# DETAILED CONTROL ROOM DESIGN REVIEW

# FINAL SUMMARY REPORT



8606

000247

# INDIAN POINT UNIT 2

# DETAILED CONTROL ROOM DESIGN REVIEW

0.465

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### ACRONYMS AND ABBREVIATIONS

AFW	Auxiliary Feedwater
ARO	Auxiliary Reactor Operator
ASSOC	Associated
ASST	Assistant
ATWS	Anticipated Transient Without Scram
AUX	Auxiliary
CAT	Category
CCR	Central Control Room
CLO	Checklist Observation
CON ED	Consolidated Edison Company of New York
CONT	Control
CR	Control Room
CRS	Control Room Survey
CRT	Cathode Ray Tube
CVC	Chemical Volume Control
DBMS	Data Base Management System
DCRDR	Detailed Control Room Design Review
EES	Emergency Event Sequences
EOF	Emergency Operations Facility
EOP	Emergency Operating Procedures
EPRI	Electric Power Research Institute
ERG	Emergency Response Guidelines
ESF	Engineered Safety Feature
EST	Estimate(d)
EXPER	Experience
FW	Feedwater
FSAR	Final Safety Analysis Report
HE	Human Engineering
HED	Human Engineering Discrepancy
HEO	Human Engineering Observation

## ACRONYMS AND ABBREVIATIONS (continued)

I&C	Instruments and Controls
INPO	Institute of Nuclear Power Operations
IP2	Indian Point Unit 2
LDR	Leader
LER	Licensee Event Report(s)
LOCA	Loss of Coolant Accident
LOSP	Loss of Offsite (AC) Power
M/M	Man/Machine
MCP	Main Control Panel
MON	Monitor
MSIV	Main Steam Isolation Valve
MW(e)	Megawatts (electric)
NOS	Numbers
NRC	Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
OER	Operating Experience Review
OSC	Operational Support Center
PORV	Power Operated Relief Valve
PRT	Pressurizer Relief Tank
PSAR :	Preliminary Safety Analysis Report
PSZR	Pressurizer
RCB	Reactor Containment Building
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RECIRC	Recirculating
REQ'D	Required
RG	Regulatory Guide
RHR	Residual Heat Removal
RO	Reactor Operator
SG	Steam Generator
SI	Safety Injection
SOE	Selected Operational Event(s)

## ACRONYMS AND ABBREVIATIONS (continued)

SPDS	Safety Parameter Display System
SRO .	Senior Reactor Operator
SFTA	System Function and Task Analysis
SS	Subsystem
STAT	Systems Task Analysis Team
SUPVR	Supervisor
SW	Switch
SYS	System
TMI	Three-Mile Island
TSC	Technical Support Center
WOG	Westinghouse Owners Group

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#### PREFACE

The Detailed Control Room Design Review (DCRDR) of the Indian Point Unit 2 (IP2) nuclear power plant began in January 1984. This review was performed by Consolidated Edison Company of New York with assistance from its consultant Torrey Pines Technology, a division of GA Technologies Inc. The Program Plan for the DCRDR of IP2 was submitted to the NRC on February 14, 1984.

The DCRDR of the Indian Point Unit 2 power plant was completed in May 1986. This review included the following major activities:

- o The development of a detailed program plan for performing the DCRDR.
- o An Operating Experience Review that included a review of plant operating history documents, evaluation of responses to operator questionnaires, and the evaluation of the results of operator interviews.
- o A System Function and Task Analysis that included an identification of systems/subsystems, an identification of event sequences for analysis, an identification of system functions and information and control characteristics for each event sequence, and a task analysis for the identified functions in the event sequences.
- o A survey of the control room design with respect to human engineering guidelines.
- o A verification of the availability and suitability of the control room information and controls.
- o A validation of the control room safety functions.

- o An assessment of the Human Engineering Observations (HEOs) identified during the review.
- Categorization of the Human Engineering Discrepancies\* (HEDs) found and development of recommended corrective actions.
- . o Development of a corrective action implementation schedule.
- o Establishing a mechanism to ensure proper human engineering input in the design of future control room modifications.

A total of 221 HEOs were generated in this DCRDR, 153 from the control room survey, 25 from the verification and 43 from the validation.

Documentation describing the work performed for the DCRDR is summarized below:

- o Program Plan Defined the plan for performing the DCRDR.
- Procedures Provided the detailed guidelines and basis for the basic activities of the DCRDR and described the administrative interface between Con Edison and Torrey Pines Technology.
- o Operating Experience Review Report Described the review process results, conclusions and recommendations of the operating experience review activity defined in the Program Plan.
- Inventory Report Included a listing of control room devices with identifying information and panel drawings for referencing device location.

<sup>\*</sup>Human Engineering Discrepancies (HED) is terminology employed by the NRC in its guidelines which is used here only for consistency.

- o System Function and Task Analysis (SFTA) Report Described the methodology, results, conclusions and recommendations for the SFTA activity defined in the Program Plan.
- o Control Room Survey Report Described the review process, results, conclusions and recommendations of the Control Room Survey activity defined in the Program Plan. This report also correlated the findings of the operating experience review with human engineering observations resulting from the control room survey.
- o Final Summary Summarized the DCRDR methodology, results, conclusions, recommendations and schedule for implementation.

#### **1.0 INTRODUCTION**

#### 1.1 GENERAL

This report summarizes the methodology and results of the DCRDR of IP2 conducted as part of an integrated plan generically required by NUREG-0737, Supplement 1: "Requirements for Emergency Response Capability (Generic Letter No. 82-33)" dated December 17, 1982. The DCRDR was a joint effort performed by the Consolidated Edison Company and by Torrey Pines Technology. The purpose of this review was: to review and evaluate the control room workspace, instrumentation, controls, and other equipment from a human factors engineering point of view; to identify Human Engineering Observations (HEOs); to evaluate and categorize those which are Human Engineering Discrepancies (HEDs); and to establish an implementation plan for corrective action.

This control room review was performed according to the Program Plan submitted to the NRC on February 14, 1984 and subsequent meetings were held with the NRC on June 26, 1984, November 20, 1984, and December 4, 1985.

The major activities included in the control room review were as follows:

- o Operating Experience Review
- o System Function and Task Analysis
- o Control Room Survey
- o Verification of Task Performance Capabilities
- o Validation of Control Room as an Integrated System

In performing the SFTA phase of the review, an analysis of plant emergency operations was required. In this area, an extensive system review and task analysis was performed by the Westinghouse Owners Group (of which Con Edison is a member) when they developed the Emergency Guidelines (ERGs)

which have been implemented at IP2. This effort by the WOG was integrated into the Indian Point Unit 2 DCRDR. The SFTA was performed using plant specific procedures developed from the ERGs, Rev. 1. The ERG background documentation was used to generate the instrument and control characteristics data.

#### **1.2 OBJECTIVES**

The objectives of the DCRDR were as follows:

- o Determine whether system status information, control capabilities, feedback, and analytical aids necessary for control room operators to accomplish their functions under abnormal or emergency conditions in an effective, safe and reliable manner are provided in the control room.
- Identify characteristics of the existing control room instrumentation, controls, other equipment, and physical arrangements that may significantly impact operator performance.
- o Analyze and evaluate potential problems that could arise from this review.
- o Define and implement a plan of action that, where necessary and appropriate, would apply required human factors principles to enhance operator effectiveness. Particular emphasis is placed on consideration of possible improvements affecting control room design and operator performance under abnormal or emergency conditions.
- o Integrate the DCRDR with other areas requiring the application of human factors principles identified in Con Edison's April 15, 1983 response to NUREG-0737, Supplement 1.

o Utilize previous studies already completed and work already implemented or planned for implementation.

#### **1.3 PREVIOUS HUMAN ENGINEERING REVIEWS**

In response to the NRC Confirmatory Order of February 11, 1980, Con Edison contracted with Essex Corporation to perform a human engineering review of the IP2 central control room. The central control room review included surveys, interviews with operators, simulator exercises of procedures, video-taping of selected emergency procedures, and a review and revision of selected emergency procedures. As a result of that review, numerous human engineering discrepancies were identified.

Gibbs & Hill was retained by Con Edison in June 1981 to evaluate the significance of HEDs identified by Essex. The evaluation performed by Gibbs & Hill also included the design review of control room modifications made after the initial review and recommended appropriate changes to address the discrepancies.

In our letters of December 19, 1980, May 15, 1981, February 11, 1982, and May 14, 1982, we documented proposed corrective actions and implementation schedules based on the early control room reviews. We have implemented several of these changes in the control room as summarized in our April 15, 1983 response to NUREG-0737, Supplement 1 and the February 14, 1984 Program Plan submittal.

By letter dated February 11, 1982, we proposed modifications to the IP2 central control room to correct HEDs identified during the 1980 and 1981 reviews. The improvements that were then planned to be implemented by the Cycle 6/7 (1984) refueling outage and since put on hold pending the results of this DCRDR included:

- o Annunciator point relocations and consolidations.
- o Audible alarm localization, flash rate frequency, and horn silence controls.
- Eliminating normally lit annunciator points to achieve a dark board of normal operations.
- o Lamp test capability.
- o Regrouping of alarms.
- o Annunciator tile/panel device labeling.
- o Control/display alignment.
- o Guard rail on flight panel.
- o Integration of recent control room modifications.

The resolution of annunciator tile, panel device labeling, and lamp test capability for all ESF systems were integrated with this review. The other listed items previously committed to in our February 11, 1982 submittal have been determined to be unnecessary as a result of the DCRDR and therefore have been permanently cancelled.

#### **1.4 DEFINITION OF CONTROL ROOM**

The control room is defined as the following panels:

Assessment Flight Panel "FA" Flight Panel "FB" Flight Panel "FC"

Flight Panel	"FD"	
Supervisory	Panel	"SA-1"
Supervisory	Panel	"SA" (
Supervisory	Pane1	"SB-1"
Supervisory	Pane1	"SB-2"
Supervisory	Panel	"SC"
Supervisory	Pane1	"SD"
Supervisory	Panel	"SE"
Supervisory	Pane1	"SF"
Supervisory	Pane1	"SG"
Supervisory	Pane1	"SH"
Supervisory	Pane1	"SJ"
Supervisory	Pane1	"SK"
Supervisory	Panel	"SL"
Supervisory	Pane1	"SM"
Supervisory	Pane1	"SN"
Supervisory	Pane1	"S0"

Figure 1-1 shows a layout of the control room.



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Figure 1-1. Indian Point Unit 2 Control Room Layout

### 2.0 PLANNING AND ORGANIZATION

The DCRDR was a project involving several different types of formal review activities that required the services of many people with various kinds of experience and training. To insure that a timely and integrated approach was used to perform the DCRDR, a thoroughly planned and well organized program was necessary. This program included an organized plan for accomplishing the review, a properly structured team to perform and review the work, detailed procedures for performing each phase of the review, and well organized systems for handling the documentation and data. The following sections discuss the methods used to organize the DCRDR.

#### 2.1 PLANNING

A preliminary Program Plan was developed by Torrey Pines Technology and submitted to the NRC on February 14, 1984. This report provided the anticipated plan for performing the various phases of the DCRDR. However, this document was intended only as a guide to the DCRDR team and in a few areas, as a result of meetings/discussions with the NRC and other considerations, the control room review deviated from the Program Plan. Review tasks that deviated from the Program Plan include the following:

- o Several of the forms such as the HEO record form, and some of the SFTA forms shown in the Program Plan as samples were changed or eliminated.
- o The procedure and event sequences presented for the SFTA were modified to reflect the most current SFTA methodology.
- o The Control Room Survey activity was repeated using NUREG-0700 guidelines rather than using the survey from the previous control room reviews.

Specific deviations, if any, from the Program Plan for each DCRDR activity are described in the sections that discuss the objective of the activity.

#### 2.2 MANAGEMENT AND STAFFING

The overall DCRDR was managed by Con Edison with the individual responsibilities as defined in the project interface procedure. Management responsibilities included the following:

- o Analysis of objectives and constraints.
- o Commitment of resources.
- o Selection of review team personnel.
- Assurance that the review team performs in accordance with applicable commitments.
- o Integration of control room improvements with other design changes and improvement programs.
- o Provide an interface between the review team and other groups, vendors, consultants, and NRC.

In addition to these responsibilities, the project interface procedure defines the responsibilities of the review team personnel from Torrey Pines Technology.

A multi-disciplined team was organized to perform the DCRDR. The staffing of this team is shown in Figure 2-1.

The qualifications of this multi-disciplined team are consistent with the guidelines of NUREG-0700. The qualifications of Torrey Pines Technology personnel have been reviewed in past DCRDR programs by the NRC.

The control room review was conducted according to procedures that outlined the purpose, applicability, responsibilities, and requirements of each activity. Table 2-1 shows the index of the procedures for performing the DCRDR.

V. Jay	A. Adorno varaman (Alternate)
Sr. Huma	n Factors Specialist
	S. F. Luna
	System Function and
Planning	Task Analysis
S. F. Luna A. Adorno*	S. F. Luna V. Jayaraman
D. Ellwood	R. C. Potter* R. Redding
	r. r. Scaletta
	I. A. Sgammato
Operating Experience Review	Verification of Task Capabilities
R. Arnold L. G. Lewis	R. C. Potter* F. Inzirillo
S. F. Luna	F. P. Scaletta
R. Sabeh*	T. A. Sgammato
	E. P. Gagnon
	W. Welcn
	R. Sabeh
Contral Room Summer	Malidation of Control Boom Function
Control Room Survey	
S.F. Luna	R. C. Potter* F. Inzirillo
R. Sabeh*	
W. Welch	
Control Boom Tryontowy	Assessments and Implementation
W. Welch# A. Adurno	S. F. Luna A. Adorno*
F. P. Scaletta	R. Sabeh J. Curry
T. A. Sgammato	J. Del Percio
<b>3</b>	P. M. Duggan
、 、	F. Inzirillo
	J. Mooney
	T. Q. Wong
Documentation	Improvements
S. F. Luna A. Adorno	S. F. Luna A. Adorno
R Sabeh	R. Sabeh
	R. C. Potter#
R. C. Potter*	
R. C. Potter*	

Figure 2-1. DCRDR Organization

#### TABLE 2-1

#### INDEX OF DCRDR PROCEDURES

#### 1.0 PROCEDURE PLAN

#### 2.0 MANAGEMENT AND STAFFING

- 2.1 Project Interface Procedure
  2.2 Review Team Staffing

#### 3.0 DOCUMENTATION AND DOCUMENT CONTROL

- 3.1 Documentation of Project Meetings
- 3.2 Documentation of Telephone Correspondence
- 3.3 Photographic Record of HEOs
- 3.4 DCRDR Master File

#### 4.0 **REVIEW PROCEDURES**

- 4.1 Operating Experience Review4.2 Control Room Survey

- 4.3 Control Room Inventory4.4 System Function and Task Analysis and Verification
- 4.5 Validation

#### HEO ASSESSMENT AND HED IMPROVEMENT 5.0

5.1 HEO Assessment and HED Improvement

#### 3.0 DOCUMENTATION

The DCRDR involved the use and development of a large number of documents. In order to keep these documents well organized and easily accessible, a documentation filing system was implemented. This system was created for the purpose of filing and controlling documents, procedures, reference material, data, etc., either relating to or developed during the DCRDR.

#### 3.1 DOCUMENT CONTROL

Torrey Pines Technology established a library of reference material to assist the review team. The documents in this library primarily relate to human factors and control room reviews including many of those identified in NUREG-0700, as well as relevant EPRI and INPO documents.

The following documents were generated in support of this review:

o Program Plan

- o Operating Experience Review Report
- o Control Room Survey Report
- o System Function and Task Analysis Report
- o Procedures
- o Final Summary

Documentation was performed as described in the Program Plan with the following exeptions:

o The procedures documentation was added.

o A criteria report was not written but the criteria information (criteria matrix) was included in the procedures document.

#### 3.2 DATA MANAGEMENT

Several activities in the DCRDR involve the development, filing, sorting and comparing of large amounts of data. To aid in this operation a computerized Data Base Management System (DBMS) was used. This system, which was operated on a mini-computer, has a large storage capacity, capable of storing thousands of records each with hundreds of fields, sorting up to 16 fields, and relating (linking) files through a common field in each file.

The following data files were created for the SFTA:

o Control room inventory

- o Information and control requirements for the SFTA
- o Operator task data for the SFTA
- o HEO data

Using the above data files, the following reports (formatted listings) were generated with the DBMS:

- Control Room Inventory a listing of the inventory of all controldisplay devices in the main control room.
- Preliminary Operator Task Data Sheet a data worksheet to be used for monitoring and collecting operator task data during SFTA operator discussions.
- Information and Control Requirements a listing of the Information and Control Requirements data for each operator step.
- Operator Task Data Sheet a listing of the final overall Operator
   Task Data sorted by various selected operating events and step
   sequence number; a link of the required Operator Task Data and the

Control Room Inventory was made using the equipment number as the common data field. This was used to verify availability.

Verification of Suitability Data Sheet - a link of the Operator Task
 Data and the Control Room Inventory; used to compare task requirements
 with the device specifications for the verification of device
 suitability.

Examples and discussion of the above data sheets are presented in the appropriate sections of this report.

#### 3.3 HUMAN ENGINEERING OBSERVATION FORMS

A computer program was developed using the DBMS for storing, reporting and sorting of the HEOs identified during the various phases of the DCRDR. The forms were structured to allow computer sorting and input of review team comments. The program produces individual forms as shown in Figure 3-1 for each HEO generated.

The left hand side of the form was filled out by the evaluator making the observation. The right hand side of the form was completed to document the management review process. The form is divided into eight sections which are defined in Figure 3-1a. The observation section of the form has been formatted to provide for computer sorting. The fields available for computer sorting are defined in Figure 3-1b.

	HUMAN ENGINEER	RING OBSERVAT	TION ASSESSMENT	
OBSERVAT EVALUATOR:	ION HED#:		AIT REVIEW CHAIRMAN [] Concur. [] Concur. [] Concur.	DATE
	DATE:	PEV.	[] Concur Wron Commency Note:	
1. TILE:	HED CATEGORY:	NLY A	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION:			Comment Note/Reason:	
HED DESCRI	PTION			
NIDELNE-				
·				
1 SUPPORT MATERIAL ATTACHED			1) Promotiv	······
POTENTIAL OPERA	Tor Error(s)		Near Term Convenient Outage Optional	
			WANAGEMENT REVIEW/APPROVAL CHAIRMAN	DATE
			[] Concur With Comment/Note.	
SUGGESTED CORRE	CTIVE ACTION		[] Do Not Concur for Following Reason:	
			[] Reevaluate & Resubmit for Following Reason:	
			Comment/Note/Reason:	
,				
			EXECUTIVE REVIEW CHAIRMAN	DATE
			APPROVE: YES[] NO[] NOTE:	

Figure 3-1. HEO Form

OBSERVATION	Provides the unique identified characters (i.e, HEO number, checklist number, HEO category, etc.) for each observation. These characters are defined in Figure 3-1b.
HEO DESCRIPTION	Provides a brief description of the guidelines being reviewed and a description of the observation being made. Reference is made to associated observations or support material where applicable.
POTENTIAL OPERATOR ERROR(s)	Describes the potential operator error if the HEO were left uncorrected.
SUGGESTED CORRECTIVE ACTION	Provides space for the evaluator to elaborate or clarify the observation being made. By having the evaluator pro- vide a suggested corrective action, the review team can better understand the observation. The suggested correct- ive action should only be considered as an aid to the Assessment and Improvement Team (AIT). The determination of the recommended corrective action is the responsibil- ity of the AIT. The recommendations are forwarded to management for concurrence.
AIT REVIEW	Provides for documentation of the AIT review of the observation. Checkoffs are utilized to show concurrence, noncurrence, concur with comment/note, or reevaluate. It is to be understood that concurrence does not necessarily mean that the AIT concurs with the evaluator's suggested corrective action, or potential operator errors. The checkoff is a means of documenting that the AIT concurs with the observations.
RECOMMENDED IMPLEMENTATION	Provides for an estimate by the AIT of when the correc- tive action should be implemented.
MANGEMENT REVIEW/ APPROVAL	Provides for documentation of management's review of the AIT's recommended corrective actions.
EXECUTIVE REVIEW	Provides for the documentation of executive approval.

Figure 3-1a. Definition of Main Sections of HEO

1. EVALUATOR - The human factors specialist who prepared the HEO. 2. HED # - The Human Engineering Discrepancy number assigned by the Assessment Team. TASK - Control Room Review Task title. 3. 4. HEO # - A unique identifying number for each HEO assigned by the evaluation. 5. CL - Checklist number. CL ITEM - These numbers correspond to the guideline number in Chapter 6. 6 of NUREG-0700. 7. DATE - The date the HEO was prepared. 8. REV - The revision if applicable. 9. CL TITLE - The title of the checklist. 10. HEO CATEGORY - This is for category designations assigned by the AIT for presentation to the Management Team. 11. CONTROL BOARD LOCATION - The name of the control panel containing the instrument in question. 12. HEO DESCRIPTION - Starts off with a description of the CL item, identifies the instrument and/or boards/console in question and describes the nature of the observation. 13. POTENTIAL OPERATOR ERROR - Describes the potential operator error. SUGGESTED CORRECTIVE ACTION - Contains a suggested human engineering 14. fix for presentation to the assessment team. 15. AIT REVIEW, RECOMMENDED IMPLEMENTATION, EXECUTIVE REVIEW - This portion of the HEO form was completed by the AIT Management Teams and Executive Review Team.

Figure 3-1b. Definition of Sortable Fields on HEO Form

### 4.0 REVIEW ACTIVITIES

The control room review was subdivided into the following major activities:

- o Operating Experience Review
- o System Function and Task Analysis
- o Control Room Survey
- o Verification of Task Performance Capabilities
- o Validation of Control Room as an Integrated System

The purpose of this section is to describe each of these major activities and summarize the results. It is to be understood that the details for each of these activities is available in the individual program reports.

### 4.1 OPERATING EXPERIENCE REVIEW

The operating experience review consisted of two parts; an examination of available documentation and a survey of operations personnel. The review activities conducted for this task included the following:

- Reviewing selected plant specific Licensee Event Reports (LERs) and industry-wide documents.
- o Preparing, distributing and completing an operations personnel questionnaire.
- o Analyzing the written questionnaire responses.
- o Conducting structured interviews based on the written questionnaire responses.
- o Analyzing the interview responses.

- o Preparing observations for further investigation in the Control Room Survey and System Function and Task Analysis.
- o Preparing an Operating Experience Review Report.

This task was performed as a team effort according to the Program Plan. Initially, a meeting of the team was held to detail the task efforts and make arrangements for their execution.

#### 4.1.1 Review of Operating History Documents

The examination of available documents is recommended by NUREG-0700 as part of the Operating Experience Review task. The objective of this review was to identify conditions that may cause human performance problems which could be alleviated by application of good human engineering design principles. Both industry-wide reports (particularly Licensee Event Report experience with generic applicability) and plant-specific documents were reviewed. Historical incidents were identified according to the following criteria:

- o Event involves a detection error due to high workload, high noise level, poor location of signal, confusion of alarms due to poor localization, discriminability, or poor grouping of alarm location.
- Event involves a display identification error due to inadequate labeling; inadequate differentiation by shape, color, grouping or demarcation; poor display legibility; inadequate display scale; inappropriate scale units requiring mental conversion.
- o Event involves a decision error due to inadequate training, insufficient information, poor integration of information, or lack of decision aids and diagnostic procedures.

- o Event involves a procedure error due to inadequate training, procedures poorly written or organized, or panel layout not corresponding to the operating sequence.
- Event involves an execution error due to inadequate labeling; inadequate differentiation of controls, grouping or demarcation; violation of stereotype control measurements; inadequate labeling of control positions; inadequate device feedback; or insufficient training.
- o Event involves a communication error due to inconveniently located or insufficient communication equipment, poor quality communication, or lack of standard lexicon of syntax for messages.
- Event involves a side-effect error due to device poorly positioned in workspace or due to a crowded workspace.

The review of the IP2 Licensee Event Reports were performed as follows.

During January 17-19, 1984, 169 LERs were reviewed covering the years of 1979 thru 1983. Table 4.1-1 shows the distribution of LERs and those suspected of being possible human factors error related by year. As a result of applying the above criteria, six LERs were selected for a more thorough review. These are: 80-003/03L-0; 81-015/03L-0; 82-039/03L-0; 82-043/02L-0; 83-041/03L-0 and 83-043/01T-0.

The six selected LERs were further reviewed for possible identification as a human engineering observation to be examined during the Control Room Survey or the System Function Task Analysis phase of this DCRDR. This phase of the review of the six LERs resulted in the following.

#### LER 80-003, "Boric Acid Concentration"

LER Description: During normal operations, routine chemical sampling indicated that the boric acid concentration in the Boron Injection Tank was 1/4 percent below technical specification requirements. A plant shutdown was initiate to restore the Boron Injection Tank to the required concentration.

This human error was judged as a training limitation due to plant equipment characteristics with no obvious connection made to human engineering design deficiency. In late 1985, the Boron Injection Tank was eliminated from the IP2 design.

#### LER 81-015, "Rod Insertion Position"

LER Description: During low power operation, control room instrumentation indicated a control rod at the inserted position.

This LER was determined to be an equipment malfunction with no obvious connection made to human engineering design deficiency.

#### LER 82-039, "Boric Acid Storage Tank"

LER Description: During normal operations, boric acid concentration in the Boric Acid Storage Tank exceeded technical specifications by 0.15 percent.

This LER was determined to be an equipment failure (mechanical seal leakage) with no obvious connection made to human engineering design deficiency.

#### LER 83-043, "CVCS Valve Line-up"

LER Description: In the process of making a valve line-up, the Nuclear Plant Operator, incorrectly opened a valve which decreased the concentration in the CVCS hold-up tank.

This LER was attributed to a procedure limitation due to insufficient information being provided on valve line-ups. This was remedied by a procedure rewrite and equipment modification.

#### LER 83-041, "Chloride Concentration"

LER Description: During full power operation, chloride concentration in the Reactor Cooling System exceeded the technical specification levels by 50 ppb.

This error was attributed to a procedure limitation due to insufficient information being provided regarding demineralizer flushing. This was remedied by a procedure revision.

#### LER 83-043, "Containment Spray Pump Test"

LER Description: While conducting the Containment Spray Pump surveillance test, two valves were closed. The closed header discharge valves rendered the automatic containment spray operation inoperative in the automatic mode.

This error was attributed to insufficient information being provided the operator on the check-off list (COL). This was remedied by revising the COL and retraining the operators.

In summary, the six selected LERs resulted in three being attributed to procedure or COL limitation and one due to training limitation. The remaining two were equipment problems with no human engineering design deficiency. Since the errors were adequately corrected by procedure, COL or training revisions, HEOs were not initiated as a result of the IP2 operating history document review effort.

### 4.1.2 Questionnaires

A questionnaire containing four sections was prepared covering the topical areas of Section 6 in NUREG-0700. The four sections were specifically directed at operations personnel in positions or former positions of:

- o Reactor Operators/Senior Reactor Operators
- o Shift Supervisors
- o Shift Technical Advisors
- o Operations Managers

The topics of the questionnaire included:

- o Control Room Workspace
- o Communications
- o Annunciator Warning Systems
- o Controls
- o Visual Displays
- o Labels and Location Aids
- o Process Computers
- o Panel Layout
- o Control Display Integration
- o Procedures, Manning and Training

o Control Room Equipment and Storage.

The respondents were asked to explain the specific problem or deficiency and, if applicable, to identify the associated panel, system, equipment and/or components. The respondents were asked to make recommendations concerning actions that could be taken to correct or improve the deficiencies.
Questionnaires were distributed to the IP2 operations personnel and 16 completed or partially completed questionnaires were returned to Torrey Pines Technology for review and analysis.

Table 4.1-2 is a summary of the number of operations personnel by position and Indian Point Unit 2 Nuclear Power Plant experience that responded to the questionnaire.

## 4.1.3 Operations Personnel Interviews

The purpose of these interviews was to identify any operating experiences that are related to human engineering design deficiencies which could contribute to human error or degraded operator performance.

Each interview session involved one or two persons interviewed and two or three Review Team interviewers. A total of 24 operations personnel including some training people were interviewed. Information on the positions and number of years of IP2 plant experience for the persons interviewed is presented in Table 4.1-3. Each interview session lasted one hour, with the last ten minutes used to verify that the notes taken by the interviewers were accurate. To insure that the information would not be misinterpreted, the interview data were recorded on a specially designed form. The form provided the review team members the opportunity to assess the recorded data immediately following each interview session.

The results of the interviews were reviewed and observations of potential deficiencies which could contribute to human error or degraded operator performance were documented as OER Observations. The OER Observations that could be directly associated with a NUREG-0700 Section 6 guideline criteria were identified and were evaluated during the Control Room Survey (CRS) and SFTA phases of the review. Confirmed observations were then documented as Human Engineering Observations (HEOs). For example, OER-001 was the first observation associated with the OER task. Since this observation is related to CRS item 6.1.5.1a, the HEO documented on this item was

identified under CRS Checklist 6.1 and was verified as HEO 6.1.011. Thus, only one HEO was generated instead of two for the same observation. This procedure was used to reduce potential HEO duplication.

Observations unique to the Operating Experience Review having human factors implications but do not violate guideline criteria were documented for management's consideration during review and update of plant program, policy and organization.

In general, responses during the interview sessions supported the written comments to the questionnaires. The operations personnel responding to the written questionnaire were not necessarily the same as those who participated in the interviews.

As previously noted, the questionnaire responses provided the review team the basis on which to structure the interview. The OER number and the responses to the interview question are summarized as observations by topic and are listed in Appendix B. In addition, the HEO resulting from either the Control Room Survey or the Validation/Verification, that supports the OER observation is listed. In some cases, there was no HEO written and for these a justification is presented to explain why no HEO was prepared. In these instances, either the problem was corrected between the time the operator had this concern and the time of the survey, or the operator was not experienced with the system. Of the 51 observations described in Appendix B, 41 were used to document HEOs for use during the control room survey or system function and task analysis phases of this DCRDR.

# 4.1.4 Sample of Operating Experience Review Execution

Figure 4.1-1 shows a page from one of the completed questionnaires. Note the concern expressed by the operator over the line-up of steam generator devices on flight panel. Based on this concern, and the concern of several respondents, questions such as those shown in Figure 4.1-2 were used during the operator interviews. In developing the interview questions no attempt

was made to associate results with an individual. As many of the resulting interview questions as possible were asked of all the persons interviewed within the allotted interview period.

The example of operator concern shown in Figure 4.1-1 regarding problem with vertical line-up of steam generator devices on flight panel was designated as OER-047. This example will be followed further in sections on Control Room Survey.

11. Is adequate seating and workspace available for operators assigned to the control room?

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(🗙 Yes ( ) No (explain) \_\_\_\_

12. Can all plant-critical operator decisions and responses be made from the primary control room operating area (per Figure A-1)?

(X) Yes ( ) No (explain) \_\_\_\_\_

13.	Are all visual	displays	located	in a	viewing	position	that	provide	for
	efficient and	comfortabl	e monito	ring?					

() Yes ( No (explain) THE VEETICLE LINE UP OF STEAM GENERATOR LEVEL CHART RECORDERS AND CHANNEL LEVELS 15 CONFUSING

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Figure 4.1-1. Page from a Completed Operator Questionnaire

#### INDIAN POINT 2 OPERATOR INTERVIEW QUESTIONS

#### A. Workspace Problem Areas

- 1. Is it difficult to locate controls within a group, e.g., SI, Spray Pump Discharge, NAOH?
- 2. Do the overhead lights produce a glare, e.g., Rod Position Indicators?

3. Do you have sufficient light at your work station?

4. Under what conditions is noise a problem?

5. Under what conditions is air quality a problem?

- 6. Do you find the temperature variation a problem? Is the humidity too low?
- 7. Are there tasks that take you out of the control room to insure safe shutdown, e.g., Main Transformer cooling, Incore temperature monitoring?

8. Is there too much traffic through the control room?

9. Is there a dedicated communications channel between the shift supervisor and the control room operators?

# Figure 4.1-2. Sample Interview Questions

TA	BL	Ε	4.	1-	1

Year	No. of LERs Reviewed	No. of LERs with Possible Human Factors Errors
1979	24	0
1980	17	1
1981	3	1
1982	50	2
1983	45	2

LERS REVIEWED WITH POTENTITAL FOR HUMAN ERROR

# TABLE 4.1-2

# POSITION AND EXPERIENCE PROFILE OF THE SIXTEEN (16) QUESTIONNAIRE RESPONDENTS

Position	Number	Average Years Experience at Indian Point Unit 2 Power Plant
Manager	2	13.5
STA	1	4.0
SS	4	11.13
RO/SRO	9	5.76
Total	16	

# **TABLE 4.1-3**

# POSITION AND INDIAN POINT UNIT 2 EXPERIENCE OF OPERATIONS PERSONNEL INTERVIEWED

Position	Number	Average Years Experience Indian Point-2* as of Early 1984
Reactor Operator/Senior Reactor Operators**	15	12.17
Shift Supervisor	2	17.0
Shift Technical Advisor	1	18.0
Managers	6	6.23
Total	24	

\*Years of experience are at Indian Point 2 and not necessarily in the position indicated.

**\*\***Eight (8) of the ROs were "Reactor Operators in Training" (ROIT) that passed their qualification test but not assigned a license number.

## 4.2 SYSTEM FUNCTION AND TASK ANALYSIS

The SFTA established the input/output requirements of the control room operator tasks and these requirements were used to determine the adequacy of the control room instrumentation, controls, and other equipment. This was accomplished by using a top-down approach that included the following:

- o identification of systems and subsystems
- o identification of event sequences for analysis
- o identification of system functions for each event sequence
- o task identification and analysis for the identified functions in the event sequences

The SFTA was performed according to the methods described in the Program Plan with the following exceptions:

- o The traffic link diagrams and the operational spatial sequence diagrams described in the Program Plan were judged to be unnecessary for the evaluation of panel contents and panel layout.
- o The forms used in the SFTA were modified or eliminated as required to reflect the most current SFTA methodology.

# 4.2.1 System Identification and Review

A review of the system related documents was performed to identify the major plant operating systems and subsystems.

The system review provided a background of information that was used to identify and compare systems and subsystems between the IP2 plant and the generic Emergency Response Guidelines (ERGs) Rev. 1; and to verify the functions of these systems. Also, the review served to familiarize the analyst with plant systems and plant operation including the documents and drawings associated with these systems.

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# 4.2.2 Identification of Event Sequences

The process for selection of the event sequences to be analyzed in the SFTA required development of event selection criteria. These criteria were based on guidance provided by the NRC, Westinghouse Owners' Group, and discussions with experienced operations personnel. The following sections cover the methods used to select the events and presents the Selected Operational Events (SOEs).

# 4.2.2.a Preliminary Event Selection

Discussions were conducted with experienced plant operators to review selection criteria and to select the preliminary SOEs. Based on this discussion the following four selection criteria were established:

- o The event should utilize a broad range of the control room functions.
- o The event should require time dependent action by operators.
- o The event should represent a potential high stress or complex situation for the operators.
- o The event should require an unusual sequence or combination of multifunction operations by the operators.

Based on the above criteria the operations personnel made the following event selections:

- o Reactor trip
- o Large break LOCA
- Loss of secondary coolant (steam line break)
- o Steam generator tube rupture
- o Loss of AC power
- o Anticipated transient without scram (ATWS)

#### 4.2.2.b System Review

A review was performed of the generic system review and task analysis that was developed by the Westinghouse Owners' Group. This review established that the SOEs listed above represent a complete and comprehensive set of events for evaluation in the SFTA.

The plant systems involved in the SOEs were determined using the SFTA results presented in the ERG documentation. Table 4.2-1 shows the systems utilized for each of the SOEs.

# 4.2.2.c Functional Review

The functional review demonstrated that the set of SOEs selected included the ten operator functions as defined by the ERGs:

- o Verify automatic actions
- o Diagnose plant condition
- o Monitor/regulate RCS boron content
- o Monitor/regulate RCS pressure
- o Monitor/regulate RCS temperature
- o Monitor/regulate RCS inventory
- o Monitor/regulate RCS secondary coolant pressure
- Monitor/regulate RCS secondary coolant inventory
- o Monitor/regulate RCS containment environment
- o Evaluate equipment status

An assessment of these ten safety functions and their associated tasks was performed for each of the SOEs. Table 4.2-2 shows these functions associated with each SOE. As shown, both the LOCA and the loss of secondary coolant events involve all ten of the functions.

# 4.2.2.d Final Selected Operational Events

The following SOEs were selected for Task Analysis. The governing ERG procedures were defined as shown in the logic diagram of Figure 4.2-2.

Reactor Trip (E-0, ES-0.1, ES-0.2)
Large Break LOCA (E-0, E-1, ES-1.1)
Loss of Secondary Coolant (E-0, E-1, ES-1.3)
SG Tube Rupture (E-0, E-3)
Loss of all AC Power (E-0, ECA-0.0, ECA-0.2)
ATWS (E-0, FR-S.1)

## 4.2.3 Operator Task Analysis

The task analysis established the information and control requirements and the operator tasks/steps that are necessary to perform all the required operator functions. The information generated in the task analysis was used to support the human engineering evaluation that was performed in the verification phase of the DCRDR.

The task analysis was based on the IP2 plant specific EOPs, the ERG background documents and the associated SFTA. This analysis included the following activities:

o Development of the required control room information and actions.

- Development of the information and control requirements (needs and characteristics).
- Development of the data that describes the operator actions for the SOEs.

o Analysis of operator task data with regard to information and control needs and characteristics.

The following sections discuss the methods and results for the above task analysis activities.

# 4.2.3.a Emergency Operating Procedures (EOPs)

The Emergency Response Guidelines, Rev. 1, were developed by the Westinghouse Owners Group (WOG) to provide generic guidance to owners of Westinghouse designed NSSS for operation of their plants following an accident or transient event. The EOPs for IP2 were directly adapted from these generic guidelines.

Figure 4.2-3 shows an example page from the EOPs. The numbering for the EOPs uses a designator, a number, and a title that is consistent with the ERGs. A two column format for Action/Expected Response (primary action) steps and Response Not Obtained (alternate or contingency action) steps was used.

The content of the EOPs follows the generic ERGs, Rev. 1 with plant specific information, operations, or values entered where indicated in the ERGs. For any step which differed from the corresponding ERG step, a Step Documentation Form as 'shown in Figure 4.2-4 was completed. This form provided a detailed description and a basis for the difference between the EOP and the ERG Rev. 1 step. This form also provided information that was necessary in the development of the information and control requirements described in the next section.

# 4.2.3.b A Priori Determination of Information and Control Requirements

For analysis of the operator task/steps in the SOEs, the Information and Control Requirements were defined for the tasks, including the branching or alternate tasks. These were established independent of the existing control room and simulator. They included a description of the required task, the required information or action, the information or control requirements (defined as the types of devices required), and the required characteristics (defined as the instrument/control readings/settings).

Figure 4.2-5 presents a sample DBMS listing of the Information and Control Requirements and Figure 4.2-5a shows the column heading definitions. Figure 4.2-5b shows the source from which the information and control requirements were derived. The information and control requirements were used to develop the preliminary Required Operator Task Data as described in the next section.

The Information and Control Requirements were derived prior to the discussions with the operators. Most of the information and control requirements and characteristics were obtained from information presented in the ERGs, the ERG background documents, and documentation for the system review and task analysis performed by the Westinghouse Owners Group. In situations where plant specific steps or plant specific parameter values were required, the IP2 "Plant Design Differences and Generic Analysis Applicability" document and IP2 "Plant Specific Setpoints for Emergency Operating Procedures" document were used as references.

# 4.2.3.c SFTA Required Operator Task Data

The Required Operator Task Data represents detailed information about the instruments and controls needed by the operator to perform the required generic tasks. This information includes type of device required, the

characteristics (value, setting, rate of change, etc.) the device must have, and number of the specific device that is used.

The information for the operator task data was developed in two steps. First, a preliminary listing of the data was obtained from the Information and Control Requirements. Figure 4.2-6 shows an example of the form used for this information. This form was then used in the second step, a talk-through of the events with the operators. The purpose of this talkthrough was to establish additional information on the operator tasks and alternate tasks required to accomplish each SOE. This information involved details relating to actions/decisions, results or system response and consequences of task error/omission. This information was written on the forms shown in Figure 4.2-6 and later used as input to the DBMS. The talk-throughs were performed independent of the control room prior to entering the control room or the simulator.

During the operator talk-throughs, questions were asked by the SFTA team member. The following questions were used as a guide:

- 1. To what accuracy must the information be read?
- 2. How quickly must the information be obtained?
- 3. Must the information be accessible from several places in the control room?
- 4. Is the information required by the EOP in the most direct form?
- 5. Is post/historical information required?
- 6. Is the rate of information change required (Analog, Digital, autotrending, direct rate)?

- 7. What type of control function is required (Discrete, Continuous)?
- 8. Is the control function required in the control room?

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9. What are the consequences if the task is performed incorrectly or omitted?

After the operator talk-throughs, the SOEs were walked through by the operator in the simulator.

At this time, the Information/Control number for the device that is used for each operator action was added to the Figure 4.2-6 form. The device number was needed by the DBMS to permit a comparison of the Required Operator Task Data with the Control Room Inventory.

The information obtained during the operator talk-through and walk-through was entered into the DBMS. The final result is the complete listing of the Required Operator Task Data. Figure 4.2-7 shows an example of this listing.

The information developed in the SFTA was used in the Verification and Validation phases of the DCRDR. These phases are discussed in the following sections.



