, ESWPP, Disch. Wtr.

ID or No.: NA

DESCRIPTION:

Keys can be removed in operating position for controls on:

Panel

903(3) Hi DW Press, CTMT Spray 1st key & 2nd key, System Crosstie, ESWPP 1B & 1D and CTMT Spray 1st & 2nd key

905(3) Disch Vol Hi Wtr

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

These keys must be removed to operate the next sequential keylocked switch.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

HED1/87/69

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.4.01e

CONTROLS

TITLE:
Rotary Control Skirt Dimensions

PRIORITY: 1

COMMENT:
Rotary controls with knob skirts should conform with guideline dimensions

Reviewer	Date	Ref.	Source
R. Sabeh	10-2-87	6.4.4.4 e(1-5)	Control Room Survey

IDENTIFICATION: Panel: 904 (3), 918 (4), 919 (4), 934 (4)

Component Name: GE Controllers

ID or No.: NA

DESCRIPTION:

This is a generic problem with "GE" Type Controllers dimensions:

Panel

904(3) Recirc PP Controllers, CH. A&B (GE Controllers)
918(4) 26 GE Controllers
919(4) 17 GE Controllers
934(4) 23 GE Controllers

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

These controls do not present problems to the operator.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

HED1/87/70

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.4.017

CONTROLS

TITLE:
Readability of Rotary Selector Controls

PRIORITY: 1

COMMENT:
Rotary controls should have a moving pointer and fixed position setting.

Reviewer	Date	Ref.	Source
R. Sabeh	10-2-87	6.4.4.5 c	Control Room Survey

IDENTIFICATION: Panel: 904 (3), 918 (4), 919 (4), 934 (4)

Component Name: GE Controllers

ID or No.: NA

DESCRIPTION:

This is a generic problem with "GE" Type Controllers dimensions, they use moving scale and fixed pointer:

904(3) Recirc PP Controllers, CH. A&B
918(4) 23 GE Controllers
919(4) 17 GE Controllers
934(4) 23 GE Controllers

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

These devices do not present operational problems.

Approved Signature: TA Shaffer Date: 8/28/89

/ / Additional page(s) attached

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.4.018

CONTROLS

TITLE:
Rotary Control Diameter

PRIORITY: 1

COMMENT:
Rotary selector controls should have a diameter of 1.0 inches.

Reviewer	Date	Ref.	Source
R. Sabeh	10-2-87	6.4.4.5 e(3)	Control Room Survey

IDENTIFICATION: Panel:

Component Name: See Attached

ID or No.:

DESCRIPTION:

See Attachment for rotary controls that do not satisfy the guideline diameter.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

These devices do not present operational problems.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

MP-1 (CRS)
ATTACHMENT FOR:

HED# 6.4.018 GUIDELINE REF# 6.4.4.5 c(3) DATE 10-2-87

PANEL	SUB PANEL	DESCRIPTION
924	4	TIC 20-2005 & TIC 20-1005 (TEMP) FIC/20/21, FIC 20/20 (OFF-GAS Flow) LIC/20/5, LIC/20/6 A&B (OFF-GAS CONDENSER LEVEL) GE CONTROLLERS
937	4	Meter controls for units: LPRM GP1 & GP2 APRM CH 1 thru 6 RMB CH 7 & 8
913	4	Units For: Drive Control CH 1 thru 4
911	4	Units For: Power Supply Area Monitor Units for (1 thru 30)
910	4	Upscale Hi and Hi/Hi Units for Rad Waste Effluents
ATWS CRP 980-1	4	ATI Self Test Controls for Trip Set (4)
980-2	4	ATI Self Test Controls for Trip Set (4)

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.4.020

CONTROLS

TITLE:
Thumbwheel Dimensions

PRIORITY: 1

COMMENT:
Thumbwheel dimensions should conform with guidelines.

Reviewer	Date	Ref.	Source
R. Sabeh	10-2-87	6.4.5.1 d	Control Room Survey

IDENTIFICATION: Panel: 925 (4)

Component Name: Hour Meters

ID or No.: A&B

DESCRIPTION:

These meters do not satisfy the guideline dimensions for thumbwheels.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)
CORRECTION: (Code IV)

These devices do not present any operational problems.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO 6.5.007

VISUAL DISPLAYS

TITLE:
Character Height

PRIORITY: 1

COMMENT:
Character Height should subtend a visual angle of 15 minutes of arc.

Reviewer	Date	Ref.	Source
R. Sabeh	10-5-87	6.5.1.3a	Control Room Survey

IDENTIFICATION: Panel: See Attached

Component Name: See Attached

ID or No.: See Attached

DESCRIPTION:

See Attached for displays that are less than 0.4 inches in height.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code)

See Attached

Approved Signature: T A Shaffer Date: 8/23/89

/ / Additional page(s) attached

MP-1
ATTACHMENT FOR:

HED#6.5.007 GUIDELINE REF# 6.5.1.3a DATE 10-5-87

	RES CODE	PANEL	SUB PANEL	CORR CODE	DESCRIPTION
A)	A	~~904~~ 903	2	XV XVIII	Suppression Pool Temp A&B Meters Make scale marking larger (Dixson) Modify or replace indicator.
B)	E	905	2	II	Source Range Recorder (Power Levels) Not Significant
C)	E	906	2	IV	Cond Byp Flow Meter Meter Scales are easily read
D)	A	925	4	XV XVIII	Hi Range CTMT Rad Mon. for Recorder Sup Pool Lvl A, Supp Press Chamber Lvl B, H, Conc Recorder Scales. Modify or replace indicator scale on recorder.
E)	E	934	4	IV	GE Controllers Not at Eye Lvl (11 Controllers) I&C Surveillance Controls
F)	E	919	4	IV	GE controllers Not at Eye Lvl (8 Controllers) I&C Surveillance Controls
G)	E	936	4	IV	Meter For Rad Monitors, Pwr Lvls (Monitors 25 thru 30) Meter Scales are easily read
H)	E	910	4	IV	Rad Waste Effl Meter Units, Serv Wtr Effl, Stack Gas CH 1 & 2, Channel Trip Test Meters (2) Power Lvls or small numbers. Meter Scales are easily read
I)	E	902	4	IV	Recorders: Service Wtr Effl, Stack Gas Rad, Off-gas lvl, stack alarm set points, MSL Rad Lvl - Power Levels Meter Scales are easily read

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.5.009

VISUAL DISPLAYS

TITLE:
Contrast (Character/Background)

PRIORITY: 1

COMMENT:
Displays should contain black characters on white background.

Reviewer	Date	Ref.	Source
R. Sabeh	10-5-87	6.5.1.3c(1,2)	Control Room Survey

IDENTIFICATION: Panel: See Attached

Component Name: See Attached

ID or No.: See Attached

DESCRIPTION:

See attached for character/background that are not of high contrast.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code)

See Attached

Approved Signature: T A Shaffer Date: 9/22/89

/ / Additional page(s) attached

MP-1
ATTACHMENT FOR:

HED#6.5.009 GUIDELINE REF# 6.5.1.3c(1 2) DATE 10-5-87

	RES CODE	PANEL	SUB PANEL	CORR CODE	DESCRIPTION
A)		903	2	DUP 6.5.007A	Supp Pool Wtr Temp Meters A&B Black on clear glass (Plexiglass).
B)		904	2	DUP 6.5.008A	Cleanup Temp (TI 1290-21A) Pencil on white Enhancements to Correct
C)	A	924	4	V	TI/20/23, P/TI/20/25/29, TI/20/24, P/TI/20/26/40, FIC/20/22, LIC/20/5, LIC/20/6 Black on Clear Glass
D)	A	936	4	V	Aux Units CH 11, 13, 15, 17 (Light red on faded white) CH 12, 14, 16, 18 Enhancements to correct
E)	E	937	4	IV	LPRM GP1 & GP2, APRM CH 1 thru 6, RBM Ch. 7 & 8 I&C Surveillance equipment.

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.5.013

VISUAL DISPLAYS

TITLE:
Transformations Needed

PRIORITY: 1

COMMENT:
To multiple/divide displayed reading by powers of 10, the operation required must be clearly indicated.

Reviewer	Date	Ref.	Source
R. Sabeh	10-5-87	6.5.1.4f	Control Room Survey

IDENTIFICATION: Panel: See Attached

Component Name: See Attached

ID or No.: See Attached

DESCRIPTION:

See attached for transformations that do not use readings to the base 10.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code)

See Attached

Approved Signature: T A Shaffer Date: 9/22/87

/ / Additional page(s) attached

HED2/87/15

MP-1
ATTACHMENT FOR:

HED# 6.5.013 GUIDELINE REF# 6.5.1.4f DATE10-5-87

	RES CODE	PANEL	SUB PANEL	CORR CODE	DESCRIPTION
A)		903	B	DUP 6.5.003A	Isol Condenser Meter must multiply by 12.
B)	A	904	B	XV	Drywell Floor/Equipment Drain Sump Flow Readouts - Each number on the readout represents the numeral 15. Revise to be an actual gallons readout or a X 10 or X 2. Easier to read.
C)		945	D	DUP 6.5.003E	Recorder: Water Quality Monitor measures values in units of 9.
D)	A	925	D	XV XVIII	SPL Recorder channels A and B starts 1st value at 2.2 ft. and increases by 5.0 ft.
E)	E	902	D	IV	Area Rad Recorder Green Light = 1-24 channels Blue Light = 25-48 Channels i.e., Blue Light channel 1 reading = channel 26. 48 Channel Recorder

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.5.019

VISUAL DISPLAYS
TITLE:

Multi Scale Indicators

PRIORITY: 1

COMMENT:
Multi Scale Indicators should be avoided.

Reviewer	Date	Ref.	Source
R. Sabeh	10-5-87	6.5.1.5f	Control Room Survey

IDENTIFICATION: Panel: See Attached

Component Name: See Attached

ID or No.: See Attached

DESCRIPTION:

The attached identifies the multi scale indicators (single pointer multiscale).

POSSIBLE SOLUTIONS:

RESOLUTION: (Code)

See Attached.

Approved Signature: TA Shaffer Date: 8/24/89

/ / Additional page(s) attached

MP-1
ATTACHMENT FOR:

HED# 6.5.019 GUIDELINE REF# 6.5.1.5f DATE10-5-87

	RES CODE	PANEL	SUB PANEL	CORR CODE	DESCRIPTION
A)	E	903	B	IV	Recorders: 24 point recorders, points over-write Meter: Cleanup Temp 1290-21A 1 scale/6 position switch. These indicators are easily read.
B)	E	904	B	II	TR262-19 (16 channel) with 7 different lines. Not emergency operating procedure related.
C)	E	907	B	II	R-46, R-47, R-48 24 channels all overwrite, ACC Range Selector range 2 & 1 low vs. high, Amplidyne voltage 150-150 switch reduce X 10 (15 - 15). Not emergency operating procedure related.
D)	E	906	B	IV	Condenser Recorder 1 pen for Hot W lvl A or B. Equipped with A, B Selector Switch.
E)	E	924	D	IV	Multi Pen Recorders TR20-20, TR20-6, TR20-7. These devices do not present any problems to the operators.
F)	E	931	D	IV	TR931-3, TR931-1, TR2-70, TR2-40, TR931-2, TR2-58 all 24 point recorders. These devices do not present any problems to the operators.
G)	E	925	D	IV	8 position switch 1 circular meter 25→125 DW Recirc Unit/CLG WTR Temp Selector, TR1602-6, TR1602-5. These devices do not present any problems to the operators.
H)	A	921	D	XIX	TR340-16, TR260-20, TR263-104 Meter Reference Leg Thermocouple 1 meter 10 temperature ranges. Add to computer.
I)	A	923	D	V	Vib Phase Meter 16 positions, circular meter 0-360 degrees no identification of 16 positions. Enhancements to correct.

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.5.024

VISUAL DISPLAYS

TITLE:
Pointer Tip Selection

PRIORITY: 1

COMMENT:
Pointer Tip should be selected to minimize scale concealment and should not overlap the smallest graduation.

Reviewer	Date	Ref.	Source
R. Sabeh	10-5-87	6.5.2.2 a(2), b(1)	Control Room Survey

IDENTIFICATION: Panel: See Attached

Component Name: See Attached

ID or No.: See Attached

DESCRIPTION:

See attached for pointer tips that do not conform with the guideline.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code)

See Attached.

Approved Signature: TA Shaffer Date: 8/24/87

/ / Additional page(s) attached

HED2/87/26

MP-1
ATTACHMENT FOR:

HED# 6.5.024 GUIDELINE REF# 6.5.2.2a(2),b(1) DATE10-5-87

	RES CODE	PANEL	SUB PANEL	CORR CODE	DESCRIPTION
A)	E	903	2	IV	Recorders: LPCI 1 Flow Total sys, Rx Press, Isol Cond, Vsl Lvl, CTMT Press, DW Atmos Press Red pointer. Does not present difficulty to operators who can read value of chart paper.
B)	E	904	2	IV	Recorders: TR1040-2, CR1290-3, TR262-32, TR262-19, Cleanup Flow Press, Vsl Temp, PP A/B Flow, Recirc Loop Temp, Meters: DW Equip Drain Sump PP, Rx Bldg Equip Drain Tk Temp. Does not present difficulty to operators who can read value of chart paper.
C)	E	905	2	IV	Recorders: Computer Trend (3), 263-110, SR Monitor Lvl, Vsl lvl/total FW Flow, Rx Press/ 1st Stage, Rx Press/Stm flow. Does not present difficulty to operators who can read value of chart paper.
D)	E	906	2	IV	Recorders: RF Wtr Temp, Cond A Conductivity, Cond B conductivity, SJAE EXH Flow, Demin D/P, Meters: Red Pointer A, B, C, RFP Aux Oil PP (3) Does not present difficulty to operators who can read value of chart paper.
E)	E	907	2	IV	Recorders: R46, R47, R48, Speed Control VA Pos BYP Vu Pos. Does not present difficulty to operators who can read value of chart paper.
F)	E	924	4	IV	Meters: PI/2/29, PI/20/20, FI/2/100, Spare Can be read to required precision.

HED2/87/26

MP-1
ATTACHMENT FOR:

HED# 6.5.024 GUIDELINE REF# 6.5.2.2a(2),b(1) DATE10-5-87
(con't)

	RES CODE	PANEL	SUB PANEL	CORR CODE	DESCRIPTION
G)	E	931	4	IV	Recorders: TR931-3, TR931-1, TR2-70, TR2-49, TR2-56, TR931-2 Does not present difficulty to operators who can read value of chart paper.
H)	E	925	4	IV	Recorders: TR1602-6, TR1602-5, SPL/DW Press Meters: Red Pointer SBGT A, B Temp's Does not present difficulty to operators who can read value of chart paper.
I)	E	945	4	IV	Recorders: P_H Temp, Temp Diff Does not present difficulty to operators who can read value of chart paper.
J)	E	937	4	IV	Meters: LPRM GP1 & GP2, APRM CH 1 thru 6 RBM Ch 7, 8 Can be read to required accuracy.
K)	E	913	4	IV	Flux Amplifier Meter Can be read to required accuracy.
L)	E	902	4	IV	Recorders: AR1815-6, Off-Gas lvl, Stack Gas Rad Lvl, Rx Bldg Plenum, Iso Cond Rad Lvl, MSL Rad Lvl, Stack Gas Rad Lvl. Does not present difficulty to operators who read value off of chart paper.

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.5.032

VISUAL DISPLAYS

TITLE:
Indicator Colors

PRIORITY: 1

COMMENT:

Where meaning is not apparent, label must be provided to identify message.

Reviewer	Date	Ref.	Source
R. Sabeh	10-9-87	6.5.3.2a(1)	Control Room Survey

IDENTIFICATION: Panel: See Attached

Component Name: See Attached

ID or No.: See Attached

DESCRIPTION:

See attached for non-legend lights that do not conform with guideline.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code)

SEE ATTACHED

Approved Signature: TA Shaffer Date: 8/24/89

/ / Additional page(s) attached

MP-1 (CRS)
ATTACHMENT FOR:
HED# 5.5.032 GUIDELINE REF# 6.5.3.a(2) DATE 10-9-87

	RES CODE	PANEL	SUB PANEL	CORR CODE	DESCRIPTION
A)	A	905	3	I	White light on control in FW position
B)	A	906	3	I	Ht Drn Pumps A, B, C Red Light "on", white light with control in Auto Start position.
C)	A	906	2	I	White light over Cond MI Disch VV's, V4-4A, B4-4C
D)	E	907	2	IV	Mech Press Reg with White Light Elec Press Reg with Blue Light Colors varied for contrast.
E)	A	908	2	I	Synchroscope White Light
F)	E	908	3	IV	Above Gas Turb Control white and yellow lights Colors varied for constrast & labelled
G)	A	909	4	I	Point Cancel white light
H)	A	923	4	I	Main Stm Sampling white light on with control in "ON" position.
I)	A	923	4	I	Thrust wear test blue, white and blue light.
J)	A	922A&B	4	I	4 white unlabelled lights on each panel.
K)	A	1AC-1 VAC-1	4	I	Single amber light indicates "normal source" on both panels.
L)	A	DC11-A-2	4	I	Amber light normal "on"
M)	A	936	4	I	12 Units the panel - use colored liquid different from convention. Aux units CH 11 thru 18, 21 thru 24
N)	A	937	4	I	Use white and amber lights with 6 red lights for Hi/Hi indication.
O)	E	913	4	IV	Use white, red, green and amber on units 1 thru 4 and valve control CH 1 thru 4 "different meanings". Control CH. 1→4 are labelled adequately.

MP-1 (CRS)
ATTACHMENT FOR:
HED# 6.5.032 GUIDELINE REF# 6.5.3.a(2) DATE 10-9-87
(con't)

	RES CODE	PANEL	SUB PANEL	CORR CODE	DESCRIPTION
P)	E	911	4	IV	Unit area rad monitor units have white and amber lights. Lights are well labelled.
Q)	E	910	4	IV	Units use red, white and amber lights. Lights are well labelled.
R)	A	915	4	V	Scram solenoid 4 lite amber lights - Scram lights go "OUT"-- Change to White.

MILLSTONE UNIT 1

HUMAN ENGINEERING DISCREPANCY

HED NO. 6.8.001

PANEL LAYOUT

TITLE:
Assigning Panel Contents

PRIORITY: 1

COMMENT:

Controls and displays should be placed to promote efficient operation by task sequence and functional grouping.

Reviewer	Date	Ref.	Source
R. Sabeh	10-30-87	6.8.1.1.a&b	Control Room Survey

IDENTIFICATION: Panel: See attached

Component Name: See attached

ID or No.: See attached

DESCRIPTION:

See attached for controls and displays not grouped by task sequence or system function.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code)

See Attached.

Approved Signature: T A Shaffer Date: 8/28/89

/ / Additional page(s) attached

MP-1 (CRS)
ATTACHMENT FOR:

HED#6.8.001 GUIDELINE REF# 6.8.1.1.a&b DATE 10-30-87

	PANEL	RES CODE	SUB PANEL	CORR CODE	DESCRIPTION
A)	903	B	2	II	Isolation Condenser Recorder (Press/Level) is about 30 inches to the left of the associated controls.
B)	903	E	2	IV	The Wide Range (Yarway Meters) for Levels A, B are too far to the right of the LPCI Core Spray System. Alternate methods available.
C)	903	E	2	IV	Reactor D/P meter should be with recorder (core press drop/total core flow) on panel 905(2) about 10 feet away. Locations correct for required actions.
D)	903	E	3	IV	The isolation system controls 1-IC-1 (Sply), 1-IC-4 (Return) are about 50 inches away from the other IC System Controls. These controls are separated by the Main Steam System and Atmospheric Control System controls. Operators tasks reaided by locations (No misoperation).
E)	924	E	4	IV	The Hydrogen Level Recorder is not close to other recorders that must be read together, i.e., Electrical Heater Outlet Temperature, Cyclic Dryer Outlet Temperature and Moisture Level Recorders. (about 4 feet away). Not used in EOP's.

MP-1-CRDR

HUMAN ENGINEERING DISCREPANCY

HED NO. ICCR-3

TITLE:
Inadequate Resolution

PRIORITY: 1

COMMENT:

ICCR identifies 1°F as required resolution.

Reviewer	Date	Ref.	Source
RK Mccarthy	9/7/89	7.14.3	ICCR

IDENTIFICATION: **Panel:**

Component Name: Temp Recorder

ID or No.: TR-263-105

DESCRIPTION:

TR-263-105 is in increments of 10.

POSSIBLE SOLUTIONS:

None

RESOLUTION: (Code E)

CORRECTION: (Code IV)

1°F Resolution is based on setpoint not instrument display Req.
TR-263-105 fulfills the display requirements of 25/15°F.

Approved Signature: TA Shaffer **Date:** 9/21/89

/ / Additional page(s) attached

9.12.89
HED4/88-40

MP-1-CRDR

HUMAN ENGINEERING DISCREPANCY

HED NO. ICCR-5

TITLE:
Inadequate Resolution

PRIORITY: _____

COMMENT:

ICCR identifies resolution of 1°F.

Reviewer	Date	Ref.	Source
RK McCarthy	9/7/89	7.16.1	ICCR

IDENTIFICATION: **Panel:**

Component Name: Drywell Temp

ID or No.: TR-1602-5

DESCRIPTION:

TR-1602-5 is displayed in 2° increments.

POSSIBLE SOLUTIONS:

None

RESOLUTION: (Code E)

CORRECTION: (Code IV)

Operator can read to 1/2 of smallest scale division.

Approved Signature: T A Shaffer **Date:** 9/21/89

/ Additional page(s) attached

MP-1-CRDR

HUMAN ENGINEERING DISCREPANCY

HED NO. ICCR-7

TITLE:
Inadequate Resolution

PRIORITY: 1

COMMENT:

ICCR identifies a 1°F required resolution.

Reviewer	Date	Ref.	Source
RK McCarthy	9/7/89	7.16.4	ICCR

IDENTIFICATION: **Panel:**

Component Name: Torus Pool Temp

ID or No.: TI-1601-51A, B

DESCRIPTION:

TI-1601-51A, B Displays in 5°F increments.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code E)

CORRECTION: (Code IV)

ICCR Resolution requirement is based on setpoint, not display requirement.

APPROVED SIGNATURE: T A Shaffer **DATE:** 9/21/89

1 ADDITIONAL PAGE(S) ATTACHED

HUMAN ENGINEERING DISCREPANCY

HED NO. ICCR-15

TITLE:
Lack of Indication

PRIORITY: 1

COMMENT:

LPCI Discharge Pressure

Reviever	Date	Ref.	Source
R. K. McCarthy	9/29/89	7.8.1, 7.8.3	ICCR

IDENTIFICATION: Panel:

Component Name: LPCI Pump Discharge Pressure

ID or No.:

DESCRIPTION:

MP-1 does not display LPCI pump discharge pressure.

POSSIBLE SOLUTIONS:

Add discharge pressure indication for LPCI pumps.

RESOLUTION: (Code E)

CORRECTION: (Code IV)

Justify - LPCI A, B, Flows are indicated along with total system flows, along with red & green status pump lights and annunciators allow operators to determine pump/system status.

Approved Signature: T A Shaffer Date: 10/24/89

Additional page(s) attached

MP-1-CRDR

HUMAN ENGINEERING DISCREPANCY

HED NO. ICCR-19

TITLE:
Inadequate Resolution

PRIORITY: 1

COMMENT:

Reviewer	Date	Ref.	Source
R. K. McCarthy	10/4/89	7.38.2	ICCR

IDENTIFICATION: **Panel:** 921

Component Name: Temp. Ind.

ID or No.: TI-1290-21

DESCRIPTION:

ICCR identifies 1°F Resolution Requirements for TI-1290-21.

POSSIBLE SOLUTIONS:

RESOLUTION: **(Code E)**

CORRECTION: (Code IV)

Operator can easily trend temperature on meter reading 1/2 of smallest scale division (5°F).

Approved Signature: T A Stall **Date:** 10/24/89

/ / Additional page(s) attached

HUMAN ENGINEERING DISCREPANCY

HED NO. 0-3

TITLE:
Controls on Back Panels

PRIORITY: 1

COMMENT:

Needed controls should be on front panels

Reviewer	Date	Ref.	Source
A. Stave	8/24/1988	Operator Questionnaire	

IDENTIFICATION: **Panel:** Back side of control boards

Component Name:

ID or No.:

DESCRIPTION: The recombiner should be out front.
Some recorders should be moved out front (MSL radiation, Drywell Temp. lvl). We have to do frequent chart checks to trend abnormal data.
Surveillance uses 905 & 921 (front and back panels)
Turbine start surveillance (SP 668.2)
Pumping Torus water to rad waste (925 and panels in front of boards)
925- RAD level must be checked before restarting N2 compressor.
SBGT switches & instrumentation is on back panels. Put on CRP 903.
SRV Tailpipe temperatures, Drywell hi pressure, FWCI Selector SW., WR Torus level, AOGS, Relief Valve temps, H2/O2 concentration, Some CTMT operating parameters,
Move APR rail pipe Temperatures:

FROM: TR 260-20 (CRP 921)
TO: TR 1540-5 (CRP 903)
This puts APR temps. on the same panel as switches.
This requires rewiring the annunciator from the back recorder (260-20) to the front recorder (1540-5)
Annunciator 903 A1 6-2
For turbine start on DC power (BLACK START)
need three men: one at 908
one at 932 (with key to insert accident signal)
one in GT cubicle
(question is, to move key switch to 908 or not
Teeple feels no need, this test is done once per month)

POSSIBLE SOLUTIONS:

RESOLUTION: (Code)
See Attached.