# Figure 4.2-1. SFTA Methodology





E-3,		s ste	EAM GENERATOR	TUBE R	UPTURE	VALIDATION COPY 11/30/84
STEP	ACTION/	EXPECTED RESPONS	Е ]	RESPON	ISE NOT OBTAINED	
* * '	* * * * * *	*****	CAUTION	• • • •	******	* * * * * * *
	SI MUST BE overfillin	TERMINATED when g of the rupture	termination ad SG(s).	criter	ia are satisfied	to prevent
21.	Check If S Be Termina	I System Flow Si tea:	nould			* * * * * * * *
	a. RCS s leg w THAN TABLE	ubcooling based fide range RTDs VALUE OBTAINED.I	on hot - GREATER FROM	å.	DO NOT STOP SI S Go to ECA-3.1, S OF REACTOR COOLA SUBCOOLED RECOVE Step 1.	YSTEM PUMPS. GTR WITH LOSS NT - RY DESIRED,
	RCS PRESS (PSIG)	URE RCS SU	BCOOLING F)		Juch I.	
-	0-200 201-500 501-100 1001-250	120 50 0 33 0 30	(180) (250) (136) (62)			
	b. Secor o To SC Th	dary heat sink: tal feed flow t i(s) - GREATER IAN 420 GPM AVAI -OR-	o LABLE	b.	IF neither condi satisfied, THEN SI SYSTEM PUMPS. ECA-3.1, SGTR WI REACTOR COOLANT RECOVERY DESIREI	tion OO NOT STOP Go to TH LOSS OF - SUBCOOLED D, Step 1.
	o Na a Gi F(	arrow range leve t least one inta REATER THAN 5% ( DR ADVERSE CONTA	l in ct SG - 29% INMENT)		- -	
	C. RCS I Incri	pressure - STABL EASING	EOR	с.	DO NOT STOP SI Go to ECA-3.1, LOSS OF REACTOR SUBCOOLED RECOVE Step 1.	SYSTEM PUMPS. SGTR WITH COOLANT - ERY DESIRED,
	d. PRZR 4% ( Cont.	level - GREATER 36% FOR ADVERSE AINMENT)	THAN	d.	DO NOT STOP SI Return to Step	SYSTEM PUMPS. 13.
1-11	7094		19 of 30		8257/	0890Z:7

# Figure 4.2-3. Example of EOP Format

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	TNUTAN POTNT UN	Page 1 of 4
	INDIAN TOTAL OF	
		ž+
EOP No.: <u>E-</u>	3	Rev.: _0
Title: <u>Stear</u>	n Generator Tube	Rupture
Prepared by:	K. J. Victor	Date: <u>07/12/84</u>
Reviewed by:	S. R. Prokopov	vich. R. R. Oft Date: 07/16/84
•		
STEP NO.	STEP NO.	EXPLANATION OR BASIS FOR DIFFERENCE
Cover Page	-	Adverse containment conditions were added to the cover page as a reminder to the operator
3rd CAUTION before Step 3	<b>_</b> .	A caution warning against potential high radiation fields was added for attempting to close the steam supply header valves since these are local valves.
3b	-	An RCS temperature check was added to determine if a cooldown is required.
3c 2) RNO	3b 2) RNO	MSIV bypass valves were deleted because valves are normally closed and there is no control or indication in the control room.
3f	3d	Since the steam supply header valves are local valves, the ERG step was rewritten to check if a motor-driven AFW pump is running. If not, then dispatch an operator to attempt to locally close valves if the turbine-driven AFW pump is the source of feed.
3g	-	The steam supply regulator valve was added since it could be closed from the control room.
3h		A step was added to close the steam traps upstream of the MSIVs and the MSIV bypass valves.
55 RNO	5b RNO	The ERG step was changed to verify block valve closed if PORVs can not be closed since block valves are normally closed during operation.
0-021585		8292/09572:7

# Figure 4.2-4. Step Documentation Form

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	÷		INDIAN INFORMATION AN PROC	i point unit 2 D control requirements Edure E-0			Page 6
step Sequence Number	REQUIRED INFORMATION/ACTION	INFORMATION/CONTROL. REQUIREMENTS	REQUIRED CHARACTERISTICS	ALTERNATE REQUIRED INFORMATION/ACTION	ALTERNATE INFORMATION/CONTROL REQUIREMENTS	ALTERNATE REQUIRED CHARACTERISTICS	REFE
13.2100	DETERMINE THAT WAIN STEAMLINES ARE ISOLATED	MSIV	CLOSED	MANUALLY CLOSE VALVES	MSIV SWITCH	CLOSED	1 (P.4)
13.2204	I	BYPASS VALVES	CLOSED	MANUALLY CLOSE VALVES	BPV SWITCH	CL.OSED	1 (P.4)
14.0000	T: VERIFY CONTAINMENT SPRAY NOT REQUIRED						
14.110	DETERMINE IF CONTAINMENT SPRAY REQUIRED	CONTAINMENT PRESSURE	REMAINS LT HIGH-3 SETPOINT				1 [P.4] [P.24]
14.216	DETERMINE IF CONTAINMENT SPRAY INITIATED IF REQUIRED	SPRAY PUMPS STATUS INDICATION	RUNNING	MANUALLY START PUMPS	SPRAY PLMP SWITCH	START	1 (P.4) [P.24]
14.310	DETERMINE IF CONTAINMENT ISOLATION PHASE B VALVES CLOSED IF REQUIRED	PHASE B VALVES POSITION INDICATION	CLOSED	MANLALLY CLOSE PHASE B VALVES	PHASE B ISOLATION VALVE SWITCH	CLOSED	1 [P.4] [P.24]
14.410	IF PRESSURE GT HIGH-3 SETPOINT, STOP ALL RCPS	RCPS STATUS INDICATION	STOPPED	MANUALLY STOP RCPS	RCP SWITCHES	STOPPED	1 [P.4] [P.24]
15.000	T: VERIFY SI FLOW						
15.110	DETERMINE IF HIGH-HEAD SI FLOW NEEDED	RCS PRESSURE INDICATION	HIGH-HEAD SETPOINT				1 (P.6) [P.26]
15.120	,	HIGH-HEAD SI PUMP FLOW INDICATION	CHECK FOR FLOW			•.	1 (P.6] (P.28]
15.130	<b>)</b> .	HIGH-HEAD SI PUMP STATUS INDICATION	RUNNING	MANUALLY START PUMP	SI PUMP SWITCH	START	1 (P.6] (P.26)
15.140	9	SI VALVE POSITION INDICATION	OPEN/CLOSE	MANUALLY ALIGN VALVE	SI VALVE SWITCH	OPEN/CLOSE	1 [P.6] [P.26]
15.210	DETERMINE IF LOW-HEAD SI FLOW NEEDED	RCS PRESSURE INDICATION	LOW HEAD SETPOINT			r -	1 [P.5] [P.26]
15.220	<b>3</b>	LOW-HEAD SI PUMP FLOW INDICATION	CHECK FOR FLOW			1	1 [P.6] [P.26]
15.230	3	LOW-HEAD SI PUMP STATUS INDICATION	RUNNING	MANUALLY START PUMP	SI PUMP SWITCH	START	1 (P.5) (P.26)

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Figure 4.2-5. Example of Information and Control Requirements Listing

# STEP SEQUENCE NUMBER

A sequence number of the form XX.YYYY where XX is the step number from the ERG document and YYYY is a sequential number for sorting the steps in the DBMS.

#### REQUIRED INFORMATION/ACTION

Description of the task and the required information or action required to accomplish this task.

#### INFORMATION/CONTROL REQUIREMENTS

Description of the type of display or control device required to satisfy the needs of a given task.

## REQUIRED CHARACTERISTICS

Description of the value, range, status, trend, or setting indication to be read or the setting indication to be met.

#### ALTERNATE-COLUMN HEADINGS

Same as above except for alternate tasks.

#### REFERENCE

Indication of information source of reference used (see Figure 4.2-5b for legend of the source numbers).

Figure 4.2-5a. Information and Control Requirements Column Heading Definitions Entry of the form X [Y]. X and Y indicate the information source or reference used in determining the instrument or control requirement and characteristics as follows:

- X=1: Westinghouse Owners Group Emergency Response Guidelines Low Pressure, Rev. 1, September 1, 1983, [Y] = ERG page number.
- X=2: Westinghouse Owners Group Emergency Response Guidelines, Low Pressure Version, Background Documents Rev. 1, September 1, 1983, [Y] = page number.

X=3: Information generated by the SFTA team.

X=4: Indian Point Unit 2 "EOP Value Document," [Y] = page number.

X=5: Indian Point Unit 2 EOP Step Documentation Forms, [Y] = date issued .

Figure 5.2-5b. Information Sources for Information and Control Requirements

18-Jun-1985 Page 111 Figure INDIAN POINT UNIT 2 REQUIRED OPERATOR TASK DATA PROCEDURE ECA-0.0 EOP STEP NJMBER step Sequence Number ALTERNATE INFORMATION/CONTROL REQUIREMENTS ALTERNATE INFO/CONTROL NUMBER INFORMATION/CONTROL REQUIREMENTS REQUIRED CHARACTERISTICS INFO/CONTROL NUMBER ALTERNATE REQUIRED CHARACTERISTICS 4 AVAIL 2-6. DECREASING 1.1400 NEUTRON FLUX INDICATION 2.1100 TURBINE STOP VALVE POSITION INDICATIONS CLOSED TURBINE TRIP SWITCHES STOP PRZR PORV POSITION INDICATIONS LT 💭 PSIG 3.1100 CLOSED PRZR P INDICATION Listing 2

. Example 0f Operator Task Data

STEP SEQUENCE The operator step number that addresses the task from NUMBER which the instrument and control requirement was determined. A format X.YYYY will be used where XX is the step number from the ERG and YYYY is an arbitrary sequence number that will be used by the DBMS to sort the steps. EOP STEP Number of the operator step from the emergency operating NUMBER procedure. INFORMATION/ Description of the type of display or control device required to satisfy the needs of the task. CONTROL REQUIREMENTS REOUIRED Description of the value, range, status, trend, or CHARACTERISTICS setting indication to be read or the setting indication to be met. INFO/CONTROL Identifying number (from inventory) for instrument/control. NUMBER ALTERNATE Same as above except for alternate tasks. INFORMATION/ CONTROL REQUIREMENTS ALTERNATE Same as above except for alternate tasks. REQUIRED CHARACTERISTGICS ALTERNATE INFO/ Same as above except for alternate tasks. CONTROL NUMBER

Figure 4.2-6a. Operator Task Data Column Heading Definitons

				İndi. Required Pr	n point Operato Dcedure	UNIT 2 R TASK DATA E-0		·	15-Nov Page 1	-1985 1
STEP SEQ NO .	eop Step No.	REQUIRED INFORMATION /ACTION	INFORMATION /CONTROL REQUIREMENTS	REQUIRED CHARACTERISTICS	INFO/ CONTROL NUMBER	ALTERNATE INFORMATION /ACTION	ALTERNATE INFORMATION /CONTROL REQUIREMENTS	ALTERNATE REQUIRED CHARACTERISTICS	ALTER INFO CONTROL NUMBER	REF
6.1450	8		PHASE A VALVE	CLOSED	18.027					
7.1100	9	DETERMINE IF AFW PUMPS ARE RUNNING	MD AFW PUMPS STATUS INDICATION	RUNNING	10.042	MANUALLY START PUMPS	ND AFW PUMP SWITCHES	on/running	10.042	1 (P.3)
7.1110	9		ND AFW PUMPS STATUS INDICATION	RUNNING	10.043		MD AFW PUMP SWITCHES	on/running	10.043	
7.1200	9		TURBINE-DRIVEN PUMPS	RUNNING IF NECESSARY	10.041	MANUALLY OPEN STEAM SUPPLY VALVES	STEAM SUPPLY VALVE SWITCHES, PCV1139	OPEN	10.041	1 [P.3]
7.1210	9					·	STEAM SUPPLY VLAVE SWITCH, HCV1118	ADJUST	10.038	
8.1100	10	DETERMINE IF SI PUMPS ARE RUNNING	HIGH-HEAD SI PUMPS STATUS INDICATION	RUNNING	9.029	MANUALLY START PUMPS	PUMP SWITCH	START	9.029	1 [P.3] 3
8.1110	10		HIGH HEAD SI PUMPS STATUS INDICATION	RUNNING	9.030		PUMP SWITCH	START	9.030	
8.1120	10	•.	HIGH HEAD SI PUMPS STATUS INDICATION	RUNNING	9.Ø31		PUMP SWITCH	START	9.031	
8.1130	10		HIGH-HEAD SI PUMPS STATUS INDICATION	RUNNING	9.032		PUMP SWITCH	START	9.032	
8.1200	10		LOW-HEAD SI PUMPS STATUS INDICATION	RUNNING	14.020	MANUALLY START PUMPS	PUMP SWITCH	START	14.020	1 [P.3] 3
8.1210	10		LOW-HEAD SI PUMPS STATUS INDICATION	RUNNING	14.021		PUMP SWITCH	START	14.021	
9.1100	6	DETERMINE IF CCW PUMPS ARE RUNNING	CCW PUMP STATUS INDICATION	RUNNING	14.017	MANUALLY START PUMPS	CCW PUMP SWITCH	START	14.017	1 [P.3]

Figure 4.2-7. Example of Final Required Operator Task Data

	Nuclear Instrumentation ESF Actuation Reactor Trip Actuation	tional Event	ES-0.2) x x	-1.3) x x x	dary Coolant x x ) -1.3)	Jre x x	AC Power ), ECA-0.2) sly ECA 2 & ECA-2.2) x x <sup>1</sup>	ously ECA-1) x x	
	Reactor Coolant Containment Instrumentation Radiation Instrumentation Control Rod Instrumentation		×	x x x x	x x x x	× × ×	× × × ×	X X X	
Systems	Chemical and Volume Control Residual Heat Removal Safety Injection		x x x	x x x	× × ×	x x x	x x x	<b>×</b>	
	Containment Spray Service Water Component Cooling Water		×	x x x	× × ×	× × ×	× × ×		
	Main Feedwater and Condensate Main Steam		×	××××	××××	××××	×	×	
	Steam Generator Blowdown Auxiliary Feedwater		×	×	×	×	×	×	

# TABLE 4.2-1. PLANT SYSTEMS INVOLVED IN SOES

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	tions	E	content	<b>6</b>	re		ant	ant		
Selected Operational Event	Verify automatic act	Diagnose plant conditio	Monitor/regulate RCS boron	Monitor/regulate RCS pressure	Monitor/regulate RCS temperatu	Monitor/regulate RCS inventory	Monitor/regulate secondary cool pressure	Monitor/regulate secondary cool inventory	Monitor/regulate containment environment	Evaluate equipment status
		2.	т	4.	2.	.9		8	.6	10.
Reactor Trip (E-0, ES-0.1, ES-0.2)	x	x	x	x	x	x	x	x	x	• .
Large Break LOCA (E-O, E-1, ES-1.2, ES-1.3)	x	x	x	x	x	X	x	x	X	x
Loss of Secondary Cooant (E-O, E-2, ES-2.1)	x	x	x	x	x	x	x	x	x	x
SG Tube Rupture (E-O, E-3, ES-3.1)	×	x	x	x	x	x	x	x	x	
Loss of All AC Power (ECA-2, ECA-2.2)	×	x		x	x	x		x	x	x
ATWS (ECA-1)	x	x	x							
										×

TABLE 4.2-2. OPERATOR FUNCTIONS ASSOCIATED WITH SOES

# 4.3 CONTROL ROOM INVENTORY

The control room inventory represents a file of data that describes every instrument, control or other equipment that is present in the defined control room presented in Section 1.4. The information that is presented for each device in the inventory includes the following:

- o Device number
- o Type of device
- o Functional title
- o Panel location
- o Calibrated range for instruments, status light information for indicators, or switch position titles, etc.
- o Minimum scale increment for instruments

The data for the inventory were obtained from photos of the IP2 simulator, the current control panel drawings, the control room, and the control room simulator. This information was entered into the DBMS.

Figure 4.3-1 presents an example of the inventory listing from the DBMS and Figure 4.3-1a shows the definitions of the column headings in the inventory listing. A total of 1345 devices are listed in 986 line items that make up the control room inventory.

The control room inventory provides the information that is necessary to perform the verification of availability and suitability that is described in Section 4.5.

		25-Feb-1985 Page 4				
	DEVICE NUMBER	PANEL	TYPE	FUNCTIONAL TITLE	RANGE UNITS	MINIMUM SCALE INCREMENT
	2.007	FA	IL ·	CONTROL VLV-TEST MECH-UPPER LEFT (007) LOWER LEFT (008) LOWER RICHT (009) UPPER RICHT (010) (IND LITES)	CLOSED-OPEN G-R LITES	N/A
	2.011	FA	IL.	CONTROL VLV-UPPER LEFT (011) LOWER LEFT (012) LOWER RIGHT (013) UPPER RIGHT (014) (IND LITES)	CLOSED-OPEN G-R LITES	N/A
	2.015	FA	IL	TURNING GEAR-DISENGAGED (016) ENGAGED (016) (IND LITES)	DISENGAGED-ENGAGED G-R LITES	N/A
	2.017	FA	IL	TURNING GEAR MOTOR (IND LITES)	STOPPED-RUNNING G-R LITES	N/A
	2.018	FA	IL	QLAND CONDENSER-LOW VACUUM (IND LITES)	LOW R LITE	N/A
	2.019	FA	PI	COND PUMP DISCH (PRESS IND)	0-10 PSIG	0.1
	2.020	FA	PI	HDP DISCH - ND. 21 (020) ND. 22 (021) (PRESS INDS)	0-800 PSIC	10
	2.022	FÅ	PI	BFPT STEAM HP (022) LP (023) (PRESS INDS)	0-300 PSIG, 0-10 PSIG	5, 0.1
t	2.024	FA	PI	FW PRESS SG21 (024) SG22 (025) SG23 (028) SG24 (027) (PRESS INDS)	0-1500 PSIG	25
	2.028	FA	DT	BOILER FEEDPUMP 21 SPEED (DIGITAL TACHOMETER)	Ø-9999 RPM	1
	2.029	FA	DT	BOILER FEEDPUMP 22 SPEED (DIGITAL TACHOMETER)	Ø-9999 RPM	1
	2.031	FA	рі	CYLINDER HEATING-STEAM PRESS-GOV END (PRESS IND)	0-10 PSIG	1
	2.032	FA	PI	CYLINDER HEATING - STEAM PRESS-GEN END (PRESS IND)	0-10 PSIG	Ø.1
	2.033	FA	PI.	CYLINDER HEATING - STEAM PRESS - STEAM SEAL (PRESS IND)	0-16 PSIG	0.2
•	2.034	FA	PI -	GOV CONT OIL (PRESS IND)	<b>0-60</b> PSIG	1
	2.035	FA	PI	LOAD LIMIT OIL (PRESS IND)	<b>9-69</b> PSIG	1
	2.038	FA	PI ,	LOAD LIMIT NO. 2 (PRESS IND)	Ø-60 PSIG	1

Figure 4.3-1. Example of DBMS Inventory Listing

DEVICE NUMBER An identifying number for the device in a five digit format XX.YYY where XX is the panel identification from Figure 4.3-1b and YYY is the nameplate number of the device from panel drawings.

PANEL Panel designation as shown in Figure 4.3-1b.

TYPE Designation for type of device as defined in Figure 4.3-1c.

FUNCTIONAL TITLE Description from the nameplate list of the panel drawing. This was correlated with the nameplate appearing in the panel photos or in the control room during the survey.

RANGE/UNITS Obtained from photos or during CRS. For meters and recorders this is the scale and units including any required operator conversion. For controls this is the labeled control position including indicator light colors.

MINIMUM SCALE Number of units between the smallest graduation shown on INCREMENT face of instrument.

Figure 4.3-1a. Control Room Inventory Column Heading Definitions

	XX = 01	Assessment
	02	Flight Panel "FA"
	03	Flight Panel "FB"
	04	Flight Panel "FC"
	05	Flight Panel "FD"
	06	Supervisory Panel "SA-1"
	07	Supervisory Panel "SA"
	08	Supervisory Panel "SB-1"
	09	Supervisory Panel "SB-2"
	10	Supervisory Panel "SC"
	11	Supervisory Panel "SD"
	12	Supervisory Panel "SE"
	13	Supervisory Panel "SF"
	14	Supervisory Panel "SG"
	15	Supervisory Panel "SH"
	16	Supervisory Panel "SJ"
	17	Supervisory Panel "SK"
	18	Supervisory Panel "SL"
	19	Supervisory Panel "SM"
	20	Supervisory Panel "SN"
	21	Supervisory Panel "SO"
· ·		

Figure 4.3-1b. Inventory-Panel Identification

ADJ = ADJUSTER	
AM = AMMETER	
ANN = ANNINCTATOR	
AP = AI ARM PROCESSOR	
AR = ANALYZER RECORDER	
C = CLOCK	
CCR = CHIORIDE CONCENTRATION RECORDE	R
CI = FREDIJENCY METER	
CP = CONTROL PANEL	
CPMR = CPM RECORDER	
DC = DIGITAL COUNTER	
DM = DIGITAL METER	
DPI = DELTA P INDICATOR	
DR = DIGITAL REGISTER	
DT = DIGITAL TACH	
ER = EXPANSION RECORDER	
FC = FLOW CONTROLLER	
FDI = FLUX DIFFERENTIAL INDICATOR	
FI = FLOW INDICATOR	
FLR = FLOW/LEVEL RECORDER	
FPR = FLAME PHOTOMETER RECORDER	
HRR = HI-RAD RECORDER	
IL = INDICATOR LIGHTS	
INF = INPUT FRAME	
KS = KEY SWITCH	
LI = LEVEL INDICATOR	
LR = LEVEL RECORDER	
MDD = METEURULUGICAL DIGITAL DISPLAY	
PC = PRESSORE CONTROLLER $PD = POWEP DPAWEP$	
PIR = PRESSURE / I FVFI RECORDER	
POST = POSITION INDICATOR	
· · ·	

Figure 4.3-1c. Inventory-Device Type Definitions

POSR = PPBR = PRI = PRI = PRR = RCS = RI RMR RPI = = RR RSI = SSI = SSI = SSI = SSI = FI =	POSITION RECORDER PPB RECORDER POWER RANGE INDICATOR PRINTER POWER RECORDER ROD CONTROL SWITCH RATE INDICATOR RAD MONITOR RECORDER ROD POSITION INDICATOR RAD MONITOR RECORDER ROD POSITION INDICATOR RANGE RECORDER ROTARY SWITCH ROD SPEED INDICATOR SALINITY RECORDER SPEED CONTROLLER SPEED INDICATOR SPEED INDICATOR SPEED RECORDER SYNCHROSCOPE TEMPERATURE CONTROLLER TELEPHONE TOXIC GAS MONITOR TEMPERATURE INDICATOR TOGGLE SWITCH TEMPERATURE RECORDER TEMPERATURE RECORDER TEMPERATURE RECORDER TEMPERATURE RECORDER TEMPERATURE RECORDER TEMPERATURE RECORDER TEMPERATURE RECORDER TEMPERATURE RECORDER TREND RECORDER TV MONITOR UV RELAY VAR INDICATOR VOLT METER VIBRATION RECORDER WIND RECORDER

Figure 4.3-1c. Inventory-Device Type Definitions (Cont.)

## 4.4 CONTROL ROOM SURVEY

The Control Room Survey (CRS) determined whether components installed in the control room were well designed for use by operators, and whether the control room environment provided acceptable working conditions. The procedure for performing the CRS describes the development of the criteria for evaluating the control room and the method for performing the evaluation.

The CRS was performed according to the Program Plan with the following exceptions:

- A complete survey was repeated using NUREG-0700 guidelines rather than using the survey from previous control room reviews.
- The survey was performed according to NUREG-0700 guidelines instead of using a criteria report for guidelines.

# 4.4.1 Objectives

The objective of the control room survey was to evaluate the control room against established human factors guidelines. Specifically, the CRS:

- Identified characteristics of the control room controls, instrumentation, displays and physical arrangements that may degrade operator performance.
- Determined whether the control room provides the system status information, control capabilities, feedback, and analytical aids necessary for safe and effective plant operation.
- o Provided suggestions for correcting the observations.

Further, the control room survey examined the consistency of control room conventions, as well as the adequacy of the control room to fulfill some requirements determined from both the System Function and Task Analysis and the verification of task performance capabilities.

## 4.4.2 Methods

Checklists were developed using sound human engineering criteria established for the nuclear industry. The CRS procedure (see Section 2.3) identifies the references and guideline criteria used to develop each checklist. The topics for these checklists were:

- o Control Room Workspace
- o Communications
- o Annunciator Warning System
- o Controls
- o Visual Displays
- o Labels and Location Aids
- o Process Computers
- o Panel Layouts
- o Control Display Integration

The checklists used the same numbers and titles contained in NUREG-0700, Section 6.0. Example checklist forms are shown in Figures 4.4-1 and 4.4-2.

The activity was performed as a Design Review Team effort and was performed in the simulator and control room. Two human factors specialists performed the survey with control room personnel available to provide operational assistance on an as-needed basis during the survey.

For each checklist item that was not satisfied, a Human Engineering Observation (HEO) was prepared. Each HEO contains a brief statement explaining how the device or observation failed to meet the guideline, the
potential human error that could occur, and a suggestion for a human engineering fix. HEOs were further documented with a photograph where appropriate. The HEOs were also correlated with the observations made during the Operating Experience Review. HEO's where sequentially numbered by NUREG-0700 checklist 6.1 through 6.9, (i.e., 6.1.001 was the first HEO identified under checklist 6.1).

The CRS produced a total of 153 HEOs.

### 4.4.3 Sample of Control Room Survey Execution

Figure 4.4-3 shows an example of a completed CRS checklist. Note that for non-complaint items, the "NO" column was checked and the Reference/Comment Form was completed. Also note that the Guideline Criteria Item number and the HEO number were referenced. The devices found to be in non-compliance with the criteria were listed in the Reference/Comment columns.

The HEO form, Figure 4.4-4, was completed with the information from the checklist form. The device numbers shown on the HEO are from the Control Room Inventory. These are the devices that are under review for the specific observation.

Figure 4.4-5 shows a photograph of the part of the control panel that illustrates an example of some of the devices that were under review for the specific observation.

### GUIDELINE

# 6.8.1.3 ENHANCING RECOGNITION AND IDENTIFICATION

Several enhancement techniques are available for setting apart groups of controls and displays. Three preferred techniques for enhancement are spacing, demarcation, and color shading. Other acceptable techniques for setting apart groups of controls include the use of insert panels and added panel relief.

a. SPACING – Spacing consists of physically separating groups of components on a panel with enough space between groups so that the boundaries of each group are obvious. Spacing between groups should be at least the width of a typical control or display in the group (see Exhibit 6.8-1).

 DEMARCATION – Demarcation consists of circumscribing functional or selected groups of controls and displays with a contrasting line. The application of demarcation techniques should conform to Guideline 6.6.8.2. (See also Exhibit 6.8-1.)

# N/A Yes No Reference/Comment Image: A state of the 
PANEL LAYOUT 6.8

GENERAL PANEL LAYOUT 6.8.1



Figure 4.4-1. Typical Checklist Criteria

# DETAILED CONTROL ROOM DESIGN REVIEW CONTROL ROOM SURVEY REFERENCE/COMMENT FORM

OBSERVER:	 DATE:	PAGEOF
LOCATION:		

GUIDELINE CRITERIA ITEM NO .: \_\_\_\_\_

. . . . . .

HEO REFERENCE NO .: \_\_\_\_

5.

CRITERIA ELEMENT NO.	PANEL/ CONSOLE NO.	SUBPANEL	REFERENCE/COMMENT
•			·
·			
:			
		-	
DIAGRAM/PHO	DTO NO.:	<b>.</b>	• • • • • • • • • • • • • • • • • • • •

# Figure 4.4-2. Example of Checklist Form

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### PANEL LAYOUT 6.8 LAYOUT ARRANGEMENT FACTORS 6.8.2

### GUIDELINE

### 6.8.2.1 SEQUENCE, FREQUENCY OF USE, AND FUNCTIONAL CONSIDERATIONS

The layout of panels is a compromise among a number of considerations. In some instances, various human factors principles will conflict, not only with each other but also with other design requirements. Because it is difficult to rate the conflicting considerations for importance, final decisions must be based on careful evaluation and sound judgment. This subsection deals with the analysis of the factors of task sequence, frequency of use, and function.

 SEQUENCE—Controls and displays which are used together during a normal task sequence should be grouped together.

- (1) Displays which are observed in a specified sequence, as during hot-leg temperature check for all reactor coolant loops, should be grouped together. It is desirable that they be positioned so that they are normally used in a left-to-right, top-tobottom, or other natural sequence.
- (2) Controls which are operated in sequence, as in energizing a system or aligning a series of valves for a particular function, should be grouped together. It is desirable that they be positioned so that they are normally used in a left-to-right, top-to-bottom, or other natural sequence.
- (3) When there is a set of related controls and displays, the layout of displays should be symmetrical with the controls they represent.



Figure 4.4-3a. Sample of Completed Checklist Criteria

BSERVER: OCATION:	SABEH, TP2 C	/WELCH R	DATE: ////////PAGE_OF
UIDELINE CRIT	ERIA ITEM NO.:	6.8.2	HEO REFERENCE NO.: 6.8.002
CRITERIA ELEMENT NO.	PANEL/ CONSOLE NO.	SUBPANEL	REFERENCE/COMMENT
ه (ع)			Panel FBF - Stean generater level controls """"""""""""""""""""""""""""""""""""
HAGBAM/PHO	TO NO.:		OFR-026 OFR-047

1 A A A

Figure 4.4-3b. Sample of Completed CRS Checklist

NDIAN POINT UNIT #2 NETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSERVA	ATION ASSESSMENT
OBSERVATION VALUATOR: Sabeh/Weich	HED#: 6.8.002	AIT REVIEW CHAIRMAN: A. Adorno DATE: 3/13/85 [] Concur.
: Control Room Survey HEOM: 6.8.202 8.8 CL ITEM: 6.8.2.1a(3) DATE: 11/7/84 REV: ITLE: Panel Layout HED CATEGORY: C ROL BOARD LOCATION: Flight HEO DESCRIPTION		<ul> <li>[X] Concur With Comment/Note.</li> <li>[] Do Not Concur for Following Reason:</li> <li>[] Resvaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: AIT recommends that smaller recorders be assessed to improve the line up.</li> </ul>
The system steam generator moters on panel FB not in line with recorders 93,95,97 and 99 or 126,127,128,129,130,131,132,133,134,135,136 an RE: HEO 6.8.001 RE: OER-0-19,043,044,047	≖ 78,80,84 and 88 are the Foxboro controllers d 137.	
RE: Photo No. 1-33 [X] SUPPORT WATERIAL ATTACHED POTENTIAL OPERATOR EA	ROR (S)	RECOMMENDED IMPLEMENTATION  Promptly Near Term Convenient Outage
Increase the time and the probability of error and feed flows.	for matching steam	( ) Uptions: MANAGEMENT REVIEW/APPROVAL CHAIRMAN: DATE: ( ) Concur.
SUGGESTED CORRECTIVE Relocate the steam generator maters to be in I recorders. This HEO should be considered alor	ACTION ine with the feed flow g with HEO 6.8.001.	<ul> <li>[ ] Concur with Comment/Note.</li> <li>[ ] Do Not Concur for Following Reason:</li> <li>[ ] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>
		EXECUTIVE REVIEW CHAIRMANDATE APPROVE: YES[] NO[] NOTE:

Figure 4.4-4. Sample of Completed HEO Form

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Figure 4.4-5. Supporting Evidence for Sample HEO

### 4.5 VERIFICATION

The purpose of the verification of task performance capability was to assure that the operator tasks could be performed in the existing control room with a minimum of human error. This was accomplished by verifying the presence (or absence) of information and controls required to perform each task and by verifying the suitability of the information and controls for performing each task. The following sections discuss the methods that were used to perform the verification of availability and suitability.

### 4.5.1 Verification of Availability

As indicated in NUREG-0700 it was necessary to determine the presence (or absence) of the information and controls required to implement each task. This evaluation was referred to as the verification of availability.

Using the SFTA methodology discussed in Section 4.2 and as presented in Figure 4.2-1, the independently determined information and control requirements were used to develop the Required Operator Task Data. The verification also results in a final determination of the information and control requirements.

During the initial operator walk-through, the required device and device number were identified and the device was verified as available both on the simulator control panels and on the inventory diagrams of the control room panels. The verification of availability resulted in two HEOs where devices that were required during the immediate action steps were not available in the control room. These were HEO 6.1.020 and 6.1.022 which involved a violation of checklist criteria 6.1.1.1a, Accessibility of Instrumentation/Equipment (present in the control room).

# 4.5.2 Verification of Suitability

The objective of the verification of suitability was to determine if the controls and displays identified in the verification of availability are effectively designed to accomplish the required task. This involved the review of the device specifications and layout to determine if the task requirements could be satisfied. The information generated in the SFTA and the inventory phases of the DCRDR (i.e., the Operator Task Data, the control room inventory, and the Information and Control Requirements) was used to perform this verification. The criteria used to evaluate suitability were primarily those NUREG-0700 criteria involving the specification and location of the panel devices (e.g., does the instrument have the necessary range and accuracy to satisfy the operator task requirements and is it properly located with respect to associated devices). The comparison was performed using the DBMS data sheet shown in Figure 4.5-1. With this data sheet the uses of a device in the SOEs were listed at the top including the required information and control characteristics. These characteristics were then compared to the device specifications which were obtained from the control room inventory and printed at the bottom of the data sheet.

Table 4.5-1 presents a list of the criteria used in the verification of suitability including the data sources from task analysis that were used to evaluate each criteria. A checklist was used to evaluate each criteria and these were integrated into the Control Room Survey checklist reports.

The suitability evaluation resulted in a total of 25 HEOs. Of these, 12 involved the Visual Display criteria (Section 6.5 of NUREG 0700) and eight involved the Label and Location Aid criteria (Section 6.6 of NUREG 0700).

		:	INDIAN VERI INFORMATION & CONTRO	POINT UNIT 2 POWER : Fication of Suitabi L Characteristics,	STATION LITY REQUIRED VS AVAILABLE		18-Nov-1980 Page 1
 	L		INFORMATI	ON & CONTROL REQUIR	EMENTS		
 EOP SIEP NO.	PROCEDURE NUMBER	STEP SEQUENCI NUMBER	PRIM E OR ALT TASK	REQUIRED Information or action	INFORMATION OR CONTROL REQUIREMENTS	REQUIRED CHARACTERISTICS	DEVIC NUMBE
9	E-0	7.1110	Ρ		MD AFW PUMPS Status Indication	RUNNING	16.043
9	E-0	7.1110	A		MD AFW PUMP SWITCHES	on/running	10.043
18	E-0	18.1110	A		AFW PUMP Switches	START	10.043
19	E-0	17.2120			AFW PUMP SWITCH	START	10.043
3	E-3	3.5510	Р		MD AFW PUMP IND	ONE RUNNING	18.043
7	ECA-Ø.Ø	6.1610	P		MD AFW PUMPS	PULL-OUT	10.043
4	ECA-Ø.2	4.1420	P		AFW PUMP CONTROL	START	10.043
6	ECA-0.2	5.1310	, A		MD AFW PUMP Control	START	10.043
9	ES-Ø.1	7.1250	•		MD AFW PUMP Status	START	10.043
6	FR-5.1	6.1110	A		AFW PUMP Controls	START	10.043
 			DISPLA	Y OR CONTROL AVAILA	BLE	·	•••••
DEVICE	10 TI	YPE	FUNCTIONAL TITLE	PANEL	RANGE/UNITS	MINIMUM	SCALE INCR
10.0430	R	s .	AUX FWP NO. 23 4807 BUS NO. 8A (ROTARY	SC	STOP-AUTO-START G-A-R LITES	N/A	;

Figure 4.5-1. Data Sheet for Verification

	NUREG 0700 Guideline	Operator Task Data	Data Sheet Information and Control Requirements	Verification of Suitability	Valid Walk Through
			· · · · · · · · · · · · · · · · · · ·		
6.1.1.1	Accessibility of Insrumentation/ Equipment		,		
a.	Present in the Control Room	X			X
b.	Arranged to Facilitate Coverage	х			
6.1.1.2	Consistency of Manning with Equipment				
	Layout				v
a.	Coverage	X	4		. V
b.	Utilization of Additional Personnel	x			<b>A</b> .
6.4.1.1	Selection of Controls-General Principles				
a.	Adequacy			· v	
	(1) Range			X Y	
	(2) Precision			• •	
,D.				Y	
	(2) NO DUPLICATION (2) Excessive Precision/Range			x	
	()) Excessive in constant number				
6.4.3.1	Pushbutton Design Principles	х			
a.	Position	-			
6.5.1.1	Information to be Displayed				
a.	Task Analysis	x	X	X	
b.	Completeness of Information		X	X	
c.	Unnecessary Information		X	X	
d.	Redundancy		. ^	A	
е.	Demand Vs. Status Information	v	Y		
	(2) Status for important Parameters	<b>^</b>	~		
6.8.3.1	Separation of Controls				X
6.9.1.1	Single Control & Display Pairs				x
					v

TABLE 4.5-1. CRITERIA FOR VERIFYING SUITABILITY

.

		Operator Task Data	Information and Control Requirements	Verification of Suitability	Valid Walk Throug
6 0 2 1					
5.9.2.1	Groups of Controls & Displays			•	
а.	Functional Integrity	X			v
b.	Sequence of Use				*
5.9.2.2	Single Panel Arrangements				
a.	Display Above Each Control				х
b.	Control & Displays in Rows			\$	х
c.	Multi-Row Displays with Single-				Х
	Row Controls				
5931	General Movement Relationships				
с.	Display Response Time Lag				x
5.9.3.2	Control/Display Ratio				
a.	Controls				х
b.	Displays ,				x
с.	Excess Precision			x	
d.	Feedback				X
5.5.1.2	Usability of Displayed Values			X	•
a.	Scale Selection			x	
ь.	Scale Range				
5633	Label Content-Consistency			v	x
C.	Consistency with Procedures			А	~
	· · · · ·		·	•	
5.8.1.1	Assigning Panel Contents	v			Y
а.	Grouping by Task Sequence	x v			X ·
b.	Grouping by System Function	x X			x
с.	Grouping by Importance and	A			
	Frequency of Use				
5.8.1.3	Enhancing Recognition & Identification				x

	NUREG 0700 Guideline	Operator Task Data	Data Sheet Information and Control Requirements	Verification of Suitability	Valid Walk Throug
6.8.2.1	Sequence, Frequency of Use and				
2	Functional Considerations	x			x
a. b.	Frequency of Use	x			x
c.	Functional Considerations	X			<b>x</b> .
6.8.2.2	Logical Arrangement & Layout	x			X
6.8.2.3	Layout Consistency				x
6.8.2.4 a.	Standardization Panel-to-Panel				x
	. · · · ·				
				· .	
	· .				
•					
•					

TABLE 4.5-1. (continued)

### 4.6 VALIDATION

The objective of the validation task was to determine if the functions required of the control room operating crew can be accomplished effectively within the control room design under dynamic, real-time abnormal and emergency conditions. This was accomplished by having control room personnel walk and talk through the event sequences studied in the SFTA. Also, a real-time simulation of these events was performed in the control room simulator. The validation methodology includes the following tasks:

o Selection of event sequences for validation from the STFA results.

o Briefing of the operators prior to simulation exercises.

o Walk and talk through of the selected event sequences.

- o Video taping of real-time simulation of selected event sequences.
- A review and discussion of the video tape results with the plant operators.
- Preparation of HEOs resulting from the walk/talk through and real-time simulation exercises.

The following sections discuss the methods used to perform the above validation tasks.

### 4.6.1 Validation Events

The six SOEs analyzed in the SFTA phase of the DCRDR were reviewed to determine what events or parts of events to walk through for the validation. Based on the results of the SFTA performed for these events by the WOG, events were chosen so that the validation involved the major plant safety systems and the ten safety functions identified in the ERGs, Rev. 1. A review of the plant systems in Table 4.2-1 and the operator functions in Table 4.2-2 for the SOE, showed that the LOCA event involved all the major plant safety systems and all ten of the operator safety functions. This event was therefore selected for the validation exercises.

A second event, the SG tube rupture, was selected to allow a validation of the tasks involved with isolating, monitoring, and regulating a steam generator. This event involves operator action early on in the transient.

During the operator briefing (prior to the walk throughs) the LOCA and the SG tube rupture were discussed with the operators. The concensus of opinion was that these two events were good representative events for demonstrating the use of the control room in performing the operator safety functions.

### 4.6.2 Walk and Talk Through

The walk and talk through of the selected validation events was performed in the control room. Current copies of the EOPs were used by the operators. The duties performed by the participants were as follows:

- Control Room Supervisor read aloud each operational task and step in the procedure before the action was performed. Operator actions were observed to detect any problems relating to the validation questions and criteria.
- o Two Reactor Operators simulated the performance of the tasks, answered questions posed by the other participants, and identified potential HEOs.
- First Reviewer (nuclear systems engineer) followed operator actions in the EOPs and in the Task/Step Data listing (Data Sheet No. 1) taking note of the critical sequences previously identified. Also, asked

questions, monitored actions/responses for potential HEOs, and recorded information on all potential HEOs.

 Second Reviewer. (design and human factors engineer) - followed the operators, asking questions and monitored actions/responses for potential HEOs. Discussions were recorded.

As indicated above, the participants were included in the validation process of identifying potential human engineering problems. With these participants, the significant interaction and discussion helped individuals recall problems encountered. Table 4.6-1 lists some of the recommended questions that were asked during the walk throughs, briefings, and subsequent discussions. Discussions were audio recorded on tape.

### 4.6.3 Real-Time Simulation Exercise

A real-time simulation of the two selected operational events was performed in the control room simulator. The purpose of this exercise was to evaluate the control room layout with regard to time, workload, or work flow related problems. The exercise was audio/video taped using a color TV camera with zoom capability. The movements and voice of the reactor operators were recorded on the video tape.

The real-time simulation was performed with the same personnel that performed the walk and talk through. For this operation, the reviewers limited their participation to observation only since the events were followed in real-time which would not allow for interruptions.

A debriefing session was held after real-time exercise with the same validation teams and group of operators. A short introductory discussion was held where the operators were briefed on the purpose of the video tape review. It was emphasized at this time that the video tape should be viewed with the following questions in mind:

- o Do the emergency operating procedures allow you to effectively accomplish your control room functions?
- o Does the control room design allow you to effectively accomplish your control room functions?

The video tape of the validation events was played back and reviewed. The tape was stopped when required to discuss any problems noted. Items identified as problems were documented as HEOs.

### 4.6.4 Validation Results

The criteria used in evaluating the control room and operation actions during the validation are listed in Table 4.6-2.

A total of 43 HEOs were identified during the validation phase of the DCRDR. Copies of these HEOs are included with those presented in Appendix A.

### TABLE 4.6-1

### QUESTIONS FOR VALIDATION

### A. Questions Concerning Control or Display Location, Layout, Type etc.

- 1. Is this a good location for the device or would you recommend another location?
- 2. Does the indication (instrument) provide the most direct reading?
- 3. What other instruments provide redundant or confirmatory readings?
- 4. Is this the right type of control or display or would you recommend a different type?
- 5. Have you had any trouble or know of any problems using this control or display for plant operations?
- 6. Are you satisfied with the accuracy, minimum increments, scale markings and range of this device?
- 7. Should any controls/displays be added or moved to another control panel, or should it be duplicated on another control panel?
- 8. Should any controls be moved from outside the control room or from a back panel to the control panel?

### B. Questions Concerning Plant Response

- 1. How does the operation of this control affect the plant system being controlled?
- 2. What changes in plant parameter do you expect to see when this control is changed? (identify instruments)
- 3. When monitoring rate of change (heatup/cooldown rate) are the devices used acceptable? How do you determine what is acceptable?
- 4. Do you have any problems in maintaining proper control of any parameters? Or any System?
- 5. Does this controller provide good sensitivity and is the system design such that the device performs all the actions necessary?
- 6. Do any sequences cause a time, workload, or work flow related problem?

### TABLE 4.6-1 (Continued)

### C. Questions Concerning Procedure

- 1. Is the sequence or order of operations shown in the procedure adequate or can the steps be rearranged for more efficiency with regard to operator movement?
- 2. Do procedures have sufficient (or too much) detail or should steps, or other information be added (or removed)? Do you see the need for support information (Graphs)?
- 3. Are any systems or systems steps not covered in the procedures?
- 4. Any problems understanding any parts of the procedures?

# **TABLE 4.6-2**

# CRITERIA FOR VALIDATION

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GUIDELINE NO.	CRITERIA DESCRIPTION
6.1.1.1b	Instrumentation/equipment should be arranged to facilitate coverage.
6.1.1.2a	Control room manning and task assignments should ensure complete and timely coverage of equipment during all modes of operation.
6.1.1.2b	Additional onsite on offsite personnel may augment the normal crew.
6.6.3.3a	Labels should be consistent within and across pieces of equipment.
6.8.2.1a	Controls/display which are used together during a normal task sequence should be grouped together.
6.8.2.1b	Frequently used controls/displays should be arranged to reduce search time and minimize potential for error.
6.8.2.1c	Functionally related controls/displays should be grouped together.
6.8.3.1	Minimum control spacing criteria.
6.9.1.1	Controls/displays which are normally used together should be located in close proximity.
6.9.1.2	Multiple control/display relationship.
6.9.2.1b	Sequence of use of controls/displays should be left-to- right, top-to-bottom.
6.9.3.1c	There should be no time lag between system condition change and display indication; or when there is a time lag there should be an immediate feedback indication.
6.9.3.2a	Controls should provide a capability to affect the parameter controlled easily.
6 <b>.9.3.</b> 2b	Displays should provide a capability to distinguish significant levels of the system parameter controlled.
6.9.3.2c	Feedback from the display should be apparent for any deliberate movement of a control.

### 5.0 HEO ASSESSMENT

The assessment of all HEOs was performed by the Assessment and Improvement Team (AIT) identified in Figure 2-1. The assessment resulted in Human Engineering Discrepancies (HEDs) with corrective actions selected and HEOs for which corrective actions were optional. The assessment was performed according to the Program Plan.

### 5.1 HEO/HED CLASSIFICATIONS

Each HEO was categorized by the AIT using the definitions summarized below. These assessments were based on an evaluation of the impact of each observation on operating crew performance, overall plant safety and plant reliability.

- o Category A Includes those HEOs which have a documented or potential error and:
  - Are of high safety importance, or
  - Have a safety implication or violate technical specification.
- o Category B Includes those HEOs which have a documented or high potential error and:
  - Are of low safety consideration, or
  - Can result in a potentially unsafe condition.
- o Category C Includes those HEOs which have a documented or potential error and:
  - Can have a significant financial loss, or
  - Can reduce reliability/availability, or
  - Can have a low safety implication.

- o Category D Includes those HEO s which have a low potential error and:
  - Does not have any safety implication or potential for a significant financial loss, or
  - Are not interactive or cumulative with other HEOs.

Those observations judged to have a high potential for affecting plant safety and reliability were categorized as HEDs. Nonsignificant observations and Category D remained as HEOs.

### 5.2 ASSESSMENT FOR CUMULATIVE EFFECTS

As discussed above, the HEOs were reviewed and discussed by the members of the AIT to develop an understanding of the observation. The HEOs were classified by category according to the process shown in Figure 5-1.

After the initial categorization process, remaining HEOs (Category D) were reanalyzed to identify any cumulative or interactive effects of multiple HEOs. Observations categorized A through C were assigned an HED number and recorded on the master log sheet shown in Figure 5-2.

### 5.3 CORRECTIVE ACTIONS

Three corrective methods were considered by the AIT: design enhancement, design changes, and procedure changes. These methods are defined as follows:

- Design Enhancement any control room improvement accomplished by a surface treatment technique such as painting or changing labels.
- Design Change corrections which were developed through planned design engineering efforts.

 Procedure Correction - changes to existing procedure to correct or mitigate the effect of an HED.

Figure 5-3 shows the method used for determining the corrective action.



Figure 5-1. HEO Categorization Process

		DCKDR HEO	DISPOSITION I	,Ui		
EO	CL ITEMS	BOARD LOCATIONS	HEO CATEGORY	HED	COMMENTS	
	· · · · · · · · · · · · · · · · · · ·		3 3	· · ·		
		•			<u> </u>	
			·			
		······································			<u></u>	
		<u> </u>	<u> </u>			<u>,</u>
				. <u>.</u> .		
		<u> </u>			· · · · · · · · · · · · · · · · · · ·	<u> </u>
	. <u></u> .	<u> </u>		<u></u>		
		······································				
			<u></u>			
<u> </u>						<u> </u>
				<u> </u>		
ASSESSME	ENT		DAT	E	DATE	OF
			·. ·			

# Figure 5-2. HEO Master Log Sheet



Figure 5-3. Selection of a Correction Method

### 6.0 DCRDR RESULTS

The DCRDR of the IP2 CCR resulted in HEOs, which are summarized in Table 6-1. This table shows which phase of the DCRDR generated the HEO and the category assigned to each. The HEO forms generated during the DCRDR are included as Appendix A to this report. The supporting documentation is available in the individual program reports kept on file. Table 6-2 presents a more detailed summary of the HEOs and HEDs.

HEO categories A, B, and C in Table 6-1 were classified as HEDs for which corrective actions were identified and scheduled for implementation. Those HEOs classified as Category D are HEOs, for which implementation of corrective action is optional.

The corrective actions and the scheduled implementation dates for the HEDs are summarized in Table 6-3. The implementation schedule is shown in Figure 6-1. The three correction methods available were; Design Change Requests used to correct HEDs through design change or design enhancements, Administrative Changes for which engineering analysis or design was not required, and Procedure Changes to permit more efficient operation of the plant.

To assure an efficient and integrated approach for correcting the identified HEDs, a cross reference was prepared and is presented in Appendix C. This cross reference identifies HEDs applicable to a particular instrument number. This cross reference will also be helpful in evaluating proposed changes to the baseline control room.

To support the implementation effort, three further studies of the control panels were performed: A panel demarcation study, an annunciator study, and a lamp test capability study.

### 6.1 PANEL DEMARCATION

Various HEDs have been identified concerning the ability of the operator to readily discern a certain group of controls from an adjacent group during a transient or accident situation.

After a careful study of the IP2 control room panels with the operations personnel, and with input from our human engineering consultant, a methodology for demarcating the panels has been adopted. Panel demarcation will entail color coordination of controls, painting panel areas around selected controls, etc. Figures 6-2 and 6-3 are samples of the methodology to be employed.

### 6.2 ANNUNCIATORS

The IP2 annunciators have been evaluated to determine if their locations are properly aligned relative to their associated controls and displays and to provide a more systems oriented display to the operators to aid them in coping with transients or accidents. As a result of past control room reviews, many annunciator changes have already been incorporated into the CCR resulting in an improved panel layout and better functional grouping leaving only 91 displaced annunciators. The remaining displaced annunciators were reviewed to determine their role in assisting an operator in coping with transients or accidents. Displaced annunciators not of use to an operator during transients and accidents or not solely relied on do not require relocation. The review criteria included the following considerations:

- o The system involved (safety related or not).
- Automatic response as well as annunciation that makes operator action unnecessary.
- o Alternate methods that indicate the appropriate automatic response.

 Nonannunciator sources of primary information which assures appropriate operators action.

o Is the operator action safety related.

Given an annunciator was not removed from further consideration by applying the above criteria, it would become a candidate for functional grouping review. Otherwise, its present location is acceptable. Two (2) displaced annunciators (out of 91) need to be relocated as a result of this review. These relocations will be incorporated into the CCR in a controlled manner to minimize disruption to operators and training.

### 6.3 LAMP TEST CAPABILITY

The IP2 panel indicator lights have been reviewed to resolve the lamp test operability in accordance with our DCRDR Program Plan and the NRC letter of June 7, 1982 (S. A. Varga to J. D. O'Toole). As indicated in the Program Plan, this review was deferred from earlier reviews and integrated into the DCRDR. We have determined that for the indicators needed for the operator to perform or verify safety functions in the CCR during a transient or accident, modifications to install lamp test capability are not required. Existing features such as "two-is-true" displays of critical ECCS valves, existing redundant indicating lights for certain safety related equipment, the circuit design for valve position indication, alternative panel mounted instrumentation to verify an indicated function and normal maintenance procedures presently in effect provide sufficient capability for the operator to determine if a panel indicating light that may be needed during a transient or accident is burned out of not. Lamp test capability is not required for indicators in non-safety related systems and/or indicators not needed to cope with a transient or accident. The above review criteria was applied to the 2540 indicating lights in the CCR. From this review, 71 indicating lights which were not removed from further consideration by applying the above criteria, are now being reviewed further. Depending on the outcome of this additional review, of those 71 not normally lit, we will periodically remove the bulb and test it in a spare receptacle, replacing a burnout bulb as necessary. This action will even further reduce the likelihood that when an indicating light is needed to cope with a transient or accident it will not be burnt out.



-1 Type all	1-2	1-3	1-4	1-5	1-ь	1-1	1-8	1-9
SA-1	2	3	4	5	2	7	8	9
-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8	2-9
10	11	12	13	14	15	16	17	.18
-1	3-2	3-3	3-4	3-5	3-6	3-7	3-8	3-9
19	20	21	22	25	24	2.5	26	27
-1	4-2	4-3	<b>4-4</b>	4-5	9-6	4-7	4-8	4-9
28	29	30	31	32	33	34	35	36







50

51

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Figure 6-2 Sample of Demarcation for Panel SA



Figure 6-3 Sample of Demarcation for Panel FA

# TABLE 6-1

		No. of	No. of DCRDR Phase*				HED Category				
	Checklist Guideline	Cases	OER**	CRS	V/V	Α	В	Č	<b>D</b> .	None	
·		20	( 5)	18	10	0	2	7	1	18	
6.1 6.2	Communications	13	( 4)	13	0	3	2	2	0	6	
6.3	Annunciator .	24	(3)	22	. 2	0	0	3	2	19	
6.4	Controls	23	(6)	21	2	0	0	6	· 1	16	
6.5	Visual Displays	51	(6)	28	23	1	0	8	7	35	
6.6	Label and Location Aids	39	(4)	19	20	0	0	19	10	10	
6.7	Process Computers	16	(3)	16	0	0	0	1	5	10	
6.8	Panel Layout	18	. (6)	8	10	1	4	5	0	8	
6.9	Control-Display Integration	9	(3)	8	1	0	1	4	0	4	
			``								
	Total	221	(41)	153	68	5	9	55	26	126	

# HUMAN ENGINEERING OBSERVATION SUMMARY

\*OER: Operating Experience Review, CRS: Control Room Survey,; V/V: Verficiation/Validation. \*\*Number of cases in the OER column indicates the OER cases that were also identified in the OER phase. +None: Includes HEOs that the AIT did not concur with and HEOs that have been completed.

# Table 6-2 Detailed HEO/HED Summary

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HEO	HED CATEGORY	HED	CHECKLIST	TASK
6 1 001	R	8 1 001	<b>6</b> 1 <b>5</b> 1 -	Contract Room Summer
8 1 002	Č	6 1 660	0.1.0.12 0.1 E 0L	Control Room Survey
8 1 003	None	Nene	0.1.0.2D 8 1 5 76(2)	Control Room Survey
6 1 004	Comp	Completed	0, 1, 5, 70(3)	Control Room Survey
6 1 005	None	Nono	0.1.0.08	Control Room Survey
8 1 006	None	None	0.1.1.31(1,2)	Control Room Survey
8 1 007	C C	NONE e 1 aag	0.1.1.40 0.1.1.0- L	Control Room Survey
6 1 008	Nono	0.1.003	0.1.1.0a,D	Control Room Survey
8 1 ØØ9	D		0.1.1.10	Control Room Survey
6 1 010	Nana	0.1.004	0.1.2.2D(1)	Control Room Survey
8 1 011	None	None	6.1.2.2C, d(2)	Control Room Survey
8 1 Ø12-	None C		6.1.2.20(2)	Control Room Survey
8 1 Ø126		0.1.005	0.1.2.53(1)	Control Room Survey
6 1 Ø120		0.1.005	6.1.2.5a(1)	Control Room Survey
8 1 Ø12h		0.1.000	6.1.2.5D(1)	Control Room Survey
6 1 0130		0.1.000	6.1.2.5D(1)	Control Room Survey
6 1 Ø14	Nono	0.1.000	6.1.2.5D(1)	Control Room Survey
8 1 015	None	None	0.1.2.5D(2)	Control Room Survey
8 1 Ø16	Nana	None	6.1.1.5C	Control Room Survey
8 1 017	None	None	6.1.5.3e(2)	Control Room Survey
6 1 Ø19	None	None	0.1.5.3T	Control Room Survey
8 1 Ø19	None .	NONE 8 1 007	0.1.1.1D	Control Koom Survey
6 1 020		6.1.007	0.1.2.52	
8 1 021	Nono	0.1.000 Nono	0.1.1.18	
6 1 022	None	None		
6 1 023	None	None	• 0.1.1.1a	
B 1 024	None	None	0.1.1.40	VALIDATION
6 1 025	None	None	0.1.1.13	Verification
6 1 026			0.1.1.18	
B 1 027	Nono	No. 1. 009	0.1.1.1a 0 1 1 1-	
8 1 028	Comp	Completed	0.1.1.10	VALIDATION
0.1.020	Comp	Completed	0.1.1.1a	Verification
6.2.001	None	None	6.2.1.2b(6)	Control Room Survey
6.2.002	None	None	6.2.1.2d	Control Room Survey
6.2.003	None	None	8 2 1 5b	Control Room Survey
6.2.004	None	None	6.2.1.5c	Control Room Survey
6.2.005	· A	6.2.001	6.2.1.6a(2)	Control Room Survey
8.2.008	C	6.2.002	8 2 1 7	Control Room Survey
6.2.007	B	6.2.003	8.2.1.8b	Control Room Survey
6.2.008	A	6.2.004	6.2.1.6f	Control Room Survey
6.2.009	В	6.2.005	6.2.1.1c(1)	Control Room Survey
6.2.010	A	6.2.006	6.2.1.6a(2)	Control Room Survey
6.2.011	None	None	6.2.1.8b	Control Room Survey
6.2.012	C	6.2.007	6.2.2.1c(2)	Control Room Survey
6.2.013	None	None	6.2.1.60(2)	Control Room Survey
e 2 /3/11	New			
6 3 660	None	None	6.3.1.2b(1)	Control Room Survey
0.3.002	None	None	6.3.1.2c(1)	Control Room Survey
0.3.003	None	None	6.3.1.2c(2)	Control Room Survey
0.3.004	None	None	6.3.1.2e(3)	Control Room Survey

Table 6-2 Detailed HEO/HED Summary (Cont.)

CHECKLIST HED TASK HED ITEM HEO CATEGORY \_\_\_\_ Control Room Survey 8.3.1.5a None None 6.3.005 6.3.2.1b Control Room Survey None None 6.3.006 6.3.2.1c Control Room Survey Ċ 6.3.001 6.3.007 Control Room Survey None 6.3.3.1b None 6.3.008 8.3.3.1c(2)Control Room Survey 6.3.009 None None 6.3.3.2c Control Room Survey None None 6.3.010 Control Room Survey 8.3.3.2f(2) None None 6.3.011 Control Room Survey None 8.3.3.3c(1)6.3.012 None None 6.3.3.4c Control Room Survey 6.3.013 None 6.3.3.5a Control Room Survey None 6.3.014 None Control Room Survey None 6.3.3.5a(2)6.3.015 None Control Room Survey С 6.3.002 6.3.3.5c(1) 6.3.016 6.3.4.1a(1) Control Room Survey None None 6.3.017 Control Room Survey 6.3.4.1a(2) None None 6.3.018 Control Room Survey None None 6.3.4.2a 6.3.019 6.3.1.4b(2) Control Room Survey None 6.3.020 None 6.3.1.2d Control Room Survey Ð None 6.3.021 6.3.3.2b Control Room Survey None 6.3.022 None 6.3.3.3b VALIDATION 6.3.023 D None 6.3.003 6.3.3.4a Verification С 6.3.024 8.4.1.1b(1) None Control Room Survey 6.4.001 None Control Room Survey None 6.4.1.1c(1)6.4.002 None 6.4.001 6.4.1.1e(1) Control Room Survey 6.4.003 С 8.4.1.1d Control Room Survey 8.4.004 None None 6.4.1.2a Control Room Survey 6.4.005 None None Control Room Survey D None 6.4.1.2a 6.4.006 Comp 6.4.2.1 Control Room Survey. 6.4.007 Completed None 6.4.2.26 Control Room Survey 6.4.008 None 6.4.3.1c Control Room Survey 6.4.009 None None Control Room Survey 6.4.3.3a None None 6.4.010 Control Room Survey **C** . 6.4.002 6.4.3.3b(1)6.4.011 6.4.003 6.4.3.3b(5) Control Room Survey С 6.4.012 6.4.3.3c(4) Control Room Survey С 6.4.004 8.4.013 6.4.4.1a Control Room Survey Completed 6.4.014 Comp 6.4.015 None None 6.4.4.3b Control Room Survey Control Room Survey С 6.4.005 6.4.4.3f 6.4.016 None 6.4.4.4c(2)Control Room Survey None 6.4.017 None 6.4.4.5d(2) Control Room Survey 6.4.018 None 8.4.019 None None 6.4.4.5e(3) Control Room Survey VALIDATION None 6.4.1.1 None 8.4.020 6.4.1.1a Verification None 6.4.021 None 6.4.006 6.4.2.1 Control Room Survey С 8.4.022 6.4.2.1 Control Room Survey 6.4.023 None None None 6.5.1.1c Control Room Survey None 6.5.001 6.5.1.2b Control Room Survey 6.5.002 None None 6.5.1.3a Control Room Survey 6.5.003 None None 6.5.1.1b Control Room Survey None 6.5.004 None 6.5.001 8.5.1.1b Control Room Survey 6.5.005 A

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# Table 6-2 Detailed HEO/HED Summary (Cont.)

	HED		CHECKI IST	
HEO	CATEGORY	HED	TTEM	TASK
6.5.006	С	6.5.002	6.5.1.2a.d(1.2.3)	Control Room Survey
6.5.007	D	None	6.5.1.3b(2)	Control Room Survey
6.5.008a	c	6.5.003	6.5.1.5a(1)	Control Room Survey
6.5.ØØ8b	ċ	6.5.003	6.5.1.5a(1)	Control Room Survey
6.5.008c	Ċ	6.5.003	6.5.1.5a(1)	Control Room Survey
6.5.009	č	6.5.004	6.5.1.5b	Control Room Survey
6.5.010a	č	6.5.005	6.5.1.5c	Control Room Survey
6.5.010b	č	6.5.005	6.5.1.5c	Control Room Survey
6.5.011	None	None	6.5.2.1b	Control Room Survey
6.5.012a	None	None	6.5.3.1a(1)	Control Room Survey
8.5.012b	None	None	8.5.3.1a(1)	Control Room Survey
6.5.013	None	None	6.5.3.1c(2)	Control Room Survey
8 5 014	None	None	6 5 3 3b(5)	Control Room Survey
8 5 015	None	None	6 5 3 3c	Control Room Survey
8 5 018	D	None	8 5 4 19	Control Room Survey
8 5 017	None	None	6 5 4 1c	Control Room Survey
8 5 019	Neno	Nono	8 5 A 1L	Control Room Survey
8 5 010	None	None	$6 5 5 1_{2}(A)$	Control Room Survey
8 E 020	Comp	Completed		Control Room Survey
8 5 021	Comp		6 = 4 2 b (3)	Control Room Survey
8 E 000	Nana	Nepe		Control Room Survey
8 5 Ø22	None	None	8 5 1 25	Control Room Survey
8 5 023	None	None	8 5 1 25	Control Room Survey
8 5 025	Nono	None	8 5 1 22	Control Room Survey
8 5 Ø28	None	None	8 5 1 22	Control Room Survey
8 5 027		None		Control Room Survey
8 5 029	Nana	None	8 5 1 14	
8 5 829	None	None	8 5 3 22	VALTDATION
8 5 Ø3Ø	None	None	8 5 1 80	
8 5 031	None	None	8 5 4 16	VALTDATION
8 5 032	D	None	8 5 1 26	VALTDATION
6 5 033	None	None	8 5 4 19	
8 5 034	None	None	8 5 1 24	VALTDATION
6 5 035	None	None	8 5 3 12	
6 5 036	None	None	8531	
6 5 037	ſ	6 5 997	8 5 3 1	VALTDATION
6.5.038	None	None	8 5 1 2h	
6 5 039	None	None	6531c(1)	Control Room Survey
8 5 040	None	None	8 5 1 16	Verification
6.5.041	None	None	6 5 1 6d(1)	Verification
8 5 942	None	None	8 5 1 1e(2)	Verification
8 5 043	C	8 5 008	8 5 1 15	Verification
8 5 044	None	None	6 5 3 1 c(1)	Verification
6.5.045	None	None	6.5.1.2a	Verification
6.5.046	None	None	8.5.1.1c	Verification
6.5.047	D	None	6.5.3.2a(2)	Verification
6.5.048	Ď	None	6.5.3.1c(1)	Verification -
6.5.049	None	None	6.5.1.6d(1)	Verification
6.5.050	D	None	6.5.1.2d(1)	Verification
6.5.051	č	6.5.009	6.5.1.2d(1)	Verification
	÷	0.0.000	0.0.1.20(1)	

Table 6-2 Detailed HEO/HED Summary (Cont.)

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HEO	HED CATEGORY	HED	CHECKLIST ITEM	TASK
6.6.001	D	None	6.6.1.2a(1,2)	Control Room Survey
6.6.002	C	6.6.001	6.6.2.1a	Control Room Survey
6.6.003	C	6.6.002	6.6.2.2a	Control Room Survey
6.6.004	D	None	6.6.2.3a(1)	Control Room Survey
6.6.005	Ç	6.6.003	6.6.3.3c	Control Room Survey
6.6.006	C.	6.6.004	6.6.3.7a	Control Room Survey
6.6.007	None	None	6.6.3.8b	Control Room Survey
6.6.008	None	None	6.6.3.9a,b	Control Room Survey
6.6.009	C	6.6.005	6.6.4.1a(1,2)	Control Room Survey
6.6.010	C	6.6.006	6.6.4.1b(1)	Control Room Survey
6.6.011	· C	6.6.007	6.6.4.2c,d(1,3)	Control Room Survey
6.6.012	None	None	6.6.5.1e,f,g	Control Room Survey
6.6.013	None	None	6.6.5.1b	Control Room Survey
6.6.014	None	None	8.6.5.2b(b)	Control Room Survey
6.6.015	· C	6.6.008	6.6.5.2c	Control Room Survey
6.6.016	C	6.6.009	6.6.6.4a(3)	Control Room Survey
6.6.017	C	6.6.010	6.6.6.4b(3)	Control Room Survey
6.6.018	C	6.6.011	6.6.1.1	Control Room Survey
6.6.019	L .	6.6.012	6.6.3.30	Control Room Survey
6.6.020	None	None	6.6.6.1	VALIDATION
6.6.021	U C	None	0.0.3.3D	
6.6.022		6.6.013	6.6.3.30	
6.6.023	Ŭ	None	0.0.3	
6.6.024	l	0.0.014		VALIDATION
6.6.025	Ĺ	0.0.015	0.0.1.1 0.0.1.1	
6.6.020	U Nono	None		
0.0.027	None	None		
0.0.020	None	None		
6 6 0129	D	None	6 6 3 25	
0.0.030				
8 8 022	Č	None	8 8 1 1	Verification
8 8 022	D	None	8 8 3 3h	Verification
8 8 Ø3A	Ď	None	6 6 3 3c	Verification
8 8 035	None	None	8 8 8 3	Verification
8 8 Ø37		8 8 017	6638	Verification
6 6 039	· D	None	8 8 1 1	Verification
8 8 Ø39	C C	6 6 018	6 6 3 82	Verification
8 8 949	č	8 8 019	6 6 3 3b	Verification
0.0.040		0.0.010	0.0.00	
6.7.001	None	None	6.7.1.4b	Control Room Survey
6.7.002	D	None	6.7.1.4i	Control Room Survey
6.7.003	C	6.7.001	6.7.1.5d(1)	Control Room Survey
6.7.004	D	None	6.7.1.8a(5)(a)	Control Room Survey
8.7.005	None	None	6.7.2.4k	Control Room Survey
6.7.006	None	None	6.7.2.41 (3)	Control Room Survey
6.7.007	D	None	6.7.2.5h,i	Control Room Survey
6.7.008	None	None	6.7.2.6j	Control Room Survey
6.7.009	None	None	.6.7.2.7e(2)	Control Room Survey
6.7.010	None	None	6.7.2.71(1)	Control Room Survey
6.7.011	None	None	6.7.3.1e(3)	Control Room Survey
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Table 6-2 Detailed HEO/HED Summary (Cont.)

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	HED		CHECKLIST	740%
HEO	CATEGORY	HED	· ITEM	I ASK
6.7.012	None	None	6.7.3.1f(1)	Control Room Survey
6.7.013	D	None	6.7.3.2a(2)	Control Room Survey
6.7.014	D	None	6.7.3.2c	Control Room Survey
6.7.015	None	None	8.7.3.27(1,2)	Control Room Survey
6.7.016	None	None	6.7.1.2,6.7.1.8	Control Room Survey
8 8 001	c	6 9 ØØ1	<b>6 9 1 1</b> 5	Control Room Survey
6 9 002	C B	6 9 002	8 9 7 1 9 (3)	Control Room Survey
8 8 003	B	6 9 003	8 8 2 22	Control Room Survey
6 8 994	Č	6 8 004	8 8 2 22	Control Room Survey
8 9 005		6 9 005	6 8 2 22	Control Room Survey
6 9 006	None	None	8 8 2 36	Control Room Survey
6 8 007	R	6 8 006	6 8 2 4h	Control Room Survey
6 9 009-	Č	6 9 667	6 8 3 2c(1)	Control Room Survey
6 9 ØØ95	č	6 9 007	6 8 3 2c(1)	Control Room Survey
6 8 000	None	None	6 8 2 32	VALTDATION
6 9 010	None	None	6 8 2 1c	
8 9 011	C	R R 0/019	8 8 2 32	
6 8 012	None	None	6 8 1 1c	VALTDATION
6 8 913	None	None	6 8 1 1b	VALTDATION
6 8 014	None	None	6 8 1 12	
6 8 015	None	None	8 8 1 12	
6 8 016	A	6 8 009	8 8 1 19	
8 9 017	None	None	6 8 2 2	Verification
8 9 019	R	6 9 010	$6, 9, 2, 1_{0}(1)$	
0.0.010	b	0.0.010	0.0.2.10(1)	VALIDATION
6.9.001	None	None	6.9.1.1c(1)	Control Room Survey
6.9.002	Comp	Completed	6.9.1.1c(1)	Control Room Survey
6.9.003	c '	6.9.001	6.9.1.2a(3,4)	Control Room Survey
6.9.004	С	6.9.002	6.9.1.2a(5)	Control Room Survey
6.9.005	None	None	6.9.2.1a	Control Room Survey
6.9.006	C	6.9.003	6.9.2.2e	Control Room Survey
6.9.007	В	6.9.004	6.9.2.1a	Control Room Survey
6.9.008	ē	6.9.005	6.9.2.1a	Control Room Survey
6.9.009	None	None	6.9.2.2d	VALIDATION

# TABLE 6-3

# SUMMARY OF COMMITMENTS

For a description of the corrective action the below listed HEDs see Appendix A.

HEO No.	HED No.	CAT	87 Outage	By/88	89 Outage
6 2 005	6 2 001	· 詳 /	·		· · · · · · · · · · · · · · · · · · ·
6 2 007	6 2 003	R R	×		
6 5 005	6 5 001	Δ	Ŷ		
6 1 000	6 1 004	· · · · · ·	^		· <b>v</b>
6 9 002	6 8 002	B			X
6 8 003	6 8 003	B			x
6 0 007	6 0 000	B			X ·
6 1 007	6 1 003	C C		~	Y . Y
6 2 012	6 2 007	Č ·	, •	x	X
6 3 016	6 3 002	· Č		x	
6 1 010	6 1 007	C C		x	
6 4 016	6 4 005	r r		X	
6 5 037	6 5 007	Č			· <b>X</b>
6 8 005	6.8.005	č			X
6 5 006	6.5.002	Č			· <b>X</b>
6.5.021	6.5.006	. Č		x	
6.6.015	6.6.009	č	x(p)		x
6.6.018	6.6.011	Ĉ			x
6.6.013	6.1.006	č			· <b>x</b>
6.9.004	6.9.002	Č			X
6.6.003	6.6.002	Č		x	
6.8.001	6.8.001	Ċ			· <b>x</b>
6.1.012	6.1.005	Ċ	· · · · ·		x
6.3.021	None	<sup>с.</sup> С	•	x	
6.3.023	None	D			X
6.4.006	None	D		x	
6.5.047	None	D			
6.5.016	None	·D			X
6.7.002	None	D (Pro	ogramming Chang	e)	x
6.7.004	None	D (Pro	ogramming Chang	e)	
6.7.007	None	D (Pro	ogramming Chang	e)	

For annunciators review see Section 6.2. For lamp test capability review see Section 6.3.

Note: Category "D" HEDs, have not been assigned HED numbers.

For implementation purposes, all HEDs have been grouped by projects which are reflected in above listing.

# Future Control Room Changes

Con Edison will incorporate into Corporate procedures a Human Factors Engineering Review Procedure for reviewing changes to the Control Room and its environs for good Human Factors Engineering practices.

7.0

APPENDIX A DCRDR HEO FORMS

A

HUMAN ENGINEERING OBSERVATION ASSESSMENT \_\_\_\_\_ OBSERVATION AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/11/85 EVALUATOR: R. Sabeh HED#: 6.1.001 [] Concur. TASK: Control Room Survey HEO#: 8.1.001 [X] Concur With Comment/Note. CL: 6.1 CL ITEM: 6.1.5.1a DATE: 5/10/84 REV: Do Not Concur for Following Reason: [] [] Reevaluate & Resubmit for Following Reason: CL TITLE: Control Room Workspace HED CATEGORY: B CONTROL BOARD LOCATION: N/A Comment/Note/Reason: The humidity problem is considered as an "B" Category. The temperature problem is not considered serious. HED DESCRIPTION Recommended a humidifier be installed or some other means. GUIDELINE- TEMPERATURE AND HUMIDITY (COMFORT ZONE): The temperature ranged between 77 and 80 degrees F with the humidity between 34-44 percent. The temperature and humidity levels fall just outside the comfort zones. Re: 0ER-001 RECOMMENDED IMPLEMENTATION ------[] SUPPORT MATERIAL ATTACHED Promotly Near Term POTENTIAL OPERATOR ERROR (S) Convenient Dutage Optional The high temperature and low humidity make the operating environment ----uncomfortable and produce high static levels that shock operators MANAGEMENT REVIEW/APPROVAL and influence meter levels. The impact of this environmental aspect CHAIRMAN: V. Javaraman DATE: 3/25/86 tends to degrade operator performance and increase the probability [X] Concur. instrument error. [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: Reduce the temperature and increase the humidity in the control room operating area. The comfort range is between 73 to 77 degrees F with [] Reevaluate & Resubmit for Following Reason: a humidity level at about 40 percent. Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES [X] NO[] NOTE:

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HUMAN ENGINEERING OBSERVATION ASSESSMENT

EVALUATOR: R. Sabeh       HED#: 6.1.002         TASK: Control Room Survey       HED#: 6.1.002         TASK: Control Room Survey       HED#: 6.1.002         C1: 6.1       C1 TTLE: 6.1.5.2b       DATE: 5/10/94         CI TTLE: Control Room Workspace       HED CATEORY: C         CONTROL BOARD LOCATION: N/A       [] Do Not Concur for Following Reason:         CONTROL BOARD LOCATION: N/A       [] Reavaluate & Resubmit for Following Reason:         CONTROL BOARD LOCATION: N/A       [] Reavaluate & Resubmit for Following Reason:         CONTROL BOARD LOCATION: N/A       [] Reavaluate & Resubmit for Following Reason:         CONTROL BOARD LOCATION: N/A       [] Reavaluate & Searching 45 free per minute and be in the range of 18 feet/minute.         CONDELINE- VENTILATION (AIR VELOCITY):       [] SUPPORT MATERIAL ATTACHED         [] SUPPORT MATERIAL ATTACHED       [] Promptly         POTENTIAL OFEMATOR ERROR(S)       [] Promptly         [] SUPPORT MATERIAL ATTACHED       [] Concur With Comment/Note.         [] SUPPORT MATERIAL ATTACHED       [] Concur With Comment/Note.         [] SUPPORT MATERIAL ATTACHED       [] Concur With Comment/Note.         [] SUPCESTED CORRECTIVE ACTION       [] Concur With Comment/Note.         [] SUPCESTED CORRECTIVE ACTION       [] Concur With Comment/Note.         [] Reavaluate & fisea per minute at operator head positions and to not	OBSERVATION		AIT REVIEW CHATRMAN, A ADORNO DATE: 3/11/85	
ASK: Control Room Survey       HED#: 6.1.802         L: 6.1       CL ITEM: 6.1.5.2b       DATE: 5/18/64         L: 11LE: Control Room Workspace       HED CATEGORY: C         CMIRCL BOARD LOCATION: N/A       [] Reavaluate & Resubmit for Following Reason:         IDELINE- VENTLATION (AIR VELICITY):	VALUATOR: R. Sabeh	HED#: 6.1.002	[] Concur.	
L: 6.1       CL ITEM: 6.1.5.2b       DATE: 5/18/34       REV:         L: 1TLE: Control Room Workspace       HED CATEGORY: C         CMIROL BOARD LOCATION: N/A       () Revaluate & Resubmit for Following Reason:         HED DESCRIPTION       HED DESCRIPTION         DIDELINE- VENTILATION (AIR VELOCITY):       Comment/Note/Reason: The AIT recomments this item be referred to tHAC design to assure that air movement is less than 45 feet per minute and be in the range of 16 feet/minute.         DIDELINE- VENTILATION (AIR VELOCITY):       There adjusted by the operators. There are adjusted by the operators o cool the area, see HED 6.1.601.         E: 0ER-602       RECOMENCE DIPLEMENT ERROR(S)         POTENTIAL OPERATOR ERROR(S)       RECOMENCE IMPLEMENTATION         POTENTIAL OPERATOR ERROR(S)       POTENTIAL OPERATOR ERROR(S)         Result of the degrade operator performance by norressing operator response time and the probability of error.       RECOMENCE IMPLEMENTATION         SUCCESTED CORRECTIVE ACTION       SUCCESTED CORRECTIVE ACTION       I Concur With Comment/Note.         I: Do Not Concur for Following Reason:       I Concur.       I Concur With Comment/Note.         I: Do Not Concur for Following Reason:       Concer With Comment/Note.       I Do Not Concur for Following Reason:         Concur With Comment/Note.       Do Not Concur for Following Reason:       Conment/Note/Reason:         Do Not Concur With Comment/Note.       Do Not C	ASK: Control Room Survey	HEO#: 6.1.002	[X] Concur With Comment/Note.	
L TITLE: Control Room Workspace       HED CATEGORY: C         CMTROL BOAD LOCATION: N/A       Comment/Net/Reason: The AIT recommends this item be         HED DESCRIPTION       Comment/Net/Reason: The AIT recommends this item be         IDPLINE: VENTIATION (AIR VELOCITY):       Comment/Net/Reason: The AIT recommends this item be         IDPLINE: VENTIATION (AIR VELOCITY):       Feed and highly dependent upon the lower positions that         readits are present with air novement coording 46 feest per minute at operators       file feet/minute.         ocol the are, he HED 6.1.001.       Feestper minute at operators         coord the are, see HED 6.1.001.       Feestper minute at operators         portentiat. OPERATOR ERROR(S)       POTENTIAL OPERATOR ERROR(S)         rafts produce operator response time and the probability of error.       Chainwait Conveniant Outage         SURGESTED CORRECTIVE ACTION       Chainwait for Following Reason:         struct maintenance to adjust and fix lowers to produce adequate air irculation not to exceed if feet per minute at operator head positions and o not produce noticeable drafts.       I Dent Concur for Following Reason:         Comment/Note/Reason:       I Reevaluate & Resubmit for Following Reason:         Comment/Note/Reason:       Comment/Note/Reason:	_: 6.1 CL ITEM: 6.1.5.2b	DATE: 5/10/84 REV:	[] Do Not Concur for Following Reason:	
DNTROL BOARD LOCATION: N/A       Comment/Note/Reason: The AIT recommends this item be readered to NAAC design to assure that air movement is less than 45 feet per minute and be in the range of 10 feet/minute.         UIDELINE- VENTLATION (AR VELOCITY): he air velocity is variable and highly dependent upon the louver positions that readjustable by the operators. There are several locations in which noticeable of 10 feet/minute.       Comment/Note/Reason: The AIT recommends this item be range of 10 feet/minute.         IDELINE- VENTLATION (AR VELOCITY): he air velocity is variable and highly dependent upon the louver positions that readjustable by the operators. There are several locations in which noticeable of coll the area, see HEO 6.1.801.       Comment/Note/Reason: The AIT recommends this item be range of 10 feet/minute.         ISUPPORT MATERIAL ATTACHED       POTENTIAL OPERATOR ERROR(S)       RECOMMENDED INFLEMENTATION         ISUPPORT MATERIAL ATTACHED       Maar Term       Convenient Dutage         POTENTIAL OPERATOR ERROR(S)       Maar Term         Increasing operator response time and the probability of error.       Convenient Dutage         SUGGESTED CORRECTIVE ACTION       I Concur With Comment/Note.         I Do Not Concur for Following Reason:       I Reevaluate & Resubmit for Following Reason:         I Recollute a Resubmit for Following Reason:       Comment/Note/Reason:         Executive CHAIRMAN: J. Basile       DATE: 5/19	L TITLE: Control Room Workspace	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
HED DESCRIPTION         HED DESCRIPTION         IDELINE- VENTILATION (AIR VELOCITY):         te air velocity is variable and highly dependent upon the louver positions that erails state by the operators. The louvers are continuously being adjusted by the operators afts are present with air movement exceeding 45 feet per minute at operator o cool the area, see HED 6.1.001.         E: OER-002       RECOMMENDED IMPLEMENTATION         POTENTIAL OPERATOR ERROR(S)       Potential ATTACHED         POTENTIAL OPERATOR ERROR(S)       Potential degrade operator performance by ncreassing operator response time and the probability of error.         SUGGESTED CORRECTIVE ACTION nstruct maintenance to adjust and fix louvers to produce adequate air irculation not to exceed 45 feet per minute at operator head positions and o not produce noticeable drafts.         Beevaluate & Resubmit for Following Reason: comment/Note/Reason:       [] Reevaluate & Resubmit for Following Reason: comment/Note/Reason:         EXECUTIVE REVIEW       CHAIRMAN: J. Basile       DATE: 5/19	ONTROL BOARD LOCATION: N/A		Comment/Note/Reason: The AIT recommends this item be	
UDELINE- VENTILATION (AIR VELOCITY):         he air velocity is variable and highly dependent upon the lower positions that         he air velocity is variable and highly dependent upon the lower positions that         rafts are present with air movement exceeding 46 feet per minute at operators         o cool the area, see HED 6.1.001.         E: OER-002         POTENTIAL OPERATOR ERROR(S)         rafts produce operator discomfort that degrade operator performance by         ncreasing operator response time and the probability of error.         SUGGESTED CORRECTIVE ACTION         nstruct maintenance to adjust and fix louvers to produce adequate air irculation not to exceed 45 feet per minute at operator head positions and o not produce noticeable drafts.         EXECUTIVE REVIEW       CHAIRMAN: J. Basile         DATE: 5/19	HEO DESCRIPTION	۰	is less than 45 feet per minute and be in the range	
E: 0ER-602   SUPPORT MATERIAL ATTACHED  POTENTIAL OPERATOR ERROR(S)  rrafts produce operator discomfort that degrade operator performance by ncreasing operator response time and the probability of error.  SUCCESTED CORRECTIVE ACTION  SUCCESTED CORRECTIVE ACTION  Instruct maintenance to adjust and fix louvers to produce adequate air incrulation not to exceed 45 feet per minute at operator head positions and o not produce noticeable drafts.  EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/15	UIDELINE- VENTILATION (AIR VELOCITY): he air velocity is variable and highly depen re adjustable by the operators. There are s rafts are present with air movement exceedin lead positions. The louvers are continuously to cool the area, see HEO 6.1.001.	ndent upon the louver positions that several locations in which noticeable ng 45 feet per minute at operator y being adjusted by the operators		
] SUPPORT MATERIAL ATTACHED         POTENTIAL OPERATOR ERROR(S)         rafts produce operator discomfort that degrade operator performance by increasing operator response time and the probability of error.         SUGGESTED CORRECTIVE ACTION         SUGGESTED CORRECTIVE ACTION         incrulation not to exceed 45 feet per minute at operator head positions and o not produce noticeable drafts.         Image: Revenue and the degrade operator head positions and on the probability of error.         Suggested Corrective Action         Image: Revenue and the probability of error.         Suggested Corrective Action         Image: Revenue and fix louvers to produce adequate air         Image: Revenue and the probabilities of the perminities at operator head positions and on not produce noticeable drafts.         Image: Revenue and the probability of the perminities at operator head positions and on the produce noticeable drafts.         Image: Revenue and the probability of the perminities at operator head positions and the produce noticeable drafts.         Image: Revenue and the problemating the perminute at operator head positions an	E: 0ER-002	• • • •	RECOMMENDED IMPLEMENTATION	
POTENTIAL OPERATOR ERROR(S)  rafts produce operator discomfort that degrade operator performance by ncreasing operator response time and the probability of error.  WANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur. [] Concur With Comment/Note. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: [] Reevaluate & Resubmit for Following Reason: [] Reevaluate & Resubmit for Following Reason: [] Comment/Note/Reason: [] EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19	] SUPPORT MATERIAL ATTACHED	· · ·	[] Promptly	
Image: construct of the second operator discomfort that degrade operator performance by noreasing operator response time and the probability of error.       Image: construct discomfort that degrade operator performance by noreasing operator response time and the probability of error.         Image: construct discomfort that degrade operator performance by noreasing operator response time and the probability of error.       Image: construct discomfort that degrade operator for construct discomfort response time and the probability of error.         Image: construct discomfort that degrade operator for construct discomfort response time and the probability of error.       Image: construct discomfort response time and the probability of error.         Image: construct discomfort that degrade operator for formance to adjust and fix louvers to produce adequate air irculation not to exceed 45 feet per minute at operator head positions and o not produce noticeable drafts.       Image: construct discomfort for	POTENTIAL OPERATOR ERROR(S)		-   [ ] Near Term   [X] Convenient Outage	
SUGGESTED CORRECTIVE ACTION       [] Concur With Comment/Note.         Instruct maintenance to adjust and fix louvers to produce adequate air       [] Do Not Concur for Following Reason:         Circulation not to exceed 45 feet per minute at operator head positions and       [] Reevaluate & Resubmit for Following Reason:         Comment/Note/Reason:       [] Concur With Comment/Note.         [] Do Not Concur for Following Reason:       [] Concur With Comment/Note.         [] Do Not Concur for Following Reason:       [] Concur With Comment/Note.         [] Concur With Comment/Note.       [] Do Not Concur for Following Reason:         [] Concur With Comment/Note.       [] Do Not Concur for Following Reason:         [] Concur With Comment/Note.       [] Do Not Concur for Following Reason:         [] Concur With Comment/Note.       [] Do Not Concur for Following Reason:         [] Concur With Comment/Note.       [] Do Not Concur for Following Reason:         [] Concur With Comment/Note.       [] Do Not Concur for Following Reason:         [] Concur With Comment/Note.       [] Do Not Concur for Following Reason:         [] Concur With Comment/Note.       [] Do Not Concur for Following Reason:         [] Concur With Comment/Note.       [] Do Not Concur for Following Reason:         [] Concur With Comment/Note.       [] Do Not Concur for Following Reason:         [] Concur With Comment/Note.       [] Do Not Concur for Following	Drafts produce operator discomfort that degra increasing operator response time and the pro	ade operator performance by obability of error.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur.	
Instruct maintenance to adjust and fix louvers to produce adequate air inculation not to exceed 45 feet per minute at operator head positions and to not produce noticeable drafts.          [] Do Not Concur for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         [] Comment/Note/Reason:         [] EXECUTIVE REVIEW         ChairMan: J. Basile       DATE: 5/15	SUGGESTED CORRECTIV	E ACTION	- [] Concur With Comment/Note.	
<pre>circulation not to exceed 45 feet per minute at operator head positions and co not produce noticeable drafts. Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/15</pre>	Instruct maintenance to adjust and fix louve	rs to produce adequate air	- [ ] Do Not Concur for Following Reason:	
Comment/Note/Reason: 	circulation not to exceed 45 feet per minute to not produce noticeable drafts.	at operator head positions and	[]. Reevaluate & Resubmit for Following Reason:	
EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/15		· · ·	Comment/Note/Reason:	
EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/15	х			
EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/15				
EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/15				
			EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/8	
APPROVE: YES[X] NO[] NOTE:			APPROVE: YES[X] NO[] NOTE:	

HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBS	ERVATION	AIT REVIEW
EVALUATOR: R. Sabeh	- HED#: None	[] Concur.
TASK: Control Room Survey	HEO#: 6.1.003	[] Concur With Comment/Note.
CL: 6.1 CL ITEM: 6.1.5.	7b(3) DATE: 5/8/84 RE	V: [X] Do Not Concur for Following Reason:
CL TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: Not a concern due to number of operators.
HEO D	ESCRIPTION	
GUIDELINE- AMBIENCE AND COMFORT (RE The distance from the primary opera control room (restroom and lockers) "very loud shout" to recall an oper The loud shout will no longer be su fire door closed.	STROOM AND EATING FACILITIES). ting area to other areas in the is about 70 feet requiring a ator. fficient with the	
RE: 0ER-006		
HEO 6.1.007		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL	OPERATOR ERROR (S)	[] Convenient Outage
The operator will not be available abnormal or emergency events.	to perform duties necessary to handle	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur.
SUGGESTED	CORRECTIVE ACTION	[] Concur with CommencyNote.
Install an intercom or visual indic locker area to recall operators.	ator capability in the restroom and	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
•		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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,	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: R. Sabeh	HED#: Completed	[] Concur.	
TASK: Control Room Survey	HEO#: 6.1.004	[] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.5.5a	DATE: 5/8/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: Comp	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: New A/C units have been installed. Units in	
HEO DESCRIPTION		- Control room are for ellergency use only.	
GUIDELINE- AUDITORY ENVIRONMENT (BACKGROUND NO The equipment noise produced by the continuous conditioning units and the printers is at or a See diagram at end of checklist.	ISE): operation of the air bove 75 dB(c).		
RE: 0ER-006			
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[ ] Promptly -   [ ] Near Term	
POTENTIAL OPERATOR ER	ROR (S)	[] Convenient Outage -  [] Optional	
Produces operator fatigue and increases the probability of error and the time to respond to an alarm. 		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.	
Install sound suppression material over the no and printer units.	ise producing air conditioning	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
. · ·		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

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## HUMAN ENGINEERING OBSERVATION ASSESSMENT

	HOWAY ENGINEERING ODSER	VALUU ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: R. Sabeh	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.1.005	[] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.1.3f(1,2)	DATE: 5/10/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Back Boards (NIS/Rod Pos	. & Rad Monitor)	Comment/Note/Reason: The AIT indicates that the plant	
HEO DESCRIPTION		is taking measurements and does not concur with the	
GUIDELINE- EQUIPMENT-TO-OPPOSING SURFACE DISTAN The separation between opposing surfaces on the with one rack reducing the separation to 44 inc	CE: back board panels is 47 inches hes.		
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED	<b>.</b>	[] Promptly	
POTENTIAL OPERATOR ERR	OR(S)	- [] Near lerm	
Increases the time and the probability of error in the area at the same time.	when more than one person is	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.	
SUGGESTED CORRECTIVE A	CTION	[ [] Do Not Concur for Following Reason:	
Schedule I&C not to be in the area during perio meter readings and/or are monitoring instrument during the interviews operators did not report	ds while operators are taking s. It should be noted that any difficulty with this area.	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
		APPROVE: YES[X] NO[] NOTE:	

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION EVALUATOR: R. Sabeh	HED#: None HED#: 6 1 0006	AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/11/85 [] Concur. [] Concur With Comment/Note.
TASK: Control Room Survey CL: 6.1 CL ITEM: 6.1.1.4d CL TITLE: Control Room workspace CONTROL BOARD LOCATION: N/A HEO DESCRIPTION GUIDELINE- DOCUMENT ORGANIZATION AND STORAGE Documents are not protected against wear, mak if dog-eared or torn. [] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR OF Increases the time and the probability of error SUGGESTED CORRECTIVE Provide protective covers for document pages use e.g., plastic covers	HEO#: 6.1.006 DATE: 5/10/84 REV: HED CATEGORY: None (PROTECTION): ing them difficult to read FROR (S) For to read documents.	<pre>[] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate &amp; Resubmit for Following Reason: Comment/Note/Reason: AIT indicates that operation take measures to insure that documents are not torn or dogeared. Re-evaluation consensus is that operations has adequate controls.</pre>

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/11/85
EVALUATOR: R. Sabeh	HED#: 6.1.003	[] Concur.
TASK: Control Room Survey	HEO#: 6.1.007	[X] Concur With Comment/Note.
CL: 6.1 CL ITEM: 6.1.1.6a,b	DATE: 5/10/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Control Room Workspace	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: The AIT consensus is that the existing page
HED DESCRIPTION		of the HEO.
GUIDELINE- SUPERVISOR ACCESS (COMMUNICATIONS): The shift supervisors office is outside the cor dedicated communications link between his works operating area or at the NPO shack.	ntrol room and there is no space and the primary	
See HEO 6.2.006 Point-to-Point Intercom Systems	5	
	• •	RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED	۵ 	
POTENTIAL OPERATOR ER	ROR (S) 	[ [ ] Optional
Delay in contacting shift supervisor during ab operations. 	normal or emergency ACTION	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason:
Install a point-to-point intercom between the and the shift supervisors office and the NPO s	control room operating area hack.	[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
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· ,		
		EVECUTIVE REVIEW CHATRWAN   Bacile DATE 5/19/86
· · · · · · · · · · · · · · · · · · ·		APPROVE: YES[X] NO[] NOTE:
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# HUMAN ENGINEERING OBSERVATION ASSESSMENT

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OBSERVATION		AIT REVIEW 
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.
TASK: Control Room Survey	HE0#: 6.1.008	[] Concur With Comment/Note.
CL: 6.1 CL ITEM: 6.1.1.1a	DATE: 10/31/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Main Boiler Feedpump Inst	rumentation	Comment/Note/Reason: AIT does not concur that the
HEO DESCRIPTION		instrumentation in the control room is needed for
GUIDELINE- ACCESSIBILITY OF INSTRUMENTATION EQUIF (Present in the Control Room): There are instruments outside the control room ne for detection of abnormal conditions and to bring plant to a safe shutdown condition, for example: main boiler feed pump instrumentation.	MENT cessary 1 the	SFTA. If additional instrumentation is needed, they will be identified and evaluated on a case by case basis. This didnot surface in the SFTA. AIT doesnot consider this a problem.
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR	R(S)	   [ ] Promptly   [ ] Near Term   [ ] Convenient Outage   [ ] Optional
Delay in responding to an emergency or abnormal event. SUGGESTED CORRECTIVE AC The SFTA effort will identify the need to relocation identified above to the control room.	TION te the instrumentation	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

## HUMAN ENGINEERING OBSERVATION ASSESSMENT

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OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh	HED#: 6.1.004	[] Concur.
TASK: Control Room Survey	HEO#: 6.1.009	[X] Concur With Comment/Note.
CL: 6.1 CL ITEM: 6.1.2.2b(1)	DATE: 10/31/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Control Room Workspace	HED CATEGORY: B	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Assessment Panel		Comment/Note/Reason: AIT reviewed these controls in the
HEO DESCRIPTION		
GUIDELINE- STANDUP CONSOLE DIMENSIONS (Highest Contro Controls that exceed 56 inches with benchboard are No.'S 1,16,29,39,507.	ol):	
RE: Photo No. 2-35		
		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED		[] Promptly 
POTENTIAL OPERATOR ERROR(S)		[ ] Convenient Outage   [ ] Optional
Delay in operating controls or inability to operate controls by the 5th percentile female operator.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur. [X] Concur With Comment/Note.
Leven the control or provide an operator aid		[] Do Not Concur for Following Reason:
		[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason: Must be coordinated with 1.97 changes affecting this panel.
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:
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DETAILED CUNTRUL ROUM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: R. Sabeh	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO <b>#:</b> 6.1.010	[] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.2.2c,d(2)	DATE: 10/31/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Assessment and Flight Panels		Comment/Note/Reason: AIT does not consider these controls	
HEO DESCRIPTION			
GUIDELINE- STANDUP CONSOLE DIMENSIONS (Bench Board S Controls outside reach radius for 5th percentile fem operation include: Assessment Panel: 1,7,8,11,12,16,29,39,507. Flight Panel: FA; 61,62,63,64,66,69,72,74,75,76. FB; 503,92,94,96,98,100,504,101. FC: 31 32 33	lope): ale		
RE: Photo No. 2-35		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		[ ] Promptly -   [ ] Near Term   [ ] Convenient Outage -   [ ] Optional	
POTENTIAL OPERATOR ERROR(S)			
Delay in activating controls that exceed the reach envelope for the 5th percentile female operator.		MANAGEMENT REVIEW/APPROVAL	
		CHAIRMAN: V. Jayaraman DAIE: 3/25/88 [X] Concur.	
		- [] Concur With Comment/Note.	
		- [] Do Not Concur for Following Reason:	
Relocate the controls to within the 28 inch reach envelope or provide an operator aid to assist the 5th percentile female operator to reach the controls. It should be noted that no operator expressed concern that the distance of the controls was a problem.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88 APPROVE: YES[X] NO[] NOTE:	

### HUMAN ENGINEERING OBSERVATION ASSESSMENT

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		AIT REVIEW	
EVALUATOR: Sabeh/Weich	#ED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.1.Ø11	[] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.2.2e(2)	DATE: 10/31/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight Panel A		Comment/Note/Reason: The AIT does not consider this	
HEO DESCRIPTION		the tile before going to the acknowledge control.	
GUIDELINE- STANDUP CONSOLE DIMENSIONS (Horizontal Displ Annunciator tiles not readable from the acknowledge pus are on the turbine first-out panel No. 501.	acement): . h button		
Re: HE0 6.3.014			
•			
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[] Promptly -   [] Near Term	
POTENTIAL OPERATOR ERROR(S)		[ ] Convenient Outage   [ ] Optional	
Increase the probability of not reading the correct til 	e message.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note. - [] Do Not Concur for Following Reason:	
Relocate the annunciator controls to a more central console position.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

	HUMAN ENGINEERING OBSER	WATION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: 6.1.005	[X] Concur.	
TASK: Control Room Survey	HE0#: 6.1.012a	[] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.2.5a(1)	DATE: 10/31/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason:	
HEO DESCRIPT	ION		
GUIDELINE- VERTICAL PANELS (Control Height Controls above 70 inches and below 34 incl Controls above 70 inches are: SH; 19 and SN; 1,8. Below 34 inches are: SA; 38,39,40,43,44,45,46,51. SB-1: 107,108,109,110,112,113,114,115,120 28,47,93,94,95,102,104,105,29 SB-2; 15,39,41,42,43,44,45,46,47,48,49,50 51,52,53,54,58,57,58,59,60,61,62.	): nes: 121,122,123 and	RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED	· · · · ·	( ۲ Promotly	
POTENTIAL OPERATOR ERROR(S)		- [] Near Term   [X] Convenient Outage - [] Optional	
Difficulty in reading controls above 70 inches and increases the probability of accidental activation of controls below 34 inches in height. SUGGESTED CORRECTIVE ACTION The rolling ladder is an operator aid that is adequate to adjust controls above 70 inches. Relocate to a position above 34 inches of the lower controls or provide protective covers for controls that if accidentally activated would cause an unsafe plant condition.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86         [] Concur.          [X] Concur With Comment/Note.          [] Do Not Concur for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         Comment/Note/Reason: Engineering to evaluate which controls could accidently activated and cause plant trip. Fix to include whether change of handle will solve the problem.         EXECUTIVE REVIEW       CHAIRMAN: L Basile       DATE: 5/19/86	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/85 APPROVE: YES[X] NO[] NOTE:	
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RE: 0ER-007

See page a.

See page a.

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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

#### AIT REVIEW OBSERVATION CHAIRMAN: DATE: HED#: 6.1.005 [X] Concur. EVALUATOR: Sabeh/Weich [] Concur With Comment/Note. HEO#: 6.1.012b TASK: Control Room Survey [] Do Not Concur for Following Reason: DATE: 10/31/84 REV: CL ITEM: 6.1.2.5a(1) [] Reevaluate & Resubmit for Following Reason: HED CATEGORY: C CL TITLE: Control Room Workspace Comment/Note/Reason: CONTROL BOARD LOCATION: Supervisory HED DESCRIPTION GUIDELINE- VERTICAL PANELS (Control Height): Below 34 inches are: (cont.) SC: 44,45,46,49,50,51,52,53,54,55,56,59,61,63,65,67,68, 70,72,74,76,78,513. SH; 57,58,59,60,61,62,63,77,79,81,83. SJ: 509,510,511,512,513,514,47,48. SM; 12,39,40,41,42,43,44. RECOMMENDED IMPLEMENTATION . 22 SN: 38,39,40,41,42,43,44,46,47. \_\_\_\_\_ RE: PHOTÓ NÓ. 1-22 Promptly [] SUPPORT MATERIAL ATTACHED Near Term Convenient Outage [X] POTENTIAL OPERATOR ERROR(S) [] Optional a di a tas MANAGEMENT REVIEW/APPROVAL DATE: CHAIRMAN: [] Concur. [X] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: CHAIRMAN: J. Basile DATE: 5/19/86 EXECUTIVE REVIEW APPROVE: YES [X] NO [ ] NOTE:

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	WATION ASSESSMENT	
OBSERVATION		AIT REVIEW CHAIRMAN: A ADORNO DATE: 3/11/85	
EVALUATOR: Sabeh/Welch	HED#: 6.1.006	[] Concur.	
TASK: Control Room Survey	HEO#: 6.1.013a	[X] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.2.5b(1)	DATE: 10/31/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight and Supervisor	y Panels	Comment/Note/Reason: AIT recommends that the part	
HEO DESCRIPTION	۱	be removed and the high rod indicators for   control bank B and C moved into the blank	
GUIDELINE- VERTICAL PANELS (Display Height): Displays above 70 inches are: FA; 19,20,22,503,504,505,28,29,38,39,42,43,44 FB; 1,2,9,10,13,16,21,24,36,37,38,39,48,49,50 FC; 502,503,504,505,506,507,508,509,510,511,5 FD; 502 and 503 Re: Photo No. 1-33 an HEO 6.5.027 for removal length rod meters and indicator on panel FB.	4,45,46 and 47 9 and 51 512,513,514,515 and 516 1 of part	space. Another consideration is to tilt the panel to remove the glare and provide a more desirable reading location.	
		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERROR (S)		[X] Convenient Outage	
Increase the time and the probability of error for reading displays. SUGGESTED CORRECTIVE ACTION Provide an operator aid on the Supervisory panel to aid the operator in reading displays located above 70 inches and relocate the lower displays to above 41 inches in height.		WANAGEMENT REVIEW/APPROVAL CHAIRWAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
		[] Concur for Following Reason:	
		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
•			
	•	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

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# HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

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OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: 6.1.006	- CHAIRMAN: A. ADURNU DATE: 3/11/85	
TASK: Control Room Survey	HEO#: 6.1.013b	[X] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.2.5b(1)	DATE: 10/31/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight and Superviso	ry Panels	Comment/Note/Reason: (Continue) the roll around ladder	
HEO DESCRIPTIO	N	- I satisfies the readability on the supervisory panel.	
GUIDELINE- VERTICAL PANELS (Display Height) ( Supervisory Panel: SA; 1,2,3,4,5,6,502,505,5 SA-1; 1,2 and 3 SB-1; 502,503,504,506,509,510,511,21 and 22 SB-2; 502,503,504,506,507,508,509,510 and 51 SC; 502,503,504,505,506,1,2,6,7,10,11,15 and SD: 1,4,7,10,13,16,19 and 22 SE; 32 SF; 502,503,504,505,506,507,508,509,510,511, 518,519,4,5,6,7,8,9,10,11 and 12	cont.): 06,509,510,511,512 and 513 1 16 512,513,514,515,516,517,	RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[] Promotly	
POTENTIAL OPERATOR ERROR(S)		[] Near Term   [X] Convenient Outage	
See page a	na se	- [] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN:DATE:	
SUGGESTED CORRECTIV	E ACTION	- [] Concur With Comment/Note.	
See name a		- [] Do Not Concur for Following Reason:	
	•	[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
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• • • • •			
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	B VATION ASSESSMENT	UCKUR-NEU-2
OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/11/8	35
EVALUATOR: Sabeh/Welch	HED#: 6.1.006		
TASK: Control Room Survey	HEO#: 6.1.Ø13c	[X] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.2.5b(1)	DATE: 10/31/84 REV:	[] Do Not concur for for forming grant	
CL TITLE: Control Room Workspace	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason.	
CONTROL BOARD LOCATION: Flight and Supervisory Pane	ls		
HEO DESCRIPTION			
GUIDELINE- VERTICAL PANELS (Display Height) (cont.) SG; 502,503,504 and 505 SH; 1,2,3,4,5,6,7,11,13,14 and 15 SJ; 14,15,18,22,23 and 24 SK; 1 SM;502,503,504,505 and 506 SO: 501	:		
Displays below 41 inches are: SA: 515, Supervisory Panel SC; 38 - SD; 43		RECOMMENDED IMPLEMENTATION	
SE; 521,522 [] SUPPORT MATERIAL ATTACHED		[] Promptly [] Near Term	
POTENTIAL OPERATOR ERROR (S	5) 	[X] Convenient Outage [] Optional	
See page a SUGGESTED CORRECTIVE ACTIO	DN	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason:	DATE:
		Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile APPROVE: YES[X] NO[] NOTE:	DATE: 5/19/86

HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW CHAIRWAN: A. ADORNO DATE: 3/11/85	
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.1.014	[] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.2.5b(2)	DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight Panel		Comment/Note/Reason: AIT does not consider the RPIs a problem since	
HEO DESCRIPTION			
GUIDELINE- VERTICAL PANELS (Display Height): Displays that must be used frequently or precisely that exceed 65 inches in height are the Rod Position Indicators on panel FC 508,509,510,511,512,513,514,515 and 516.			
RE: Photo No. 1-35			
		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		   [] Promptly -   [] Near Term	
POTENTIAL OPERATOR ERROR(S)		[] Convenient Outage   [] Optional	
Increases the time and the probability of error displays.	for reading	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTED CORRECTIVE	ACTION	[] Do Not Concur for Following Reason:	
Relocate rod position indicators to a lower pos 65 inches and above 50 inches in height.	sition below	[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
		APPROVE: YES[X] NO[] NOTE:	

HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.1.015	[X] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.1.5c	DATE: 11/4/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: AIT recommends compliance with the	
HEO DESCRIPTION			
GUIDELINE- SPARE PARTS, OPERATING EXPENDABLES, AN The lens caps to indicate the functional position controls are difficult to remove for replacing burned out bulbs. A simple small screw driver to would save many broken caps.	) TOOLS (Tools): of bl		
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR	(5)	<pre>[] Promptly = [] Near Term [] Convenient Outage = [X] Optional</pre>	
Broken caps can easily fall off and the color cod information provided is lost.	ing 	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.	
Provide a special tool such as a small screw driv in the control room for removal of lens caps.	локи Эрг	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> <li>EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86</li> <li>APPROVE: YES[X] NO[] NOTE:</li> </ul>	

## HUMAN ENGINEERING OBSERVATION ASSESSMENT

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OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/11/85	
OBSERVATION         OBSERVATION         EVALUATOR: Sabeh/Welch       HED#: None         TASK: Control Room Survey       HEO#: 6.1.016         CL: 6.1       CL ITEM: 6.1.5.3e(2)       DATE: 11/4/84         CL TITLE: Control Room Workspace       HED CATEGORY: None         CONTROL BOARD LOCATION: Assessment and Supervisory       HEO DESCRIPTION         GUIDELINE- ILLUMINATION (Shadowing):         Labels below instrumentation on:         Assessment Recorders:       12,17,18,19,20,21,22,40,41,42,43,44,45         Recorders on SD 43 and SO 1 and 2 are shadowed.       HEO ESCRIPTION		CHAIRMAN: A. ADORNO DATE: 3/11/85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: AIT does not consider this a problem. Labels are visible.	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR	:(S)	RECOMMENDED IMPLEMENTATION  [] Promptly [] Near Term [] Convenient Outage [] Optional	
Inability to quickly and accurately identify inst 	ruments.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason:	
Relocate labels above their associated recorders	•	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

DETAILED CONTROL RÖOM DESIGN REVIEW	HUMAN ENGINEERING OBSERV	DCRDR-HEO-2		
OBSERVATION         VALUATOR: Sabeh/Welch       HED#: None         ASK: Control Room Survey       HED#: 6.1.017         L: 6.1       CL ITEM: 6.1.5.3f       DATE: 11/4/84       REV:         L TITLE: Control Room Workspace       HED CATEGORY: None         ONTROL BOARD LOCATION: Flight Panel "C"       HEO DESCRIPTION         NIDELINE- ILLUMINATION (Glare):       Hare produced by the overhead lights is on the instrument ace covers on 508,509,510,511,512,513,514,515 and 516.         K: HEOs 6.1.013;6.1.014;6.5.002;6.5.009;6.5.010;6.5.026		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/11/85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Past lighting studies and modifications to lighting system has reduced glare significantly. The glare on instrumentation identified are not considered to be a major problem.		
RE:0ER-003 [] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR FROM	2/(2)	RECOMMENDED IMPLEMENTATION  [] Promptly [] Near Term [] Converient Outage		
POTENTIAL OPERATOR ERROR(S) Increase the time and the probability of display reading errors. SUGGESTED CORRECTIVE ACTION		[] Optional         MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.         [] Concur With Comment/Note.         [] Do Not Concur for Following Reason:		
Relocate display indicators to lower position on and direct the light away from the curved meter	the panels surface.	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:		

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## HUMAN ENGINEERING OBSERVATION ASSESSMENT

## DCRDR-HE0-2

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OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.1.Ø18	[] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.1.1b	DATE: 11/7/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason: This instrument is a supplementary	
HEO DESCRIPTION		- I dragnostic coor for survarrance cesting.	
GUIDELINE- ACCESSIBILITY OF INSTRUMENTATION/EQUIPMEN to Facilitate Coverage): The bistable status lights on panel SO 501 are out c operator and not conveniently located for monitoring	T (Arranged f view of the		
RE: 0ER-004	,		
RE: Photo No. 1-2	· .		
	. %	RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERROR(S)		[] Convenient Outage	
Increase the time and probability of error in respon bistable status indication.	nding to a	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.	
SUGGESTED CURRECTIVE ACTION	N	[] Do Not Concur for Following Reason:	
Relocate the bistable status light indicator panel t	to the SA-1 panel.	[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
- -		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
		APPROVE: YES[X] NO[] NOTE:	

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION		AIT REVIEW
EVALUATOR: R. POTTER	HED#: 6.1.007	[X] Concur.
TASK: VALIDATION	HEO#: 6.1.Ø19	[] Concur With Comment/Note.
CL: 6.1 CL ITEM: 6.1.2.5a	DATE: 10/9/85 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Control Room Workspace	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight Panel FD		Comment/Note/Reason: AIT recommends label be
HEO DESCRIPTION		
GUIDELINE- VERTICAL PANELS (Control Height): Saturation meter is too high to read labels (5. meter control.	ØØ2) on	
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Difficulty/delay in reading/interpreting meter.		[] Promptly - [] Near Term [X] Convenient Outage - [] Optional
		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur. [] Concur With Comment/Note.
SUGGESTED CORRECTIVE A	ACTION	[ ] Do Not Concur for Following Reason:
Move meter down and/or change label to be more readable.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
	• •	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW	
EVALUATOR: R. POTTER	HED#: 6.1.008	[] Concur.	
TASK: VALIDATION	HEO#: 6.1.020	[X] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.1.1a	DATE: 10/9/85 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Backpanel		Comment/Note/Reason: Part of R.G. 1.97.	
HEO DESCRIPTION			
GUIDELINE- ACCESSIBILITY OF INSTRUMENTATION/EQUIPMENT (Present in the Control Room): Core exit thermocouple readings are on a back panel.	· · · · · · · · · · · · · · · · · · ·		
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S)		   [] Promptly   [] Near Term   [X] Convenient Outage   [] Optional	
Increased time in executing procedures.		WANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur. [] Concur With Comment/Note.	
Add indicators for core exit thermocounles.		- [] Do Not Concur for Following Reason:	
		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
	· .	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

DCRDR-HEO-2

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT			
ÓBSERVATION		AIT REVIEW CHATRWAN: A Adorgo DATE: 12/10/85			
EVALUATOR: R. POTTER	HED#: None	[] Concur.			
TASK: VALIDATION	HEO#: 6.1.021	[] Concur With Comment/Note.			
CL: 6.1 CL ITEM: 6.1.5.5d	DATE: 10/10/85 REV:	[X] Do Not Concur for Following Reason:			
L TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:			
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: Beeper is an operational aid.			
. HEO DESCRIPTION	1	-			
CUIDELINE- AUDITORY ENVIRONMENT (Noise Distra During some events the beeper signaling maked continuously and is very annoying and distrac to the operators.	actions): up goes ting				
		RECOMMENDED IMPLEMENTATION			
[] SUPPORT MATERIAL ATTACHED		[] Promptly			
POTENTIAL OPERATOR ERROR(S) Produces operator fatigue and increases probability of error. SUGGESTED CORRECTIVE ACTION		<pre>[ ] Near Term [ ] Convenient Outage [ ] Optional</pre>			
			Consider a defeat switch for the makeup beeper so operator has the option to switch off the beep.		-   [ ] Do Not Concur for Following Reason:
					L Reevaluate & Resubmit for Following Reason:
		Comment/More/Ves2ou:			
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86			
		APPROVE: YES[X] NO[] NOTE:			

HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW CHAIRMAN: A. Adorno DATE: 12/10/85
VALUATOR: R. POTTER	HED#: None	[] Concur.
ASK: VALIDATION	HEO#: 6.1.022	[] Concur With Comment/Note.
CL: 6.1 CL ITEM: 6.1.1.1a	DATE: 10/14/85 REV:	[X] Do Not Concur for Following Reason:
L TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory Panel SJ, Back F	Panel	Comment/Note/Reason: AIT does not consider these
HEO DESCRIPTION		
SUIDELINE- ACCESSIBILITY OF INSTRUMENTATION/EQUIPME (Present in Control Room): SW bypass gate for DG (16.046) control/status does not work and operator must call out to perform the step (procedure E-0, step 11c); CCR air conditioner status is read from a back panel (procedure E-0, step 14). These are immediate action steps which should be performed entirely within the control room	π ·	
workspace.	υ. 	
[] SUPPORT MATERIAL ATTACHED		[] Promptly 
POTENTIAL OPERATOR ERROR(S	)	[ ] Convenient Outage   [ ] Optional
Increase in time and probability of error in performing immediate action steps.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur.
SUGGESTED CORRECTIVE ACTION		[[X] Concur With Commency Note:
Correct the problem with the disconnected (or malfunctioning) status indication. Move the CCR controls/displays to the control room panels.		<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: The possibility of relocating controls should be considered when reviewing HEO 6.5.037.</li> </ul>
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88 APPROVE: YES[X] NO[] NOTE:

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HEO-2	
OBSERVATION		AIT REVIEW	
EVALUATOR: R. POTTER	HED#: None	-   CHAIRMAN: A. Adorno DATE: 12/10/85   [] Concur.	
TASK: VALIDATION	HEO#: 6.1.023	[] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.1.4a	DATE: 10/15/85 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: Procedure exists.	
HEO DESCRIPTION			
GUIDELINE- DOCUMENT ORGANIZATION AND STORAGE ( A page was missing from the control room copy procedure E-0.	Accessibility): of		
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		   [ ] Promptly   [ ] Near Term   [ ] Convenient Outage	
POTENTIAL OPERATOR ERROR(S)			
Increase in the time and probability of error in executing procedures. SUGGESTED CORRECTIVE ACTION An administrative procedure should be followed that involves periodic review/update of control room documents.		MANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Jayaraman DATE: 3/25/86         [] Concur.         [] Concur With Comment/Note.         [] Do Not Concur for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         Comment/Note/Reason: Procedures OAD #24 & #26 to be revised as required to include periodic checking of pages.         EXECUTIVE REVIEW       CHAIRMAN: J. Basile       DATE: 5/19/88         APPROVE:       YES[X] NO[]       NOTE:	

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	HUMAN ENGINEERING UBSER	VALION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: Welch/Sabeh/Gagnon	HED#: None	- CHAIRMAN: A. Adorno DATE: 3/20/88	
TASK: Verification	HEO#: 6.1.024	[] Concur With Comment/Note.	
CL: 6.1 CL ITEM: 6.1.1.1a	DATE: 12-13-85 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory SG		Comment/Note/Reason: RHR flow indication is available on panel SB-2.	
HEO DESCRIPTION		All recommends as a possible enhancement duplicating RHR flow instruments on panel SG as long as there is no conflict with panel	
GUIDELINE- ACCESSIBILITY OF INSTRUMENTATION/EQUIPMENT(Present in Control Room): RHR flow indication is required to support task ES-1.3/step 16. This information is not available in the control room.		space required by keg. Guide 1.97. Greater readability should be considered if change is made.	
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		   [ ] Promptly	
POTENTIAL OPERATOR ERROR(S)		- [ ] Near Term   [ ] Convenient Outage	
Increase the time and probability of error in executing the task to establish minimum RHR flow.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.	
SUGGESTED CORRECTIVE ACTION		 -   [] Do Not Concur for Following Reason:	
Install a RHR flow indicator on Supervisory pan	el SG.	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HE0-2	
OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 12/10/85	
EVALUATOR: R. POTTER	HED#: None	[] Concur.	
TASK: VALIDATION	HEO#: 6.1:025	[] Concur With Comment/Note.	
L: 6.1 CL ITEM: 6.1.1.1a	DATE: 10/9/85 REV:	[X] Do Not Concur for Following Reason:	
L TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
ONTROL BOARD LOCATION: N/A		Comment/Note/Reason: This is not a concern. There are	
HEO DESCRIPTION			
GUIDELINE- ACCESSIBILITY OF INSTRUMENTATION/EQUIPMENT (Present in the Control Room): Steam dump valve position indication is not in control room.			
[] SUPPORT MATERIAL ATTACHED		[] Promptly   [] Near Term	
POTENTIAL OPERATOR E	ERROR (S)		
Increased time in executing procedures.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTED CORRECTIVE	ACTION	[] Concur with Comment/Note:	
d indicators for dump valve position.		[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
		I APPRUVE: YES[X] NU[] NUIE:	

# HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

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OBSERVATION		AIT REVIEW
EVALUATOR: R. POTTER	HED#: 6.1.009	[] Concur.
TASK: VALIDATION	HEO#: 6.1.026	[X] Concur With Comment/Note.
CL: 6.1 CL ITEM: 6.1.1.1a	DATE: 10/9/85 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Control Room Workspace	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight FB		Comment/Note/Reason:
HEO DESCRIPTION		
GUIDELINE- ACCESSIBILITY OF INSTRUMENTATION/EQUI (Present in the Control Room): Procedure E-3, step 18c calls for "close normal valve controls have no position indicator or sta is closed.	[PMENT spray valves" (3.121, 3.122) but atus light to indicate valve	
[] SUPPORT MATERIAL ATTACHED	· · ····· ·	[ ] Promptly -   [ ] Near Term
POTENTIAL OPERATOR ERROR(S)		[X] Convenient Uutage -   [] Optional
Increased time in executing procedures.	 CTION	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.
		- [] Do Not Concur for Following Reason:
Add indicators for spray valve positions.		[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

### INDIAN POINT UNIT #2 DETAILED CONTROL ROOM CTON DEVICEN

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DETAILED CUNTROL ROUM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION		AIT REVIEW
EVALUATOR: R. POTTER	HED#: None	[] Concur.
TASK: VALIDATION	HED#: 6.1.027	[] Concur With Comment/Note.
CL: 6.1 CL ITEM: 6.1.1.13	DATE: 10/9/85 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Control Room Workspace	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight FD		Comment/Note/Reason: AIT feels this is adequate.
HEO DESCRIP	TION	
GUIDELINE- ACCESSIBILITY OF INSTRUMENTATI (Present in the Control Room): Saturation meter (5.002) does not have in small light (which can't be seen from a d	UN/EQUIPMENT dication for negative values except a istance).	
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR(S)		-   [] Near Term   [] Convenient Outage
Increased time in executing procedures.		
SUGGESTED CORRECTIVE ACTION		CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason:
Add indicator rights for negative subcoor	ing.	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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OBSERVATION		AIT REVIEW CHAIRMAN: A. Adorno DATE: 3/20/86
EVALUATOR: E. CAGNON	HED#: Completed	[] Concur.
TASK: Verification	HEO#: 6.1.028	[] Concur With Comment/Note.
CL: 6.1 CL ITEM: 6.1.1.1a	DATE: 5/5/86 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Control Room Workspace	HED CATEGORY: Comp	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: NA		Comment/Note/Reason: EOPs now require operators to check recorders.
HEO DESCRIPTION		
GUIDELINE- ACCESSIBILITY OF INSTRUMENTATION/EQUIPMENT Various radiation levels are required to be alarmed in several tasks in E-0, E-1, E-3, ECA-Ø.0. This informat available in the control room in the form of alarms.	(Present in Control Room): a support of tion is not	
[X] SUPPORT MATERIAL ATTACHED		- [] Near Term
POTENTIAL OPERATOR ERROR (S)		- [ ] Optional
Increases the time & probability of error in executin tasks.	g radiation-related	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.
SUGGESTED CORRECTIVE ACTION		- [] Do Not Concur for Following Reason:
Add radiation level alarms.		[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
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		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
		APPROVE: YES[X] NO[] NOTE:

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INDIAN POINT UNIT #2 DETAILED CONTROL ROOM D	ESIGN REVIEW	HUMAN ENGINEERING OBSERV	ATION ASSESSMENT	DCRDR-HE0-2
OBSERVATION 		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/11/85 [] Concur.		
TASK: Control Room Surv	ey	HE0#: 6.2.001	[] Concur With Comment/Note.	
CL: 6.2 CL	ITEM: 6.2.1.2b(6)	DATE: 5/8/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Communication	S	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reaso	on:
CONTROL BOARD LOCATION:	Operator Consoles (All)		Comment/Note/Reason: AIT does not consider this	sa
	HEO DESCRIPTION		-   safety related item and operations believes the   current arrangement is satisfactory.	3
GUIDELINE- CONVENTIONAL Plug-in handsets at eac	-POWERED TELEPHONE SYSTE h console do not have cr	MS (Handsets): adles.	No action required. Re-evaluation concurred with previous results.	
RE: Photo No. 2-37.				
			RECOMMENDED IMPLEMENTATIO	N
[X] SUPPORT MATERIAL	ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERROR(S)		- [] Near lerm  [] Convenient Outage [] Optional		
Handsets can be easily knocked off the console and damage the unit.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur. - [X] Concur With Comment/Note.	ATE: 3/25/86	
SUGGESTED CORRECTIVE ACTION				
Install handset cradles	at each console.	······································	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> </ul>	on :
		Comment/Note/Reason: Cradle not required due to constant use of pho	to constant use of phone.	
		•		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile	DATE: 5/19/86	
		APPROVE: YES[X] NO[] NOTE:		
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#### LENAN ENOTHEEDTHE ODGEDVATION ASSESSMENT

OBSERVATION		AIT REVIEW   CHAIRMAN: A. ADORNO DATE: 3/11/85	
EVALUATOR: R. Sabeh	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.2.002	[] Concur With Comment/Note.	
CL: 6.2 CL ITEM: 6.2.1.2d	DATE: 5/8/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Communications	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: Operations does not consider this a problem.	
HEO DESCRIPTION		Re-evaluation concurred with previous results.	
GUIDELINE- CONVENTIONAL-POWERED TELEPHONE SYST The loudness of the ringing is not adjustable	EMS (Telephone Ringing): at the telephone instrument.		
· · · ·		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR EF Too loud a ring can be annoying or too low a r	ROR(S) ing may not be heard.	[] Promptly [] Near Term [] Convenient Outage [] Optional MANAGEMENT REVIEW/APPROVAL	
SUGGESTED CORRECTIVE	ACTION	CHAIRMAN: V. Jayaraman DATE: 3/25/88 [] Concur. [X] Concur With Comment/Note. [] Do Not Concur for Following Reason:	
· · · · · · · · · · · · · · · · · · ·		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Adjusting volume down could create an operational problem with operator when not seated at console.	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

DCRDR-HE0-2

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	WATION ASSESSMENT	
OBSERVATION		AIT REVIEW CHATRMAN: A ADORNO DATE: 3/11/85	
EVALUATOR: R. Sabeh	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.2.003	[] Concur With Comment/Note.	
CL: 6.2 CL ITEM: 6.2.1.5b	DATE: 5/8/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Communications	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisor & Assessment	nt Consoles	Comment/Note/Reason: AIT does not consider this as a problem	
HEO DESCRIPTION	١		
The gain control can turn off the audible sig	gnal.		
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increase the probability of missing an incoming UHF call. SUGGESTED CORRECTIVE ACTION Modify the UHF gain control to eliminate the off position for the auditory signal.		<pre>/ [] Promptly - [] Near Term [] Convenient Outage - [] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur. - [] Concur With Comment/Note. - [] Do Not Concur for Following Reason: [] Reevaluate &amp; Resubmit for Following Reason: [] Reevaluate &amp; Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88</pre>	
		APPROVE: YES[X] NO[] NOTE:	

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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

OBSERVATION			AIT REVIEW	
EVALUATOR: R. Sabeh HED#: None		HED#: None	[] Concur.	
TASK: Control	Room Survey	HEO#: 6.2.004	[] Concur With Comment/Note.	
CL: 6.2	CL ITEM: 6.2.1.5c	DATE: 5/8/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Com	nunications	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD	LOCATION: N/A	:	Comment/Note/Reason: Procedures are in control room, operators	
	HEO DESCRIPTION		-   are trained and this has never been a problem.	
GUIDELINE- FD The procedures	(ED-BASE UHF TRANSCEIVERS (Proced s for the use of the UHF system a	ures): re not posted.		
		С. 	RECOMMENDED IMPLEMENTATION	
[] SUPPORT I	MATERIAL ATTACHED	•	[] Promptly	
POTENTIAL OPERATOR ERROR(S)		ROR (S)	[ ] Near lerm   [ ] Convenient Outage	
Increase the probability of operators mis-using the UHF system.		ng the UHF system.	[ ] Uptional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
	SUGGESTED CORRECTIVE	ACTION	[] Do Not Concur for Following Reason:	
Post procedur assessment co	es for the use of UHF procedures nsoles.	at the supervisor and	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
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			EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88 APPROVE: YES[X] NO[] NOTE:	

HIMAN ENCINEERING OBSERVATION ASSESSMENT

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OBSERVATION		AIT REVIEW CHATRMAN: A. ADORNO DATE: 3/11/85	
EVALUATOR: R. Sabeh	HED#: 6.2.001	[] Concur.	
TASK: Control Room Survey	HEO#: 6.2.005	[X] Concur With Comment/Note.	
CL: 6.2 CL ITEM: 6.2.1.6a(2)	DATE: 5/8/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Communications	HED CATEGORY: A	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: AIT recommends another solution is to	
HEO DESCRIPTION			
GUIDELINE- ANNOUNCING SYSTEMS (Intelligibility There are some areas in the containment buildir be heard. This comment obtained by operator in where the paging system could not be heard as in interviews include: o Auxiliary Building; feedwater pump and pi o Turbine hall o Service water strainer pit	and Coverage): ng that the paging system cannot nterview. Other "dead spot" areas identified during the OER iping penetration areas		
o Main boiler teed pump		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[X] Promptly	
POTENTIAL OPERATOR ERROR(S)		[] Convenient Outage	
Inability to receive important announcements.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.	
SUGGESTED CORRECTIVE ACTION		[] Do Not Concur for Following Reason:	
Modify paging system or provide an alternate communication mode. Techniques should be investigated to insure positive communications between the control room and all plant areas.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

CL: 6.2

DETAILED CUNTRUL ROUM DESIGN REVIEW	HUMAN ENGINEERING OBSERVA	ATION ASSESSMENT
OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/11/85
EVALUATOR: R. Sabeh	HED#: 6.2.002	[] Concur.
TASK: Control Room Survey	HEO#: 6.2.006	[X] Concur With Comment/Note.
CL: 6.2 CL ITEM: 6.2.1.7	DATE: 5/8/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Communications	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: AIT recommends that this item be coordinated with HEO 6.7.007.
HEO DESCRIPTION		No problem with locker and restroom areas.
GUIDELINE- POINT-TO-POINT INTERCOM SYSTEMS: There is no intercom system between the shift supervisors office and the control room primary operating area.		
See HEO 6.1.003 for restroom area and HEO 6.1.007		
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED	· · · · · · · · · · · · · · · · · · ·	[] Promptly [] Near Term
POTENTIAL OPERATOR ERROR	?(S)	[X] Convenient Outage   [] Optional
Delay in contacting shift supervisor or recall of operators.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
		[] Concur With Comment/Note.
SUGGESTED CORRECTIVE ACT		[] Do Not Concur for Following Reason:
Install a point-to-point intercom between the control room operating area and the shift supervisors office, as well as, the locker and restroom area.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:

EXECUTIVE REVIEW

CHAIRMAN: J. Basile

APPROVE: YES [X] NO [ ] NOTE:

DATE: 5/19/86

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DIAN POINT UNIT #2 TAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HEO-2
OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/11/85
/ALUATOR: R. Sabeh	HED#: 6.2.003	[] Concur.
SK: Control Room Survey	HEO#: 6.2.007	[X] Concur With Comment/Note.
.: 6.2 CL ITEM: 6.2.1.8b	DATE: 5/8/84 REV:	[] Do Not Concur for Following Reason:
_ TITLE: Communications	HED CATEGORY: B	[] Reevaluate & Resubmit for Following Reason:
DNTROL BOARD LOCATION: N/A	·	Comment/Note/Reason: AIT recommends that device selected have adequate I microphone internal/external to mask.
HEO DESCRIPTION		
here is some difficulty communicating while face mask. This observation was received a esult of a query.	wearing s a	
		RECOMMENDED IMPLEMENTATION
] SUPPORT MATERIAL ATTACHED		[] Promptly [V] Near Term
POTENTIAL OPERATOR ERROR(S)		[] Convenient Outage
perators are unable to use communications eq hile wearing face masks.	uipment	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORRECTIVE	ACTION	- [ ] Concur With Comment/Note:
Procure high quality face masks with throat		- [ [ ] Do Not Concur for Following Reason:
nikes to permit communications while wearing a face mask.		Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
		APPROVE: YES [X] NO [] NOTE:
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HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION .			AIT REVIEW
EVALUATOR: R.	Sabeh	HED#: 6.2.004	[X] Concur.
TASK: Control	Room Survey	HEO#: 6.2.008	[] Concur With Comment/Note.
CL: 6.2	CL ITEM: 6.2.1.6f	DATE: 5/29/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Com	nunications	HED CATEGORY: A	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD	LOCATION: N/A		Comment/Note/Reason:
	HEO DESCRIPTION		
GUIDELINE- AN The control re the plant ann	NOUNCING SYSTEM (Priority): com does not have a priority overr ouncing system (paging system).	ide to	
Re: 0ER-008		·	
		· •	
,		•	
[] SUPPORT	MATERIAL ATTACHED 	ROR (S)	[X] Fromptly [] Near Term   [] Convenient Outage
Increase the announcements	time necessary to make important or direct NPO activities.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
			[] Concur With Comment/Note.
	SUGGESTED CURRECTIVE /	ACTION	[] Do Not Concur for Following Reason:
Add an execut system for co	ntrol room use.	ging	[] Reevaluate & Resubmit for Following Reason:
			Comment/Note/Reason:
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			EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
			APPROVE: YES[X] NO[] NOTE:
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INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSET	DCRDR-HEO-2
OBSERVATION		AIT REVIEW
EVALUATOR: R. Sabeh	HED#: 6.2.005	CHAIRMAN: A. ADURNU DATE: 3/11/85
TASK: Control Room Survey	HEO#: 6.2.009	[] Concur With Comment/Note.
CL: 6.2 CL ITEM: 6.2.1.1c(1)	DATE: 5/30/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Communications	HED CATEGORY: B	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason:
HEO DESCRIPTION		
QUIDELINE- GENERAL REQUIREMENTS FOR VOICE COMMU	NICATIONS SYSTEMS	
(EMERGENCY MESSAUES): During emergency or abnormal operations voice of are burdened (over loaded) requiring an operato dedicated on the communications console to perf call up requirements. This observation was identified during the OER	ommunications r to be orm interviews.	
RE: 0ER-Ø1Ø		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR(S)		[X] Near Term   [ ] Convenient Outage
Increase time and the probability of error in making calls while services are needed at the control panels.		- [] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORRECTIVE A	CTION	[] Concur With Comment/Note.
Incorporate an automatic message call up capabi	lity	[ [ ] Do Not Concur for Following Reason:
into the control room communications console.		[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
		APPROVE: YES[X] NO[] NOTE:

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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

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OBSERVATION		AIT REVIEW	
EVALUATOR: R. Sabeh HED#: 6.2.006		[] Concur.	
TASK: Control Room Survey	HEO#: 6.2.010	[X] Concur With Comment/Note.	
CL: 6.2 CL ITEM: 6.2.1.6a(2)	DATE: 5/30/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Communications	HED CATEGORY: A	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: Solution to HEO 6.2.005 will resolve problem.	
HEO DESCRIPTION			
GUIDELINE- ANNOUNCING SYSTEM (Intelligibility and Nuclear Power Operators (NPO) must leave a contro (charging pump area) to respond to a page.	d Coverage): blled area		
Re: 0ER-011			
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[X] Promptly	
POTENTIAL OPERATOR ERROR(S)		[]     Convenient Outage       []     Optional	
Delay in responding to a page from the control r	оот.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
		[] Concur With Comment/Note.	
	ind area	[] Do Not Concur for Following Reason:	
Install a page unit in the charging pump concrot		[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
	•	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
		APPROVE: YES[X] NO[] NOTE:	

HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/11/85		
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.		
TASK: Control Room Survey	HEO#: 6.2.011	[X] Concur With Comment/Note.		
CL: 6.2 CL ITEM: 6.2.1.8b	DATE: 11/1/84 REV:	[] Do Not Concur for Following Reason:		
CL TITLE: Communications	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:		
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: AIT recommends this item be referred to		
HEO DESCRIPTION		-   operator training.   Refer to HEO 6.2.007.		
GUIDELINE- EMERGENCY COMMUNICATIONS (Equipment Usability): Operators have no experience using communications equipment while wearing protective clothing.				
	· · · · · · · ·	RECOMMENDED IMPLEMENTATION		
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increase time and probability of error with using communications equipment by personnel wearing protective clothing. SUGGESTED CORRECTIVE ACTION Include in the training program the use of communications equipment for personnel while dressed in protective gear.		<pre></pre>		
			- [] Do Not Concur for Following Keason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	

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### HUMAN ENGINEERING OBSERVATION ASSESSMENT

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OBSERVATION			AIT REVIEW	
EVALUATOR: Sabeh/Weich		HED#: 6.2.007	- CHAIRMAN: A. ADORNO DATE: 3/11/85	
TASK: Control R	com Survey	HEO#: 6.2.Ø12	[X] Concur With Comment/Note.	
CL: 6.2	CL ITEM: 6.2.2.1c(2)	DATE: 10/30/84 REV:	[] Do Not Concur for Following Reason:	
CL_TITLE: Commun	nications	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LO	DCATION: Supervisory	· · · · · ·	Comment/Note/Reason: AIT recommends removal of the auditory alarm.	
	HEO DESCRIPTION	*****	-	
GUIDELINE- USE ( The overpressure (SF) subpanel is communications.	DF AUDITORY SIGNALS (Selection): e system alarm (DPS) on supervisory s too loud and interferes with verbal		• • • • • • • • • • • • • • • • • • •	
		, 		
		14	RECOMMENDED IMPLEMENTATION	
	POTENTIAL OPERATOR ERROR(S)		[] Promptly -   [] Near Term   [X] Convenient Outage	
Increased time a verbal communica	and probability of error in hearing ations.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
	SUGGESTED CORRECTIVE ACTION		- [] Concur With Comment/Note.	
Reduce the OPS alarm to a discriminable level that does not interfere with verbal communications (at least 10 DBA above ambient noise level).			<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>	
			EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
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INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	علم المراجع DCRDR-HE0-2 VATION ASSESSMENT
OBSERVATION		AIT REVIEW -   CHAIRMAN: A. ADORNO DATE: 3/11/85
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.
TASK: Control Room Survey	HEO <b>#: 6.2.013</b>	[] Concur With Comment/Note.
CL: 6.2 CL ITEM: 6.2.1.6e(2)	DATE: 11/1/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Communications	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: AIT does not concur. Operators do not use
HEO DESCRIPTION		is used.
GUIDELINE- ANNOUNCING SYSTEMS (Loudspeaker Volume) The announcing system volume can be reduced below audible levels.	:	
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		   [] Promptly - [] Near Term   [] Convenient Outage - [] Ontional
POTENTIAL OPERATOR ERROR	S)	
Increases the probability of missing an incoming announcement.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORRECTIVE ACT	:	[] Concur With Comment/Note:
SUGGESTED CURRECTIVE ACTION Install audio gain control stops to preclude the ability to reducing announcing system loud speaker volume below an audible level.		<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>
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		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
		APPROVE: YES[X] NO[] NOTE:

#### HIMAN ENGINEERING ORSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Wetch	HED#: None	[] Concur.	./00
TASK: Control Room Survey	HEO#: 6.3.001	[] Concur With Comment/Note.	
CL ITEM: 6.3.1.2b(1)	DATE: 11/1/84 REV:	[X] Do Not Concur for Following Reason:	
CI TITLE Annunciator Warning Systems	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	• .
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason: AIT feels that these alarms ha	ave been carefully
HEO DESCRIPTION		selected to assure that no important function is mas	
GUIDELINE- ALARM PARAMETER SELECTION (General Alarms) Annunicator alarms that require an Auxiliary Operator go to a given plant location for specific information "Hydrogen System Trouble" = SE "Steam and Water System Trouble" = SC "Waste Disposal Boron Recycle" = SF	: to include:		
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[] Promptly [] Near Term	
POTENTIAL OPERATOR ERROR(S)		[] Optional	
Increase time to identify specific source of trouble.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: [X] Concur.	3/25/86
SUGGESTED CORRECTIVE ACTION			
Assess the criticality of these alarms to determine the trade-off for identifying the specific source of trouble from the control room.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile APPROVE: YES[X] NO[] NOTE:	DATE: 5/19/86

DCRDR-HE0-2

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DETAILED CONTROL ROOM DESIGN REVIEW			DCRDR-HE0-2	
OBSERVATION         EVALUATOR: Sabeh/Weich       HED#: None         FASK: Control Room Survey       HEO#: 6.3.002         CL: 6.3       CL ITEM: 6.3.1.2c(1)       DATE: 11/1/84         CL TITLE: Annunciator Warning Systems       HED CATEGORY: None         CONTROL BOARD LOCATION: N/A       HEO DESCRIPTION         CUIDELINE- ALARM PARAMETER SELECTION (Multichannel or Shared Alarms): Annunciator alarms with inputs from more than one plant parameter include: "Electric Heat Trace" = (SM)         "Isolation Phase Bus Duct Cooling" = (SE)         "Feedwater Heaters 21-24 and 26A,B and C High/Low Alarms" = (SE)         "Safeguard Off-Normal Position" = (SB-1)         "Area Monitor High Rod" = (SB-2)		HED#: None HEO#: 6.3.002 DATE: 11/1/84 REV: HED CATEGORY: None rel or Shared Alarms): re plant parameter include: w Alarms" = (SE)	AIT REVIEW - CHAIRMAN: A. ADORNO DATE: 3.11.85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: - AIT feels that new administrative controls adequately address this concern.	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increase time and the probability of error in determining source of trouble.			RECOMMENDED IMPLEMENTATION          [] Promptly         [] Near Term         [] Convenient Outage         -       [] Optional         MANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Jayaraman DATE: 3/25/86         [] Concur.         -       [X] Concur With Comment/Note.	
SUGGESTED CORRECTIVE ACTION Assess the shared alarm annunciators to determine the trade-off for identifying the specific source of trouble from the control room.			<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: Procedure SAO #206 &amp; DAD-15 cover this problem.</li> <li>EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88</li> <li>APPROVE: YES[X] NO[] NOTE:</li> </ul>	

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HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSE	RVATION	AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.
TASK: Control Room Survey	HEO#: 6.3.003	[] Concur With Comment/Note.
CL: 6.3 CL ITEM: 6.3.1.2	2c(2) DATE: 11/1/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Annunciator Warning System	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION:		Comment/Note/Reason:
HEO DE	SCRIPTION	available. Extra alarms into printer would not
GUIDELINE- ALARM PARAMETER SELECTION The multi-channel or shared alarms a output (print) on the alarm printer	N (Multi-Channel or Shared Alarms): are not programmed to	provide meaningful information.
•		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR (S)		[ ] Near Term [ ] Convenient Outage
Increase the time to determine the	source of trouble.	
		[X] Concur.
SUGGESTED	CORRECTIVE ACTION	[] Concur With Comment/Note.
Program the computer to output (pri	nt) the alarm	[ ] Do Not Concur for Following Reason:
specific cause on the alarm printer		[] Reevaluate & Resubmit for Following Reason:
,	· · · ·	Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
	· · ·	APPROVE: YES [X] NO [] NOTE:
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DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSEF	BURDR-HEO-2	
OBSERVATION         EVALUATOR: Sabeh/Welch       HED#: None         TASK: Control Room Survey       HEO#: 6.3.0004         CL: 6.3       CL ITEM: 6.3.1.2e(3)       DATE: 11/4/84         CL TITLE: Annunciator Warning Systems       HED CATEGORY: None         CONTROL BOARD LOCATION:       HEO DESCRIPTION         GUIDELINE- ALARM PARAMETER SELECTION (Multi-Channel or Shared Alarms): There is no reflash capability with the FW heaters, isolation phase, RCP standpipe high and low levels, RCP motor oil levels high and low, safeguard multi-input, safeguard off normal position and area radiation monitor.		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/11/85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Design philosophy used when system was put together was to not put critical alarms as category alarms.	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Delaý in responding or taking appropriate action to a shared or meaningful alarm. SUGGESTED CORRECTIVE ACTION Provide a reflash capability to allow for subsequent alarms to activate the auditory alert mechanism and reflash the visual tile even though the first alarm may not have been cleared.		RECOMMENDED IMPLEMENTATION  [] Promptly [] Optional [] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur [] Concur With Comment/Note [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

#### NOTHERTING OBSERVATION ASSESSMENT

	HUMAN ENGINEERING UBSERV			
OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/11/85		
EVALUATOR: Sabeh/Welch HED#: None		[] Concur.		
TASK: Control Room Survey	HEO#: 6.3.005	[] Concur With Comment/Note.		
CL: 6.3 CL ITEM: 6.3.1.5a	DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:		
CL TITLE: Annunciator Warning Systems	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:		
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason:		
HEO DESCRIPTION		can tell if coming or going.		
GUIDELINE- CLEARED ALARMS (Auditory Signal): There is no dedicated or distinctive auditory signal for cleared alarms.	· · · · · ·			
		RECOMMENDED IMPLEMENTATION		
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S	»)	[ ] Promptly -   [ ] Near Term   [ ] Convenient Outage		
Inability of operators to discriminate between inco and cleared alarms.	ming	- [] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.		
SUGGESTED CORRECTIVE ACTION	N	- [] Do Not Concur for Following Reason:		
Provide a distinct and dedicated auditory signal (chime) for cleared alarms.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:		
	· · · · ·			
· · · · · · · · · · · · · · · · · · ·		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86		
		APPROVE: YES[X] NO[] NOTE:		

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HEO-2 VATION ASSESSMENT
OBSERVATION EVALUATOR: Sabeh/Weich TASK: Control Room Survey CL: 6.3 CL ITEM: 6.3.2.1b CL TITLE: Annunciator Warning Systems CONTROL BOARD LOCATION: N/A	HED#: None HEO#: 6.3.006 DATE: 11/4/84 REV: HED CATEGORY: None	AIT REVIEW - CHAIRMAN: A. ADORNO DATE: 3/11/85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: [] Reevaluate & Resubmit for Following Reason: - Comment/Note/Reason: AIT indicates that normal plant - procedures are in effect to adjust the signal
HEO DESCRIPTION GUIDELINE- SIGNAL TO DETECTION (Control): The annunciator signal intensity can be adjusted but there is no administrative procedure that directs the control adjustments.	,	- intensity.
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increase the probability of not responding to an annunciator alarm if the intensity is adjusted at too low a level. SIGGESTED CORRECTIVE ACTION		<pre>[] Promptly [] Near Term [] Convenient Outage  [] Optional </pre>
Provide administrative procedures regarding the adjustability of the annunciator signal intensity.		<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: Procedure OAD-2 is applicable.</li> <li>EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86</li> <li>APPROVE: YES[X] NO[] NOTE:</li> </ul>

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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION			AIT REVIEW
EVALUATOR: Sabeh/Welch HED#: 6.3.001		HED#: 6.3.001	[] Concur.
TASK: Control	Room Survey	HEO#: 6.3.007	[X] Concur With Comment/Note.
CL: 6.3	CL ITEM: 6.3.2.1c	DATE: 11/4/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Annu	unciator Warning Systems	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD	LOCATION: N/A		Comment/Note/Reason: AIT recommends audible portion of this alarm
	HEO DESCRIPTION		be removed und (overpressure system).
GUIDELINE- SI The over press too loud.	GNAL DETECTION (Limits): surization system signal is		
RE: 6.2.012			
,			RECOMMENDED IMPLEMENTATION
[] SUPPORT	MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR(S)			[ ] Near lerm   [X] Convenient Outage
The irritatio	n or startling effect increases to to respond to the annunciator si	 he gnal.	WANAGEMENT REVIEW/APPROVAL
			[] Concur.
	SUGGESTED CORRECTIVE	ACTION	- [X] Concur With Comment/Note. - [] Do Not Concur for Following Reason:
Reduce the ov	verpressure system signal to a lev	el	
of 10 DBA abo level.	ove the control room ambient noise		[] Keevaluate & Resubmit for Following Reason:
		· · · · ·	Comment/Note/Reason: Coordinate with HEU 6.2.012.
. ·			
		• · · · · · · · · · · · · · · · · · · ·	
		· ·	
			EVECUTAE MEATEM CUNTUMMAN: J. DASTIN DATE: 2/13/00
			APPROVE: YES[X] NO[ ] NUTE:

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HEO-2
OBSERVATION EVALUATOR: Sabeh/Welch TASK: Control Room Survey CL: 6.3 CL ITEM: 6.3.3.1b CL TITLE: Annunciator Warning Systems CONTROL BOARD LOCATION: N/A HEO DESCRIPTION GUIDELINE- VISUAL ANNUNCIATOR PANELS (Labeling): Individual annunciator panels are not labeled. RE: Photo No. 2-19	HED#: None HEO#: 6.3.008 DATE: 11/4/84 REV: HED CATEGORY: None	AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/12/85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Panels already have labels and annunciators located thereon carry same designation.
[ X ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERRO Delay in operator response. SUGGESTED CORRECTIVE AC	R(S)	RECOMMENDED IMPLEMENTATION  [] Promptly [] Near Term [] Convenient Outage [] Optional  MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.
Provide panel labels for all panels.		<pre>[ ] Do Not Concur for Following Reason: [ ] Reevaluate &amp; Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88 APPROVE: YES[X] NO[] NOTE:</pre>

HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Weich	HED#: None	- CHAIRMAN: A'. ADORNO DATE: 3/12/85	
TASK: Control Room Survey	HEO#: 6.3.009	[] Concur With Comment/Note.	
CL: 6.3 CL ITEM: 6.3.3.1c(2)	DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Annunciator Warning Systems	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason:	
HEO DESCRIPTION		<ul> <li>  Drawings exist; color coding &amp; other procedures preclude</li> <li>  incorrect bulb replacement.</li> </ul>	
GUIDELINE- VISUAL ANNUNCIATOR PANELS (Lamp Repl Lamp replacement requires removal of the comple to replace lamp. These lamps are on the bi-stable panel.	acement): ate unit	-	
RE: Photo No. 1-2	ан 1917 - Эли		
[X] SUPPORT MATERIAL ATTACHED			
POTENTIAL OPERATOR ER	20R (S)	- [] Near Term [] Convenient Outage	
Increase probability of error in replacing unit location when more than one is removed.	s in the proper	- [] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTED CORRECTIVE A	CTION	- [] Concur With Comment/Note.	
		- [] Do Not Concur for Following Reason:	
		[] Reevaluate & Resubmit for Following Reason:	
	· .	Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

#### HIMAN ENGINEERING OBSERVATION ASSESSMENT

	HUMAN ENGINEERING UBSERV		
OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/12/85	
ALUATOR: Sabeh/Weich       HED#: None         INTROL Room Survey       HED#: 6.3.010         :: 6.3       CL ITEM: 6.3.3.2c       DATE: 11/4/84       REV:         . TITLE: Annunciator Warning Systems       HED CATEGORY: None         NIROL BOARD LOCATION: N/A       HED DESCRIPTION         UIDELINE- VISUAL ALARM RECONITION AND IDENTIFICATION (Flasher Failure): nnunciators are checked at the start of each watch, failure         f a flasher between watches will not be detected until the tart of the next watch.         I       SUPPORT MATERIAL ATTACHED         SUGGESTED CORRECTIVE ACTION         SUGGESTED CORRECTIVE ACTION         Install a capability to detect flasher failure when it occurs.		<pre>[] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate &amp; Resubmit for Following Reason: Comment/Note/Reason: AIT does not consider this item a problem becuase the existing circuitry provides the operator with sufficient information to identify the failed flasher. This had never been known to be a problem in the past. Re-evaluation concurred with previous results.</pre>	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88 APPROVE: YES[X] NO[] NOTE:	

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### HUMAN ENGINEERING OBSERVATION ASSESSMENT

	OBSERVATION		AIT REVIEW		
EVALUATOR: Sabeh/Weitch HED#: None		CHAIRMAN: A. ADORNO DATE: 3/12/85			
TASK: Control Room Se	urvey	HEO#: 6.3.011	[] Concur With Comment/Note.	ана стана br>Стана стана	
CL: 6.3	CL ITEM: 6.3.3.2f(2)	DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:		
CL TITLE: Annunciator	r Warning Systems	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason		
CONTROL BOARD LOCATIO	ON: N/A	·	Comment/Note/Reason: The AIT indicated that an	administrativo	
	HEO DESCRIPTION		procedure (OAD-15) is in place.		
GUIDELINE- VISUAL ALARM RECOGNITION AND IDENTIFICATION (Extended Duration Illumination): Lighted tiles for extended period during normal operations are not controlled by administrative procedures					
RE: Photo No. 1-10					
	•		·		
[X] SUPPORT MATER	IAL ATTACHED		RECOMMENDED IMPLEMENTATION	RECOMMENDED IMPLEMENTATION	
			- [ ] Promptly - [ ] Near Term   [ ] Convenient Outage -   [ ] Optional		
Increases the probability of not responding to an					
alarm condition.			MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE [] Concur.	E: 3/25/88	
	SUGGESTED CORRECTIVE A	 CTION	[X] Concur With Comment/Note.		
Provide administrativ	ve procedures to control th	e period	- [] Do Not Concur for Following Reason:	· · ·	
for maintaining tiles	s in a lighted status.		[] Reevaluate & Resubmit for Following Reason:		
	· .		Comment/Note/Reason: See procedure OAD-15 & SAO-	206.	
				• • • • •	
		·			
·		EXECUTIVE REVIEW CHAIRWAN: J. Basile	DATE: 5/19/86		
			APPROVE: YES [X] NO [ ] NOTE:		
	·	· .			

DETAILED CONTROL ROOM DESIGN REVIEW	DCRDR-HEO-2
OBSERVATION         EVALUATOR: Sabeh/Welch       HED#: None         TASK: Control Room Survey       HEO#: 6.3.012         CL: 6.3       CL ITEM: 6.3.3.3c(1)       DATE: 11/4/84       REV:         CL TITLE: Annunciator Warning Systems       HED CATEGORY: None         CONTROL BOARD LOCATION: N/A       HEO DESCRIPTION         GUIDELINE- ARRANGEMENT OF VISUAL ALARM TILES (Labeling of Axes):         There is no labeling of vertical and horizontal axes of the annunciator panels.         RE: Photo No. 1-10	AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/12/85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: A numbering system already exists for maintenance puropses. Operations does not need it for its operators.
[ X ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increases the time and the probability of error for ready coordination designation of a particular annunciator tile. SUGGESTED CORRECTIVE ACTION Label the vertical and horizontal axis of each	RECOMMENDED IMPLEMENTATION         [] Promptly         [] Near Term         [] Optional         MANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.         [] Concur With Comment/Note.         [] Do Not Concur for Following Reason:
annunciator panel. Use the alphabet for the vertical and numerals for the horizontal axis labels.	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: 

	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: None	- CHAIRMAN: A. ADORNO DATE: 3/12/85	
TASK: Control Room Survey	HEO#: 6.3.Ø13	[] Concur With Comment/Note.	
CL: 6.3 CL ITEM: 6.3.3.4c	DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Annunciator Warning Systems	· HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason:	
HEO DESCRIPTION		-   In cases where corrective action is required, an indicator in   near vicinity provides supplementary info.	
GUIDELINE- VISUAL TILE LEGENDS (Specificity): There are tiles that alarm for two conditions, e.	g.,		
"Turbine Generator Lube Oil Conditioner High/Low "FW Heaters 21-24 or 26 High/Low Levels" "Accumulator 21 Level High/Low" "Accumulator 22 Level High/Low Level" "Accumulator 23 Level High/Low Level" "Accumulator 24 Level High/Low Level" "Sea Water Collecting High/Low Level"	Level "		
[] SUPPORT MATERIAL ATTACHED			
POTENTIAL OPERATOR ERROR (S)		- [] Near Term  [] Convenient Outage	
Inability of the operator to identify the directi of the fault.		[] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur.	
SUGGESTED CORRECTIVE ACT	 ION	[X] Concur With Comment/Note.	
Annunciator tiles addressing two conditions that different actions should be split into separate t	require iles.	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: Some non-safety-related alarms do not have indicators, but ARPs adequately address these conditions for all</li> </ul>	
	•	alarms.	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

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	HUMAN ENGINEERING OBSERV	ATION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Weich	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.3.014	[] Concur With Comment/Note.	
CL: 6.3 CL ITEM: 6.3.3.5a	DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Annunciator Warning Systems HED CATEGORY: None		[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight Panel and Superv	isory Panels	Comment/Note/Reason:	
HEO DESCRIPTION		normally reads the tile before going to the acknowledge control.	
GUIDELINE- VISUAL TILE READABILITY (Distance); The reactor first out panel tiles on flight pan cannot be read from the acknowledge control pos The acknowledge control position on supervisory readability on supervisory panels SC. The acknowledge control position on supervisory tile readability on panel SM.	el FA ition at panel FC. SA limits the panel SG limits		
RE: HE0 6.1.011		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		   [] Promptly -   [] Near Term   [] Converient Outage	
		- [] Optional	
Increases the time to respond and the probability of error in reading alarm messages.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.	
SUGGESTED CURRECTIVE A		[] Do Not Concur for Following Reason:	
Review the location of the annunciator controls and add or relocate controls to enable the operator to read all annunciator tiles from the acknowledge control position.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
	· · · · · ·	APPROVE: YES[X] NO[] NOTE:	

UMAN ENGINEERING OBSERVATION ASSESSME

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION			AIT REVIEW	
EVALUATOR: Sabeh/Welch		HED#: None		CHAIRMAN: A. ADURNU DATE: 3/12/85
TASK: Control Room Survey		HEO#: 6.3.015		[] Concur With Comment/Note.
CL: 6.3	CL ITEM: 6.3.3.5a(2)	DATE: 11/4/84 R	EV:	[X] Do Not Concur for Following Reason:
CL TITLE: Annun	ciator Warning Systems	HED CATEGORY: None		[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD L	OCATION: Assessment			Comment/Note/Reason:
	HEO DESCRIPTION			new annunciator.
GUIDELINE- VISU The letter heig tiles is smalle on the flight a	AL TILE READABILITY (Distance): tht on the assessment panel annuncia or than the annunciator tiles locate and supervisory panel.	tor d		
RE: Photo No. 2	2-19			
<b>.</b> * -				RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED				[] Promptly [] Near Term [] Convenient Outage [] Ontional
POTENTIAL OPERATOR ERROR(S)				
Increases the t in reading alar	time to respond and the probability rm messages.	of error		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
	SUGGESTED CORRECTIVE ACT	0N		[] Concur With Comment/Note.
Increase the le Assessment pane annunciator ti	atter heights of the annunciator til al to conform with the letter height les on the flight and Supervisory pa	es on the s of nels.		[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
	·			EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

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	HOWAN ENGINEERING ODSE	
OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: 6.3.002	[X] Concur.
TASK: Control Room Survey	HEO#: 6.3.Ø16	[] Concur With Comment/Note.
CL: 6.3 CL ITEM: 6.3.3.5c(1)	DATE: 11/4/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Annunciator Warning Systems	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight and Supervisory Pane	ls .	Comment/Note/Reason:
HEO DESCRIPTION		
GUIDELINE- VISUAL TILE READABILITY (Legend Contrast Numerous annunciator tile messages (legends) are no engraved but are printed on a varitype tape and stu on the face of the window, e.g., panel SM "Fire Damper."	i) : it ick	
RE: Photo No. 2-33		
		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED		- [] Promptly - [] Near Term [X] Convenient Outage - [] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.
POTENTIAL OPERATOR ERROR (S	»)	
Paper tape peels off and contrast is reduced result increased time and probability of error in reading annunciator message.	ing in	
SUGGESTED CORRECTIVE ACTIO		
Provide engraved legend messages on all annunciator	tiles.	[ ] Do Not Concur for Following Reason:
		[] Reevaluate & Resubmit for Following Reason: 
		Comment/Note/Reason:
	۰ ۰	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88 APPROVE: YES[X] NO[] NOTE:

	HUMAN ENGINEERING OBSER	VATION ASSESSMENT DCRDR-HE0-2	
OBSERVATION	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	AIT REVIEW	
EVALUATOR: Sabeh/Weich	HED#: None	- CHAIRMAN: A. ADORNO DATE: 3/12/85	
TASK: Control Room Survey	HEO#: 6.3.Ø17	   [] Concur With Comment/Note.	
CL: 6.3 CL ITEM: 6.3.4.1a(1)	DATE: 11/4/84 REV:	   [X] Do Not Concur for Following Reason:	
CL TITLE: Annunciator Warning Systems	HED CATEGORY: None	   [] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Assessment	,	Comment/Note/Reason: AIT indicates that the two button annunciator	
HEO DESCRIPTION	• • • • <i>• • • • • • • • • • • • • • • </i>	-   controls are not a problem - this was confirmed by operator query and   control room walk-thru.	
GUIDELINE- CONTROLS (Silence): The two sets of annunciator controls on subpanel does not have a silence pushbutton. The reset p used to silence the alarm.	1 ushbotton is		
	-€°, . 	RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERRO	R(S)	[] Convenient Outage	
Increases the probability of not responding to a annunciator alarm.	י י י	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur.	
SUGGESTED CORRECTIVE AC	гоол	[] Concur With Comment/Note.	
Install a silence pushbutton with the annunciator controls on the assessment panel.		<ul><li>[] Do Not Concur for Following Reason:</li><li>[] Reevaluate &amp; Resubmit for Following Reason:</li></ul>	
•		Comment/Note/Reason:	
	:		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSE	DCRDR-HE0-2	
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.3.018	[] Concur With Comment/Note.	
CL: 6.3 CL ITEM: 6.3.4.1a(2)	DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Annunciator Warning Systems	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Assessment		Comment/Note/Reason: The AIT does not consider this to be a	
HEO DESCRIPTION		to reinforce operators to go to the assessment panel to silence	
GUIDELINE- CONTROLS (Silence): Each set of controls only silences the auditory all signal for the tiles associated with the annunciat control position.	ərt Dr	Re-evaluation concurred with previous results.	
		RECOMMENDED IMPLEMENTATION	
[ ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S)		   [] Promptly   [] Near Term   [] Convenient Outage	
Increases the time and the probability of error in responding to an auditory alert signal. SUGGESTED CORRECTIVE ACTI Provide a capability to silence an auditory alert	DN signal	<ul> <li>[] Uptional</li> <li>MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86</li> <li>[X] Concur.</li> <li>[] Concur With Comment/Note.</li> <li>[] Do Not Concur for Following Reason:</li> </ul>	
from any set of annunciator controls at the primar operating area.	Y	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

DCRDR-HE0-2

#### INDIAN POINT UNIT #2 DETA

DETAILED CONTR	OL RÖOM DESIGN REVIEW			
	· · · · · · · · · · · · · · · · · · ·	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
	OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch		HED#: None	-     [] Concur.	CHAIRMAN: A. ADORNO DATE: 3/12/85
TASK: Control	Room Survey	HEO#: 6.3.019	[] Concur With Co	omment/Note.
CL: 6.3	CL ITEM: 6.3.4.2a	DATE: 11/4/84 REV:	[X] Do Not Concur	for Following Reason:

CL TITLE: Annunciator Warning Systems HED CATEGORY: None [] Reevaluate & Resubmit for Following Reason: CONTROL BOARD LOCATION: Supervisory Comment/Note/Reason: HEO DESCRIPTION

GUIDELINE- Control Set Design (Positioning of Repetitive Groups): The annunciator controls on the Supervisory panel SE has a vertical set of annunciator pushbuttons.

RE: Photo No. 1-14

#### [X] SUPPORT MATERIAL ATTACHED

#### POTENTIAL OPERATOR ERROR(S)

Increase the time and the probability of error in responding to an annunciator alarm.

#### SUGGESTED CORRECTIVE ACTION

Reorient the vertical set of annunciator pushbuttons on subpanel SE to a horizontal position.

AIT indicates that the arrangement was made because space was limited and does not consider this a problem. RECOMMENDED IMPLEMENTATION Promptly Near Term Convenient Outage Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. Do Not Concur for Following Reason: **Г**1 [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile

APPROVE: YES [X] NO [] NOTE:

DATE: 5/19/86

DCRDR-HE0-2

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,	HUMAN ENGINEERING OBSER	VATION ASSESSMENT		
OBSERVATION		AIT REVIEW		
EVALUATOR: Sabeh/Weich HED#: None		[] Concur.		
TASK: Control Room Survey	HEO#: 6.3.020	[] Concur With Comment/Note.		
CL: 6.3 CL ITEM: 6.3.1.4b(2)	DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:		
CL TITLE: Annunciator Warning Systems	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:		
CONTROL BOARD LOCATION: Flight		Comment/Note/Reason:		
HEO DESCRIPTION		concerns. As project proceeds, system will be re-evaluated as		
GUIDELINE- PRIORITIZATION (Priority Coding): Change in status on the permissives indicator p can be easily missed unless some auditory tone chime is used.	ane I or	part of the program.		
RE: 0ER-Ø14				
RE: Photo No. 1-36				
		RECOMMENDED IMPLEMENTATION		
[X] SUPPORT MATERIAL ATTACHED		[] Promptly - [] Near Term		
POTENTIAL OPERATOR ERR	OR (S)	<pre>[] Convenient Outage [] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur [] Concur With Comment/Note.</pre>		
Increases the time and the probability of error responding to a status change on the permissive SUGGESTED CORRECTIVE A	in s panel. CTION			
Incorporate a chime or bell to indicate a chang permissives panel.	e on the	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>		
	· · · · · · · · · · · · · · · · · · ·	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88 APPROVE: YES[X] NO[] NOTE:		

DCRDR-HE0-2

HUMAN ENGINEERING OBSERVATION ASSESSMENT			
OBSERVATIO	N	AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: None	CHAIRMAN: A. ADORNO DATE: 3/12/85	
TASK: Control Room Survey	HEO#: 6.3.021	[] Concur With Comment/Note.	
CL: 6.3 CL ITEM: 6.3.1.2d	DATE: 11/7/84 REV:	[ ] Do Not Concur for Following Reason:	
CL TITLE: Annunciator Warning Systems	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Unit-1		Comment/Note/Reason:	
HEO DESCRIPT.	ION	-	
GUIDELINE- ALARM PARAMETER SELECTION (Mult Many of the IP-1 annunciators of no concer are still active and is a potential source operator detraction from main control board	i-Unit Alarms): n to IP-2 of ds.	-	
RE: 0ER-Ø15			
RE: Photo No. 2-34			
	4 <u>1</u>		
[X] SUPPORT MATERIAL ATTACHED		[] Promotly	
POTENTIAL OPERATOR	R ERROR (S)	- [ ] Near Term   [X] Convenient Outage	
Increases the time to respond to IP-2 contr		- [] Optional	
boards		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Javaraman DATE: 3/25/98	
	· · · · · · · · · · · · · · · · · · ·	[] Concur.	
SUGGESTED CORRECT	IVE ACTION	- [X] Concur With Comment/Note.	
Remove all IP-1 annunciators of no concern	to	- [] Do Not Concur for Following Reason:	
IT-2 operations.		[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason: Recommend 'convenient outage'. An engineering request has been submitted.	
· · · · · · · · · · · · · · · · · · ·			
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

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	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch HED#: None		[] Concur.	
TASK: Control Room Survey	HEO#: 6.3.022	[X] Concur With Comment/Note.	
CL: 6.3 CL ITEM: 6.3.3.2b	DATE: 11/4/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Annunciator Warning Systems	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: AIT wants the comment included that the	
HEO DESCRIPTION		The annunciator system and NRC determined the solution	
GUIDELINE- VISUAL ALARM RECOGNITION AND IDENTIFIC The flash rate does not satisfy the guideline cri three to five flashes per second.	ATION (Flash Rate): teria of		
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[] Promptly [] Near Term [] Convenient Outage	
POTENTIAL OPERATOR ERROR	!(S)		
Delay in responding to an activated alarm. SUGGESTED CORRECTIVE ACTION The analysis performed by Gibbs & Hill to utilize a flash rate of 2 per second by replacing flasher module appears adequate for operator detection of an alarmed tile.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur. - [] Concur With Comment/Note. - [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
	•	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

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### HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

OBSERVATION		AIT REVIEW
EVALUATOR: R. POTTER	HED#: None	[X] Concur.
TASK: VALIDATION	HEO#: 6.3.Ø23	[] Concur With Comment/Note.
CL: 6.3 CL ITEM: 6.3.3.3b	DATE: 10/7/85 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Annunciator Warning Systems	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory Panel SC		Comment/Note/Reason:
HEO DESCRIPTION		
GUIDELINE- ARRANGEMENT OF VISUAL TILES (Functional G Tiles for Condensate Storage Tank Low Level and Condensate Storage Tank Level Hi Lo are not located together.	rouping):	
	2	RECOMMENDED IMPLEMENTATION
[ ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S)		[] Promptly [] Near Term [X] Convenient Outage
Difficulty/delay in locating correct alarm tiles.		
		MANAGEMENT REVIEW/APPRUVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur. - [X] Concur With Comment/Note.
Social Social Connective Action		[] Do Not Concur for Following Reason:
relocate thes so the two are adjacent.		[] Reevaluate & Resubmit for Following Reason:
· · · · · · · · · · · · · · · · · · ·		Comment/Note/Reason: MGT recommends this be done at a 'convenient outage'.
· • •	• • • • • •	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:
	· · · · ·	

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DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HE0-2
OBSERVATION WALUATOR: E. GAGNON ASK: Verification CL: 6.3 CL ITEM: 6.3.3.4a CL TITLE: Annunciator Warning System CONTROL BOARD LOCATION: Supervisory SB-2 HEO DESCRIPTION WIDELINE- VISUAL TILE LEGENDS (Unambigous): the Safeguards annunciator panel contains two annunciator	HED#: 6.3.003 HEO#: 6.3.024 DATE: 5/5/86 REV: HED CATEGORY: C nciators with the same iated at different RWST levels.	AIT REVIEW CHAIRMAN: A. Adorno DATE: 3/12/85 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
[ X ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR( Increase the time and probability of error in response SUGGESTED CORRECTIVE ACTION Revise annunciator legend to show level being annua	5) onding to the alarm. DN nciated.	RECOMMENDED IMPLEMENTATION           [] Promptly         [] Near Term         [X] Convenient Outage         [] Optional         MANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.         [] Concur With Comment/Note.         [] Do Not Concur for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         [] Reevaluate & Resubmit for Following Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: None	-   CHAIRMAN: A. ADORNO DATE: 3/12/85   [] Concur.
TASK: Control Room Survey	HEO#: 6.4.001	[X] Concur With Comment/Note.
CL: 6.4 CL ITEM: 6.4.1.1b(1)	DATE: 11/4/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Controls	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Assessment		Comment/Note/Reason: The space is valuable and when needed unit 1
HEO DESCRIPTION	*	-   equipment will be removed to allow use by unit 2 equipment.
GUIDELINE- GENERAL PRINCIPLES (Economy): Controls not used and belonging to decommissioned U located on the Assessment panel should be removed.	nit 1	
RE: Photo No. 2-17		
		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED	· · · · ·	[] Promptly
POTENTIAL OPERATOR ERROR(S)		[ ] Near Term   [ ] Convenient Outage
Unnecessary use of valuable panel space.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.
SUGGESTED CORRECTIVE ACTIO	N 	- [] Do Not Concur for Following Reason:
Remove Unit 1 controls that are inactive and not of use to Unit 2 operations.	any	[] Reevaluate & Resubmit for Following Reason:
	•	Comment/Note/Reason:
· · · · ·	•	
	· · ·	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HEO-2	
OBSERVATI	N .	AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: None	[X] Concur.	
TASK: Control Room Survey	HED#: 6.4.002	[] Concur With Comment/Note.	
CL: 6.4 CL ITEM: 6.4.1.1c(1)	DATE: 11/4/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Controls	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight Panel		Comment/Note/Reason:	
HEO DESCRIP	TION	-	
GUIDELINE- GENERAL PRINCIPLES (Human Suit The first out panel annunciator controls other annunciator control pushbuttons. T control is a rotary switch that differs f annunciator controls.	ability): differ from he acknowledge rom all other		
RE: Photo No. 1-31			
•		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		   [ ] Promptly   [ ] Near Term	
POTENTIAL OPERAT	DR ERROR (S)	[ ] Convenient Outage   [ ] Optional	
Increases the time and probability of err responding to the first out annunciator p alarm.	or in anel	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTED CORRECTIVE ACTION		[ [] Concur With Comment/Note.	
The rotary switch is used to prevent inad acknowledgement of the first out annuncia This appears to be a satisfactory solution prevent inadvertent acknowledgement.	vertant tor. n to	[ ] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