Approved Signature: T A Stave **Date:** 9/22/89

/ / Additional page(s) attached

MP-1
ATTACHMENT FOR:
HED#Q-3 GUIDELINE REF OPERATOR QUESTIONNAIRE DATE 8/24/88

		RES CODE	CORR CODE	
A.	Recombiner	E	IV	This is an infrequently performed Non-EOP related task
B.	MSL Radiation	DUP	TA-80, 8	
C.	Drywell Temp.	DUP	TA-21	
D.	Drywell Level	DUP	TA-4	
E.	Turbine Start	E	IV	This is a surveillance task not EOP related.
F.	Rad. Level	DUP	TA-80, 8	
G.	SBGT	DUP	TA-15, 17	
H.	SRV Tail Pipe	A	XIX	
I.	Drywell Press	DUP	TA-4, 32	
J.	FWCI Sel. SW	DUP	TA-22	
K.	Torus Level	DUP	TA-4, 25	
L.	Off Gas	E	IV	This is an infrequently performed Non-EOP related task
M.	H2/O2 Recorders	A	III	
N.	Relief Valve Temps.	A	III	

MP-1-CRDR

HUMAN ENGINEERING DISCREPANCY

HED NO. 0-7

TITLE:
Communications Problem

PRIORITY: 1

COMMENT:

Problems with: Telephones, Maintenance Jacks, Radios, P/A System, and, in general, contacting people from the control room.

Reviewer	Date	Ref	Source
A. Stave	8/26/1988	Operator Questionnaires	

IDENTIFICATION: **Panel:**

Component Name: Communications Equipment

ID or No.: >

DESCRIPTION:

A) There are not enough telephones on the panels
B) The cords do not reach far enough
C) For TSV testing operators are at 923, 915, and 917 and communications is by yelling.
D) It is difficult to communicate while wearing a face mask.
E) Telephones on 903 & 908 hanging off the apron are bumped and fall on the floor.

Further items are on the following sheets.

POSSIBLE SOLUTIONS:

RESOLUTION: (Code)

See Attached

Approved Signature: T.A. Shaffer **Date:** 8/29/89

/ / Additional page(s) attached

HED Q-7 (con't)
Communications Problems

F) (5) Maintenance Jack - noisy (bad connections static)

(2) limited locations (not enough jacks)
(2) not enough circuits (channels), jacks, & headgear are too undependable.

(4) Radio coverage can be spotty

Is only good for someone who has his pager selected to the "vibration" mode.

We have had trouble using radios with the fire drills for years. Never seem to have it fixed where we can depend on it 100%.

Hard to use radios inside buildings.

(3) P/A system is ineffective for high noise areas
P/A needs more speakers.
Sometimes PA system goes on the blink.
P/A is misused by non-plant personnel during outages.
Have problems using comm. with people in the plant talking with the control room.

Phone cords are cumbersome.

(2) The telephone are adequate but used too much for surveillance or other in-plant events.

We should have one touching dialing

Control room to rest of plant:

Differences in plant terminology sometimes result in misunderstandings between Operations and the other departments.

HED Q-7 (con't)
Communications Problems

	RES CODE	CORR CODE	
A)	A	IX	Add phone to 903
B)	A	IX	Add long cord to 925 phone
C)	E	IV	Not EOP related (testing)
D)	A	IX	Purchase face masks with integral Communications
E)	A	XV	Extended Panel Edge will correct
F)	A	XXII	Initiate study & resolve identified problem areas.

MP-1-CRDR

HUMAN ENGINEERING DISCREPANCY

HED NO. 0-27

TITLE:
Controls that are Difficult to Use

PRIORITY: 1

COMMENT:

Some controls are hard to use because they are: too sensitive, require too much (or too little) force, not enough space is provided.

Reviewer	Date	Ref.	Source
A. Stave	9/06/88	Operator Questionnaires	

IDENTIFICATION: **Panel:**

Component Name:

ID or No.:

DESCRIPTION:

A) Master Recirc Controller - Modify the master manual control for the recirc. MG sets to allow smaller power changes. Now the smallest is 4-5 Mwt.

B) EPR & MPR - Not sensitive enough at times or too sensitive at other times.

C) Diesel Gen Pre Lube - Pump must be held in prelube position up to 4 min. Use a fixed position switch not a spring loaded one, or a start/stop pushbutton.

D) CR2940 or OT2 - Valves that are operated with thumb/pointer finger (knuckle busters) (See Attached)

POSSIBLE SOLUTIONS:

RESOLUTION: (Code)

See Attached

Approved Signature: T A Stave **Date:** 8/29/89

/ / Additional page(s) attached

HED Q-27 (con't)
Controls difficult to use

E) CRP 903 LPCI/ESW Heat Exchanger - ΔP controllers (A&B).
When running ESW pumps for surveillance test it is very difficult to obtain **EXACTLY** 2500 gpm as indicated on "Heat Exchanger ESW Flow" indicators (903). Slight adjustments in control pot will result in overshooting the 2500 mark.

LPCI controller (1-LPC-4A & B) -
The function of this valve is to throttle flow. It is a motor operated valve which is a poor throttler (this is a miss-application of the valve).

F) Operation of the RWCU at rated pressure -
Too many variables to try to adjust.
Lag time from control manipulation until system response usually results in system isolation and then subsequent recovery isn't any easier.

Two handed manipulation of cleanup flow and pressure can become tedious with the controls located on the vertical part of the panel. It would be easier if these controls were on the apron section.

G) Paralleling the main generator to the grid - Have to walk back and forth between GTAC and 908 panel.

H) Control of RX level below 60" during EOP operations.

I) Pressing the APR trimmer PRT button.
Operations of all controllers.

J) AUG OFF Gas system - Placing in service, because the board is kind of tough to follow.

K) The electrical system - (Because controls and displays are not close to each other.)

L) The Feed Reg. valves are on the Flow Control light (annunciator?).
Rearrange things to fit possible accident scenarios.

M) Accelerating the turbine from rest to 1800 RPM. This could be done automatically as with EHC plants.

N) Control of Rx recirc. speed (is difficult due to) one minute delay till pressure and power react.

HED Q-27 (con't)
Controls difficult to use

	RES CODE	CORR CODE	
A)	A	XVIII	Replace with a less sensitive control (more movement for less output change)
B)	E	IV	Further questioning reveals no operational problem.
C)	A	I	NON-HED
D)	A	II	Not Significant
E)	DUP	TA-26	
F)	A	XXIV	Investigate and correct cause of controls difficulty.
G)	A	II	Not significant
H)	E	IV	System dynamics dictate operational requirements.
I)	DUP	TA-14	
J)	A	VI	Training to accent start up ϕ operation of off-gas.
K)	A	V	Enhancements to improve situation.
L)	A	III	Relocate to vertical section with reset switch and make light amber.
M)	A	XVIII	Replace acceleration meter with dual indicator.
N)	Duplicate Q-27A		

HUMAN ENGINEERING DISCREPANCY

HED NO. 0-32

TITLE:
Displays that tend to stick

PRIORITY: 1

COMMENT:

Displays must be tapped to be sure they are reading properly.

Reviewer	Date	Ref.	Source
A. Stave	9/7/1988	Operator Questionnaires	

IDENTIFICATION: **Panel:**

Component Name:

ID or No.:

DESCRIPTION:

A) Yarway Level Indicators
B) Any edgewise indicator - Static electricity can cause any of them to hang up.
C) 903 - SW Pressure
D) 905 - IRM/APRM
E) Stack Gas Rad Level (when in purge)

POSSIBLE SOLUTIONS:

RESOLUTION: (CODE)

See Attached

Approved Signature: T A Staffa **Date:** 8/28/89

/ / Additional page(s) attached

Q-32 (con't)
Displays That Tend To Stick

	RES CODE	CORR CODE	
A)	DUP	TA-1, 2	
B)	A	I	Static is not a problem, non-HED
C)	A	I	System Dynamics caused.
D)	E	IV	Existing project to correct.
E)	A	XIV	

MILLSTONE UNIT NO.1 TASK ANALYSIS
HUMAN ENGINEERING DISCREPANCY

HED TITLE: MUST LEAVE PRIMARY AREA PRIORITY: 1

HED NO.: TA-22

EOP NO.: 570

EOP STEP: RCL-1

TASK ANALYSIS: X

ECP WALKTHROUGH: X

DISCREPANCY DESCRIPTION: OPERATOR HAS NO MAIN BOARD INDICATION OF WHICH FWCI TRAIN IS SELECTED FOR AUTO START

PANEL ID.: 926

COMPONENT ID.: FWCI START

COMPONENT LABEL:

RESOLUTION CODE: E

CORRECTION CODE: IV

HED RESOLUTION: THE OPERATORS UTILIZE A MAGNETIC SIGN ON THE CONTROL BOARD TO INDICATE THE FWCI TRAIN SELECTED FOR AUTO START NO CHANGE REQUIRED

WRITTEN BY: R.K.MCCARTHY DATE: 07/29/88

APPROVED BY: T.A.SHAFFER T A Shaffer 9/9/89 DATE: / /

MILLSTONE UNIT NO.1 TASK ANALYSIS
HUMAN ENGINEERING DISCREPANCY

HED TITLE: TIMER INTERLKS ON LPCI PPS & VLVS PRIORITY: 1

HED NO.: TA-24

EOP NO.: 570

EOP STEP: RCL-1

TASK ANALYSIS: X

EOP WALKTHROUGH: X

DISCREPANCY DESCRIPTION: 5 & 10 MINUTE TIMERS PREVENT THE OPERATOR FROM CONTROLLING LPSI FLOW FOLLOWING RECEIPT A -48" OR 2# ACCIDENT INITIATION SIGNAL.OPERATOR HAS NO INDICATION OF WHEN TIMERS ARE TIMED OUT.

PANEL ID.: 903

COMPONENT ID.: LPSI VALVES

COMPONENT LABEL:

RESOLUTION CODE: E

CORRECTION CODE: IV

HED RESOLUTION: BY THE TIME THE OPERATOR IS READY TO INJECT. THE TIMERS HAVE TIMED OUT AND HE CAN USE THE #10 VALVE POSITION INDICATION TO ESTABLISH TIMER STATUS

WRITTEN BY: R.K.MCCARTHY DATE: 08/01/8[illegible]

APPROVED BY: T.A.SHAFFER T A Shaffer 9/9/89 DATE: / /

MILLSTONE UNIT NO.1 TASK ANALYSIS
HUMAN ENGINEERING DISCREPANCY

HED TITLE: MUST LEAVE CONTROL ROOM PRIORITY: 1

HED NO.: TA-27

EOP NO.: 526

EOP STEP: RCL-1

TASK ANALYSIS: X

EOP WALKTHROUGH: X

DISCREPANCY DESCRIPTION: LAST RESORT STEPS TO MAINTAIN VESSEL LEVEL REQUIRE OPERATOR TO PERFORM MUTLTIPLE OPERATIONS REMOTE TO THE CONTROL ROOM.

PANEL ID.:

COMPONENT ID.:

COMPONENT LABEL:

RESOLUTION CODE: E

CORRECTION CODE: IV

HED RESOLUTION: THERE ARE ENOUGH ON SHIFT OPERATORS (8) TO PERFORM THESE LAST RESORT REMOTE TASKS

WRITTEN BY: R.K.MCCARTHY DATE: 08/01/88

APPROVED BY: T.A.SHAFFER TA Shaffer 9/9/89 DATE: / /

MILLSTONE UNIT NO.1 TASK ANALYSIS
HUMAN ENGINEERING DISCREPANCY

HED TITLE: SRV'S ARRANGEMENT PRIORITY: 1

HED NO.: TA-29

EOP NO.: 570

EOP STEP: FLD-1

TASK ANALYSIS: X

EOP WALKTHROUGH: X

DISCREPANCY DESCRIPTION: VALVES ARE NOT ARRANGED PER POPULATION STEREOTYPES THE ARE ARRANGED E,B,F,C,D,A.

PANEL ID.: 903

COMPONENT ID.: MS-3ABCDEF

COMPONENT LABEL:

RESOLUTION CODE: E

CORRECTION CODE: IV

HED RESOLUTION: THESE VALVES ARE ARRANGED LIKE THIS TO UNIQUELY IDENTIFY THE AUTOMATIC PRESSURE RELIEF VALVES

WRITTEN BY: R.K.MCCARTHY DATE: 08/01/8E

APPROVED BY: T.A.SHAFFER TA Shaffer 9/9/89 DATE: / /

MILLSTONE UNIT NO. 1 TASK ANALYSIS
HUMAN ENGINEERING DISCREPANCY

HED TITLE: INADEQUATE RECORDER SCALE UNITS PRIORITY: 1

HED NO: TA-68

EOP NO: 580

EOP STEP: OVRIDES

TASK ANALYSIS: X

EOP WALKTHROUGH: X

DISCREPANCY DESCRIPTION: THE OFFSITE RADIOACTIVE RELEASE RATE (STACK GAS) RECORDER IS PRESENTED IN COUNTS PER MINUTE. THE TECHNICAL SPECIFICATION IS PRESENTED IN MICROCURIES PER SECOND.

PANEL ID.: 902

COMPONENT ID.: 1705-11

COMPONENT LABEL:

RESOLUTION CODE: E

CORRECTION CODE: IV

HED RESOLUTION: THE CPM TO MICROCURIE PER SECOND CONVERSION IS A VARIABLE FACTOR AND IS UPDATED REGULARLY BY I&C AND HP/CHEMISTRY.