### DCRDR-HE0-2

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	OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch		HED#: 6.4.001	- CHAIRMAN: DATE: 3/12/85 [X] Concur.
TASK: Control Room Survey	/	HEO#: 6.4.003	[] Concur With Comment/Note.
CL: 6.4 CL I	TEM: 6.4.1.1e(1)	DATE: 11/4/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Supervisory		HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION:			Comment/Note/Reason:
*******************************	HEO DESCRIPTION		-
GUIDELINE- GENERAL PRINC The pushbutton controls o	IPLES (Durability): on subpanel SO are broken	502.	-
			RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL AT	TACHED		[] Promptly
POTENTIAL OPERATOR ERROR(S)		(S)	-   [ ] Near Term   [X] Convenient Outage
Prevents or limits the oppushbotton control.	perators ability to activa	te or deactivate the	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
	SUGGESTED CORRECTIVE ACTI	:0N	- [ ] Concur With Comment/Note.
Replace broken controls w	with new pushbuttons.		- [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
	• •		
		•	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch	HED <b>#</b> : None	[] Concur.
TASK: Control Room Survey	HEO#: 6.4.004	[] Concur With Comment/Note.
CL: 6.4 CL ITEM: 6.4.1.1d	DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Controls	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: Gloves are not worn in the control
HEO DESCR	IPTION	-   room as protective clothing.
GUIDELINE- GENERAL PRINCIPLES (Compatib Operators have no experience using cont dressed in protective clothing.	ility with Emergency Gear): rols while	
RE: HEO 6.2.007		
	and the second second second second second second second second second second second second second second second	RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		   [] Promptly -   [] Near Term   [] Convenient Outage
POTENTIAL OPERATOR ERROR(S)		
Difficulty in operating controls due to experience.	lack of	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur.
SUGGESTED CORR	ECTIVE ACTION	[ [X] Concur With Comment/Note.
Provide operator training using protect equipment.	ive	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: Protective equipment except mask is not required in the CCR.</li> </ul>
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

DCRDR-HE0-2

#### DCRDR-HE0-2 HUMAN ENGINEERING OBSERVATION ASSESSMENT OBSERVATION AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/12/85 EVALUATOR: Sabeh/Welch HED#: None [] Concur. TASK: Control Room Survey HEO#: 6.4.005 [X] Concur With Comment/Note. CL: 6.4 CL\_ITEM: 6.4.1.2a DATE: 11/4/84 REV: [] Do Not Concur for Following Reason: CL TITLE: Controls HED CATEGORY: None [] Reevaluate & Resubmit for Following Reason: CONTROL BOARD LOCATION: Flight Panel on FB Comment/Note/Reason: AIT advised that an ongoing project will correct this condition. HEO DESCRIPTION GUIDELINE- PREVENTION OF ACCIDENTAL ACTIVATION (Proper Location): Changing recorder paper on 507 requires the operator to lean over the console portion of panel FA that could accidently activate govenor 90 and 91 and controllers on FB-118,119,120,121, 122,123,124,125,134,135,136 and 137. RECOMMENDED IMPLEMENTATION Re: Photo No. 2-2 [X] SUPPORT MATERIAL ATTACHED Promptly Near Term POTENTIAL OPERATOR ERROR(S) Convenient Outage [] Optional Increase the probability of accidental activation of govenor coantrols 90 and 91. MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [ ] Do Not Concur for Following Reason: Provide a guard for control 90 and 91 located on the console portion of subpanel FA. [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES [X] NO [ ] NOTE:

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT DCRDR-HE0-2
OBSERV	 ATION	/ AIT REVIEW
EVALUATOR: Sabeh/Welch	 HED#: Non <del>o</del>	- CHAIRMAN: A. ADORNO DATE: 3/12/85
TASK: Control Room Survey	HE0#: 6.4.006	[X] Concur With Comment/Note.
CL: 6.4 CL ITEM: 6.4.1.2a	DATE: 11/4/84 REV:	[ ] Do Not Concur for Following Reason:
CL TITLE: Controls	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight		Comment/Note/Reason: The AIT recommends the use of shape coding.
HEO DESCI	RIPTION	-
GUIDELINE- PREVENTION OF ACCIDENTAL AC The turbine generator base adjustor and breakers 109 and 113 are lined up with identical in shape.	TIVATION (Proper Location): d the exciter field each other and	-
RE: 0ER-Ø17		
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR(S)		-   [ ] Near Term   [ ] Convenient Outage
The location, orientation and shape of accidental activation of a wrong contro	these controls makes of highly likely.	- [X] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORRECTIVE ACTION		[] Concur With Comment/Note.
Provide shape or color coding on one of the operator in differentiating the cor	these controls to aid atrols.	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

#### DCRDR-HE0-2

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OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/12/85	
EVALUATOR: Sabeh/Weich	HED#: Completed	[] Concur.	
TASK: Control Room Survey	HEO#: 6.4.007	[] Concur With Comment/Note.	
CL: 6.4 CL ITEM: 6.4.2	2.1 DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Controls	HED CATEGORY: Comp	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight and	d Supervisory	_Comment/Note/Reason:	
HE0	DESCRIPTION	been put on controllers.	
GUIDELINE- DIRECTION OF MOVEMENT: Controls that violate population Foxboro controllers all increase decrease in a clockwise direction FA; 92,93 and 94 FB; 118,119,120,121,122,123,124,1 132,133,134,135,136 and 137. FC, SC; 19,20,21,22,23,24,25 and 26. SF; 14,15,16,17,18 and 19. SG; 1 RE: DER - 020 RE: HED 6.4.014 RE: Photo No. 2-23 and 1-25 [] SUPPORT MATERIAL ATTACHED POTENTIA Increase the time and the probabi setting control positions.	stereotypes are: in counter clockwise direction and : 25,126,127,128,129,130,131, 62. SB-2; 20. 4. SM; 6. L OPERATOR ERROR(S) lity of error in adjusting and	RECOMMENDED IMPLEMENTATION  [] Promptly [] Near Term [] Convenient Outage [] Optional  MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTE	D CORRECTIVE ACTION	[] Concernmentories.	
Modify the Foxboro controllers to	have the adjustments conform with convention.	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
· · · · · · · · · · · · · · · · · · ·		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
<b>.</b>			

DETAILED CONTROL ROOM DESIGN REVIEW			DCRDR-HE0-2
OBSERVATION	HUMAN ENGINEERING UBSER		
EVALUATOR: Sabeh/Weich	HED#: None	- CHAIRMAN: A. Adorn	no DATE: 3/12/85
TASK: Control Room Survey	HEO#: 6.4.008	[] Concur With Comment/Note.	
CL: 6.4 CL ITEM: 6.4.2.2b	DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reasor	1:
CL TITLE: Controls	HED CATEGORY: None	[] Reevaluate & Resubmit for Followin	ng Reason:
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason: Panel SB-1 is adja	cent to panel SB-2. Controls
HEO DESCRIPTION		_	
GUIDELINE- CODING OF CONTROLS (Location Coding) The RHR valve controls on SB-1; 73,74,75,77,79, should be on SB-2 with other associated RHR ind	: 93,94,95 and 96 icators.		
RE: 0ER-022			
		RECOMMENDED IMPLEM	/ENTATION
[] SUPPORT MATERIAL ATTACHED		<ul> <li>Promptly </li> <li>Promptly </li> <li>Near Term </li> <li>Convenient Outage </li> <li>Optional </li> <li>MANAGEMENT REVIEW/APPROVAL <pre>CHAIRMAN: V. Jayaraman DATE: 3/25/86 </pre> </li> <li>[X] Concur. </li> <li>[] Concur With Comment/Note.  </li> <li>[] Do Not Concur for Following Reason: </li> <li>[] Reevaluate &amp; Resubmit for Following Reason: </li> <li>[] Reevaluate &amp; Resubmit for Following Reason: </li> </ul>	
POTENTIAL OPERATOR ERROR(S)			
Increase time and probability of error in executing safeguard fuctions. 			-aman DATE: 3/25/86
			n: ng Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. E APPROVE: YES[X] NO[] NOTE:	Basile DATE: 5/19/86

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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/12/85	
EVALUATOR: Sabeh/Welch	HED#: None	['] Concur.	
TASK: Control Room Survey	HEO#: 6.4.009	[] Concur With Comment/Note.	
CL: 6.4 CL ITEM: 6.4.3.1c	DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Controls	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Assessment		Comment/Note/Reason: AIT indicates that slippage will not	
HEO DESCRIP	TION	result in a problem, and does not control any plant parameter.	
GUIDELINE- PUSHBUTTON DESIGN PRINCIPLES ( Pushbuttons with smooth surfaces are on t monitoring subpanels: 1,7,8,11,16,29,39,50	Pushbutton Surface): he radiation 07 and 21.		
RE: Photo No. 2-8			
· · · · · · · · · · · · · · · · · · ·		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERROR(S)		[ ] Near lerm [ [] Convenient Outage	
Increases the time and probability of err actuation of pushbuttons.	or for positive	[ ] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTED CORRECTIVE ACTION		[] Concur With Comment/Note.	
Install slip resistant surface on pushbut		[] Do Not Concur for Following Reason:	
		[ ] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
·			
·			
•	,	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
		APPROVE: YES[X] NO[] NOTE:	
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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

	HUMAN ENGLINEERING UDSERT	
OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/12/85
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.
TASK: Control Room Survey	HE0#: 6.4.Ø1Ø	[] Concur With Comment/Note.
CL: 6.4 CL ITEM: 6.4.3.3a	DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Controls	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory SO		Comment/Note/Reason: Pushbuttons are push to test legend lights.
HEO DESCRIPTI	ON	procedures.
GUIDELINE- LEGEND PUSHBUTTONS (Discriminina Legend pushbuttons are not discriminable fr lights pushbuttons 502 on the "Heat Trace a Deluge Alarm" controls.	bility): om legend nd	
RE: HEO 6.5.015		
RE: Photo No. 1-2		
	· · ·	RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR(S)		[] Convenient Outage
Increases the probability of error in contr activation.	ol VE ACTION	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur. [] Concur With Comment/Note.
Provide a coding scheme to discriminate let	rend lights	- [] Do Not Concur for Following Reason:
from legend pushbuttons.		[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
		APPROVE: YES[X] NO[] NOTE:

DCRDR-HE0-2

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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: 6.4.002	[] Concur.
TASK: Control Room Survey	HEO#: 6.4.011	[X] Concur With Comment/Note.
CL: 6.4 CL ITEM: 6.4.3.3b(1)	DATE: 11/4/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Controls	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory	· · · ·	Comment/Note/Reason: AIT notes that this panel is being
HEO DESCRIPTION		- replaced through standard engineering procedures.
GUIDELINE- LEGEND PUSHBUTTONS (Legend): The legend pushbuttons with black letters on a blue background are difficult to read because of the poor color contrast.		-
· · · · · · · · · · · · · · · · · · ·	. 4- 1 .	RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR(S)	***************************************	[X] Convenient Outage
Increases the time and the probability of error in activating a control.		<pre>MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.</pre>
SUGGESTED CORRECTIVE ACTION		- [ ] Do Not Concur for Following Reason:
Change the contrast colors of black on blue to a more discriminable contrast.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

HAWN EXCINEERING OBSERVATION ASSESSMENT         OBSERVATION         ATT REVIEW         CHARM ENCINEERING OBSERVATION ASSESSMENT         CALL COLSPANDING CONTROL DATE: 3/12/85         (I) Concur.         (I) Concur. With Comment/Note.         (I) Concur. With Comment/Note.         (I) Concur. With Comment/Note.         (I) ITTEL CONTROL         (I) DATE: 11/4/84 REY:         (I) Do Not Concur for Following Reason:         (I) DATE: Supervisory         (I) Do Not Concur for Following Reason:         (I) DESCRIPTION         (I) DESCRIPTION         (I) SUPPORT MATERIAL ATTACHED         (I) SUPPORT MATERIAL ATTACHED         (I) SUPPORT MATERIAL ATTACHED         (I) SUPPORT MATERIAL ATTACHED
UBSERVATION       AIT REVIEW         EVALUATOR: Sabeh/Weich       HED#: 6.4.803         TASK: Control Room Survey       HED#: 6.4.812         CL: 6.4       CL ITEM: 6.4.3.3b(5)       DATE: 11/4/84         RECOMPTION       HED CATEGORY: C         CINTROL BOARD LOCATION: Supervisory       HED CATEGORY: C         MITO DESCRIPTION       Concur for Following Reason:         CUIDELINE: LEGEND PUSHBUTTONS (Legend):       HED CESCRIPTION         GUIDELINE: LEGEND PUSHBUTTONS (Legend):       Concur For Following Reason: AIT will elert engineering practices. AIT will elert engineering of the 3 line text limit.         PUTENTIAL OPERATOR ERROR(S)       Improve from and the probability of reading error.         SUGGESTED CORRECTIVE ACTION       Concur With Comment/Note.         SUGGESTED CORRECTIVE ACTION       Improve from three
ENCLONAR: sabely refer       HED#: 6.4.803       [] Concur.         TASK: Control Room Survey       HED#: 6.4.812       [X] Concur. With Comment/Note.         CL: 6.4       CL ITEM: 6.4.3.3b(5)       DATE: 11/4/84       REY:         CL TITLE: Controls       HED CATEGORY: C       [] Do Not Concur for Following Reason:         CONTROL BOARD LOCATION: Supervisory       [] Reevaluate & Resubmit for Following Reason:         CONTROL BOARD LOCATIONS (Legend):       Comment/Note/Net/Note.         Most of the pushbutchs contain more than three lines of lettering (print) on the legend messages on S0; 502.       Comment/Note/Reason: AIT will alert engineering references. AIT will alert engineering of the 3 line text limit.         POTENTIAL OPERATOR ERROR(S)       POTENTIAL OPERATOR ERROR(S)       RECOMENCED IMPLEMENTATION         Increases the time and the probability of reading error.       Concur. With Comment/Note.       [] Concur.         SUGGESTED CORRECTIVE ACTION       SUGGESTED CORRECTIVE ACTION       [] Do Not Concur for Following Reason:       [] Do Not Concur for Following Reason:         [] Do Not Concur for Following Reason:       [] Do Not Concur for Following Reason:       [] Do Not Concur for Following Reason:
IASK: Control Room Survey       HED#: 6.4.012         CL: 6.4       CL ITEM: 6.4.3.3b(5)       DATE: 11/4/84       REV:         CL: 11LE: Controls       HED CATEGORY: C         CONTROL BOARD LOCATION: Supervisory       [] Do Not Concur for Following Reason:         CONTROL BOARD LOCATION: Supervisory       [] Reevaluate & Resubmit for Following Reason:         CONTROL BOARD DESCRIPTION       HED DESCRIPTION         GUIDELINE: LEGEND PUSHBUTTONS (Legend):       Common that three lines of lettering (print) on the legend messages on S0; 502.         RE: HED 6.5.014       RECOMPEDED IMPLEMENTATION         [] SUPPORT MATERIAL ATTACHED       RECOMMEDDED IMPLEMENTATION         [] SUPPORT MATERIAL OPERATOR ERROR(S)       MAXGEMENT REVIEW/APROVAL         [] Optional       Convenient Outage         [] Optional       Concur.         SUGGESTED CORRECTIVE ACTION       [] Concur With Comment/Note.         [] Do Not Concur for Following Reason:       [] Do Not Concur for Following Reason:
CL: 6.4       CL ITEM: 6.4.3.3b(5)       DATE: 11/4/84       REV:         CL ITTLE: Controls       HED CATEGORY: C         CONTROL BOARD LOCATION: Supervisory       I Reevaluate & Resubmit for Following Reason:         CONTROL BOARD LOCATION: Supervisory       I Reevaluate & Resubmit for Following Reason:         CUIDELINE- LEGEND PUSHBUTTONS (Legend):       Comment/Note/Reason: AIT notes that this panel is being replaced through standard engineering practices. AIT will alert engineering of the 3 line text limit.         CUIDELINE- LEGEND PUSHBUTTONS (Legend):       Revise the legend messages on SU; 562.         RE: HEO 6.5.014       POTENTIAL OPERATOR ERROR(5)         Increases the time and the probability of reading error.       POTENTIAL OPERATOR ERROR(5)         SUGGESTED CORRECTIVE ACTION       I Concur.         Revise the legend messages to contain no more than three       I Concur for Following Reason:         Inerease the legend messages to contain no more than three       I Concur for Following Reason:
CL TITLE: Controls       HED CATEGORY: C         CONTROL BOARD LOCATION: Supervisory       [] Reevaluate & Resubmit for Following Reason:         MED DESCRIPTION       GUIDELINE- LEGEDD PUSHBUTTONS (Legend):         Most of the pushbuttons contain more than three lines of lettering (print) on the legend messages on S0; 502.       Comment/Note/Reason: AIT notes that this panel is being replaced through standard engineering practices. AIT will alert engineering of the 3 line text limit.         (] SUPPORT MATERIAL ATTACHED       RECOMENDED IMPLEMENTATION         [] Promptly       Near Term         Near Term       Convenient Outage         [] Concur.       (Deptional         MANAGEMENT REVIEW/APPROVAL       CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.       [] Concur With Comment/Note.         [] Do Not Concur for Following Reason:       [] De Not Concur for Following Reason:
CONTROL BOARD LOCATION: Supervisory       Comment/Note/Reason: AIT notes that this panel is being replaced through standard engineering practices. AIT will alert engineering of the 3 line text limit.         GUIDELINE-LEGEND PUSHBUTTONS (Legend):       Comment/Note/Reason: AIT notes that this panel is being replaced through standard engineering practices. AIT will alert engineering of the 3 line text limit.         GUIDELINE-LEGEND PUSHBUTTONS (Legend):       Mathematication more than three lines of lettering (print) on the legend messages on S0; 502.         RE: HEO 6.5.014       RE: HEO 6.5.014         POTENTIAL OPERATOR ERROR(S)       RECOMMENDED IMPLEMENTATION         Increases the time and the probability of reading error.       Concur.         SUGGESTED CORRECTIVE ACTION       Concur With Comment/Note.         Revise the legend messages to contain no more than three       I Do Not Concur for Following Reason:
HED DESCRIPTION         GUIDELINE- LEGEND PUSHBUTTONS (Legend):         Most of the pushbuttons contain more than three lines of         lettering (print) on the legend messages on SD; 502.         RE: HED 6.5.014         Image: POTENTIAL OPERATOR ERROR(S)         Increases the time and the probability of reading error.         SUGGESTED CORRECTIVE ACTION         Revise the legend messages to contain no more than three         Image: The state of the standard engineering practices. AIT will alert engineering of the 3 line text limit.         Image: The state of the standard engineering practices. AIT will alert engineering of the 3 line text limit.         Image: The state of the standard engineering practices. AIT will alert engineering of the 3 line text limit.         Image: The state of the standard engineering practices. AIT will alert engineering of the 3 line text limit.         Image: The state of the
GUIDELINE- LEGEND PUSHBUTTONS (Legend):         Most of the pushbuttons contain more than three lines of         lettering (print) on the legend messages on S0; 502.         RE: HEO 6.5.014
RE: HEO 6.5.014           [] SUPPORT MATERIAL ATTACHED       RECOMMENDED IMPLEMENTATION         POTENTIAL OPERATOR ERROR(S)       [] Promptly         Increases the time and the probability of reading error.       [] Promptly         WANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/96       [] Concur.         SUGGESTED CORRECTIVE ACTION       [] Concur With Comment/Note.         [] Do Not Concur for Following Reason:       [] Do Not Concur for Following Reason:
[] SUPPORT MATERIAL ATTACHED
[] SUPPORT MATERIAL ATTACHED
[] SUPPORT MATERIAL ATTACHED         POTENTIAL OPERATOR ERROR(S)         Increases the time and the probability of reading error.         SUGGESTED CORRECTIVE ACTION         Revise the legend messages to contain no more than three         Increase of lettering.
[]] SUPPORT MATERIAL ATTACHED         POTENTIAL OPERATOR ERROR(S)         Increases the time and the probability of reading error.         MANAGEMENT REVIEW/APPROVAL (]] Optional         MANAGEMENT REVIEW/APPROVAL (HAIRMAN: V. Jayaraman DATE: 3/25/86)         []] Concur With Comment/Note.         []] Do Not Concur for Following Reason:         []] Do Not Concur for Following Reason:
POTENTIAL OPERATOR ERROR(S) Increases the time and the probability of reading error. SUGGESTED CORRECTIVE ACTION Revise the legend messages to contain no more than three Ines of lettering. Increases the time and the probability of reading error. Increases the time and the probability of time and the probability of time and the probability of time and the probability of time and the probability of time and the probability of time and the probability of time and the probability of time and the probability of time and the probability of time and the probability of time and the probability of time and the probability
Increases the time and the probability of reading error.  Increases the time and the probability of the time and the probability of the time and the time and the time and the time and the time and the time and the time and the time and titerand titerand time and time and time and time and time an
MANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.         SUGGESTED CORRECTIVE ACTION         Revise the legend messages to contain no more than three         [] Do Not Concur for Following Reason:         [] Do Not Concur for Following Reason:         [] Revise the legend messages to contain no more than three
[X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Revise the legend messages to contain no more than three [] Do Not Concur for Following Reason: [] Revise the legend messages to contain no more than three
SUGGESTED CORRECTIVE ACTION [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Ines of lettering. [] Revealunts & R
Revise the legend messages to contain no more than three [] Do Not Concur for Following Reason: [] Do Not Concur for Following Reason: [] Revuelunts & Revuelunts
lines of lettering.
[] Reavaluate & Resubmit for Following Reason:
Comment/Note/Reason:
EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
APPROVE: YES[X] NO[] NOTE:
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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION			AIT REVIEW
EVALUATOR: Sabeh/Welch HED#: 6.4.004		HED#: 6.4.004	[] Concur.
TASK: Control I	Room Survey	HEO#: 6.4.Ø13	[X] Concur With Comment/Note.
CL: 6.4	CL ITEM: 6.4.3.3c(4)	DATE: 11/4/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Cont	rols	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD	LOCATION: Supervisory		Comment/Note/Reason: AIT notes that this panel is being
	HEO DESCRIPTION	······································	alert engineering of the lamp failure criteria.
GUIDELINE- LEGEND PUSHBUTTONS (Provision for Lamp Failure): The legend pushbutton element must be removed for lamp replacement and pushbutton elements are not keyed on S0; 502.			
		•	
			RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED			Promptly
POTENTIAL OPERATOR ERROR(S)			[] Near Term   [X] Convenient Outage   [] Ontional
Pushbutton ele wrong position	ements can be installed in the		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur.
SUGGESTED CORRECTIVE ACTION			- [] Do Not Concur for Following Reason:
Key legend covers to the pushbutton matrix to protect against possibility of interchanging the covers.			[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Engineering to assure that template is provided for multiple light arrays.
	· .		
	· ·		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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DETAILED CONTROL ROOM DESIGN REVIEW		
SERVATION	AIT REVIEW	
HED#: Completed	CHAIRMAN: A. ADORNO DATE: 3/12/85	
HE0#: 6.4.014	[] Concur With Comment/Note.	
.1a DATE: 11/4/84 REV:	[X] Do Not Concur for Following Reason:	
HED CATEGORY: Comp	[] Reevaluate & Resubmit for Following Reason:	
Supervisory	Comment/Note/Reason:	
DESCRIPTION	Problem has been corrected by putting directional   arrows on controllers.	
Adjuster 114. 5,126,127,128,129,130,131,132,133, 2; 20 SC; 19,20,21,22,23,24,25 and 26. . SM; 6.		
	RECOMMENDED IMPLEMENTATION  [] Promptly [] Near Term [] Convenient Outage [] Optional  MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
OPERATOR ERROR (S)		
ity of error in making a		
CORRECTIVE ACTION	<pre> [] Concur With Comment/Note [] Do Not Concur for Following Reason: [] Reevaluate &amp; Resubmit for Following Reason: Comment/Note/Reason:</pre>	
e Foxboro controllers and convention or show a mimic direction.		
	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
	HUMAN ENGINEERING OBSERVATION HED#: Completed HED#: 6.4.014 .1a DATE: 11/4/84 REV: HED CATEGORY: Comp Supervisory DESCRIPTION RINCIPLES (Direction of Activation): n value with a counter value with a adjuster 114. 5,126,127,128,129,130,131,132,133, 2; 20 SC; 19,20,21,22,23,24,25 and 26. . SM; 6. OPERATOR ERROR(S) ity of error in making a CORRECTIVE ACTION a Foxboro controllers and convention or show a mimic direction.	

DCRDR-HE0-2

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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.
TASK: Control Room Survey	HEO#: 6.4.Ø15	[X] Concur With Comment/Note.
CL: 6.4 CL ITEM: 6.4.4.3b	DATE: 11/5/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Controls	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory - Assessment	•	Comment/Note/Reason: The AIT considers this item as not
HEO DESCRIPTION		-   applicable for control room environments.
GUIDELINE- KEY OPERATED CONTROLS (Teeth: Single Row Single row of teeth on keys point downward on: SB-2; 512,515 SN; 502,503,504 Assessment; 29	):	
RE: Photo No. 2-8		
· · · · · · ·	•	RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED	•	[] Promptly
POTENTIAL OPERATOR ERROR(S)		[] Near Term   [] Convenient Outage
The key insert violates the criteria guideline.	,	-   [ ] Uptional
		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
		- [] Concur With Comment/Note.
	//////////////////////////////////////	- [] Do Not Concur for Following Reason:
whether key control is necessary.		[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86

HUMAN ENGINEERING OBSER	VATION ASSESSMENT
	AIT REVIEW
HED#: 6.4.005	[X] Concur.
HEO#: 6.4.016	[] Concur With Comment/Note.
DATE: 11/5/84 REV:	[] Do Not Concur for Following Reason:
HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
1	Comment/Note/Reason:
	RECOMMENDED IMPLEMENTATION
	<pre></pre>
?(S)	
o control 10N	
	HUMAN ENGINEERING OBSER HED#: 6.4.005 HEO#: 6.4.016 DATE: 11/5/84 REV: HED CATEGORY: C (S) control

### HUMAN ENGINEERING OBSERVATION ASSESSMENT

DBSERVATION       AIT REVIEW       GHLTRANN: A. ADDRND DATE: 3/12/05         VALUATUR: Sabeh/Wolch       HEDB: None       [] Concur.         CASK: Control Room Survey       HEDB: 11/5/64       REV:         L: 6.4       CL ITEM: 6.4.4.4c(2)       DATE: 11/5/64       REV:         CONTROL BOND LOCATION: Flight/Supervisory       HED CATEGORY: None       [] Concur With Common/Jobes.         CONTROL BOND LOCATION: Flight/Supervisory       HED CATEGORY: None       [] Reevaluate & Resubmit for Following Reason:         CONTROL BOND LOCATION: Flight/Supervisory       HED DESCRIPTION       Common/Jobe/Asson: AIT reviewed these controls and indicates the control diameter is the correct size for the multiple turn design potentioneter.         CONTROL BOND LOCATION: Flight/Supervisory       HED DESCRIPTION         CONTROL BOND LOCATION: Flight/Supervisory       HED DESCRIPTION         CONTROL BOND LOCATION: Flight/Supervisory       Common/Jobe/Supervisory         MUELDESCRIPTION       Common/Jobe/Supervisory       Common/Jobe/Supervisory         GINELINE: CONTINUOUS ADUSTREET TO THE AND CONTROLS (Dimensione): Thome and for fig. 50, 51, 20, 52, 20, 20, 20, 20, 20, 20, 20, 20, 20, 2		HUWAN ENGINEERING UDSLIN		
VALUATOR: Sabeh/Weich       HEDR: None         YASK: Control Room Survey       HEDR: 6.4.4.617         YASK: Control Room Survey       HEDR: 11/5/64         RE: Controls       HED CATEORY: None         CUTTOL: COATION: Flight/Supervisory       HED CATEORY: None         CUTTOL: DARD LOATION: Flight/Supervisory       Common Model Reason: AIT reviewed these controls and indicates the control diameter is the correct size for the multiple turn design potentioneter.         CUTED. NEE: CONTINUOUS ADJECTED NEW CONTINUOUS (Dimensione):       Common Model Reason: AIT reviewed these controls and indicates the control diameter is the correct size for the multiple turn design potentioneter.         CUTED. NEE: CONTINUOUS ADJECTED NEW CONTINUOUS (Dimensione):       Common Model Reason: AIT reviewed these controls and indicates the control diameter.         CUTED. NEE: CONTINUOUS ADJECTED NEW CONTINUOUS (Dimensione):       Common Model Reason: AIT reviewed these control is and indicates the control diameter.         CUTED. NEE: CONTINUOUS ADJECTED NEW CONTINUOUS (Dimensione):       Recomment/Model Reason:         Control diameter of 1 inch on the Footboro 5:       Statistical and the secondary of the multiple turn         Control diameter of 1 inch on the Footboro 5:       Statistical and the secondary of the multiple turn         Control diameter of 1 inch on the Footboro 5:       Statistical and the secondary of the multiple turn         Control diameter of 1 inch on the Footboro 5:       Statistical and the secondary of the multinconter	OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/12/85	
ASK: Cohrol Room Survey     HEDB: 6.4.917       L: 6.4.     CL ITEM: 6.4.4.4c(2)     DATE: 11/6/64       L: TTLE: Cohrols     HED CATEGORY: None       (M Do Not Concur With Comment/Note.       CONTROL BOARD LOCATION: Flight/Supervisory       (L: DECREPTION       (M DO NOT LOCATION: Flight/Supervisory       (M DO SUPPERTING NOTION: S (Dimensione):       (MIDDELINE: CONTINUOUS ADJUSTMENT ROTARY CONTROLS (Dimensione):       (MIDDELINE: 12/25/25/26.12/125/129/139/139/139/139/139/139/139/139/139/13	VALUATOR: Sabeh/Welch HED#: None		[] Concur.	
1: 6.4.       CL ITDL: 6.4.4.4c(2)       DATE: 11/5/64       REY:         L: 5.4.       HED CATEGORY: None         CONTROL ECANDIS       HED CATEGORY: None         CONTROL ECANDIS       FLGDESCRIPTION         (K) Do Not Concur for Following Reason:         CONTROL ECANTINUE ADLATION: Flight/Supervisory         (K) Do Not Concur for Following Reason:         CONTROL ECANTINUE ADLATION: Flight/Supervisory         (K) Do Not Concur for Following Reason:         CONTROL ECANTINUE ADLATION         (K) Do Not Concur for Following Reason:         CONTROL ECANTINUE FORMATION         (K) Do Not Concur for Following Reason:         (Control tameter of 1 inch on the Forboro's:         (K) Do Not Concur for Following Reason:         (K) CONTREL CONNECTIVE ACTION         (K) CONNECTIVE ACTION         (K) CONNECTIVE ACTION         (K) Concur for Following Reason: <t< th=""><th>TASK: Control Room Survey</th><th>HEO#: 6.4.Ø17</th><th>[] Concur With Comment/Note.</th></t<>	TASK: Control Room Survey	HEO#: 6.4.Ø17	[] Concur With Comment/Note.	
L TITLE: Controls       HED CATEGORY: None         CONTROL BDARD LOCATION: Flight/Supervisory	CL: 6.4 CL ITEM: 6.4.4.4c(2)	DATE: 11/5/84 REV:	[X] Do Not Concur for Following Reason:	
CONTROL BUARD LUCATION: Flight/Supervisory  HED DESCRIPTION  HED DESCRIPTION  CONTROLTS ADLETION TOTARY CONTROLS (Dimensions): the control of aimster is the correct size for the multiple turn design potentiometer.  Comment/Note/Resson: AIT reviewed these controls and indicates the control of aimster is the correct size for the multiple turn design potentiometer.  Comment/Note/Resson: AIT reviewed these controls and indicates the control of aimster is the correct size for the multiple turn design potentiometer.  Comment/Note/Resson: AIT reviewed these controls and indicates the control of aimster is the correct size for the multiple turn design potentiometer.  Comment/Note/Resson: AIT reviewed these controls and indicates the control of aimster is the correct size for the multiple turn design potentiometer.  Comment/Note/Resson: AIT reviewed these controls and indicates the control of aimster is the correct size for the multiple turn design potentiometer.  Comment/Note/Resson: AIT reviewed these controls and indicates the control of aimster is the correct size for the multiple turn design potentiometer.  Comment/Note/Resson: AIT reviewed these controls and indicates the control of aimster is the correct size for the multiple turn design potentiometer.  Comment/Note/Resson: AIT reviewed these controls and indicates the control of aimster is the correct size for the multiple turn design potentiometer.  Comment/Note/Resson: AIT reviewed these controls and indicates the control of aimster is the correct size for the multiple turn design potentiometer.  Comment/Note/Resson: AIT reviewed these controls and indicates the control of aimster is the correct size for the multiple turn  (I) Promptly hear Term Conventent Undage (I) Concur With Comment/Note.  Increase the diameter size of the Foxboro continuous adjustment rotary controls.  Defective Review Chainwan: J, Basile DATE: 5/19/86 APPROVE: YES[X] ND[] NDTE:	CI TITIF: Controls	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
HED DESCRIPTION       design potentioneter.         QUIDELINE- CONTINUOUS ADJUSTMENT ROTARY CONTROLS (Dimensions): Thumb and forfinger encircled knobs do not have as minimum diameter of 1 inch on the Foxboro's: FR 92,93,94,138,138 and 12. FC; 62. SB-2; 20. SC; 19,20,21,22,24,75 and 25. SC; 19,20,21,22,24,75 and 25. SC; 19,20,21,22,24,75 and 25. FC 108,113,102,132,113,138,138 and 12. FC; 62. SB-2; 20. SC; 19,20,21,22,24,75 and 25. FC 108,113,102,132,124,125,126,127,126,126,127,126,127,126,127,126,127,126,127,126,127,126,127,126,127,126	CONTROL BOARD LOCATION: Flight/Supervisory		Comment/Note/Reason: AIT reviewed these controls and indicates - the control diameter is the correct size for the multiple turn	
GUIDELING- CONTINUES ADJUSTMENT RUTARY CONTROLS (Dimensions):         Thumb and forfinger encircled knobt do nob have a minimum dimenter of 1 inch to the Footboro's:         FA; 29, 29, 30, 40         FA; 29, 29, 30, 41         SC; 19, 200, 21, 22, 212, 122, 123, 124, 125, 128, 127, 128, 129, 130, 133, 134, 135, 136 and 137. FC; 22. SB-2; 28. SS; 14, 15, 16, 17, 18 and 19. SC; 14. SM; 6.         RE: Photo No. 1-34         [X] SUPPORT MATERIAL ATTACHED         POTENTIAL OPERATOR EMROR(S)         Increase probability of alignment error on control positioning.         SUGGESTED CORRECTIVE ACTION         Concernent/Note.         SUGGESTED CORRECTIVE ACTION         Increase the diameter size of the Foxboro continuous adjustment rotary controls.         SUGGESTED CORRECTIVE ACTION         Increase the diameter size of the Foxboro continuous adjustment rotary controls.	HEO DESCRIPTION		design potentiometer.	
RE: Photo No. 1-34       RE: ONDED TAPLEMENTATION         [X] SUPPORT MATERIAL ATTACHED       POTENTIAL OPERATOR ERROR(S)         Increase probability of alignment error on control       Optional         WANAGEMENT REVIEW/APPROVAL       CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.       [] Concur With Comment/Notes.         SUGGESTED CORRECTIVE ACTION       [] Do Not Concur for Following Reason:         Increase the diameter size of the Foxboro continuous adjustment rotary controls.       [] Reevaluate & Resubmit for Following Reason:         [] Reevaluate & Resubmit for Following Reason:       Comment/Note/Reason:         [] EXECUTIVE REVIEW       CHAIRMAN: J. Basile         DATE: 5/19/86       APPROVE: YES[X] NO[] NOTE:	GUIDELINE- CONTINUOUS ADJUSTMENT ROTARY CONTROLS Thumb and forfinger encircled knobs do not have minimum diameter of 1 inch on the Foxboro's: FA; 92,93,94. FB; 118,119,120,121,122,123,124,125,126,127,128, 131,132,133,134,135,136 and 137. FC; 62. SB-2; SC; 19,20,21,22,23,24,25 and 26. SF: 14.15.16.17.18 and 19. SG; 14. SM; 6.	(Dimensions): a 129,130, 20.		
[X] SUPPORT MATERIAL ATTACHED         POTENTIAL OPERATOR ERROR(S)         Increase probability of alignment error on control         Dositioning.         SUGGESTED CORRECTIVE ACTION         Increase the diameter size of the Foxboro continuous         adjustment rotary controls.         EXECUTIVE REVIEW         Chairmann, Note/Reason:         EXECUTIVE REVIEW         CHAIRMAN: J. Basile         DATE: 5/19/86	RE: Photo No. 1-34 [X] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S)		RECOMMENDED IMPLEMENTATION	
POTENTIAL OPERATOR ERROR(S)       [] Conventent observed         Increase probability of alignment error on control       [] Chillman         Dobional       CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.       [] Concur With Comment/Note.         SUGGESTED CURRECTIVE ACTION       [] Do Not Concur for Following Reason:         Increase the diameter size of the Foxboro continuous       [] Reevaluate & Resubmit for Following Reason:         [] Reevaluate & Resubmit for Following Reason:       [] Reevaluate & Resubmit for Following Reason:         [] EXECUTIVE REVIEW       CHAIRMAN: J. Basile       DATE: 5/19/86         APPROVE: YES[X] NO[] NOTE:       [] NOTE:			[] Promptly [] Near Term [] Converient Outage	
Increase probability of alignment error on control positioning. MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88 APPROVE: YES[X] NO[] NOTE:			[] Conventent Outage - [] Optional	
Increase the diameter size of the Foxboro continuous adjustment rotary controls.       [] Do Not Concur for Following Reason:         [] Reevaluate & Resubmit for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:         [] Do Not Concur for Following Reason:       Comment/Note/Reason:	Increase probability of alignment error on cont positioning.	rol 	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur. [] Concur With Comment/Note.	
Increase the diameter size of the Foxbold Collonados         adjustment rotary controls.         []] Reevaluate & Resubmit for Following Keason:         Comment/Note/Reason:         EXECUTIVE REVIEW         CHAIRMAN: J. Basile         DATE: 5/19/86         APPROVE: YES[X] NO[] NOTE:	Sould the Eavhand onti		[] Do Not Concur for Following Reason:	
EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	adjustment rotary controls.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:				
EXECUTIVE REVIEW CHAIRWAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:				
APPROVE: YES[X] NO[] NOTE:		.*	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
			APPROVE: YES [X] NO [] NOTE:	
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HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch HED#: None		- CHAIRMAN: A. ADORNO DATE: 3/12/85
TASK: Control Room Survey HEO#: 6.4.018		[] Concur With Comment/Note.
CL: 6.4 CL ITEM: 6.4.4.5d(2)	DATE: 11/5/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Controls	HED CATEGORY: None	   [] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight/Supervisory		Comment/Note/Reason: ATT examined the switches and identified
HEO DESCRIPTIO	N	- them as spring return to center. The red and green lights provide information on the control action. (NA)
GUIDELINE- ROTARY SELECTOR CONTROLS (Position Indication): Controls on subpanels FA,FB,FC,SB-1 and SH that obscure set position of rotary control are: FA; 86,89. FB; 102,103,104,105,108,109,110 and 111. FC; 77. SB-1; 23,24,71. SH; 23,24 and 31.		-
RE: Photo No. 2-23		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED		
POTENTIAL OPERATOR	ERROR (S)	-   [] Near Term   [] Convenient Outage -   [] Optional 
Increases the probability of alignment error	on	
		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.
SUGGESTED CORRECTIVE ACTION		
Extend the set position marking to permit the operator to identify the control position easily.		[] Do Not Concur for Following Reason:
		[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
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		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
		APPROVE: YES[X] NO[] NOTE:

### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION	AIT REVIEW	
VALUATOR: Sabeh/Welch HED#: None	[] Concur.	
TASK: Control Room Survey HEO#: 6.4.019	[] Concur With Comment/Note.	
CL: 6.4 CL ITEM: 6.4.4.5e(3) DATE: 11/5/84 REV:	[X] Do Not Concur for Following Reason:	
L TITLE: Controls HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight/Assessment Panels	Comment/Note/Reason: AIT examined the equipment and reveal that	
HEO DESCRIPTION	needed.	
GUIDELINE- ROTARY SELECTOR CONTROLS (Dimensions): The rotary selector controls that do not satisfy the minimum diameter size of one (1) inch are: FD; 2 Assessment; 1,7,8,11,16,39,507.		
RE: Photo No. 2-9		
	RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED	[] Promptly	
POTENTIAL OPERATOR ERROR(S)	[ ] Near Term   [ ] Convenient Outage	
Increases the probability of alignment error for control positioning.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X]. Concur. [] Concur With Comment/Note.	
SUGGESTED CORRECTIVE ACTION	- [] Do Not Concur for Following Reason:	
Increase the diameter size of the rotary selector controls.	[] Reevaluate & Resubmit for Following Reason:	
	Comment/Note/Reason:	
	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
	APPROVE: YES[X] NO[] NOTE:	
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OBSERVATION EVALUATOR: R. POTTER TASK: VALIDATION CL: 6.4 CL ITEM: 6.4.1.1 CL TITLE: Controls CONTROL BOARD LOCATION: Supervisory Panel SF HEO DESCRIPTION GUIDELINE- GENERAL PRINCIPLES (Economy): Excess letdown system is not functioning, therefore excess letdown controls do not work properly and procedure E-1, step 26h alternate cannot bo	HUMAN ENGINEERING OBSEF HED#: None HEO#: 6.4.020 DATE: 10/15/85 REV: HED CATEGORY: None	AIT REVIEW AIT REVIEW CHAIRMAN: A. Adorno DATE: 12/10/85 [] Concur. [X] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: This is a maintenance problem which should be corrected.
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S Delay in executing operating procedure. SUGGESTED CORRECTIVE ACTIO Correct the inoperative system or label the control as non-operative and change the procedure to eliminate excess letdown operations.	2) N S	RECOMMENDED IMPLEMENTATION         Promptly         Near Term         X1 Convenient Outage         Optional         WNAGEMENT REVIEW/APPROVAL         Chairman         Data         Concur         Chairman         Data         Concur         Basile         Date:         Statistic         Date:         Concur         With Comment/Note.         Data         Concur         Team recommends this be done at a 'convenient outage'.         Executive Review       CHAIRMAN: J. Basile         DATE:       5/19/86         APPROVE:       YES[X] ND[] NOTE:

HUMAN ENGINEERING OBSERVATION ASSESSMENT AIT REVIEW OBSERVATION CHAIRMAN: A. Adorno DATE: 3/20/86 HED#: None [] Concur. EVALUATOR: Welch/Sabeh/Potter [] Concur With Comment/Note. TASK: Verification HEO#: 6.4.021 [X] Do Not Concur for Following Reason: DATE: 12-12-85 REV: CL ITEM: 6.4.1.1a CL: 6.4 [] Reevaluate & Resubmit for Following Reason: HED CATEGORY: None CL TITLE: Controls Comment/Note/Reason: CONTROL BOARD LOCATION: Supervisory SG Continous adjustment is not required or called for. ON/OFF control HEO DESCRIPTION is correct control. GUITDEL THE- GENERAL PRINCIPLES (Adequacy): Control devices 14.013 & 14.015 to adjust RHR flow are discrete controls not capable of continous adjustment. RECOMMENDED IMPLEMENTATION Promptly [X] SUPPORT MATERIAL ATTACHED Near Term Convenient Outage POTENTIAL OPERATOR ERROR(S) [] Optional \_\_\_\_\_ Inability to adjust the flow continously. MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. \_\_\_\_\_ [] Concur With Comment/Note. \_\_\_\_\_ SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: Replace the discrete (position) control with a continous control. [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES [X] NO [ ] NOTE:

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HUMAN ENGINEERING OBSERVAT	ION ASSESSMENT	
OBSERVATION         EVALUATOR: Sabeh/Weich       HED#: 6.4.006         TASK: Control Room Survey       HED#: 6.4.002         CL: 6.4       CL ITEM: 6.4.2.1       DATE: 11/4/84         CL TITLE: Controls       HED CATEGORY: C         CONTROL BOARD LOCATION: Flight/Supervisory       HEO DESCRIPTION         GUIDELINE- DIRECTION OF MOVEMENT:         Controls that violate population stereotypes are:         Rotary control selector switches on:         SJ; 505 = control position manual-off auto         SF: 36,37 = auto-off-hand         SB-1: 104,105 = on-off         FC; 54,55,56 and 57 = Hi-Lo	AIT REVIEW CHAIRMAN: A. Adorno DATE: 3/12/85 [] Concur. [X] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: AIT recommends each control be evaluated on a case by case basis.	
SC; 55 and 56 = open at left, close at right SC; 59,61,63,65,68,70,72 and 74 = close-open - rod bypass RE: UER - 020 RE: HE0 6.4.014 RE: Photo No. 2-23 and 1-25 [] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increase the time and the probability of error in adjusting and setting control positions. SUGGESTED CORRECTIVE ACTION Modify to have all rotary control positions in the same location with off or low at the left, on or high at the right and auto or bypass at the center.	RECOMMENDED IMPLEMENTATION          Image: Promptly         Image: Near Term         [Image: Convenient Outage         Image: Optional         MANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.         [Image: Concur With Comment/Note.         [Image: Do Not Concur for Following Reason:         [Image: Comment/Note & Resubmit for Following Reason:         [Image: Comment/Note/Reason:         Comment/Note/Reason:         EXECUTIVE REVIEW       CHAIRMAN: J. Basile         DATE: 5/19/86	

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## HUMAN ENGINEERING OBSERVATION ASSESSMENT

AIT REVIEW OBSERVATION CHAIRMAN: A. ADORNO DATE: 3/12/85 [] Concur. HED#: None EVALUATOR: Sabeh/Welch [] Concur With Comment/Note. HEO#: 6.4.023 TASK: Control Room Survey [X] Do Not Concur for Following Reason: REV: DATE: 11/4/84 CL ITEM: 6.4.2.1 CL: 6.4 [] Reevaluate & Resubmit for Following Reason: HED CATEGORY: None a TITLE: Controls Comment/Note/Reason: CONTROL BOARD LOCATION: Flight/Supervisory This action is consistent with Con Edison convention. \_\_\_\_\_ HED DESCRIPTION GUIDELINE- DIRECTION OF MOVEMENT: Controls that violate population stereotypes are: FA; 90 and 91 = raise-off - lower RE: HE0 6.4.014 RE: 0ER - 020 RE: Photo No. 2-23 and 1-25 RECOMMENDED IMPLEMENTATION Promptly [] SUPPORT MATERIAL ATTACHED Near Term Convenient Outage POTENTIAL OPERATOR ERROR(S) Optional \_\_\_\_ Increase the time and the probability of error in adjusting and -3... MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 setting control positions. [X] Concur. [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: Locate lower on the left, raise on the right and off [] Reevaluate & Resubmit for Following Reason: at the center. Comment/Note/Reason: DATE: 5/19/86 CHAIRMAN: J. Basile EXECUTIVE REVIEW APPROVE: YES [X] NO[] NOTE:

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OBSERVATION       ATT REVIEW         ATT REVIEW         EVALUATOR: Sabeh/Welch       HED#: None       [] Concur.         TASK: Control Room Survey       HED#: 6.5.0001       [X] Concur With         CL: 6.5       CL ITEM: 6.5.1.1c       DATE: 11/5/84       REV:       [] Do Not Conc         CL TITLE: Visual Displays       HED CATEGORY: None       [] Reevaluate         CONTROL BOARD LOCATION: Assessment Panel       Comment/Note/Rei         MED DESCRIPTION       Image: Control Board IP-1 instrumentation located in the center       notes that equip         GUIDELINE- INFORMATION TO BE DISPLAYED (Unnecessary Information):       Decommissioned IP-1 instrumentation located in the center       notes that equip         and on the right side of the assessment panel is surplus.       RE: Photo No. 2-16       [] Promptly         Image: POTENTIAL OPERATOR ERROR(S)       [] Promptly       Near Term         Excess and unnecessary controls and displays causes panel clutter (increases operator search time for panel clutter (increases operator search time for SUGGESTED CORRECTIVE ACTION       [] Concur.       [] Concur.         SUGGESTED CORRECTIVE ACTION       [] Do Not Concur.       [] Do Not Concur.         [] Do Not Concurse unnecessary IP-1 instrumentation.       [] Do Not Concur.	CHAIRMAN: A. ADORNO DATE: 3/12/85 Comment/Note. ur for Following Reason: & Resubmit for Following Reason: son: AIT does not consider this a problem and ent from Unit 1 is removed on an as	
EVALUATOR: Sabeh/Welch       HED#: None       [] Concur.         TASK: Control Room Survey       HED#: 6.5.001       [X] Concur Witl         CL: 6.5       CL ITEM: 6.5.1.1c       DATE: 11/5/84       REV:       [] Do Not Concur.         CL TITLE: Visual Displays       HED CATEGORY: None       [] Reevaluate         CONTROL BOARD LOCATION: Assessment Panel       Comment/Note/Reinots that equipmeeded basis.         GUIDELINE- INFORMATION TO BE DISPLAYED (Unnecessary Information):       Descommissioned IP-1 instrumentation located in the center         and on the right side of the assessment panel is surplus.       [] Promptly         RE: Photo No. 2-16       [] Promptly         Excess and unnecessary controls and displays causes       [] Optional         manel clutter (increases operator search time for       [] Concur.         Unit 2 information). Occupies valuable panel space.       [] Concur.         SUGGESTED CORRECTIVE ACTION       [] Do Not Concur.         [] Do Not Concur.       [] Do Not Concur.	CHAIRMAN: A. ADORNO DATE: 3/12/85 Comment/Note. uur for Following Reason: & Resubmit for Following Reason: son: AIT does not consider this a problem and ent from Unit 1 is removed on an as	
TASK: Control Room Survey       HEO#: 6.5.001       [X] Concur Witl         CL: 6.5       CL ITEM: 6.5.1.1c       DATE: 11/5/84       REV:       [] Do Not Con         CL TITLE: Visual Displays       HED CATEGORY: None       [] Reevaluate         CONTROL BOARD LOCATION: Assessment Panel       [] Reevaluate         Comment/Note/Rei         MED DESCRIPTION       [] Reevaluate         GUIDELINE- INFORMATION TO BE DISPLAYED (Unnecessary Information):       Comment/Note/Rei         Decommissioned IP-1 instrumentation located in the center       and on the right side of the assessment panel is surplus.         RE: Photo No. 2-16       POTENTIAL OPERATOR ERROR(S)       [] Promptly         Excess and unnecessary controls and displays causes       panel clutter (increases operator search time for       [] Concur.         Unit 2 information). Occupies valuable panel space.       [] Concur.       [] Concur.         SUQCESTED CORRECTIVE ACTION       [] Do Not Concur.         [] Do Not Concur.       [] Do Not Concur.	Comment/Note. ur for Following Reason: & Resubmit for Following Reason: son: AIT does not consider this a problem and ent from Unit 1 is removed on an as	
CL: 6.5       CL ITEM: 6.5.1.1c       DATE: 11/5/84       REV:       [] Do Not Convert         CL TITLE: Visual Displays       HED CATEGORY: None       [] Reevaluate         CONTROL BOARD LOCATION: Assessment Panel       Interpretation       Interpretation         HED DESCRIPTION       Interpretation       Interpretation       Interpretation         GUIDELINE- INFORMATION TO BE DISPLAYED (Unnecessary Information):       Decommissioned IP-1 instrumentation located in the center and on the right side of the assessment panel is surplus.       Interpretation       Interpretation         RE: Photo No. 2-16       POTENTIAL OPERATOR ERROR(S)       Interpretation       Interpretation         Excess and unnecessary controls and displays causes panel clutter (increases operator search time for Unit 2 information). Occupies valuable panel space.       Image: Concur.       Image: Concur.         SUGGESTED CORRECTIVE ACTION       Image: Concur.       Image: Concur.       Image: Concur.         Remove unnecessary IP-1 instrumentation.       Image: Concur.       Image: Concur.       Image: Concur.	eur for Following Reason: & Resubmit for Following Reason: son: AIT does not consider this a problem and ent from Unit 1 is removed on an as	
CL TITLE: Visual Displays       HED CATEGORY: None       [] Reevaluate         CONTROL BOARD LOCATION: Assessment Panel       Comment/Note/Reimote state equipment and on the right side of the assessment panel is surplus.       Comment/Note/Reimote state equipment and on the right side of the assessment panel is surplus.         RE: Photo No. 2–16       [] Promptly         POTENTIAL OPERATOR ERROR(S)       [] Promptly         Excess and unnecessary controls and displays causes panel clutter (increases operator search time for Unit 2 information). Occupies valuable panel space.       [] Concur.         SUGGESTED CORRECTIVE ACTION       [] Do Not Concertive Action	& Resubmit for Following Reason: son: AIT does not consider this a problem and ent from Unit 1 is removed on an as	
CONTROL BOARD LOCATION: Assessment Panel       Comment/Note/Reinotes that equip needed basis.         MED DESCRIPTION       Internation (cated in the center and on the right side of the assessment panel is surplus.       Comment/Note/Reinotes that equip needed basis.         RE: Photo No. 2-18       Internation (cated in the center and on the right side of the assessment panel is surplus.       Image: Comment/Note/Reinotes that equip needed basis.         [:X] SUPPORT MATERIAL ATTACHED       Image: Conventent of the center and on the right side of the assessment panel is surplus.       Image: Conventent of the center and on the right side of the assessment panel is surplus.         [:X] SUPPORT MATERIAL ATTACHED       Image: Conventent of the center and on the right side of the assessment panel is surplus.       Image: Conventent of the center and on the right side of the assessment panel is surplus.         [:X] SUPPORT MATERIAL ATTACHED       Image: Conventent of the center and displays causes panel clutter (increases operator search time for unit 2 information). Occupies valuable panel space.       Image: Conventent of the center and displays causes panel space.         [:] Concur With SUGGESTED CORRECTIVE ACTION       [:] Concur With [:] Do Not Concertain the center and the ce	son: AIT does not consider this a problem and ent from Unit 1 is removed on an as	
HED DESCRIPTION       notes that equip needed basis.         GUIDELINE- INFORMATION TO BE DISPLAYED (Unnecessary Information):       notes that equip needed basis.         GUIDELINE- INFORMATION TO BE DISPLAYED (Unnecessary Information):       notes that equip needed basis.         and on the right side of the assessment panel is surplus.	ent from Unit 1 is removed on an as	
CUIDELINE- INFORMATION TO BE DISPLAYED (Unnecessary Information): Decommissioned IP-1 instrumentation located in the center and on the right side of the assessment panel is surplus.         RE: Photo No. 2-18         [.X] SUPPORT MATERIAL ATTACHED         POTENTIAL OPERATOR ERROR(S)         Excess and unnecessary controls and displays causes panel clutter (increases operator search time for Unit 2 information). Occupies valuable panel space.         SUGGESTED CORRECTIVE ACTION         Remove unnecessary IP-1 instrumentation.		
RE: Photo No. 2-16		
[.X] SUPPORT MATERIAL ATTACHED       [] Promptly         POTENTIAL OPERATOR ERROR(S)       [] Promptly         Excess and unnecessary controls and displays causes       [] Optional         panel clutter (increases operator search time for       [] Optional         Unit 2 information). Occupies valuable panel space.       [X] Concur.         SUGCESTED CORRECTIVE ACTION       [] Do Not Concer         [] Do Not Concer       [] Do Not Concer		
[.X] SUPPORT MATERIAL ATTACHED       [] Promptly         POTENTIAL OPERATOR ERROR(S)       [] Promptly         Excess and unnecessary controls and displays causes       [] Optional         panel clutter (increases operator search time for       [] Optional         Unit 2 information). Occupies valuable panel space.       [X] Concur.         SUGGESTED CORRECTIVE ACTION       [] Do Not Concur         [] Do Not Concur       [] Do Not Concur		
[.X] SUPPORT MATERIAL ATTACHED       [] Promptly         POTENTIAL OPERATOR ERROR(S)       [] Near Term         Excess and unnecessary controls and displays causes       [] Optional         panel clutter (increases operator search time for       [] MANAGEMENT REVIEW         Unit 2 information). Occupies valuable panel space.       [X] Concur.         SUGGESTED CORRECTIVE ACTION       [] Do Not Concer         [] Do Not Concer       [] Do Not Concer	RECOMMENDED IMPLEMENTATION	
POTENTIAL OPERATOR ERROR(S)  Excess and unnecessary controls and displays causes panel clutter (increases operator search time for Unit 2 information). Occupies valuable panel space.  SUGGESTED CORRECTIVE ACTION  Remove unnecessary IP-1 instrumentation.		
Excess and unnecessary controls and displays causes panel clutter (increases operator search time for Unit 2 information). Occupies valuable panel space.       I J Optional MANAGEMENT REVIEN [X] Concur.         SUGGESTED CORRECTIVE ACTION       [] Concur With [] Do Not Concur         Remove unnecessary IP-1 instrumentation.       [] Do Not Concur	- [ ] Convenient Outage	
SUGGESTED CORRECTIVE ACTION	- [] Uptional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note	
Remove unnecessary IP-1 instrumentation.	- [ ] Do Not Concur for Following Reason:	
[] Reevaluate Comment/Note/Rea	& Resubmit for Following Reason: son:	
EXECUTIVE REVIEW APPROVE: YES[X]	CHAIRMAN: J. Basile DATE: 5/19/86 NO[] NOTE:	

DCRDR-HF0-2

HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

- 2

OBSERVATION		AIT REVIEW	
VALUATOR: Sabeh/Welch HED#: None		[] Concur.	
ASK: Control Room Survey HEO#: 6.5.002		[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.1.2b	DATE: 11/5/84 REV:	[X] Do Not Concur for Following Reason:	
L TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight Panel		Comment/Note/Reason: AIT does not consider it to be in the best	
HEO DESCRIPTION		interest to operations to change the configuration. Provisions are available for accurate analogue indication of any rod position.	
UIDELINE- USABILITY OF DISPLAYED VALUES (ELIMID C = Rod Position Indicators 508,509,510,511,512 require the operator to read inches and divide b step position when moving the control rods.	ATION OF OPERATOR CONVERSION): 2,513,514,515 and 516 y 5/8 to determine rod	<ul> <li>Instrumentation to convert would reduce the overall reliability of the system.</li> <li>Re-evaluation concurred with previous results.</li> </ul>	
E: Photo No. 1-35			
RE: 0ER Ø24	· _	•	
		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		   [] Promptly   [] Near Term   [] Convenient Outage	
POTENTIAL OPERATOR ERRO	)R(S)		
Increased time and probability of error in arrivosition when moving control rods.	ving at rod step	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTED CORRECTIVE ACTION		[] Concur With Comment/Note.	
Provide instrumentation of rod step position the	at does not	- [ ] Do Not Concur for Following Reason:	
require operator conversion.		[] Reevaluate & Resubmit for Following Reason: 	
		Comment/Note/Reason:	
· · · ·	•		
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	·		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
		APPROVE: YES [X] NO [ ] NOTE:	
· · ·	· .		

DETAILED CONTROL ROUM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.
TASK: Control Room Survey	HEO#: 6.5.003	[] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.1.3a	DATE: 11/5/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight Panel/Supervisor	ry Panel	Comment/Note/Reason: AIT determined that these are backlighted lights
HEO DESCRIPTION		
GUIDELINE- READABILITY (CHARACTER HEIGHT): Character heights on instruments that do not me Pane! "SO" bi-stable light indicator 501 and le Panel "FC" rod botton lights 504,505,508,509,5: 518.	eet the guidline criteria are: egend pushbottons 502. 10,511,512,513,514,515 and	•
RE: Photo No. 1-35		
· · · · · ·		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED	- · ·	[] Promptly
POTENTIAL OPERATOR ERROR(S) Increased time and probability of error in interpreting displayed legend.		<pre>- [ ] Near Term [ ] Convenient Outage - [ ] Optional</pre>
· ·		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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### HUMAN ENGINEERING OBSERVATION ASSESSMENT

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OBSERVATION			AIT REVIEW
EVALUATOR: Sab	peh/Welch	HED#: None	- CHAIRMAN: A. ADORNO DATE: 3/13/85
TASK: Control	Room Survey	HEO#: 6.5.004	[] Concur With Comment/Note.
CL: 6.5	CL ITEM: 6.5.1.1b	DATE: 11/6/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Visu	ual Displays	HED CATEGORY: None	[ ] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD	LOCATION: Flight/Assessment		Comment/Note/Reason: AIT recommends that the need and location for
	HEO DESCRIPTION	· • • • • • • • • • • • • • • • • • • •	<ul> <li>I this instrument be determined by SFTA and if needed should be indicated on a recorder.</li> </ul>
GUIDELINE- INFORMATION TO BE DISPLAYED (Completeness of Information): Hotleg temperature (Th) indication is needed on subpanel FD in gauge form.		eness of Information): subpanel FD	This didnot surface in the SFTA. AIT doesnot consider this a problem.
RE: 0ER-023			
			RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED			[] Promptly   {] Near Term
	POTENTIAL OPERATOR ERF	ROR (S)	[] Convenient Outage -  [] Optional
Increases the (Th) during en	time and probability of error in mergency events.	determining	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86
			- [] Concur With Comment/Note
	SUGGESTED CORRECTIVE A		[] Do Not Concur for Following Person:
Provide a guag	ge to indicate (Th) on subpanel FE	).	[] Recycluste & Recycluste for Following Research
			Comment/Note/Reason:
· · · · ·			
		· · · ·	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
•			APPROVE: YESTX1 NO[ 1 NOTE:
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,	HUMAN ENGINEERING OBSER	ATION ASSESSMENT
OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: 6.5.001	- CHAIRMAN: A. ADORNO DATE: 3/13/85
TASK: Control Room Survey	HEO#: 6.5.005	[X] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.1.1b	DATE: 11/6/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Visual Displays	HED CATEGORY: A	[ ] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason: The AIT recommends that the Phase A logic
HEO DESCRIPTIO	N	-   be changed to include Phase A isolation actuation on   manual SI. In addition, AIT recommends that the manual
GUIDELINE- INFORMATION TO BE DISPLAYED (Completeness of Information): During a Phase A isolation operator must press two pushbuttons on subpanel SB-2 and then go to subpanel SN and press two pushbuttons.		SI pushbuttons and covers be color coded and labeled.
RE: 0ER-025		
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		   [X] Promptly
POTENTIAL OPERATOR ERROR(S)		- [ ] Near Term   [ ] Convenient Outage
Increases the time necessary to accomplish a	рhasө А	[ ] Optional 
	•	MANAGEMENT REVIEW/APPROVAL   CHAIRMAN: V. Jayaraman DATE: 3/25/86   [X] Concur.
		[] Concur With Comment/Note.
SUGGESTED CORRECTIV	'E ACTION 	[] Do Not Concur for Following Reason:
Provide additional pushbuttons on subpanel S SN pushbuttons to the manual SI Master Relay	18-2 or tie in the Matrix.	[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
	· · ·	
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		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
		APPROVE: YES[X] NO[] NOTE:

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#### HIMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW CHATEWANY & ADORNO DATE: 3/13/85
EVALUATOR: Sabeh/Welch	HED#: 6.5.002	[] Concur.
TASK: Control Room Survey	HEO#: 6.5.006	[X] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.1.2a,d(1,2,3)	DATE: 11/6/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Visual Displays	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason: AIT recommends that dual scale meters be
HEO DESCRIPTION		
GUIDELINE- USABILITY OF DISPLAYED VALUES (Scale Se The scale range on SG <sup>5</sup> 503 is 0 to 12000 with first normal indication is below 4800 making it difficu cooling level. The scale starting points for containment sump pur cavity meter 21 and 22 respectively on SB-1 start progress in 1 foot increments.	election) and (Scale Range): t number Ø unit at 4800 It to read component mp level and the reactor with odd numbers and	
RE: Photo No. 1-24		RECOMMENDED IMPLEMENTATION
OER-024 Supports this HEO [ X ] SUPPORT MATERIAL ATTACHED		
POTENTIAL OPERATOR ERROR	(S)	[X] Convenient Outage   [] Optional
Increases the time and probability of error for r cooling flow, containment sump pump level and rea SUGGESTED CORRECTIVE ACT	eading component ctor cavity. ION	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur. [X] Concur With Comment/Note. [] Do Not Concur for Following Reason:
Modify scales allow for direct reading.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Engineering to provide recommendations.
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:
		/

DETAILED CONTROL ROUM DESIGN REVIEW	HUMAN ENGINEERING OBSE	RVATION ASSESSMENT DCRDR-HE0-2
OBSERVATION EVALUATOR: Sabeh/Weich TASK: Control Room Survey CL: 6.5 CL ITEM: 6.5.1.3b(2) CL TITLE: Visual Displays CONTROL BOARD LOCATION: Supervisory HEO DESCRIP GUIDELINE- READABILITY (TYPE STYLE): The characters on SC 002 (AFW pump) are to to the meter scale.	N HED#: None HEO#: 6.5.007 DATE: 11/5/84 REV: HED CATEGORY: D FION	AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/13/85 [] Concur. [X] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Scale study to make recommendations.
RE: Photo No. 1-16		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATO Increase the time and the probability of r value.	R ERROR(S) eading the scale	
SUGGESTED CORRECT Replace the scale with the character type other meters in the control room.	IVE ACTION style used on the	<ul> <li>[] Concur With Comment/Note.</li> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: 6.5.003	[] Concur.
TASK: Control Room Survey	HEO#: 6.5.008a	[X] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.1.5a(1)	DATE: 11/6/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Visual Displays	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight/Supervisory/Asse	ssment	Comment/Note/Reason: AIT recommends that this item be included
HEO DESCRIPTION		
GUIDELINE- SCALE MARKINGS (Use of Graduations): Scales with more than 9 graduations between num FA; 20,24,504,39,47,49,50,67,92,93,94 FB; 10,13,16,21,24,27,36,37,38,39,71,118,119,12 124,125,126,127,128,129,130,131,132,133,134,135 FC; 506 and 62 FD; 508 and 518 SA-1; 1,2,3,4,5,6,7,8,9,10 and 11 Start 5 5 567 564 and 569	bers are: 0,121,122,123, 5,136,137	
RE: Photo No. 1-9		RECOMMENDED IMPLEMENTATION
OER-024 supports this HEU [X] SUPPORT MATERIAL ATTACHED		[] Promptly [] Near Term
POTENTIAL OPERATOR ER	ROR (S)	[X] Convenient Outage   [ ] Optional
Increases the time and probability of error in indicators and recorders. SUGGESTED CORRECTIVE	reading ACTION	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.
Revise scale markings to conform with guideling of 9 graduations or less between numbers.	ə criteria	[] Reevaluate & Resubmit for Following Reason:
	•	Comment/Note/Reason:
	•	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
		APPROVE: YES [X] NO [] NOTE:

	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION	J	AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: 6.5.003	CHAIRMAN: A. ADURNU DATE: 3/13/85
TASK: Control Room Survey	HEO#: 6.5.008b	[X] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.1.5a(1)	DATE: 11/6/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Visual Displays	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight/Supervisory	/Assessment	Comment/Note/Reason: See page a.
HEO DESCRIPT		
GUIDELINE- SCALE MARKINGS (Use of Graduatic SB-1; 502,503,504 and 506 SB-2; 510,511,507,20 SC; 1,10,11,19,20,21,22,23,24,24,25 and 26 SD; 1,19,41 and 42 SE; 47 SF: 502,506,516,5,6,8,9,11,12,14,15,16,17,1 SG; 14 SH; 2,4,5,7,14,6	ons) (cont.): 18 and 19	
SJ; 22,24 and 28		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED	· · · · ·	[] Promptly 
POTENTIAL OPERATOR ERROR (S)		[X] Convenient Outage   [] Ontional
See Page a		MANAGEMENT REVIEW/APPROVAL
		CHAIRMAN: DATE:
		- [] Concur With Comment/Note.
SUGGESTED CORRECT	[VE ACTION	- [] Do Not Concur for Following Reason:
See Page a		[ ] Reevaluate & Resubmit for Following Reason:
	,	Comment/Note/Reason:
-		APPROVE: YES[X] NO[] NOTE:

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HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: 6.5.003	[] Concur.	
TASK: Control Room Survey	HEO <b>#: 6.5.0</b> 08c	[X] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.1.5a(1)	DATE: 11/6/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight/Supervisory	Assessment	Comment/Note/Reason: See page a.	
HEO DESCRIPTI			
GUIDELINE- Scale Markings (Use of Graduatio SL: 502 SM; 503,504 and 6	ons) (cont.):		
AS: 20,21,22,46,511			
•			
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERROR(S)		-   [] Near Term   [X] Convenient Outage	
See page a		MANAGEMENT REVIEW/APPROVAL CHATRMAN DATE:	
		[X] Concur.	
		[] Concur With Comment/Note.	
		[] Do Not Concur for Following Reason:	
see hade a		[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
	· · ·		
	· · · · ·	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
		APPROVE: YES [X] NO [] NOTE:	

#### INDIAN POINT UNIT #2 DCRDR-HE0-2 DETAILED CONTROL ROOM DESIGN REVIEW HUMAN ENGINEERING OBSERVATION ASSESSMENT AIT REVIEW OBSERVATION CHAIRMAN: A. ADORNO DATE: 3/13/85 [] Concur. EVALUATOR: Sabeh/Welch HED#: 6.5.004 [X] Concur With Comment/Note. HEO#: 6.5.009 TASK: Control Room Survey [] Do Not Concur for Following Reason: REV: CL: 6.5 CL ITEM: 6.5.1.5b DATE: 11/5/84 [] Reevaluate & Resubmit for Following Reason: HED CATEGORY: C CL TITLE: Visual Displays Comment/Note/Reason: CONTROL BOARD LOCATION: Flight \_\_\_\_\_ Refer to HEO 6.1.013a for this fix. HEO DESCRIPTION \_\_\_\_\_ GUIDELINE- SCALE MARKINGS (Graduation Height): The graduation character heights as a function of viewing distance do not satisfy the guideline criteria - Rod position indicators on FC numbers 508,509,510,511,512,513,514,515 and 516. RE: Photo No. 1-35 RECOMMENDED IMPLEMENTATION Promptly [X] SUPPORT MATERIAL ATTACHED Near Term Convenient Outage POTENTIAL OPERATOR ERROR(S) $\mathbf{D}\mathbf{X}$ Optional Increase time and the probability of error in determining rod MANAGEMENT REVIEW/APPROVAL position indication. CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: Revise scale to conform with guideline criteria. [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: DATE: 5/19/86 CHAIRMAN: J. Basile EXECUTIVE REVIEW APPROVE: YES [X] NO [ ] NOTE:
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### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: 6.5.005	- CHAIRMAN: A. ADORNO DATE: 3/13/85	
TASK: Control Room Survey	HEO#: 6.5.010a	[X] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.1.5c	DATE: 11/5/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight/Supervisory		Comment/Note/Reason: Refer to HEO 6.5.008a.	
HEO DESCRIPTION	••••••••••••••••••••••••••••••••••••••		
GUIDELINE- SCALE MARKINGS (Valves Indicated b Unit graduation successive values that do not guideline criteria are: FA; 47,50 FB; 10,13,16,36,37,38,39 and 56 FC; 506,507,508,509,510,511,512,513,514,515 ar FD; 508,509,510 and 518 SA; 1,5,6,503,504,507 and 508 SB-1: 503,504,506	y Unit Graduations): conform with the d 516	-	
RE: Photo No. 2-30	ž	RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		[] Promptly [] Near Term	
PUTENTIAL UPERATUR ERROR(S)		- [[] Optional	
Difficulty in reading and increases the probat in determining scale values.	ility of error	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTED CORRECTIVE	ACTION	[] Concur With Comment/Note.	
Revise scales to conform with unit graduation 1,2,5 and 100.	critoria	<ul> <li>[ ] Do Not Concur for Following Reason:</li> <li>[ ] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	DCRDR-HE0-2
OBSERVATION		AIT REVIEW - CHAIRMAN: A. ADORNO DATE: 3/13/85 [] Concur.	
TASK: Control Room Survey CL: 6.5 CL ITEM: 6.5.1.5c CL TITLE: Visual Displays CONTROL BOARD LOCATION: Flight/Supervisory HEO DESCRIPTION GUIDELINE- SCALE MARKINGS (Values Indicated by Un SB-2;503 SC; 6 SF; 514,515,4,5,6,8,9,11 and 12 SG; 503 and 506	HEO#: 6.5.010b DATE: 11/5/84 REV: HED CATEGORY: C	<ul> <li>[X] Concur With Comment/Note.</li> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: See page a.</li> </ul>	
SJ; 24 SL; 502 SO; 503 [] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR See page a	?(5)	RECOMMENDED IMPLEMENTATION          [] Promptly         [] Near Term         [X] Convenient Outage         [] Optional	DATE:
SUGGESTED CORRECTIVE ACT	FION	<pre> [] Concur Wron comment/Note:  [] Do Not Concur for Following Reason: [] Reevaluate &amp; Resubmit for Following Reason: Comment/Note/Reason:</pre>	•
		EXECUTIVE REVIEW CHAIRMAN: J. Basile APPROVE: YES[X] NO[] NOTE:	DATE: 5/19/86

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HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW CHATRMAN: A. ADDRNO DATE: 3/13/85	
EVALUATOR: Sabeh/Welch       HED#: None         TASK: Control Room Survey       HED#: 6.5.011         CL: 6.5       CL ITEM: 6.5.2.1b       DATE: 11/5/84         CL TITLE: Visual Displays       HED CATEGORY: None         CONTROL BOARD LOCATION: Supervisory       HEO DESCRIPTION         GUIDELINE- DIRECTIONALITY OF MOVEMENT AND NUMBERING WITH FIXED SCALE         MOVING POINTER METERS (Vertical Straight Scales):       Values increase in a downward direction on SC 38		<ul> <li>[] Concur.</li> <li>[] Concur With Comment/Note.</li> <li>[X] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> <li>AIT feels instrument is adequately marked.</li> </ul>	
RE: Photo No. 1-17		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S)		 [] Promptly - [] Near Term [] Convenient Outage - [] Optional	
Increase the time and the probability of error scale accuracy.	in reading ACTION	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur. - [X] Concur With Comment/Note.	
Revise scale to increase with an upward moveme		<ul> <li>[] Do Not Concur for Forfowing Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: MGT team investigated and there is a nameplate being installed plus REVERSE action is a positive feature.</li> </ul>	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

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DETAILED CONTROL ROOM DESIGN REVIEW	.:		
	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Weich	HED#: None	- CHAIRMAN: A. Adorno DATE: 3/13/85	
TASK: Control Room Survey	HEO#: 6.5.Ø12a	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.3.1a(1)	DATE: 11/6/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight/Supervisory		Comment/Note/Reason: Present procedures are adequate for assuring	
HEO DESCRIPTION		- lamps are not burned out.	
GUIDELINE- CHARACTERISTICS AND PROBLEMS OF LIGHT (Precautions to Assure Availability): There is no dual bulb, dual filament or test capa FA; 18,58,59,60,508 SJ; 10 These bulbs glow read only when open. Others inc FB; 68,69,70 FC; 63	INDICATORS bility for Hude:		
RE: Photo No. 1-6		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERROR(S) Inability to detect bulb or circuit failure.		[] Near Term [] Convenient Outage [] Optional 	
Provide a dual built (filement on built of the	10N	   [] Do Not Concur for Following Reason:	
terres a dear benefit rament or build test capabil	ity.	[] Reevaluate & Resubmit for Following Reason:	
	,	Comment/Note/Reason:	
	,		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
		APPROVE: YES[X] NO[] NOTE:	

### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW -   CHAIRMAN: A. ADORNO DATE: 3/13/85	
EVALUATOR: Sabeh/Weich	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.5.Ø12b	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.3.1a(1)	DATE: 11/6/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight/Supervisory		Comment/Note/Reason: Same as page a.	
HEO DESCRIPTION			
GUIDELINE- CHARACTERISTICS AND PROBLEMS OF LIGHT (Precautions to Assure Availablity): SB-1; 30,31,32,34,35,37,38,39,40,43,44,45,51 and SD; 44 SE; 2,5,8 and 20 SK; 1	INDICATORS 52	-	
SL; 35,30,37,30 and 49			
· · · · ·			
[] SUPPORT MATERIAL ATTACHED		[] Promptly - [] Near Term	
POTENTIAL OPERATOR ERROR(S)		[] Convenient Outage -   [] Optional	
See page a		MANAGEMENT REVIEW/APPROVAL	
		CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur.	
	TION	- [ [ ] Concur With Comment/Note.	
		- [ [ ] Do Not Concur for Following Reason:	
		[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
		APPROVE: YES[X] NO[] NOTE:	

	HUMAN ENGINEERING OBSEF	VATION ASSESSMENT DCRDR-HEU-2	
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch		CHAIRMAN: A. ADORNO DATE: 3/13/85	
TASK: Control Room Survey	HEO#: 6.5.Ø13	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.3.1c(2)	DATE: 11/6/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason:	
HEO DESCRIPTION		Panel 501 has provisions and panel 502 is being replaced and will have provisions.	
GUIDELINE- CHARACTERISTICS AND PROBLEMS OF LIGH (Precautions to Avoid Misinterpretation): There is no procedure or design provision to pri interchanging indicator lenses on:	T INDICATORS event		
S0; 501,502			
RE: Photo No. 1-2			
[X] SUPPORT MATERIAL ATTACHED		[] Promotily	
POTENTIAL OPERATOR ERROR(S)		[] Near Term [] Convenient Outage	
Increase probability of error in interpreting indicator status with interchanged light lenses.		[] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
Procedure for changing light indicators should	nclude a caution	[] Do Not Concur for Following Reason:	
warning statement to avoid interchange of lens or requiring lamp covers to be replaced one at a t	covers by	[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
	•		
		·	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
		APPROVE: YES[X] NO[] NOTE:	
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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/13/85 [] Concur.	
EVALUATOR: Sabeh/Welch HED#: None			
TASK: Control Room Survey	HEO#: 6.5.014	[X] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.3.3b(5)	DATE: 11/6/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason: AIT recommends that given the size of	
HEO DESCRIPTION		cannot be met and still meet system requirements. It should	
GUIDELINE- DESIGN AND USE OF LEGEND LIGHT INDIC Legend light messages contain more than three 1 501 on the bi-stable status lights.	ATORS (Legend Design): ines of text on		
RE: HE0 6.4.012			
RE: Photo No. 1-2			
	;	RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		   [] Promptly [] Near Term	
POTENTIAL OPERATOR ER	ROR (S)	[] Convenient Outage	
Increase the time and probability of error in message text.	reading the	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.	
SUGGESTED CORRECTIVE	ACTION	- [ ] Do Not Concur for Following Reason:	
Revise legend messages to contain no more than	3 lines of text.	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
	· · ·		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

HUMAN ENGINEERING OBSERV	DCRDR-HEO-2	
	AIT REVIEW	
HED#: None	CHAIRMAN: A. ADORNO DATE: 3/13/85	
HEO#: 6.5.Ø15	[X] Concur With Comment/Note.	
DATE: 11/6/84 REV:	[] Do Not Concur for Following Reason:	
HED CATEGORY: None	[ ] Reevaluate & Resubmit for Following Reason:	
	Comment/Note/Reason: AIT indicates that the bi-stable lights	
	are being relocated. Reference HEO 6.4.011, 6.4.012, 6.4.013.	
CATORS (Distinguishability legend pushbuttons		
	RECOMMENDED IMPLEMENTATION	
XOR (S)	[ ] Near Term   [ ] Convenient Outage	
in responding to a status CTION the legend light	L J Optional         MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86         [] Concur.         [] Concur With Comment/Note.         [X] Do Not Concur for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         Comment/Note/Reason: SD-502 does not have legend lights.         EXECUTIVE REVIEW       CHAIRMAN: J. Basile         DATE: 5/19/86         APPROVE:       YES[X] NO[] NOTE:	
	HUMAN ENGINEERING OBSERVA HED#: None HED#: 6.5.015 DATE: 11/6/84 REV: HED CATEGORY: None CATORS (Distinguishability legend pushbuttons ROR(S) in responding to a status ACTION the legend light	

HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

AIT REVIEW OBSERVATION CHAIRMAN: A. ADORNO DATE: 3/13/85 [] Concur. HED#: None EVALUATOR: Sabeh/Welch [X] Concur With Comment/Note. HEO#: 6.5.Ø16 TASK: Control Room Survey [] Do Not Concur for Following Reason: DATE: 11/6/84 REV: CL ITEM: 6.5.4.1a CL: 6.5 [] Reevaluate & Resubmit for Following Reason: HED CATEGORY: D CL TITLE: Visual Displays Comment/Note/Reason: CONTROL BOARD LOCATION: Supervisory AIT recommends replacement of recorders. HEO DESCRIPTION QUIDELINE- GENERAL CHARACTERISTICS OF GRAPHIC RECORDERS (Quality of Expendable Materials): Inking problems exist on subpanel SC recorders 508,509,510,511 and 512 RE: Photo No. 1-15 RECOMMENDED IMPLEMENTATION Promotly [X] SUPPORT MATERIAL ATTACHED Near Term Convenient Outage POTENTIAL OPERATOR ERROR(S) Optional [X] Increase the time and probability of error in reading MANAGEMENT REVIEW/APPROVAL recorder values. CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: Replace inking pens with cartridge type pens. [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: DATE: 5/19/86 EXECUTIVE REVIEW CHAIRMAN: J. Basile APPROVE: YES[X] NO[ ] NOTE:

DETAILED CONTROL ROOM (	DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HED-2	
OBSERVATION			AIT REVIEW	
EVALUATOR: Sabeh/Welch		HED#: None	- CHAIRMAN: A. ADORNO DATE: 3/13/85	
TASK: Control Room Surv	vөy	HEO#: 6.5.Ø17	[] Concur With Comment/Note.	
CL: 6.5 CL	ITEM: 6.5.4.1c	DATE: 11/6/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displa	ays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION	: Flight/Supervisory/Asse	essment	Comment/Note/Reason:	
	HEO DESCRIPTION		-   Plant practice is to put correct type paper in recorders.   There may be times due to spare inventory where correct	
GUIDELINE- GENERAL CHARACTERISTICS OF GRAPHIC RECORDERS (Scale Compatibility): Recorder scales and recorder paper that are not compatible are: FC; 30 FD; 504,505 and 517 SF; 520 SG; 506 Assessment; 40,41,43 and 44		ECORDERS (Scale Compatibility): ; compatible are:	- paper is not available.	
			RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED			Promptly	
POTENTIAL OPERATOR ERROR(S)		0R(S)	[] Convenient Outage	
Increases the time and the probability of error in reading recorder values. SUGGESTED CORRECTIVE ACTION		in reading  CTION	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.	
Install recorder paper	compatible with recorder	scale.	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>	
			EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/13/85	
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.5.018	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.4.1k	DATE: 11/5/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Assessment Panel		Comment/Note/Reason: AIT indicates there is a direct readout	
HEO DESCRIPTION			
GUIDELINE- GENERAL CHARACTERISTICS OF GRAPHIC RE Wind recorder 58 on the assessment panel records display scale. Information is approximately 10 before it can be read by an operator.	CORDERS (Visibility): behind the minutes late		
RE: 0ER-027			
RE: Photo No. 2-5		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERRO	 R(S)	-   [] Near Term   [] Convenient Outage	
Increased time to determine dispersol conditions of radiation leak to atmosphere.	in the event	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.	
SUGGESTED CORRECTIVE AC	TION 	[] Do Not Concur for Following Reason:	
Provide a recorder that displays real time wind	data.	[] Reevaluate & Resubmit for Following Reason:	
· · · ·		Comment/Note/Reason:	
•	· .		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
		<u>в</u>	

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	DCRDR-HE0-2
OBSERVATION EVALUATOR: Sabeh/Welch TASK: Control Room Survey CL: 6.5 CL ITEM: 6.5.5.1a(4)	HED#: None HEO#: 6.5.Ø19 DATE: 11/5/84 REV.	AIT REVIEW - CHAIRMAN: A. ADORNO DATE: 3/ [] Concur. [] Concur With Comment/Note.	13/85
CL: 6.5 CL ITEM: 6.5.5.1a(4) DATE: 11/5/84 REV: CL TITLE: Visual Displays HED CATEGORY: None CONTROL BOARD LOCATION: Flight Panel HED DESCRIPTION GUIDELINE- DRUM-TYPE COUNTERS (Numerical Presentation Factors, Contrast): Nod step indicators 15,16,17,22,24,28 and 28 display white numerals on black background. Does not conform with guideline criteria. RE: Photo No. 1-35 [X] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increased time and probability of error in reading rod step SUGGESTED CORRECTIVE ACTION Replace with indicators that meet guideline criteria, black tharacters on a white background.		<ul> <li>[A] DO NOT CONCUT for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: AIT does not consider this a</li> <li>Operations indicates that this has never been a pro-</li> <li>Re-evaluation concurred with previous results.</li> </ul>	ı problem. oblem.
		<ul> <li>Promptly</li> <li>Promptly</li> <li>Convenient Outage</li> <li>Optional</li> <li>MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86</li> <li>[X] Concur.</li> <li>[] Concur With Comment/Note.</li> <li>[] Concur With Comment/Note.</li> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile APPROVE: YES[X] NO[] NOTE:	DATE: 5/19/86

### HIMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION EVALUATOR: Sabeh/Welch HED#: Completed			ATT REVIEW	
		HED#: Completed	[] Concur.	
TASK: Control Room Survey		HEO#: 6.5.020	[X] Concur With Comment/Note.	
CL: 6.5 CL ITE	EM: 6.5.5.2c	DATE: 11/5/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays		HED CATEGORY: Comp	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: FI	light Panel		Comment/Note/Reason: AIT recommends replacement with a higher	
	HEO DESCRIPTION			
GUIDELINE- ELECTRONIC COUN Digital meters 28,29 and E Contrast does not meet gui lens creates dimming or b viewers eye.	NTERS (Contrast): 506 display blue charac ideline. Polarizing ch lackout with vertical d	ters on black background. aracteristics of display isplacement of the		
RE: 0ER-029				
RE: Photo No. 2-22	•		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL A	K ] SUPPORT MATERIAL ATTACHED			
POTENTIAL OPERATOR ERROR(S) Increased time and probability of error in determining display values from normal operating position.		R(S) 		
		mining display values		
	SUGGESTED CORRECTIVE AC	TION	[ ] Do Not Concur for Following Reason:	
Improve contrast of displ of lenses.	ays and eliminate polar	izing characteristics	[] Reevaluate & Resubmit for Following Reason:	
• •			Comment/Note/Reason: Change has been completed. Analog instrument installed.	
• • • • •			EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
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DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSEF	DCRDR-HEO-2
OBSERVATION	***************************************	AIT REVIEW
EVALUATOR: Sabeh/Weich	HED#: 6.5.006	CHAIRMAN: A. ADORNO DATE: 3/13/85   [X] Concur.
TASK: Control Room Survey	HEO#: 6.5.021	[] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.4.2b(3)	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Visual Displays	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Assessment		Comment/Note/Reason:
HEO DESCRIPTION		
GUIDELINE- SPECIFIC RECORDER TYPES (Channel Ide The paper speed on the recorder is slower than resulting in over printing of channel numbers. identification is not readable on 511.	ntification on Recordings): the sampling rate Channel	
RE: 0ER-028		
RE: Photo No. 2-5		
		RECOMMENDED IMPLEMENTATION
[X].SUPPORT MATERIAL ATTACHED	) [] Promptly	
POTENTIAL OPERATOR ERROR(S)		[X] Convenient Outage
The operator is unable to read or associate the number with the trend line. SUGGESTED CORRECTIVE A Increase the paper speed on the recorder to elin during operations where temperature variations	temperature channel CTION minate over printing are critical.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YESDN NO[] NOTE:

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### HUMAN ENGINEERING OBSERVATION ASSESSMENT

· · · · · · · · · · · · · · · · · · ·	AIT REVIEW CHATRMAN: A. ADORNO DATE: 3/13/85	
HED#: None	[] Concur.	
HEO#: 6.5.022	[X] Concur With Comment/Note.	
DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:	
HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
	Comment/Note/Reason: AIT indicates that the general reading	
election): meter 2.		
	RECOMMENDED IMPLEMENTATION	
·	 [] Promptly [] Near Term [] Convenient Outage [] Optional	
(S)		
ding	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86	
· · · · ·	[] Concur With Comment/Note.	
TION		
need for the	[] Reevaluate & Resubmit for Following Reason:	
	Comment/Note/Reason:	
•		
·		
	FXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
	APPROVE: YES[X] NO[] NOTE:	
	HED#: None HED#: 6.5.022 DATE: 11/7/84 REV: HED CATEGORY: None election): meter 2.	