WRITTEN BY: R.K. MCCARTHY DATE: 08/05/88

APPROVED BY: T.A. SHAFFER T A Shaffer 9/21/89 DATE: / /

MILLSTONE UNIT NO. 1 TASK ANALYSIS
HUMAN ENGINEERING DISCREPANCY

HED TITLE: MUST LEAVE PRIMARY AREA PRIORITY: 1

HED NO: TA-81

EOP NO: 585

EOP STEP: OVRIDES

TASK ANALYSIS: X

EOP WALKTHROUGH: X

DISCREPANCY DESCRIPTION: OPERATOR MUST LEAVE CONTROL ROOM TO RESTART THE REACTOR BUILDING VENTILATION.

PANEL ID.:

COMPONENT ID.:

COMPONENT LABEL:

RESOLUTION CODE: E

CORRECTION CODE: IV

HED RESOLUTION: OPERATOR STAFFING IS ADEQUATE TO PERFORM RESTART OF EQUIPMENT

WRITTEN BY: R.K. MCCARTHY DATE: 08/08/88

APPROVED BY: T.A. SHAFFER T A Shaffer 9/21/89 DATE: / /

MILLSTONE UNIT NO. 1 TASK ANALYSIS
HUMAN ENGINEERING DISCREPANCY

HED TITLE: MUST LEAVE PRIMARY AREA PRIORITY: 1

HED NO: TA-83

EOP NO: 585

EOP STEP: SCT-1

TASK ANALYSIS: X

EOP WALKTHROUGH: X

DISCREPANCY DESCRIPTION: OPERATOR MUST LEAVE CONTROL ROOM IN ORDER TO START ALL AVAILABLE SECONDARY CONTAINMENT AREA COOLERS

PANEL ID.:

COMPONENT ID.:

COMPONENT LABEL:

RESOLUTION CODE: E

CORRECTION CODE: IV

HED RESOLUTION: OPERATIONS STAFFING IS ADEQUATE TO PERFORM THIS TASK

WRITTEN BY: R.K. MCCARTHY DATE: 08/08/88

APPROVED BY: T.A. SHAFFER DATE: / /

T.A. Shaffer 9/21/89

MILLSTONE UNIT NO.1 TASK ANALYSIS
HUMAN ENGINEERING DISCREPANCY

HED TITLE: LACK OF INSTRUMENTATION PRIORITY: 1

HED NO.: TA-88

EOP NO.: 575

EOP STEP: ENT COND

TASK ANALYSIS: X

EOP WALKTHROUGH: X

DISCREPANCY DESCRIPTION: THERE IS NO CONTROL ROOM INDICATION OF THE SCRAM DISCHARGE VOLUME LEVEL

PANEL ID.: N/A

COMPONENT ID.:

COMPONENT LABEL:

RESOLUTION CODE: E

CORRECTION CODE: IV

HED RESOLUTION: DISCHARGE VOLUME TANK "NOT DRAINED" ALARM PROVIDES ADAQUATE INFORMATION FOR OPERATOR USE

WRITTEN BY: R.K.MCCARTHY

T.A. Shaffer 9/9/89

DATE: 08/09/89

APPROVED BY: T.A.SHAFFER

DATE: / /

MILLSTONE UNIT NO.1 TASK ANALYSIS
HUMAN ENGINEERING DISCREPANCY

HED TITLE: MUST LEAVE PRIMARY AREA PRIORITY: 1

HED NO.: TA-89

EOP NO.: 575

EOP STEP: ENT COND

TASK ANALYSIS: X

EOP WALKTHROUGH: X

DISCREPANCY DESCRIPTION: OPERATOR MUST GO TO PANEL 923 TO DETERMINE TURBINE STOP VALVE POSITION UPON VERIFICATION OF SCRAM INITIATION SIGNAL

PANEL ID.: 923

COMPONENT ID.: TURB STP VLVS

COMPONENT LABEL:

RESOLUTION CODE: E

CORRECTION CODE: IV

HED RESOLUTION: THIS IS NOT A TIME SENSITIVE OPERATION

WRITTEN BY: R.K.MCCARTHY DATE: 08/09/88

APPROVED BY: T.A.SHAFFER 9/9/89 DATE: / /

MILLSTONE UNIT NO.1 TASK ANALYSIS
HUMAN ENGINEERING DISCREPANCY

HED TITLE: LACK OF INSTRUMENTATION PRIORITY: 1

HED NO.: TA-90

EOP NO.: 575

EOP STEP: ENT COND

TASK ANALYSIS: X

EOP WALKTHROUGH: X

DISCREPANCY DESCRIPTION: THERE IS NO CONTROL ROOM INDICATION OF THE SCRAM PILOT AIR HEADER PRESSURE FOR VERIFICATION OF SCRAM INITIATION SIGNAL

PANEL ID.: 905

COMPONENT ID.:

COMPONENT LABEL:

RESOLUTION CODE: E

CORRECTION CODE: IV

HED RESOLUTION: SCRAM AIR HEADER PRESSURE LOW ALARMS ON PANEL 905 PROVIDE ADADUATE INFORMATION FOR OPERATOR USE

WRITTEN BY: R.K.MCCARTHY DATE: 08/09/88

APPROVED BY: T.A.SHAFFER T A Shaff 9/9/89 DATE: / /

MILLSTONE UNIT NO.1 TASK ANALYSIS
HUMAN ENGINEERING DISCREPANCY

HED TITLE: INADAQUATE PROCEDURAL GUIDANCE PRIORITY: 1

HED NO.: TA-96

EOP NO.: 575

EOP STEP: FSO-6

TASK ANALYSIS: X

EOP WALKTHROUGH: X

DISCREPANCY DESCRIPTION: PROCEDURES ARE NOT REFERENCED FOR INJECTING BORON WITH FEEDWATER,CRD,RWCU,OR THE HYDRO PUMP INTO SLC

PANEL ID.:

COMPONENT ID.:

COMPONENT LABEL:

RESOLUTION CODE: E

CORRECTION CODE: IV

HED RESOLUTION: THIS IS A VERY DELIBERATE ACTION, AS SUCH THE OPERATOR WILL BE WELL AWARE OF WHAT TANK LEVEL WAS WHEN HE COMMENCED INJECTION OF BORON

WRITTEN BY: R.K.MCCARTHY DATE: 08/11/8[illegible]

APPROVED BY: T.A.SHAFFER T.A. Shaffer 9/9/89 DATE: / /

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
3	ICCR-11			DUP:TA-73
4	ICCR-16			DUP:TA-14
5	6.6.032			DUP:6.5.028
6	6.6.013			DUP:6.6.012
7	6.6.014			DUP:6.6.012
8	Q-11I			DUP 6.1.011
9	Q-27N			DUP Q-27A
10	TA-34			DUP Q6
11	Q-32A			DUP TA-1,2
12	Q-27I			DUP TA-14
13	Q-29F			DUP TA-14
14	TA-55			DUP TA-15,17
15	Q-3G			DUP TA-17,15
16	TA-41			DUP TA-19
17	TA-60			DUP TA-2
18	Q-3C			DUP TA-21
19	TA-38			DUP TA-21
20	Q-3J			DUP TA-22
21	TA-48			DUP TA-25
22	Q-14H			DUP TA-26
23	Q-27E			DUP TA-26
24	TA-45			DUP TA-28
25	TA-32			DUP TA-31
26	TA-82			DUP TA-33,42
27	TA-92			DUP TA-33,42
28	Q-3D			DUP TA-4
29	Q-3K			DUP TA-4,25
30	Q-3I			DUP TA-4,32
31	TA-53			DUP TA-40
32	Q-14I			DUP TA-46
33	Q-30D			DUP TA-5
34	TA-51			DUP TA-50
35	TA-67			DUP TA-68
36	TA-86			DUP TA-73
37	Q-3B			DUP TA-8,80
38	Q-3F			DUP TA-8,80
39	6.5.003D			DUP:TA-68
40	6.3.013			DUP: 6.3.003
41	6.4.019			DUP: 6.4.018
42	6.5.006			DUP: 6.5.002
43	6.5.003J			DUP: 6.5.003B
44	6.5.005A			DUP: 6.5.003B
45	6.5.004B			DUP: 6.5.003G
46	6.5.004C			DUP: 6.5.003H
47	6.5.004D			DUP: 6.5.003I
48	6.5.009A			DUP: 6.5.007A

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
49	6.5.009B			DUP: 6.5.008A
50	6.3.018			DUP:6.3.017
51	6.3.022			DUP:6.3.021
52	6.5.003A			DUP:6.5.002
53	6.5.003C			DUP:6.5.002
54	6.5.013A			DUP:6.5.003A
55	6.5.013C			DUP:6.5.003E
56	V-5			DUP:6.5.003B
57	6.1.007	4	A	I
58	6.1.008	4	A	I
59	6.1.013	4	A	I
60	6.1.018	I	A	I
61	6.2.001	4	A	I
62	6.2.008	4	C	I
63	6.3.003	I	A	I
64	6.3.009B	II	A	I
65	6.3.020	I	A	I
66	6.4.001	4	A	I
67	6.4.003N	1	A	I
68	6.5.005B	1	E	I
69	6.5.018B	2	A	I
70	6.5.021A	1	A	I
71	6.5.021B	1	A	I
72	6.5.022A	I	A	I
73	6.5.022B	1	A	I
74	6.5.022C	1	A	I
75	6.5.032A	1	A	I
76	6.5.032B	1	A	I
77	6.5.032C	1	A	I
78	6.5.032E	1	A	I
79	6.5.032G	1	A	I
80	6.5.032H	1	A	I
81	6.5.032I	1	A	I
82	6.5.032J	1	A	I
83	6.5.032K	1	A	I
84	6.5.032L	1	A	I
85	6.5.032M	1	A	I
86	6.5.032N	1	A	I
87	6.5.033B	1	A	I
88	6.5.034D	1	A	I
89	6.5.035D	1	A	I
90	6.5.042A	2	A	I
91	6.5.042B	2	A	I
92	6.5.042F	2	A	I
93	6.5.042H	2	A	I
94	6.5.042J	2	A	I

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR. CODE
2				
95	6.6.022	2	A	I
96	6.6.033	1	B	I
97	6.8.008	1	A	I
98	6.8.011B	1	A	I
99	Q-14J	1	A	I
100	Q-14K	1	A	I
101	Q-14N	1	A	I
102	Q-14R	1	A	I
103	Q-14S	1	A	I
104	Q-27C	1	A	I
105	Q-29B	1	A	I
106	Q-32B	1	A	I
107	Q-32C	1	A	I
108	TA-12	1	A	I
109	TA-30	1	A	I
110	TA-95	1	E	I
111	Q-25J	3	A	I,III
112	Q-25C	3	A	I,VI
113	Q-25D	3	A	I,VI
114	6.05.38	1	A	II
115	6.1.002	I	A	II
116	6.3.014	IV	A	II
117	6.5.004E	1	E	II
118	6.5.007B	1	E	II
119	6.5.019B	1	E	II
120	6.5.019C	1	E	II
121	6.5.025A	1	A	II
122	6.5.025B	1	A	II
123	6.5.025C	1	A	II
124	6.5.025D	1	A	II
125	6.5.025E	1	A	II
126	6.5.025F	1	A	II
127	6.5.027A	1	E	II
128	6.5.027B	1	E	II
129	6.5.027C	1	E	II
130	6.5.030	3	E	II
131	6.5.037A	1	A	II
132	6.5.037B	1	A	II
133	6.5.037D	1	A	II
134	6.5.037E	1	A	II
135	6.5.039	1	A	II
136	6.5.043A	1	A	II
137	6.5.043B	1	A	II
138	6.5.043C	1	A	II
139	6.5.043D	1	A	II
140	6.5.043E	1	A	II

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
141	6.5.043G	1	A	II
142	6.5.045	2	A	I
143	6.6.021	3	B	II
144	6.6.028	1	B	II
145	6.8.001A	1	B	II
146	6.8.009	1	B	II
147	6.8.011A	1	B	II
148	6.8.011C	1	B	II
149	6.8.011D	1	B	II
150	6.8.011E	1	B	II
151	6.8.011F	1	B	II
152	6.9.001	1	B	II
153	6.9.002E	1	A	II
154	6.9.002F	1	A	II
155	6.9.007A	1	B	II
156	6.9.007B	1	B	II
157	6.9.007C	1	B	II
158	6.9.008	2	B	II
159	6.9.009A	1	B	II
160	6.9.009B	1	B	II
161	6.9.009C	1	B	II
162	6.9.011	1	B	II
163	Q-10C	3	A	II
164	Q-10D	3	A	II
165	Q-11A	3	A	II
166	Q-14D	1	A	II
167	Q-14E	1	A	II
168	Q-14O	1	A	II
169	Q-27D	1	A	II
170	Q-27G	1	A	II
171	Q15	3	A	II
172	Q19	1	A	II
173	TA-69	1	A	II
174	6.1.001C	I	A	III
175	6.1.001D	I	A	III
176	6.1.001F	I	A	III
177	6.3.010	II	A	III
178	6.8.006	1	A	III
179	Q-14A	1	A	III
180	Q-19A	1	A	III
181	Q-1A	1	A	III
182	Q-27L	1	A	III
183	Q-3M	1	A	III
184	Q-3N	1	A	III
185	TA-25	1	A	III
186	TA-31	1	A	III

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
187	TA-4	1	A	III
188	TA-50	1	A	III
189	TA-62	1	A	III
190	TA-65	1	A	III
191	ICCR-6	1	A	III
192	6.1.009A	2	E	IV
193	V-7	2	E	IV
194	VD-8	2	E	IV
195	6.1.009B	I	E	IV
196	6.1.010	I	E	IV
197	6.1.012B	I	E	IV
198	6.1.012C	I	E	IV
199	6.1.012D	I	E	IV
200	6.1.012E	I	E	IV
201	6.1.012F	I	E	IV
202	6.1.012G	I	E	IV
203	6.1.012H	I	E	IV
204	6.1.012I	I	E	IV
205	6.1.012J	I	E	IV
206	6.1.012K	I	E	IV
207	6.1.012L	I	E	IV
208	6.1.014	I	E	IV
209	6.1.015	I	E	IV
210	6.1.016	I	E	IV
211	6.1.017	I	E	IV
212	6.1.020	4	A	IV
213	6.2.002	4	A	IV
214	6.2.007	4	E	IV
215	6.3.002	I	E	IV
216	6.3.004	III	E	IV
217	6.3.006	I	E	IV
218	6.3.016	II	E	IV
219	6.3.017	I	E	IV
220	6.3.023	II	A	IV
221	6.4.002	1	A	IV
222	6.4.003D	1	E	IV
223	6.4.003E	1	E	IV
224	6.4.003F	1	E	IV
225	6.4.003G	1	E	IV
226	6.4.003H	1	E	IV
227	6.4.003I	1	E	IV
228	6.4.003J	1	E	IV
229	6.4.003K	1	E	IV
230	6.4.003L	1	E	IV
231	6.4.008	1	E	IV
232	6.4.009	1	E	IV

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
233	6.4.010	2	E	IV
234	6.4.011	4	E	IV
235	6.4.012	2	E	IV
236	6.4.014	1	E	IV
237	6.4.015	1	E	IV
238	6.4.016	1	E	IV
239	6.4.017	1	E	IV
240	6.4.018	1	E	IV
241	6.4.020	1	E	IV
242	6.4.021	4	E	IV
243	6.4.022	4	E	IV
244	6.5.001	1	E	IV
245	6.5.007C	1	E	IV
246	6.5.007E	1	E	IV
247	6.5.007F	1	E	IV
248	6.5.007G	1	E	IV
249	6.5.007H	1	E	IV
250	6.5.007I	1	E	IV
251	6.5.009E	1	E	IV
252	6.5.013E	1	E	IV
253	6.5.019A	1	E	IV
254	6.5.019D	1	E	IV
255	6.5.019E	1	E	IV
256	6.5.019F	1	E	IV
257	6.5.019G	1	E	IV
258	6.5.024A	1	E	IV
259	6.5.024B	1	E	IV
260	6.5.024C	1	E	IV
261	6.5.024D	1	E	IV
262	6.5.024E	1	E	IV
263	6.5.024F	1	E	IV
264	6.5.024G	1	E	IV
265	6.5.024H	1	E	IV
266	6.5.024I	1	E	IV
267	6.5.024J	1	E	IV
268	6.5.024K	1	E	IV
269	6.5.024L	1	E	IV
270	6.5.028	1	E	IV
271	6.5.032D	1	E	IV
272	6.5.032F	1	E	IV
273	6.5.032O	1	E	IV
274	6.5.032P	1	E	IV
275	6.5.032Q	1	E	IV
276	6.5.042G	2	E	IV
277	6.8.001B	1	E	IV
278	6.8.001C	1	E	IV

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
279	6.8.001D	1	E	IV
280	6.8.001E	1	E	IV
281	6.9.006	2	E	IV
282	Q-27B	1	E	IV
283	Q-27H	1	E	IV
284	Q-32D	1	E	IV
285	Q-3A	1	E	IV
286	Q-3E	1	E	IV
287	Q-3L	1	E	IV
288	Q-7C	1	E	IV
289	Q9	2	E	IV
290	TA-103	1	E	IV
291	TA-104	1	E	IV
292	TA-106	1	E	IV
293	TA-109	1	E	IV
294	TA-110	1	E	IV
295	TA-112	1	E	IV
296	TA-22	1	E	IV
297	TA-24	1	E	IV
298	TA-27	1	E	IV
299	TA-29	1	E	IV
300	TA-68	1	E	IV
301	TA-81	1	E	IV
302	TA-83	1	E	IV
303	TA-88	1	E	IV
304	TA-89	1	E	IV
305	TA-90	1	E	IV
306	TA-96	1	E	IV
307	TA-102	1	A	IV,VII
308	ICCR-3	1	E	IV
309	ICCR-5	1	E	IV
310	ICCR-7	1	E	IV
311	ICCR-15	1	E	IV
312	ICCR-19	1	E	IV
313	VD-2	1	A	IX
314	VD-5	1	A	IX
315	V-1	1	A	IX
316	V-2	1	A	IX
317	V-6	2	A	IX
318	6.1.011	1	A	IX
319	6.1.012A	1	A	IX
320	6.6.035	1	A	IX
321	Q-10E	3	A	IX
322	Q-14B	1	A	IX
323	Q-29A	1	A	IX
324	Q-7A	1	A	IX

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
325	Q-7B	1	A	IX
326	TA-14	1	A	IX
327	TA-15	1	A	IX
328	TA-17	1	A	IX
329	TA-19	1	A	IX
330	TA-39	1	A	IX
331	TA-40	1	A	IX
332	TA-52	1	A	IX
333	TA-71	1	A	IX
334	TA-73	1	A	IX
335	TA-77	1	A	IX
336	TA-78	1	A	IX
337	ICCR-8	1	A	IX
338	ICCR-10	1	A	IX
339	TA-108	1	A	IX,XV
340	VD-1	1	A	V
341	VD-7	1	A	V
342	VD-4	1	A	V
343	6.1.003	I	A	V
344	6.2.003	1	A	V
345	6.2.004	3	A	V
346	6.3.005	I	A	V
347	6.3.007	I	A	V
348	6.3.008	II	A	V
349	6.3.015	I	A	V
350	6.3.021	II	A	V
351	6.3.024	II	A	V
352	6.4.003C	1	A	V
353	6.4.003M	1	A	V
354	6.4.004	1	A	V
355	6.4.005	1	A	V
356	6.4.013	1	A	V
357	6.5.008A	1	A	V
358	6.5.008B	1	A	V
359	6.5.008C	1	A	V
360	6.5.008D	1	A	V
361	6.5.008E	1	A	V
362	6.5.008F	1	A	V
363	6.5.008G	1	A	V
364	6.5.009C	1	A	V
365	6.5.009D	1	A	V
366	6.5.010A	1	A	V
367	6.5.010B	1	A	V
368	6.5.010C	1	A	V
369	6.5.010D	1	A	V
370	6.5.010E	1	A	V

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
371	6.5.010F	1	A	V
372	6.5.010G	1	A	V
373	6.5.010H	1	A	V
374	6.5.010I	1	A	V
375	6.5.011A	1	A	V
376	6.5.011B	1	A	V
377	6.5.011C	1	A	V
378	6.5.011D	1	A	V
379	6.5.011E	1	A	V
380	6.5.014A	1	A	V
381	6.5.014B	1	A	V
382	6.5.014C	1	A	V
383	6.5.014D	1	A	V
384	6.5.014E	1	A	V
385	6.5.014F	1	A	V
386	6.5.014G	1	A	V
387	6.5.014H	1	A	V
388	6.5.014I	1	A	V
389	6.5.014J	1	A	V
390	6.5.014K	1	A	V
391	6.5.014L	1	A	V
392	6.5.014M	1	A	V
393	6.5.014N	1	A	V
394	6.5.014O	1	A	V
395	6.5.014P	1	A	V
396	6.5.014Q	1	A	V
397	6.5.014R	1	A	V
398	6.5.015A	1	A	V
399	6.5.015B	1	A	V
400	6.5.015C	1	A	V
401	6.5.015D	1	A	V
402	6.5.015E	1	A	V
403	6.5.015F	1	A	V
404	6.5.015G	1	A	V
405	6.5.016A	1	A	V
406	6.5.016B	1	A	V
407	6.5.016C	1	A	V
408	6.5.016D	1	A	V
409	6.5.016E	1	A	V
410	6.5.016F	1	A	V
411	6.5.016G	1	A	V
412	6.5.016H	1	A	V
413	6.5.016I	1	A	V
414	6.5.016J	1	A	V
415	6.5.016K	1	A	V
416	6.5.016L	1	A	V

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
417	6.5.016M	1	A	V
418	6.5.016N	1	A	V
419	6.5.017A	1	A	V
420	6.5.017B	1	A	V
421	6.5.017C	1	A	V
422	6.5.017D	1	A	V
423	6.5.017E	1	A	V
424	6.5.017F	1	A	V
425	6.5.017G	1	A	V
426	6.5.017H	1	A	V
427	6.5.017I	1	A	V
428	6.5.017J	1	A	V
429	6.5.018A	2	A	V
430	6.5.019I	1	A	V
431	6.5.020	1	A	V
432	6.5.026	1	A	V
433	6.5.031A	1	A	V
434	6.5.031B	1	A	V
435	6.5.031C	1	A	V
436	6.5.031D	1	A	V
437	6.5.031E	1	A	V
438	6.5.031F	1	A	V
439	6.5.032R	1	A	V
440	6.5.033A	1	A	V
441	6.5.034A	1	A	V
442	6.5.034B	1	A	V
443	6.5.034C	1	A	V
444	6.5.036A	1	A	V
445	6.5.036B	1	A	V
446	6.5.036C	1	A	V
447	6.5.036D	1	A	V
448	6.5.036E	1	A	V
449	6.5.036F	1	A	V
450	6.5.036G	1	A	V
451	6.5.036H	1	A	V
452	6.5.040	1	A	V
453	6.5.042I	2	A	V
454	6.5.044	2	A	V
455	6.6.001	1	A	V
456	6.6.002	1	A	V
457	6.6.003	1	A	V
458	6.6.004	1	A	V
459	6.6.005	1	A	V
460	6.6.006	3	A	V
461	6.6.007	1	A	V
462	6.6.008	1	A	V

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
463	6.6.009	1	A	V
464	6.6.010	1	A	V
465	6.6.011	1	A	V
466	6.6.012	1	A	V
467	6.6.015	1	A	V
468	6.6.016	1	A	V
469	6.6.017	1	A	V
470	6.6.018	1	A	V
471	6.6.019	1	A	V
472	6.6.020	3	A	V
473	6.6.023	1	A	V
474	6.6.024	1	A	V
475	6.6.025	1	B	V
476	6.6.026	2	A	V
477	6.6.027	1	A	V
478	6.6.029	1	A	V
479	6.6.030	1	A	V
480	6.6.031	1	A	V
481	6.6.034	1	A	V
482	6.8.002	1	A	V
483	6.8.003	1	A	V
484	6.8.004	1	A	V
485	6.8.005	1	A	V
486	6.8.007	1	A	V
487	6.8.010	2	A	V
488	6.8.012	1	A	V
489	6.9.002A	1	A	V
490	6.9.002B	1	A	V
491	6.9.002D	1	A	V
492	6.9.003	1	A	V
493	6.9.004	1	A	V
494	6.9.005	2	A	V
495	6.9.010A	1	A	V
496	6.9.010B	1	A	V
497	Q-11B	3	A	V
498	Q-1B	1	A	V
499	Q-27K	1	A	V
500	Q-29D	1	A	V
501	Q-5B	1	A	V
502	Q-5C	1	A	V
503	Q-5D	1	A	V
504	Q-5E	1	A	V
505	Q12	3	A	V
506	Q13	1	A	V
507	Q2	1	A	V
508	Q21	1	A	V

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
509	Q22	3	A	V
510	Q26	2	A	V
511	Q33	1	A	V
512	TA-101	1	A	V
513	TA-44	1	A	V
514	TA-47	1	A	V
515	TA-56	1	A	V
516	TA-58	1	A	V
517	TA-59	1	A	V
518	TA-61	1	A	V
519	TA-7	1	A	V
520	TA-72	1	A	V
521	TA-9	1	A	V
522	Q-14Q	1	A	V,III,XVIII
523	Q-14F	1	A	VI
524	Q-16B	1	A	VI
525	Q-16C	1	A	VI
526	Q-27J	1	A	VI
527	Q-29C	1	A	VI
528	TA-94	1	A	VI
529	6.5.029	1	E	VI,VIII
530	VD-3	1	A	VII
531	Q6	1	A	VI,VII
532	TA-100	1	A	VII
533	TA-105	1	A	VII
534	TA-107	1	E	VII
535	TA-13	1	A	VII
536	TA-18	1	A	VII
537	TA-20	1	A	VII
538	TA-33	1	A	VII
539	TA-35	1	A	VII
540	TA-37	1	A	VII
541	TA-42	1	A	VII
542	TA-6	1	A	VII
543	TA-70	1	A	VII
544	TA-74	1	A	VII
545	TA-75	1	A	VII
546	TA-76	1	A	VII
547	TA-87	1	A	VII
548	TA-93	1	A	VII
549	TA-97	1	A	VII
550	ICCR-12	1	A	VII
551	ICCR-13	1	A	VII
552	6.1.004	2	A	VIII
553	6.1.005	3	A	VIII
554	6.1.006	2	A	VIII

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
555	6.4.006	2	A	VIII
556	6.4.007	3	A	VIII
557	Q-10A	3	A	VIII
558	Q-11D	3	A	VIII
559	Q-11J	3	A	VIII
560	Q-16A	1	A	VIII
561	Q-16D	1	A	VIII
562	Q17	1	A	VIII
563	Q-25B	3	A	XIII
564	Q-25G	3	A	XIII
565	Q-25H	3	A	XIII
566	Q-25I	3	A	XIII
567	V-3	1	A	XIII
568	V-4	1	A	XIII
569	Q-28B	1	A	XIV
570	Q-30A	1	A	XIV
571	Q-30B	1	A	XIV
572	Q-32E	1	A	XIV
573	TA-57	1	A	XIV
574	6.1.001A	I	A	XIX
575	6.1.001B	I	A	XIX
576	6.1.001E	I	A	XIX
577	6.5.019H	1	A	XIX
578	Q-14C	1	A	XIX
579	Q-3H	1	A	XIX
580	Q-5A	1	A	XIX
581	TA-11	1	A	XIX
582	TA-16	1	A	XIX
583	TA-21	1	A	XIX
584	TA-79	1	A	XIX
585	TA-8	1	A	XIX
586	TA-80	1	A	XIX
587	TA-84	1	A	XIX
588	TA-99	1	A	XIX
589	VD-6	I	A	XV
590	VD-9	I	A	XV
591	6.1.019	2	A	XV
592	6.3.001	I	A	XV
593	6.3.009A	II	A	XV
594	6.3.011	II	A	XV
595	6.4.003A	1	A	XV
596	6.4.003B	1	A	XV
597	6.5.003B	1	A	XV
598	6.5.003E	1	A	XV
599	6.5.003F	1	A	XV
600	6.5.003G	1	A	XV

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
601	6.5.003H	1	A	XV
602	6.5.003I	1	A	XV
603	6.5.004A	1	A	XV
604	6.5.005C	1	A	XV
605	6.5.013B	1	A	XV
606	6.5.023	1	A	XV
607	6.5.041	1	A	XV
608	6.5.042C	2	A	XV
609	6.5.042D	2	A	XV
610	6.5.042E	2	A	XV
611	6.5.043F	1	A	XV
612	6.5.043H	1	A	XV
613	6.5.043I	1	A	XV
614	Q-10B	3	A	XV
615	Q-11C	3	A	XV
616	Q-11F	3	A	XV
617	Q-11G	3	A	XV
618	Q-11H	3	A	XV
619	Q-14G	1	A	XV
620	Q-7D	1	A	XV
621	TA-111	1	A	XV
622	TA-23	1	A	XV
623	TA-26	1	A	XV
624	TA-46	1	A	XV
625	TA-49	1	A	XV
626	TA-63	1	A	XV
627	TA-64	1	A	XV
628	TA-66	1	A	XV
629	TA-98	1	A	XV
630	ICCR-1	1	A	XV
631	ICCR-4	1	A	XV
632	ICCR-9	1	A	XV
633	ICCR-14	1	A	XV
634	ICCR-18	1	A	XV
635	6.5.007A	1	A	XV,XVIII
636	6.5.012	1	A	XV,XVIII
637	6.5.013D	1	A	XV,XVIII
638	TA-85	1	A	XV/VII
639	6.5.002A	1	A	XV/XVIII
640	6.5.002B	1	A	XV/XVIII
641	6.5.002C	1	A	XV/XVIII
642	6.5.007D	1	A	XV/XVIII
643	Q-19B	1	A	XVI
644	TA-54	1	A	XVI
645	6.3.012	I	A	XVII
646	6.3.019	II	A	XVII

FIGURE 14

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
2				
647	Q20	2	A	XVII
648	Q23	1	A	XVII
649	Q24	2	A	XVII
650	TA-91	1	A	XVII
651	6.5.035A	1	A	XVIII
652	6.5.035B	1	A	XVIII
653	6.5.035C	1	A	XVIII
654	6.5.035E	1	A	XVIII
655	6.5.035F	1	A	XVIII
656	6.5.035G	1	A	XVIII
657	6.5.035H	1	A	XVIII
658	6.5.035I	1	A	XVIII
659	6.5.037C	1	A	XVIII
660	6.9.002C	1	A	XVIII
661	Q-14L	1	A	XVIII
662	Q-14M	1	A	XVIII
663	Q-14P	1	A	XVIII
664	Q-25A	3	A	XVIII
665	Q-25E	3	A	XVIII
666	Q-27A	1	A	XVIII
667	Q-27M	1	A	XVIII
668	Q-28A	1	A	XVIII
669	Q-29G	1	A	XVIII
670	Q-30C	1	A	XVIII
671	Q8	1	A	XVIII
672	TA-1	1	A	XVIII
673	TA-10	1	A	XVIII
674	TA-2	1	A	XVIII
675	TA-28	1	A	XVIII
676	TA-3	1	A	XVIII
677	TA-36	1	A	XVIII
678	TA-43	1	A	XVIII
679	TA-5	1	A	XVIII
680	ICCR-2	1	A	XVIII
681	6.2.005	1	A	XXII
682	6.2.006	1	A	XXII
683	Q-7E	1	A	XXII
684	Q-27F	1	A	XXIV
685	Q31	1	A	XXIV
686	Q4	1	A	XXIV
687	Q-29E	1	A	XXIV,V
688	ICCR-17	1	A	SEE GIC-89-337

FIGURE 15

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
3	6.1.001A	1	A	XIX
4	6.1.001B	1	A	XIX
5	6.1.001C	1	A	III
6	6.1.001D	1	A	III
7	6.1.001E	1	A	XIX
8	6.1.001F	1	A	III
9	6.1.003	1	A	V
10	6.1.011	1	A	IX
11	6.1.012A	1	A	IX
12	6.2.003	1	A	V
13	6.2.005	1	A	XXII
14	6.2.006	1	A	XXII
15	6.3.001	1	A	XV
16	6.3.005	1	A	V
17	6.3.007	1	A	V
18	6.3.012	1	A	XVII
19	6.3.015	1	A	V
20	6.4.003A	1	A	XV
21	6.4.003B	1	A	XV
22	6.4.003C	1	A	V
23	6.4.003M	1	A	V
24	6.4.004	1	A	V
25	6.4.005	1	A	V
26	6.4.013	1	A	V
27	6.5.002A	1	A	XV/XVIII
28	6.5.002B	1	A	XV/XVIII
29	6.5.002C	1	A	XV/XVIII
30	6.5.003B	1	A	XV
31	6.5.003E	1	A	XV
32	6.5.003F	1	A	XV
33	6.5.003G	1	A	XV
34	6.5.003H	1	A	XV
35	6.5.003I	1	A	XV
36	6.5.004A	1	A	XV
37	6.5.005C	1	A	XV
38	6.5.007A	1	A	XV,XVIII
39	6.5.007D	1	A	XV/XVIII
40	6.5.008A	1	A	V
41	6.5.008B	1	A	V
42	6.5.008C	1	A	V
43	6.5.008D	1	A	V
44	6.5.008E	1	A	V
45	6.5.008F	1	A	V
46	6.5.008G	1	A	V
47	6.5.009C	1	A	V
48	6.5.009D	1	A	V
49	6.5.010A	1	A	V

FIGURE 15

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
50	6.5.010B	1	A	V
51	6.5.010C	1	A	V
52	6.5.010D	1	A	V
53	6.5.010E	1	A	V
54	6.5.010F	1	A	V
55	6.5.010G	1	A	V
56	6.5.010H	1	A	V
57	6.5.010I	1	A	V
58	6.5.011A	1	A	V
59	6.5.011B	1	A	V
60	6.5.011C	1	A	V
61	6.5.011D	1	A	V
62	6.5.011E	1	A	V
63	6.5.012	1	A	XV,XVIII
64	6.5.013B	1	A	XV
65	6.5.013D	1	A	XV,XVIII
66	6.5.014A	1	A	V
67	6.5.014B	1	A	V
68	6.5.014C	1	A	V
69	6.5.014D	1	A	V
70	6.5.014E	1	A	V
71	6.5.014F	1	A	V
72	6.5.014G	1	A	V
73	6.5.014H	1	A	V
74	6.5.014I	1	A	V
75	6.5.014J	1	A	V
76	6.5.014K	1	A	V
77	6.5.014L	1	A	V
78	6.5.014M	1	A	V
79	6.5.014N	1	A	V
80	6.5.014O	1	A	V
81	6.5.014P	1	A	V
82	6.5.014Q	1	A	V
83	6.5.014R	1	A	V
84	6.5.015A	1	A	V
85	6.5.015B	1	A	V
86	6.5.015C	1	A	V
87	6.5.015D	1	A	V
88	6.5.015E	1	A	V
89	6.5.015F	1	A	V
90	6.5.015G	1	A	V
91	6.5.016A	1	A	V
92	6.5.016B	1	A	V
93	6.5.016C	1	A	V
94	6.5.016D	1	A	V
95	6.5.016E	1	A	V
96	6.5.016F	1	A	V

FIGURE 15

	A	B	C	D
1	FIED NO.	PRIORITY	RES CODE	CORR CODE
97	6.5.016G	1	A	V
98	6.5.016H	1	A	V
99	6.5.016I	1	A	V
100	6.5.016J	1	A	V
101	6.5.016K	1	A	V
102	6.5.016L	1	A	V
103	6.5.016M	1	A	V
104	6.5.016N	1	A	V
105	6.5.017A	1	A	V
106	6.5.017B	1	A	V
107	6.5.017C	1	A	V
108	6.5.017D	1	A	V
109	6.5.017E	1	A	V
110	6.5.017F	1	A	V
111	6.5.017G	1	A	V
112	6.5.017H	1	A	V
113	6.5.017I	1	A	V
114	6.5.017J	1	A	V
115	6.5.019H	1	A	XIX
116	6.5.019I	1	A	V
117	6.5.020	1	A	V
118	6.5.023	1	A	XV
119	6.5.026	1	A	V
120	6.5.031A	1	A	V
121	6.5.031B	1	A	V
122	6.5.031C	1	A	V
123	6.5.031D	1	A	V
124	6.5.031E	1	A	V
125	6.5.031F	1	A	V
126	6.5.032R	1	A	V
127	6.5.033A	1	A	V
128	6.5.034A	1	A	V
129	6.5.034B	1	A	V
130	6.5.034C	1	A	V
131	6.5.035A	1	A	XVIII
132	6.5.035B	1	A	XVIII
133	6.5.035C	1	A	XVIII
134	6.5.035E	1	A	XVIII
135	6.5.035F	1	A	XVIII
136	6.5.035G	1	A	XVIII
137	6.5.035H	1	A	XVIII
138	6.5.035I	1	A	XVIII
139	6.5.036A	1	A	V
140	6.5.036B	1	A	V
141	6.5.036C	1	A	V
142	6.5.036D	1	A	V
143	6.5.036E	1	A	V

FIGURE 15

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
144	6.5.036F	1	A	V
145	6.5.036G	1	A	V
146	6.5.036H	1	A	V
147	6.5.037C	1	A	XVIII
148	6.5.040	1	A	V
149	6.5.041	1	A	XV
150	6.5.043F	1	A	XV
151	6.5.043H	1	A	XV
152	6.5.043I	1	A	XV
153	6.6.001	1	A	V
154	6.6.002	1	A	V
155	6.6.003	1	A	V
156	6.6.004	1	A	V
157	6.6.005	1	A	V
158	6.6.007	1	A	V
159	6.6.008	1	A	V
160	6.6.009	1	A	V
161	6.6.010	1	A	V
162	6.6.011	1	A	V
163	6.6.012	1	A	V
164	6.6.015	1	A	V
165	6.6.016	1	A	V
166	6.6.017	1	A	V
167	6.6.018	1	A	V
168	6.6.019	1	A	V
169	6.6.023	1	A	V
170	6.6.024	1	A	V
171	6.6.027	1	A	V
172	6.6.029	1	A	V
173	6.6.030	1	A	V
174	6.6.031	1	A	V
175	6.6.034	1	A	V
176	6.6.035	1	A	IX
177	6.8.002	1	A	V
178	6.8.003	1	A	V
179	6.8.004	1	A	V
180	6.8.005	1	A	V
181	6.8.006	1	A	III
182	6.8.007	1	A	V
183	6.8.012	1	A	V
184	6.9.002A	1	A	V
185	6.9.002B	1	A	V
186	6.9.002C	1	A	XVIII
187	6.9.002D	1	A	V
188	6.9.003	1	A	V
189	6.9.004	1	A	V
190	6.9.010A	1	A	V

FIGURE 15

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
191	6.9.010B	1	A	V
192	ICCR-1	1	A	XV
193	ICCR-2	1	A	XVIII
194	ICCR-4	1	A	XV
195	ICCR-6	1	A	III
196	ICCR-8	1	A	IX
197	ICCR-9	1	A	XV
198	ICCR-10	1	A	IX
199	ICCR-12	1	A	VII
200	ICCR-13	1	A	VII
201	ICCR-14	1	A	XV
202	ICCR-17	1	A	GIC-89-337
203	ICCR-18	1	A	XV
204	Q-14A	1	A	III
205	Q-14B	1	A	IX
206	Q-14C	1	A	XIX
207	Q-14F	1	A	VI
208	Q-14G	1	A	XV
209	Q-14L	1	A	XVIII
210	Q-14M	1	A	XVIII
211	Q-14P	1	A	XVIII
212	Q-14Q	1	A	V,III,XVIII
213	Q-16A	1	A	VIII
214	Q-16B	1	A	VI
215	Q-16C	1	A	VI
216	Q-16D	1	A	VIII
217	Q-19A	1	A	III
218	Q-19B	1	A	XVI
219	Q-1A	1	A	III
220	Q-1B	1	A	V
221	Q-27A	1	A	XVIII
222	Q-27F	1	A	XXIV
223	Q-27J	1	A	VI
224	Q-27K	1	A	V
225	Q-27L	1	A	III
226	Q-27M	1	A	XVIII
227	Q-28A	1	A	XVIII
228	Q-28B	1	A	XIV
229	Q-29A	1	A	IX
230	Q-29C	1	A	VI
231	Q-29D	1	A	V
232	Q-29E	1	A	XXIV,V
233	Q-29G	1	A	XVIII
234	Q-30A	1	A	XIV
235	Q-30B	1	A	XIV
236	Q-30C	1	A	XVIII
237	Q-32E	1	A	XIV

FIGURE 15

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
238	Q-3H	1	A	XIX
239	Q-3M	1	A	III
240	Q-3N	1	A	III
241	Q-5A	1	A	XIX
242	Q-5B	1	A	V
243	Q-5C	1	A	V
244	Q-5D	1	A	V
245	Q-5E	1	A	V
246	Q-7A	1	A	IX
247	Q-7B	1	A	IX
248	Q-7D	1	A	XV
249	Q-7E	1	A	XXII
250	Q13	1	A	V
251	Q17	1	A	VIII
252	Q2	1	A	V
253	Q21	1	A	V
254	Q23	1	A	XVII
255	Q31	1	A	XXIV
256	Q33	1	A	V
257	Q4	1	A	XXIV
258	Q6	1	A	VII
259	Q8	1	A	XVIII
260	V-1	1	A	IX
261	V-2	1	A	IX
262	V-3	1	A	XIII
263	V-4	1	A	XIII
264	VD-1	1	A	V
265	VD-2	1	A	IX
266	VD-3	1	A	VII
267	VD-4	1	A	V
268	VD-5	1	A	IX
269	VD-6	1	A	XV
270	VD-7	1	A	V
271	VD-9	1	A	XV
272	6.6.025	1	B	V
273	6.5.029	1	E	VI,VIII
274	6.1.004	2	A	VIII
275	6.1.006	2	A	VIII
276	6.1.019	2	A	XV
277	6.3.008	2	A	V
278	6.3.009A	2	A	XV
279	6.3.010	2	A	III
280	6.3.011	2	A	XV
281	6.3.019	2	A	XVII
282	6.3.021	2	A	V
283	6.3.024	2	A	V
284	6.4.006	2	A	VIII

FIGURE 15

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
285	6.5.018A	2	A	V
286	6.5.042C	2	A	XV
287	6.5.042D	2	A	XV
288	6.5.042E	2	A	XV
289	6.5.042I	2	A	V
290	6.5.044	2	A	V
291	6.6.026	2	A	V
292	6.8.010	2	A	V
293	6.9.005	2	A	V
294	Q20	2	A	XVII
295	Q24	2	A	XVII
296	Q26	2	A	V
297	V-6	2	A	IX
298	6.1.005	3	A	VIII
299	6.2.004	3	A	V
300	6.4.007	3	A	VIII
301	6.6.006	3	A	V
302	6.6.020	3	A	V
303	Q-10A	3	A	VIII
304	Q-10B	3	A	XV
305	Q-10E	3	A	IX
306	Q-11B	3	A	V
307	Q-11C	3	A	XV
308	Q-11D	3	A	VIII
309	Q-11F	3	A	XV
310	Q-11G	3	A	XV
311	Q-11H	3	A	XV
312	Q-11J	3	A	VIII
313	Q-25A	3	A	XVIII
314	Q-25B	3	A	XIII
315	Q-25C	3	A	I,VI
316	Q-25D	3	A	I,VI
317	Q-25E	3	A	XVIII
318	Q-25G	3	A	XIII
319	Q-25H	3	A	XIII
320	Q-25I	3	A	XIII
321	Q-25J	3	A	I,III
322	Q12	3	A	V
323	Q22	3	A	V
324	TA-7	1	A	XVIII
325	TA-10	1	A	XVIII
326	TA-100	1	A	VII
327	TA-101	1	A	V
328	TA-102	1	A	IV,VII
329	TA-105	1	A	VII
330	TA-108	1	A	IX,XV
331	TA-11	1	A	XIX

FIGURE 15

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
332	TA-111	1	A	XV
333	TA-13	1	A	VII
334	TA-14	1	A	IX
335	TA-15	1	A	IX
336	TA-16	1	A	XIX
337	TA-17	1	A	IX
338	TA-18	1	A	VII
339	TA-19	1	A	IX
340	TA-2	1	A	XVIII
341	TA-20	1	A	VII
342	TA-21	1	A	XIX
343	TA-23	1	A	XV
344	TA-25	1	A	III
345	TA-26	1	A	XV
346	TA-28	1	A	XVIII
347	TA-3	1	A	XVIII
348	TA-31	1	A	III
349	TA-33	1	A	VII
350	TA-35	1	A	VII
351	TA-36	1	A	XVIII
352	TA-37	1	A	VII
353	TA-39	1	A	IX
354	TA-4	1	A	III
355	TA-40	1	A	IX
356	TA-42	1	A	VII
357	TA-43	1	A	XVIII
358	TA-44	1	A	V
359	TA-46	1	A	XV
360	TA-47	1	A	V
361	TA-49	1	A	XV
362	TA-5	1	A	XVIII
363	TA-50	1	A	III
364	TA-52	1	A	IX
365	TA-54	1	A	XVI
366	TA-56	1	A	V
367	TA-57	1	A	XIV
368	TA-58	1	A	V
369	TA-59	1	A	V
370	TA-6	1	A	VII
371	TA-61	1	A	V
372	TA-62	1	A	III
373	TA-63	1	A	XV
374	TA-64	1	A	XV
375	TA-65	1	A	III
376	TA-66	1	A	XV
377	TA-7	1	A	V
378	TA-70	1	A	VII

FIGURE 15

	A	B	C	D
1	HED NO.	PRIORITY	RES CODE	CORR CODE
379	TA-71	1	A	IX
380	TA-72	1	A	V
381	TA-73	1	A	IX
382	TA-74	1	A	VII
383	TA-75	1	A	VII
384	TA-76	1	A	VII
385	TA-77	1	A	IX
386	TA-78	1	A	IX
387	TA-79	1	A	XIX
388	TA-8	1	A	XIX
389	TA-80	1	A	XIX
390	TA-84	1	A	XIX
391	TA-85	1	A	XV/VII
392	TA-87	1	A	VII
393	TA-9	1	A	V
394	TA-91	1	A	XVII
395	TA-93	1	A	VII
396	TA-94	1	A	VI
397	TA-97	1	A	VII
398	TA-98	1	A	XV
399	TA-99	1	A	XIX
400	TA-107	1	E	VII

REQUIRED INSTRUMENTATION/CONTROL CHARACTERISTICS JUSTIFICATION SUMMARY
(MOST LIMITING CHARACTERISTICS) OF TABLE 7.3.1 (MLC)

SYSTEM: Isolation Condenser

INSTRUMENTATION/CONTROL: IC Valves

EPG/BOP REQUIREMENTS													
			INSTRUMENTATION							CONTROL			
ACTION CATEGORY/INFORMATION NEEDS		CRITERIA	SETPOINT	UNITS	RANGE	RESOL.	ACCUR	RESP TIME	DISPLAY TYPE	POSITION	RESP TIME	TYPE	
See Tables 7.3.1.a through 7.3.1.e	C	IC valve position -or- ECCS status	Open or closed	Same	Same Note (2)	Same	N/A	N/A	D	Note (4) or closed	N/A	D-valves	
			Initiated	Note (9)	Note (9)	Note (9)	N/A	N/A	D	Note (3)	N/A	ECCS	
	P	IC valve position -or- IC status	Open or closed	Same	Same	Same	N/A	Note (5)	D	Note (3) or Note (7)	Note (5)	D-valves	
			Initiated	Note (9)	Note (9)	Note (9)	N/A	15 sec. (timer)	D	Note (3)	15 sec. (timer)	D-valves	
	V			SAT	SAT	SAT	SAT	SAT	SAT	RANGE POSITION LTS FOR IC-1,2,3,4 SAT 6-27	SAT	SAT	

Reqd. Instr./Cont. Char. Just. Summ. Table

NP1 Rev. 0 - 7711510

FIGURE 16a

JUSTIFICATION TABLE 7.3.1 SUMMARY

TABLE NOTES:

Note (1): RCL-2.1 (EOP 570), DEP-2 (EOP 570), FLD-1.2 (EOP 575), DEP-1.1 (EOP 575).

Note (2): Generic and plant specific range corresponding to Reg. Guide 1.97, Rev. 2, Table 1 requirement.

Note (3): The plant specific IC system is normally lined up for operation with only one valve required to be opened for system initiation. IC-3 should be opened/verified open. IC-6 and IC-7 should be verified closed. IC-1, IC-2, IC-3 and IC-4 should be verified open. T/A

Note (4): Generic control not specified.

Note (5): Plant specific response time for IC steam supply isolation valves (IC-1, IC-2) is 24 sec., for condensate return isolation valves (IC-3, IC-4) is 19 sec. and for condenser vent to main steam isolation valves (IC-6, IC-7) is 5 sec. per MP-1 Tech. Specs., Table 3.7.1, page 3/4 7-16a, Amendment No. 22, August 2?, 1988.

Note (6): Action is discrete node of conditional logic.

Note (7): Close IC-1, IC-2 and IC-4. Verify IC-3 closed. Verify IC-6 and IC-7 open.

Note (8): Genric ECCS setpoint not specified.

Plant specific setpoint; any one or more of the following conditions coincident with any one of RPV (lo lo) water level $\leq$ -48 in. or RPV press. $\geq$ 1085 for at least 15 sec. (otherwise tabulated).

- Any one of IC-1, 2, 3, 4 not open.
- Either IC-6 or 5 not closed.

Note (9): Generic units, range and resolution initiated/not initiated to correspond to generic setpoint.

Plant specific units, range and resolution not closed/closed corresponding to Reg. Guide 1.97, Rev. 2, Table 1 requirement.

Note (10): Generic ECCS setpoint not specified.

Note (11): Generic ECCS setpoint and control not specified.

Plant specific setpoint IC-1, 2, 3, 4 open, IC-6, 7 closed.

FIGURE 16b

TABLE NOTES (Continued):

Note (12): Control to effect initiation per Table 7.3.1.3.

REVIEW SUMMARY:

a The plant specific action category directs IC initiation when it is determined that RPV level cannot be maintained above -127 inches (top of active fuel). This operator determination could be made at any level above -127 inches. Since IC initiates at -48 inches (low-low level trip), direction to initiate IC below -48 inches is not necessary. A step requiring verification of IC initiation at -48 inches may be sufficient in place of plant specific "Initiate IC" step.

b Generic and plant specific steps functionally equivalent.

c The plant specific action category directs IC initiation when RPV pressure may be above 1085 psig (for 15 sec.) IC initiation setpoint. A step requiring verification of IC initiation may be sufficient in place of plant specific "Initiate IC" step.

d Generic and plant specific steps are equivalent. IC is ECCS per MP-1 Tech. Spec. 3/4.5.

e Generic and plant specific steps are equivalent. IC is ECCS per MP-1 Tech. Spec. 3/4.5.

FIGURE 16c

FIGURE 17

	A
3	PRIORITY CODE DEFINITIONS
4	
5	1 = SAFETY SIGNIFICANT
6	HED'S THAT ARE JUDGED LIKELY TO ADVERSELY AFFECT THE MANAGEMENT OF
7	EMERGENCY CONDITIONS BY THE CONTROL ROOM OPERATORS.
8	2 = OPERATIONAL / RELIABILITY
9	HED'S THAT ARE KNOWN TO HAVE CAUSED PROBLEMS OR APPEAR TO CAUSE
10	PROBLEMS DURING NORMAL OPERATION
11	3 = MINOR CONSEQUENCES
12	HED'S THAT CAN BE DETERMINED TO HAVE MINOR AFFECT ON THE RELIABILITY
13	OF OPERATIONS
14	4 = NOT SIGNIFICANT
15	HED'S THAT DO NOT FIT INTO ANY OF THE ABOVE CATEGORIES. THESE ARE
16	JUDGED BY THE REVIEW TEAM AS NOT AFFECTING EMERGENCY OPERATIONS AND
17	NOT PREVIOUSLY DOCUMENTED AS CAUSING PROBLEMS DURING OPERATION.
18	
19	RESOLUTION CODE DEFINITIONS
20	
21	A = MEETS HUMAN FACTORS ENGINEERING GUIDELINES ORIGINALLY OR AS
22	IMPROVED
23	B = MINOR DEVIATION, BUT SATISFIES THE UNDERLYING PERFORMANCE
24	PRINCIPLE IMPLIED BY HFE GUIDELINES.
25	C = MEETS HFE GULIDELINES THROUGH A COMBINATION OF SOLUTIONS.
26	D = DOES NOT MEET HFE GUIDELINES.
27	E = SOLUTIONS DO NOT MEET ALL GUIDELINES, BUT ARE JUDGED TO BE
28	ACCEPTABLE FOR SAFE OPERATION FOR THE REASON STATED.
29	
30	CORRECTIVE ACTION CODE DEFINITIONS
31	
32	I=NON HED
33	II=NOT SIGNIFICANT
34	III=RELOCATE COMPONENT
35	IV=JUSTIFY
36	V=ENHANCEMENT
37	VI=TRAINING
38	VII=PROCEDURE CORRECTION
39	VIII=ADMINISTRATIVE CONTROLS
40	IX=ADDITION OF EQUIPMENT
41	XI=PLUG PANEL OPENING
42	XII=REEVALUATE AND CORRECT SETPOINTS
43	XIII=REMOVE COMPONENT
44	XIV=MAINTENANCE TO INSPECT/ REPLACE IF NECESSARY
45	XV=MODIFY EXISTING COMPONENT
46	XVI=PROJECT ASSIGNMENT NO. 83-017 TO CORRECT
47	XVII= INITIATE AND PERFORM ANNUNCIATOR REVIEW FOR STD'S,LOCATION ETC.
48	XVIII=REPLACE COMPONENT
49	XIX=ADD POINTS TO COMPUTER
50	XX=INVESTIGATE ALARM SETPOINTS

FIGURE 17

	A
5 1	XXI=CORRECTED BY ICS/SPDS IMPLEMENTATION
5 2	XXII=COMMUNICATIONS STUDY TO ADDRESS
5 3	XXIV=INVESTIGATE AND DETERMINE FEASABILITY
5 4	

FIGURE 18

	A	B
1	HED NO.	IMPLEMENTATION
2		OUTAGE
3	6.1.001A	2
4	6.1.001B	2
5	6.1.001C	1
6	6.1.001D	1
7	6.1.001E	2
8	6.1.001F	1
9	6.1.003	1
10	6.1.004	1
11	6.1.005	1
12	6.1.006	1
13	6.1.011	1,2,3
14	6.1.012A	1
15	6.1.012C	1
16	6.1.019	2
17	6.2.003	2
18	6.2.004	1
19	6.2.005	1
20	6.2.006	1
21	6.3.001	2
22	6.3.005	1,2,3
23	6.3.007	2
24	6.3.008	1,2,3
25	6.3.009	3
26	6.3.010	1
27	6.3.011	1
28	6.3.012	1,2,3
29	6.3.015	1,2,3
30	6.3.019	1,2,3
31	6.3.021	3
32	6.3.024	1,2,3
33	6.4.002	1
34	6.4.003A	2
35	6.4.003B	3
36	6.4.003M	1
37	6.4.004	1,2,3
38	6.4.005	1,2,3
39	6.4.006	1
40	6.4.007	1
41	6.4.013	1,2,3
42	6.5.002C	3
43	6.5.003B	1
44	6.5.003E	3
45	6.5.003F	1
46	6.5.003G	2
47	6.5.003H	2
48	6.5.003I	3

FIGURE 18

	A	B
1	HED NO.	IMPLEMENTATION
2		OUTAGE
49	6.5.004A	1
50	6.5.005C	2
51	6.5.007A	1
52	6.5.007D	3
53	6.5.008A	1
54	6.5.008B	2
55	6.5.008C	2
56	6.5.008D	3
57	6.5.008E	3
58	6.5.008F	1
59	6.5.008G	3
60	6.5.009C	3
61	6.5.009D	3
62	6.5.010A	1
63	6.5.010B	1
64	6.5.010C	2
65	6.5.010D	2
66	6.5.010E	3
67	6.5.010F	3
68	6.5.010G	3
69	6.5.010H	3
70	6.5.010I	3
71	6.5.011A	1
72	6.5.011B	2
73	6.5.011C	2
74	6.5.011D	3
75	6.5.011E	3
76	6.5.012	1,3
77	6.5.013B	1
78	6.5.013D	3
79	6.5.014A	1
80	6.5.014B	2
81	6.5.014C	2
82	6.5.014D	2
83	6.5.014E	3
84	6.5.014F	3
85	6.5.014G	1
86	6.5.014H	3
87	6.5.014I	3
88	6.5.014J	3
89	6.5.014K	3
90	6.5.014L	3
91	6.5.014M	3
92	6.5.014N	3
93	6.5.014O	3
94	6.5.014P	3

FIGURE 18

	A	B
1	HED NO.	IMPLEMENTATION
2		OUTAGE
95	6.5.014Q	3
96	6.5.014R	3
97	6.5.015A	1,2
98	6.5.015B	2
99	6.5.015C	3
100	6.5.015D	3
101	6.5.015E	3
102	6.5.015F	3
103	6.5.015G	3
104	6.5.016A	1
105	6.5.016B	1
106	6.5.016C	2
107	6.5.016D	2
108	6.5.016E	3
109	6.5.016F	3
110	6.5.016G	3
111	6.5.016H	3
112	6.5.016I	3
113	6.5.016J	3
114	6.5.016K	3
115	6.5.016L	3
116	6.5.016M	3
117	6.5.016N	3
118	6.5.017A	1
119	6.5.017B	1
120	6.5.017D	2
121	6.5.017E	3
122	6.5.017F	3
123	6.5.017G	3
124	6.5.017H	3
125	6.5.017I	3
126	6.5.017J	3
127	6.5.018A	3
128	6.5.019H	2
129	6.5.019I	2
130	6.5.020	1,2,3
131	6.5.023	2
132	6.5.026	1,2,3
133	6.5.029	1
134	6.5.031A	1
135	6.5.031B	2
136	6.5.031C	3
137	6.5.031D	3
138	6.5.031E	3
139	6.5.031F	3
140	6.5.032R	2

FIGURE 18

	A	B
1	HED NO.	IMPLEMENTATION
2		OUTAGE
141	6.5.033A	2
142	6.5.034A	2
143	6.5.034B	2
144	6.5.034C	3
145	6.5.035A	1
146	6.5.035B	2
147	6.5.035C	2
148	6.5.035E	2
149	6.5.035F	2
150	6.5.035G	2
151	6.5.035H	2
152	6.5.035I	2
153	6.5.036A	1
154	6.5.036B	1
155	6.5.036C	2
156	6.5.036D	3
157	6.5.036E	2
158	6.5.036F	2
159	6.5.036G	2
160	6.5.036H	2
161	6.5.037C	2
162	6.5.040	1,2
163	6.5.041	2
164	6.5.042C	2
165	6.5.042D	2
166	6.5.042E	2
167	6.5.042I	2
168	6.5.043F	2
169	6.5.043H	2
170	6.5.043I	2
171	6.5.044	3
172	6.6.001	1,2,3
173	6.6.002	1,2,3
174	6.6.003	1,2,3
175	6.6.004	1,2,3
176	6.6.005	1,2,3
177	6.6.006	1,2,3
178	6.6.007	1,2,3
179	6.6.008	1,2,3
180	6.6.009	1
181	6.6.010	1,2,3
182	6.6.011	1,2,3
183	6.6.012	1,2,3
184	6.6.015	1,2,3
185	6.6.016	1,2,3
186	6.6.017	1,2,3

FIGURE 18

	A	B
1	HED NO.	IMPLEMENTATION
2		OUTAGE
187	6.6.018	1,2,3
188	6.6.019	2
189	6.6.020	2
190	6.6.023	1,2,3
191	6.6.024	1,2,3
192	6.6.026	1,2,3
193	6.6.027	1,2,3
194	6.6.029	1,2,3
195	6.6.030	1,2,3
196	6.6.031	1,2,3
197	6.6.034	1,2,3
198	6.6.035	2
199	6.8.002	1,2,3
200	6.8.003	1,2,3
201	6.8.004	1,2,3
202	6.8.005	1,2,3
203	6.8.006	2
204	6.8.007	1,2,3
205	6.8.012	1,2,3
206	6.9.002A	1
207	6.9.002B	1
208	6.9.002C	2
209	6.9.002D	2
210	6.9.003	2
211	6.9.004	2
212	6.9.005	2
213	6.9.010A	2
214	6.9.010B	3
215	ICCR-1	2
216	ICCR-2	2
217	ICCR-4	2
218	ICCR-6	2
219	ICCR-8	2
220	ICCR-9	2
221	ICCR-10	1
222	ICCR-12	1
223	ICCR-13	1
224	ICCR-14	2
225	ICCR-17	1,2,3
226	ICCR-18	2
227	Q-1A	1,2,3
228	Q-1B	1,2,3
229	Q2	1,2,3
230	Q-3H	2
231	Q-3M	1
232	Q-3N	1

FIGURE 18

	A	B
1	HED NO.	IMPLEMENTATION
2		OUTAGE
233	Q-4	1,2,3
234	Q-5A	1
235	Q-5B	1
236	Q-5C	1
237	Q-5D	1
238	Q-5E	1
239	Q-6	1
240	Q-7A	2
241	Q-7B	2
242	Q-7D	3
243	Q-7E	2
244	Q-8	2
245	Q-10A	1
246	Q-10B	2
247	Q-10E	2
248	Q-11B	1,2,3
249	Q-11C	1,2,3
250	Q-11D	
251	Q-11F	1,2,3
252	Q-11G	1,2,3
253	Q-11H	1,2,3
254	Q-11J	1
255	Q-11K	1,2,3
256	Q12	1,2,3
257	Q13	1,2,3
258	Q-14A	1
259	Q-14B	3
260	Q-14C	2
261	Q-14F	3
262	Q-14G	3
263	Q-14L	3
264	Q-14M	1
265	Q-14P	2
266	Q-14Q	3
267	Q-16A	1,2,3
268	Q-16B	1,2,3
269	Q-16C	1,2,3
270	Q-16D	1,2,3
271	Q17	2
272	Q-19A	1
273	Q-19B	1,2,3
274	Q20	1,2,3
275	Q21	1,2,3
276	Q22	1,2,3
277	Q23	1,2,3
278	Q24	1,2,3

FIGURE 18

	A	B
1	HED NO.	IMPLEMENTATION
2		OUTAGE
279	Q 25A	1
280	Q-25B	1
281	Q-25C	1
282	Q-25F	1
283	Q-25G	1
284	Q-25H	1
285	Q-25J	3
286	Q26	3
287	Q-27A	2
288	Q-27F	1
289	Q-27J	1
290	Q-27K	3
291	Q-27L	2
292	Q-27M	3
293	Q-28A	2
294	Q-28B	2
295	Q-29A	3
296	Q-29C	1
297	Q-29D	3
298	Q-29E	1,2,3
299	Q-29G	3
300	Q-30A	1
301	Q-30B	3
302	Q-30C	2
303	Q31	1,2,3
304	Q-32E	2
305	Q33	1,2,3
306	TA-1	2
307	TA-2	2
308	TA-3	2
309	TA-4	1
310	TA-5	2
311	TA-6	2
312	TA-7	1,2,3
313	TA-8	2
314	TA-9	2
315	TA-10	2
316	TA-11	2
317	TA-13	2
318	TA-14	1
319	TA-15	2
320	TA-16	2
321	TA-17	2
322	TA-18	2
323	TA-19	1
324	TA-20	2

FIGURE 18

	A	B
1	HED NO.	IMPLEMENTATION
2		OUTAGE
325	TA-21	2
326	TA-23	2
327	TA-25	1
328	TA-26	1
329	TA-31	1
330	TA-33	1
331	TA-35	2
332	TA-36	2
333	TA-37	2
334	TA-39	3
335	TA-40	3
336	TA-42	1
337	TA-43	2
338	TA-44	1,2,3
339	TA-46	1,3
340	TA-47	3
341	TA-49	1
342	TA-50	1
343	TA-52	3
344	TA-54	1,2,3
345	TA-56	1,2,3
346	TA-57	1
347	TA-58	1,2,3
348	TA-59	1,2,3
349	TA-61	1,2,3
350	TA-62	1
351	TA-63	1
352	TA-64	1
353	TA-65	1
354	TA-66	1
355	TA-70	2
356	TA-71	1
357	TA-72	1,2,3
358	TA-73	2
359	TA-74	1
360	TA-75	1
361	TA-76	1
362	TA-77	2
363	TA-78	3
364	TA-79	2
365	TA-80	2
366	TA-84	2
367	TA-85	3
368	TA-87	1
369	TA-91	1,2,3
370	TA-93	1

FIGURE 18

	A	B
1	HED NO.	IMPLEMENTATION
2		OUTAGE
371	TA-94	1
372	TA-97	1
373	TA-98	3
374	TA-99	1,2,3
375	TA-100	1
376	TA-101	2
377	TA-102	1
378	TA-105	1
379	TA-107	1
380	TA-108	3
381	TA-111	2
382	V-1	3
383	V-2	3
384	V-3	1
385	V-4	1
386	V-6	2
387	VD-1	1,2,3
388	VD-2	1
389	VD-3	1
390	VD-4	1
391	VD-5	2
392	VD-6	1
393	VD-7	2
394	VD-9	2