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DETAILED CONTROL	ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT DCRDR-HE0-2
	OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/	/Welch	HED#: None	- CHAIRMAN: A. ADORNO DATE: 3/13/85
TASK: Control Roo	om Survey	HEO#: 6.5.Ø23	[] Concur With Comment/Note
CL: 6.5	CL ITEM: 6.5.1.2a	DATE: 11/7/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Visual	Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Process
CONTROL BOARD LOC	CATION: Supervisory SF		Comment. Note /Reason: All reviewed this meter is the simulator
	HEO DESCRIPTION		- and determined the range of interest is adequately marked.
GUIDELINE- USABIL SF - the charging needed between Ø- 503 from Ø to 100	ITY OF DISPLAYED VALUES (Scal pump flow first marking is 2 50 gpm, should consider reduc instead of Ø to 150.	e Selection): 5 gpm, more accuracy is ing the scale range on	-
			RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		·	<pre>[] Promptly - [] Near Term [] Convenient Outage - [] Optional</pre>
POTENTIAL OPERATOR ERROR(S)		ROR (S)	
Increase the time and probability of error in reading changing pump flow.		reading changing pump flow.	
Replace scale with	h a meter range of Ø to 100.		- [] Do Not Concur for Following Reason:
			[] Reevaluate & Resubmit for Following Reason:
			Comment/Note/Reason:
			EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW I CHAIRMAN: A. ADORNO DATE: 3/13/85	
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.5.Ø24	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.1.2a	DATE: 11/7/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason:	
HEO DESCRI	IPTION	use is during an accident and as such is adequate for normal	
GUIDELINE- USABILITY OF DISPLAYED VALUES (Scale Selection): SG - The RHR flow 505 needs more accuracy between 0 and 1500 gpm instead of the range 1500 to 7000 gpm and meter 503 should have a scale 0 to 3600 gpm instead of 0 to 12000 with the first numerical reading at 4800.			
RE: Photo No. 1-23			
		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED	D [] Promptly		
POTENTIAL OPERATOR ERROR(S) Increase the time and probability of error in reading RHR flow values.		[ ] Convenient Outage - [] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.	
Replace the scales to provide more accur	racy at the lower ranges.	[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

INDIAN POINT UNIT #2	
DETAILED CONTROL ROOM DESIGN REVIEW	

	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.5.025	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.1.2a	DATE: 11/7/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason: AIT reviewed the scales in the simulator	
HEO DESCRIPTION		-   but does not consider this a problem.	
GUIDELINE- USABILITY OF DISPLAYED VALUES (Scal SJ - The scale for 24 should have a range of Ø of Ø to 200 pounds. The new range should be e more accurate reading of values.	e Selection): to 150 instead xpanded to permit	-	
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERROR(S) Increase the time and the probability of error in reading scale values.		<pre>- [ ] Near Term   [ ] Convenient Outage - [ ] Optional</pre>	
Replace scales to provide more accuracy at the lower range.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: None	CHAIRMAN: A. ADURNU DAIE: 3/13/85
TASK: Control Room Survey	HEO#: 6.5.026	[] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.1.2a	DATE: 11/7/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight		Comment/Note/Reason: The AIT indicates accuracy is obtained
HEO DESCRIPTION		by the DVM - digital voit meter.
GUIDELINE- USABILITY OF DISPLAYED VALUES (Scale FC - The RPI needs more readability than 3 inch 508,509,510,511,512,513,514,515 and 516.	Selection): increments	Re-evaluation concurred with previous results.
RE: Photo No. 1-35		
· · · · · · · · · · · · · · · · · · ·	•	RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR(S)		-   [ ] Near Term   [ ] Convenient Dutage
Increase the time and the probability of error the RPI indicators.	in reading	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORRECTIVE ACTION		- [] Concur With Comment/Note.
Investigate alternative scale arrangements to p accurate RPI reading of values.	ermit more	[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
· · · · · · · · · · · · · · · · · · ·		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.	
TASK: Control Room Survey	HE0#: 6.5.027	[X] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.1.1c	DATE: 3/11/85 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: flight		Comment/Note/Reason:	
HEO DESCI	RIPTION		
GUIDELINE- INFORMATION TO BE DISPLAYED (Unnecessary Information): Removal of the part length rod control eliminates the need for meter 4.510 and digital indicator Part Length Bank (4.019).			
·			
RE: HEO 6.1.013a		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Excess and unnecessary displays cause panel clutter and occupy valuable panel space.		[] Promptly - [] Near Term	
		[] Convenient Outage -   [X] Optional	
		[] Concur With Comment/Note.	
SUGGESTED COR	RECTIVE ACTION	[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason:	
Remove the part length rod meters and See HEO 6.1.013a for AIT recommendatio	digital indicator. n.		
		Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION AIT REVIEW CHAIRMAN: A. Adorno DATE: 12/10/85 EVALUATOR: R. POTTER HED#: None [] Concur. TASK: VALIDATION HEO#: 6.5.028 [] Concur With Comment/Note. CL: 6.5 CL ITEM: 6.5.1.1d DATE: 10/8/85 REV: [X] Do Not Concur for Following Reason: CL TITLE: Visual Displays HED CATEGORY: None [] Reevaluate & Resubmit for Following Reason: CONTROL BOARD LOCATION: Supervisory Panels SB-2, SM Comment/Note/Reason: Meters track within acceptable tolerances. HEO DESCRIPTION GUIDELINE- INFORMATION TO BE DISPLAYED (Redundancy): Two sets of meters for accumulator pressure and level (8,502, 8,509 on panel SB-2; 19,504, 19,506 on panel SM) that show different indications at times. RECOMMENDED IMPLEMENTATION \_\_\_\_\_ [ ] SUPPORT MATERIAL ATTACHED Promotly Near Term POTENTIAL OPERATOR ERROR(S) Convenient Outage [] Optional Increase the time and probability of error in reading MANAGEMENT REVIEW/APPROVAL accumulator parameters. CHAIRMAN: V. Javaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: \_\_\_\_\_ Remove one set of meters or use same inputs to both [] Reevaluate & Resubmit for Following Reason: sets. Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES [X] NO [ ] NOTE:

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HEO-2
OBSERVATION EVALUATOR: R. POTTER TASK: VALIDATION CL: 6.5 CL ITEM: 6.5.3.2a CL TITLE: Visual Displays CONTROL BOARD LOCATION: Supervisory Panel SO HEO DESCRIPTION GUIDELINE- DESIGN AND USE OF NON-LEGEND LIGHT INDIG (Identification of Meaning): Blue lights on status panel (21.501) cannot be seen when standing at flight panels.	HED#: None HEO#: 6.5.029 DATE: 10/8/85 REV: HED CATEGORY: None CATORS	AIT REVIEW - CHAIRMAN: A. ADORNO DATE: 12/10/85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: - This is a diagnostic panel and operator aid only. -
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increase time and probability of error when reading status panel. SUCCESTED CORRECTIVE ACTION Consider moving status panel to another location closer to the flight panels or select a color that is easier to see from a distance.		RECOMMENDED IMPLEMENTATION
		- [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
	· · · ·	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW	
EVALUATOR: R. POTTER	HED#: None	[] Concur.	
TASK: VALIDATION	HEO#: 6.5.030	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.1.6c	DATE: 10/9/85 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Panels FB, SC		Comment/Note/Reason:	
HEO DESCRIPTION		-   Not considered a problem, but during the   scale replacement pointer will be repainted appropriate color.	
GUIDELINE- COLOR CODING (Meaning of Colors): Pointers on some meters (3.038, 3.039) are black and most others are red. On panel SC meter 10.506 has both red and black pointers, for no apparent reason.			
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERROR(S) Potential confusion in interpreting the importance of different colored pointers. SUGGESTED CORRECTIVE ACTION Use consistent color for pointers, avoid using red.		-   [ ] Near Term   [ ] Convenient Outage	
		[] Optional 	
		- [] Concur With Comment/Note.	
		- [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
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	• • •		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
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DETAILED CONTROL ROOM DESIGN REVIEW	Y HUMAN ENGINEERING OBSER	DCRDR-HE0-2	
OBS EVALUATOR: R. POTTER TASK: VALIDATION CL: 6.5 CL ITEM: 6.5.4. CL TITLE: Visual Displays CONTROL BOARD LOCATION: Assessment HEO D SUIDELINE- GENERAL CHARACTERISTICS Recorder scales not the same as sca the VC sump level recorders (1.023,	HED#: None HED#: 6.5.031 1b DATE: 10/9/85 REV: HED CATEGORY: None Panel DESCRIPTION OF GRAPHIC RECORDERS (Scale Compatibility): ales printed on the chart paper for , 1.030).	AIT REVIEW - CHAIRMAN: A. Adorno DATE: 12/10/85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: - Policy is to put correct chart paper in recorders, but there may be times when correct paper is not available. -	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increase of time and probability of error in reading recorder values. SUGGESTED CORRECTIVE ACTION Install recorder paper that is compatible with recorder scale.		RECOMMENDED IMPLEMENTATION          [] Promptly         [] Near Term         [] Convenient Outage         -       [] Optional         MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.         -       [] Concur With Comment/Note.         -       [] Do Not Concur for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

CL: 6.5

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION AIT REVIEW CHAIRMAN: A. Adorno DATE: 12/10/85 EVALUATOR: R. POTTER HED#: None [] Concur. TASK: VALIDATION HEO#: 6.5.Ø32 [X] Concur With Comment/Note. CL ITEM: 6.5.1.2b DATE: 10/10/85 REV: [] Do Not Concur for Following Reason: CL TITLE: Visual Displays HED CATEGORY: D [] Reevaluate & Resubmit for Following Reason: CONTROL BOARD LOCATION: Flight Panel FB Comment/Note/Reason: This will be looked at as part of the scale study. HEO DESCRIPTION GUIDELINE- USABILITY OF DISPLAYED VALUES (Elimination of Operator Conversion): Scales on SG measurements (3.048 thru 3.051, 3.060 thru 3.063) show PPH x 10-6, should be PPH x 10+6. RECOMMENDED IMPLEMENTATION [] SUPPORT MATERIAL ATTACHED Promptly Near Term POTENTIAL OPERATOR ERROR(S) Convenient Outage [X] Optional Difficulty/delay in interpreting the meter readings. \_\_\_\_\_ MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. \_\_\_\_\_ [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: Change the scale to the correct conversion value. [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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	HUMAN ENGINEERING OBSERV	VATION ASSESSMENT	
OBSERVATION		AIT REVIEW CHAIRMAN: A. Adorno DATE: 12/10/85	
EVALUATOR: R. POTTER	HED#: None	[] Concur.	
TASK: VALIDATION	HEO#: 6.5.033	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.4.1a	DATE: 10/11/85 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight Panels FB, FD		Comment/Note/Reason:	
HEO DESCRIPTION			
GUIDELINE- GENERAL CHARACTERISTICS OF GRAPHIC RECORDERS (Quality of Expendable Materials): Recorder pens stick frequently: 3.093, 3.095, 3.097, 3.099 on panel FB; 5.001, 5.504 thru 5.518 on panel FD.			
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT WATERIAL ATTACHED		[] Promptly - [] Near Term	
POTENTIAL OPERATOR ERROR(S)		[] Optional	
Increase time and probability of error in reading recorder values.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [1] Concur With Comment/Note.	
SUGGESTED CORRECTIVE A	CTION	- [] Do Not Concur for Following Reason:	
Replace inking pens with cartridge type pens.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
	•	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
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OBSERVATION		AIT REVIEW
EVALUATOR: R. POTTER	HED#: None	CHAIRMAN: A. Adorno DATE: 12/10/85
TASK: VALIDATION	HEO#: 6.5.034	[] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.1.2d	DATE: 10/11/85 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight Panel FB		Comment/Note/Reason:
HEO DESCRIPTION		-   Alternate means exist to read the required values.
GUIDELINE- USABILITY OF DISPLAYED VALUES (Scale Recorder for NR PRZR pressure has range of 1700-2500 psig (3.056), operators need to read pressures that are in the 1590 psig range.	Range) :	
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERR	10R(S)	[] Promptly [] Near Term [] Convenient Outage
Increase the time and probability of error in		[ ] Optional
SUGGESTED CORRECTIVE A	 CTION	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.
Increase the range to cover pressures down to z	ero.	[] Do Not Concur for Following Reason:
		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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	HUMAN ENGINEERING OBSER	VALUN ASSESSMENT
OBSERVATIO	XN	AIT REVIEW _   CHAIRMAN: A. Adorno DATE: 12/10/85
EVALUATOR: R. POTTER	HED#: None	[] Concur.
TASK: VALIDATION	HEO#: 6.5.Ø35	[] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.3.1a	DATE: 10/11/85 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory Panel	s SB-1, SB-2, SN	Comment/Note/Reason:
HEO DESCRIP	TION	and are easy to replace. Operators do not usually - I change these bulbs.
GUIDELINE- CHARACTERISTICS AND PROBLEMS O (Precautions to Assure Availability): Lamps on the two-is-true panels are not c reliable by the operators, bulbs burn out and are difficult to replace.	F LIGHT INDICATORS onsidered frequently	
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERAT	OR ERROR (S)	[] Promptly - [] Near Term [] Convenient Outage
Increase in time and probability of error SUGGESTED CORREC Provide a dual filament bulb. Institute for periodic check and replacement of bur	TIVE ACTION a procedure ned out bulbs.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88 APPROVE: YES[X] NO[] NOTE:

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HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW
EVALUATOR: R. POTTER	HED#: None	-   CHAIRMAN: A. Adorno DATE: 12/10/85
TASK: VALIDATION	HEO#: 6.5.Ø36	[] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.3.1	DATE: 10/14/85 REV:	[X] Do Not Concur for Following Reason:
CL_TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory Panel SN		Comment/Note/Reason:
HEO DESCRIPTION	·	-   Two-is-true panel indication is not a redundant indication.
GUIDELINE- CHARACTERISTICS AND PROBLEMS OF LIGHT IVWS valve status light (20.041) indication does not match redundant indication on the two-is-true panel (20.501).	INDICATORS.	
· · · ·		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR	?(S)	- [ ] Near Term   [ ] Convenient Outage
Misleading signals to operator can cause delay or errors in executing procedure. 		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.
Correct the problem with the incorrect status inc	ication and consider	[] Do Not Concur for Following Reason:
removing the redundant indication from the two-is	-true panel.	[] Reevaluate & Resubmit for Following Reason:
· ·		Comment/Note/Reason:
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		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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	POTTER	HED# 6.5.007	CHAIRMAN: A. Adorno DATE: 12/10/85
TASK: VALIDATI	ON .	HEO#: 6.5.037	[ ] Concur With Comment/Note.
CL: 6.5	CL ITEM: 6.5.3.1	DATE: 10/14/85 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Visu	al Displays	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD	LOCATION: Air Conditioner Panel		Comment/Note/Reason:
	HEO DESCRIPTION		-
GUIDELINE- CHA CCR air condit step 14) are d and bright lig	RACTERISTICS AND PROBLEMS OF LIG ioner status indicators (procedur lifficult to discriminate between hts.	HT INDICATORS: re E-Ø dim	-
		· · · · · ·	RECOMMENDED IMPLEMENTATION
[] SUPPORT M	ATERIAL ATTACHED		[] Promptly
	POTENTIAL OPERATOR ER		-   [ ] Near lerm   [X] Convenient Outage
Increase in ti reading CCR ai	me or probability of error in r conditioner status.	ACTION	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur. - [X] Concur With Comment/Note.
Change status	indicator to a more positive ind	ication.	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: MGT recommends redesign of CCR A/C panels.</li> </ul>
	· ·	· ·	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: R. POTTER	HED#: None	- CHAIRMAN: A. Adorno DATE: 12/10/85	
TASK: VALIDATION	HEO#: 6.5.Ø38	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.1.2b	DATE: 10/17/85 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight Panel FB		Comment/Note/Reason:	
HEO DESCRIPTION		- Ali considers existing method adequate.	
GUIDELINE- USABILITY OF DISPLAYED VALUES (Elim In reading steamline delta-P greater than 100 p operator must read several meters and make a me	ination of Operator Conversion): osi (procedure E-0, step 3) antal conversion.		·
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	· · · · · · · · · · · · · · · · · · ·	RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ER	ROR (S)	 [] Promptly 	· • • • • • • • • • • • • • • •
Increases time and probability of error in peri	rorming the above actions.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTED CORRECTIVE A	 ACTION	- [] Concur With Comment/Note.	
Consider adding a single meter that displays st	teamline pressure drop.	- [] Do Not Concur for Following Reason:	
		[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
			•
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE:	5/19/86
		APPROVE: YES[X] NO[] NOTE:	
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DETAILED CONTROL ROOM DESIGN REVIEW	HUMAÑ ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION		AIT REVIEW
EVALUATOR: WELCH/GAGNON	HED#: None	[] Concur.
TASK: Control Room Survey	HE0#: 6.5.039	[] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.3.1c(1)	DATE: 12-11-85 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Panels FA,SA,SL,SN,	SE,FB,SB-1	Comment/Note/Reason:
HEO DESCRIPTI	ON	set. There are some lens covers on FC steam dump which should be
GUIDELINE- CHARACTERISTICS AND PROBLEMS OF (Precautions to Avoid Misinterpretations): Single indicator lights that do not conform and/or do not adequately indicate equipment Single opal lights: 2.058,7.027,7.029,7.031 Single green lights: 12.030 Single red lights: 2.059,2.060,3.106,8.030, 8.043,8.044,8.045,8.051,	LIGHT INDICATORS with control room conventions status are: ,7.033,18.049,20.035,20.036 8.031,8.032,8.034,8.037,8.039,8.040, 8.052,18.035,18.036,18.037,18.038	
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED	·	[] Promptly
POTENTIAL OPERATOR	ERROR (S)	[] Convenient Outage
Causes operator confusion and increases the determine equipment status	time and probability of error to	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur.
SUGGESTED CORRECT	VE ACTION	[ ] Concur With Comment/Note.
Modify color of indicators to conform with add lights to provide equipment status feed	control room color convention and back	<pre> [] Do Not Concur for Following Reason: [] Reevaluate &amp; Resubmit for Following Reason: Comment/Note/Reason:</pre>
	• •	
· · · · · · · · · · · · · · · · · · ·		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	•
OBSERVATION		AIT REVIEW	•
EVALUATOR: Weich/Gagnon	HED#: None	- CHAIRMAN: A. Adorno DATE: 3/20/86	
TASK: Verification	HEO#: 6.5.040	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.1.1b	DATE: 12-10-85 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory SN		Comment/Note/Reason:	
HEO DESCRIPTION		-   These values are not normally operated from CCR. The controls   in question are used as a supplemental override to safeguard operat	tion.
GUIDELINE- INFORMATION TO BE DISPLAYED(Complete Devices 20.028, 20.029, 20.030, 20.031, 20.032 are valve controls with close-remote positions associated indicator lights to show valve posit must be determined from Two-is-True display par display and matrix density makes identification difficult.	eness of Information): , 20.033, 20.037 . There are no tion. Valve status nel. Arrangement of n of individual devices		
		RECOMMENDED IMPLEMENTATION	
[ X ] SUPPURI MATERIAL ATTACHED		[ ] Promptly -   [ ] Near Term	
PUTENITAL UPERATOR ER	RUR(S)	[] Convenient Outage -  [] Optional	
probability of error when determining status of	es and increased 'individual valves.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTED CORRECTIVE A	ICTION	- [] Concur With Comment/Note.	
Add green-red lights above these controls to in	dicate closed-open	- [] Do Not Concur for Following Reason:	
position as is used for all other controls.		[] Reevaluate & Resubmit for Following Reason:	ion.
		Comment/Note/Reason:	
· · · · · · · · · · · · · · · · · · ·			
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

# DETAILED CONTROL RÖOM DESIGN REVIEW

#### INDIAN POINT UNIT #2 DCRDR-HE0-2 HUMAN ENGINEERING OBSERVATION ASSESSMENT ATT REVIEW OBSERVATION CHAIRMAN: A. Adorno DATE: 3/20/86 [] Concur. EVALUATOR: Welch/Sabeh/Gagnon HED#: None [] Concur With Comment/Note. HEO#: 6.5.041 TASK: Verification [X] Do Not Concur for Following Reason: CL: 6.5 CL ITEM: 6.5.1.6d(1) DATE: 12-11-85 REV: [] Reevaluate & Resubmit for Following Reason: HED CATEGORY: None CL TITLE: Visual Displays Comment/Note/Reason: CONTROL BOARD LOCATION: Supervisory SF These amber lights indicate an alternative flow path for the given valve and not open/shut conditon. HEO DESCRIPTION GUIDELINE- COLOR CODING (Consistency of Meaning): The meaning of the amber light across applications in the control room is not consistent for device 13.035. RECOMMENDED IMPLEMENTATION [X] SUPPORT MATERIAL ATTACHED Promptly Near Term Convenient Outage POTENTIAL OPERATOR ERROR(S) Optional \_\_\_\_\_ Confuse and delay operator action regarding meaning of amber light. MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: \_\_\_\_\_ Replace amber light with a white or opal light, [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: DATE: 5/19/86 EXECUTIVE REVIEW CHAIRMAN: J. Basile APPROVE: YES [X] NO[] NOTE:

	HUMAN ENGINEERING OBSERV	ATION ASSESSMENT
OBSERVATION		AIT REVIEW
EVALUATOR: Welch/Sabeh/Gagnon	HED#: None	CHAIRMAN: A. Adorno DATE: 3/20/86
TASK: Verification	HEO#: 6.5.042	[] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.1.10(2)	DATE: 12-11-85 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Visual Displays	HED CATEGORY: None	   [] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory SB-1		Comment/Note/Reason:
HEO DESCRIPTION		These are lockout relays, not valve controls. Handles are   provided to reset the relays.
GUIDELINE- INFORMATION TO BE DISPLAYED(Demand In The actual equipment status for devices used in is not displayed for devices 8.120,8.121,8.122,8	formation vs Status Information): emergency operations 1.123.	
		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERRO	R(S)	[] Near Term   [] Convenient Outage
Inability of the operator to determine the equip SUGGESTED CORRECTIVE AC	ment status.	[] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.
Provide equipment status feedback information to indicator light.	the operator by an	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW CHAIRMAN: A. Adorno DATE: 3/20/86
EVALUATOR: Weich/Gagnon	HED#: 6.5.008	[] Concur.
TASK: Verification	HEO#: 6.5.043	[X] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.1.1b	DATE: 12-11-85 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Visual Displays	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Panels FB,SC		Comment/Note/Reason: - ( (a) For devices 3.126 - 3.129, scale is to be marked to
HEO DESCRIPTION		show 1020 psig. - ( (b) Same for devices 10.023 - 10.026.
GUIDELINE- INFORMATION TO BE DISPLAYED (Completen The instrument parameters do not agree with the for devices 3.126,3.127,3.128,3.129 3.056 10.023,10.024,10.025,10.026.	ess of Information): reading accuracies required	(c) For device 3.056, setting of 1057 psig is not required.
		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED	·	[ ] Promptly 
POTENTIAL OPERATOR ERRO	R(S)	[X] Convenient Outage   [ ] Optional
The information displayed is not sufficient for satisfy the task/step requirements.	the operator to	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur. [] Concur With Comment/Note.
SUGGESTED CORRECTIVE A	CTION	[] Do Not Concur for Following Reason:
Modify device parameters to provide the accuracy PSIG and GPM values.	required to satisfy	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
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		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:
OBSERVATION AIT REVIEW CHAIRMAN: A. Adorno DATE: 3/20/86 EVALUATOR: Welch/Gagnon HED#: None [] Concur. TASK: Verification HEO#: 6.5.044 [] Concur With Comment/Note. CL: 6.5 CL ITEM: 6.5.3.1c(1) DATE: 12-9-85 REV : [X] Do Not Concur for Following Reason: CL TITLE: Visual Displays HED CATEGORY: None [] Reevaluate & Resubmit for Following Reason: CONTROL BOARD LOCATION: Supervisory SE Comment/Note/Reason: Information required is that valve is closed. Green light HEO DESCRIPTION indicates closed position. GUIDELINE- CHARACTERISTICS AND PROBLEMS OF LIGHT INDICATORS (Procautions to Avoid Devices 12.002, 12.005, 12.008, 12.020 (28 green lights) indicate valve closed position. There are no corresponding displays for valve open which must be assumed RECOMMENDED IMPLEMENTATION [X] SUPPORT MATERIAL ATTACHED Promptly Near Term POTENTIAL OPERATOR ERROR(S) Convenient Outage Optional Increased probability of misinterpreting component status in the event of MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 DX1 Concur. [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION Do Not Concur for Following Reason: [] Provide lights to indicate component status (valves closed/open, pumps [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:

#### EXECUTIVE REVIEW

CHAIRMAN: J. Basile

APPROVE: YES [X] NO [ ] NOTE:

DATE: 5/19/86

Misinterpretation):

by absence of illumination.

burned-out bulb.

stopped/running) in accordance with control room convention.

HUMAN ENGINEERING OBSERVATION ASSESSMENT

	HUMAN ENGINEERING OBSERV	VATION ASSESSMENT	
OBSERVATIO	۰	AIT REVIEW	
EVALUATOR: Welch/Gagnon	HED#: None	[] Concur.	
TASK: Verification	HEO <b>#: 6.5.0</b> 45	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.1.2a	DATE: 12-10-85 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Panels AS,FD		Comment/Note/Reason:	
HEO DESCRIPT		in regards to margin to saturation.	
GUIDELINE- USABILITY OF DISPLAYED VALUES (S. Devices 1.017, 1.040 and 5.515, 5.516 have increments which do not permit temperature in the following EOP tables: E-3/steps 21, ES-0.2/step 12; ES1.1/step 6.	ale Selection): resolutions and minimum scale readings to the accuracy stated 24, 34; ECA-0.0/step 28;		
	· · · ·	RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		[] Promptly -   [] Near Term	
POTENTIAL OPERATOR ERROR (S)		[] Convenient Outage - [] Optional	
Delay and increased probability of error in SUGGESTED CORRECT.	executing procedures.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.	
Review EOP tables; if temperatures must be on these devices to meet the accuracy requ	read as listed, replace scales rements.	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

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	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: Welch/Gagnon	HED#: None	- CHAIRMAN: A. Adorno DATE: 3/20	J/86
TASK: Verification	HEO#: 6.5.046	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.1.1c	DATE: 12-9-85 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	• •
CONTROL BOARD LOCATION: Supervisory SB1,SE		Comment/Note/Reason:	
HEO DESCRIPTION		-   Plant has properly engraved plate. Suggest simulator	be updated.
GUIDELINE- INFORMATION TO BE DISPLAYED(Unnecessary Devices 8.038, 12.001, 12.007 are indicator lights SFTA device 8.038 was used to accomplish a task st	Information): labeled 'SPARE'. During the ep.	-	
		RECOMMENDED IMPLEMENTATION	
POTENTIAL OPERATOR ERROR(	5) performing operator tasks.	<pre>[] Promptly - [] Near Term [] Convenient Outage - [] Optional </pre>	/25/86
SUGGESTED CORRECTIVE ACTIO	N	[] Do Net Concur for Fallowing Day	
Remove above spare devices from panels.		[] Reevaluate & Resubmit for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	•
	· ·		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile APPROVE: YES[X] NO[] NOTE:	DATE: 5/19/86

DCRDR-HED-2

INDIAN POINT UNIT #2

DETAILED CONTROL ROOM DESIGN REVIEW HUMAN ENGINEERING OBSERVATION ASSESSMENT AIT REVIEW OBSERVATION CHAIRMAN: A. Adorno DATE: 3/20/86 [] Concur. HED#: None EVALUATOR: Weich/Gagnon [X] Concur With Comment/Note. HEO#: 6.5.047 TASK: Verification [] Do Not Concur for Following Reason: REV: DATE: 12-10-85 CL ITEM: 6.5.3.2a(2) CL: 6.5 [] Reevaluate & Resubmit for Following Reason: HED CATEGORY: D CL TITLE: Visual Displays Comment/Note/Reason: CONTROL BOARD LOCATION: Supervisory SB-1 AIT recommends that lens be changed to white. HED DESCRIPTION GUIDELINE- DESIGN AND USE OF NON-LEGEND LIGHT INDICATORS (Identification of Meaning): Devices 8.030 8.031, 8.037 are red indicator lights to indicate pumps-off. devices 8.032, 8.051, 8.052 are red indicator lights to indicate valves-closed. This use of red indicator lights violates control room convention. RECOMMENDED IMPLEMENTATION Promptly [X] SUPPORT MATERIAL ATTACHED Near Term \_\_\_\_\_\_ Convenient Outage POTENTIAL OPERATOR ERROR(S) Optional [X]Increased probability of misinterpreting component status. MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. \_\_\_\_\_ SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Change pumps 'OFF' and valves 'CLOSED' light indicators to GREEN and add RED light indicators for pumps 'RUNNING' and valves 'OPEN' status. Comment/Note/Reason: DATE: 5/19/86 CHAIRMAN: J. Basile EXECUTIVE REVIEW APPROVE: YES [X] NO [ ] NOTE:

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW
EVALUATOR: Gagnon/Sabeh	HED#: None	[] Concur.
TASK: Verification	HEO#: 6.5.048	[X] Concur With Comment/Note.
CL: 6.5 CL ITEM: 6.5.3.1c(1)	DATE: 1-28-86 REV:	[] Do Not Concur for Following Reason:
CL_TITLE: Visual Displays	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason: Lenses are to be changed following
HEO DESCRIPTI	 ON	
GUIDELINE- CHARACTERISTICS AND PROBLEMS OF Misinterpretation): Generic problem with use of single-bulb ind WHITE: Power On (SB1: 104,105). OPAL: CRF Flow (SL: 49), Close-Remote (SN: AMBER: DC Power Supply Status (FA: 84). NEON: Reset (SH: 77 thru 83). CLEAR: Undervoltage (SH: 70 thru 75).	LIGHT INDICATORS (Precautions to Avoid icator lamps: 35,36).	
Re: HEO 6.5.039, 6.5.049		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		
Causes operator confusion increasing the t determining equipment status.	me and probability of error in	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORRECTIVE ACTION		- [] Concur With Comment/Note.
Modify color of indicators to conform to co lights to provide positive equipment statu	ontrol room convention and add	[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason:
	• •	Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
		APPROVE: YES[X] NO[] NOTE:

HUMAN ENGINEERING OBSERVATION ASSESSMENT AIT REVIEW OBSERVATION CHAIRMAN: A. Adorno DATE: 3/20/86 [] Concur. HED#: None EVALUATOR: Gagnon/Sabeh [] Concur With Comment/Note. HE0#: 6.5.049 TASK: Verification Do Not Concur for Following Reason: REV: DX1 DATE: 1-28-86 CL ITEM: 6.5.1.6d(1) CL: 6.5 [] Reevaluate & Resubmit for Following Reason: HED CATEGORY: None CL TITLE: Visual Displays Comment/Note/Reason: CONTROL BOARD LOCATION: Flight & Supervisory These controls follow CE convention which is: WHITE - supervisory/status HED DESCRIPTION RFD - flow/open/run \_\_\_\_\_ GREEN - lack of flow/close/stopped GUIDELINE- COLOR CODING (Consistency of Meaning): AMBER - other than normal The meaning assigned to non-legend indicator lights is not consistent throughout the control room. Examples are: AMBER: High (SJ: 503), Auto (SJ: 5,7), Trip (FA: 86), Divert (SF: 22,24,34,35), Auto (SJ: 5,7), Irip (FA: 86), Divert (SF: 22,24,34,31)
 Emergency (SH: 53 thru 56,65 thru 68), Lowered (FA: 85).
 GREEN: Trip (FA: 109), Open (FA: 74), Raised (FA: 85), Off (FA: 110), Auto (SF: 36,37), Start/Stop (FC: 74,75).
 RED: Reset (FA: 86), On/Open (FA: 89), BKR-Closed (FA: 74), Tested (FA: 85), Off,Closed,Running (SB1: single lites 30 thru 45).
 WHITE: Power On (SP1: 100) 1000 RECOMMENDED IMPLEMENTATION WHITE: Power On (SB1: 104,105), Normal (SH: 53 thru 56, 65 thru 68), \_\_\_\_\_ Undervoltage (SH: 70,71), Low Flow (SL: 49), Remote (SN: 35,36). Promptly [] SUPPORT MATERIAL ATTACHED Near Term Convenient Outage POTENTIAL OPERATOR ERROR(S) Optional [] \_\_\_\_\_ Increased time and probability of error in interpreting the meaning of color MANAGEMENT REVIEW/APPROVAL light indicators. CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: 1. Provide a color coding standard for indicator lights throughout the control [] Reevaluate & Resubmit for Following Reason: room 2. Replace indicator lights as necessary to conform to the standard. Comment/Note/Reason:

EXECUTIVE REVIEW

CHAIRMAN: J. Basile DATE

APPROVE: YES [X] NO [ ] NOTE:

DATE: 5/19/86

HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW CHAIRMAN: A Adorno DATE: 12/10/85	
EVALUATOR: Gagnon/Sabeh	HED#: None	[X] Concur.	
TASK: Verification	HEO#: 6.5.050	[] Concur With Comment/Note.	
CL: 6.5 CL ITEM: 6.5.1.2d(1)	DATE: 2-24-86 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Visual Displays	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason:	
HEO DESCRIPTION	DN		
GUIDELINE- USABILITY OF DISPLAYED VALUES (S The level ranges covered by legend-lites 8.1 and by indicator 8.021 on Panel SB-1 do not expected levels to satisfy the operational	cale Range): 054, 8.055, 8.056, 8.057 sufficiently span the information requirements.		
		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR	ERROR (S)	   [ ] Promptly -   [ ] Near Term   [ ] Convenient Outage -   [X] Optional	
Inability for the operator to know when the the required level. SUGGESTED CORRECTI	indicated level is less than VE ACTION	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note. - [] Do Not Concur for Following Reason:	
Expand the indicated ranges to assure cover 34 ft8 1/2 in. on lites 8.054 & 8.055 40 ft. on lites 8.056 & 8.057 19 ft,-11 in. on indicator 8.021.	age below:	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88 APPROVE: YES[X] NO[] NOTE:	
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DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSERV	DCRDR-HEO-2
OBSERVATION VALUATOR: E. GAGNON	HED#: 6.5.009	AIT REVIEW CHAIRMAN: A. Adorno DATE: 12/10/85 [X] Concur.
ASK: Verification L: 6.5 CL ITEM: 6.5.1.2d(1) L TITLE: Visual Displays ONTROL BOARD LOCATION: Flight Panel FC HEO DESCRIPTION UIDELINE- USABILITY OF DISPLAYED VALUES (Scale	HEO#: 6.5.051 DATE: 5/5/86 REV: HED CATEGORY: C 	<ul> <li>[] Concur With Comment/Note.</li> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>
[X] SUPPORT MATERIAL ATTACHED		RECOMMENDED IMPLEMENTATION
POTENTIAL OPERATOR ERROR(S) Inappropriate action due to misinterpretation of flux level. SUGGESTED CORRECTIVE ACTION Expand scale range to include required value.		[X] Convenient Outage [] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.
		<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: None	CHAIRMAN: A. ADORNO DATE: 3/13/85
TASK: Control Room Survey	HEO#: 6.6.001	[X] Concur With Comment/Note
CL: 6.6 CL ITEM: 6.6.1.2a(1,2)	DATE: 11/6/84 REV:	[] Do Not Concur for Following Reason
CL TITLE: Labels and Location Aids	HED CATEGORY: D	[] Reevaluate & Recubrit for Fallewing Dec
CONTROL BOARD LOCATION: AII		Comment Abte /Research ATT recomment Althering Reason:
HEO DESCRIPTION		in the labeling study.
GUIDELINE- HIERARCHICAL SCHEME (Ranking): The limited hierarchical labeling on some supervisory panels does not adequately satisfy these guideline criteria.		
RE: Photo No. 1-7		
[X] SUPPORT MATERIAL ATTACHED		RECOMMENDED IMPLEMENTATION
POTENTIAL OPERATOR ERROR (S)		- [] Near Term
Increases search time, redundant label content and		[X] Optional
probability of error in locating functionally related controls and displays.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORRECTIVE ACTION		[] Concur With Comment/Note.
A hierarchical labeling study should be conducted to		[ ] Do Not Concur for Following Reason:
design an improved control room labeling scheme.		[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
	· .	APPROVE: YES[X] NO[] NOTE:

HUMAN ENGINEERING OBSERVATION ASSESSMENT \_\_\_\_\_ AIT REVIEW OBSERVATION CHAIRMAN: A. ADORNO DATE: 3/13/85 EVALUATOR: Sabeh/Welch HED#: 6.6.001 [] Concur. [X] Concur With Comment/Note. TASK: Control Room Survey HEO#: 6.6.002 [] Do Not Concur for Following Reason: CL: 6.6 CL ITEM: 6.6.2.1a DATE: 11/6/84 REV: HED CATEGORY: C [] Reevaluate & Resubmit for Following Reason: CL TITLE: Labels and Location Aids Comment/Note/Reason: AIT recommends that this item be CONTROL BOARD LOCATION: ALL \_\_\_\_\_ considered as part of the labeling study. HEO DESCRIPTION \_\_\_\_\_ GUIDELINE- PLACEMENT (Normal Placement): Most display labels throughout the control room are placed below or to one side of associated display. RE: Photo No. 1-14 RECOMMENDED IMPLEMENTATION Promotly [X] SUPPORT MATERIAL ATTACHED Near Term ั่วว่ POTENTIAL OPERATOR ERROR(S) Convenient Outage Optional \_\_\_\_\_ ------Difficulty in associating label and related display due MANAGEMENT REVIEW/APPROVAL to non-standard label location resulting in increased CHAIRMAN: V. Jayaraman DATE: 3/25/86 operator response time and the probability of error. [X] Concur. \_\_\_\_\_ [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: \_\_\_\_\_ Relocate labels above displays to conform with [] Reevaluate & Resubmit for Following Reason: quideline criteria. Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES [X] NO [ ] NOTE:

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION EVALUATOR: Sabeh/Welch HED#: 6.6.002		AIT REVIEW
		[X] Concur.
TASK: Control Room Survey	HEO#: 6.6.003	[] Concur With Comment/Note.
CL: 6.6 CL ITEM: 6.6.2.2a	DATE: 11/6/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Labels and Location Aids	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL. BOARD LOCATION: N/A		Comment/Note/Reason:
HEO DESCRIPTION		
GUIDELINE- MOUNTING (INTEGRITY): Labels are mounted on panels with adhesive. Nu labels are loose or missing, for example labels 108,109 and 110 and SL= 504 close position and 508.	merous SB1=107, FA= 503,	
RE: HE0 6.4.016		
RE: Photo No. 1-5		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		   [] Promptly -   [] Near Term   [] Converient Outage
POTENTIAL OPERATOR ERROR(S)		- [ [ ] Optional
Delay in locating or identifying control-displa increased probability of error.	y components and	WANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORRECTIVE	ACTION	[] [] Concur With Continent of Note:
Attach all labels by a secure means that will s removal for necessary changes.	still permit	[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HE0-2
OBSERVATION         EVALUATOR: Sabeh/Welch       HED#: None         TASK: Control Room Survey       HED#: 6.6.004         CL: 6.6       CL ITEM: 6.6.2.3a(1)       DATE: 11/6/84         CL TITLE: Labels and Location Aids       HED CATEGORY: D         CONTROL BOARD LOCATION: All       HEO DESCRIPTION         GUIDELINE- SPATIAL ORIENTATION (Horizontal Orientation):         Vertical meters are all labeled with vertical labels on the face of the meters.		AIT REVIEW - CHAIRMAN: A. ADORNO DATE: 3/13/85 [] Concur. [X] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: AIT recommends that this be included in labeling study.
[X] SUPPORT MATERIAL ATTACHED		RECOMMENDED IMPLEMENTATION
POTENTIAL OPERATOR ERROR(S) Delay in reading label to determine meters fuction.		<ul> <li>[] Near Term</li> <li>[] Convenient Outage</li> <li>[X] Optional</li> <li>MANAGEMENT REVIEW/APPROVAL</li> <li>CHAIRMAN: V. Jayaraman DATE: 3/25/86</li> <li>[X] Concur.</li> <li>[] Concur With Comment/Note.</li> </ul>
Provide horizontal labels for the vertical meters	•	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> <li>EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86</li> <li>APPROVE: YES[X] NO[] NOTE:</li> </ul>
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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION			AIT REVIEW	
EVALUATOR: Sabe	 h/Welch	HED#: 6.6.003	[] Concur.	
TASK: Control R	'oom Survey	HEO#: 6.6.005	[X] Concur With Comment/Note.	
CL: 6.6	CL ITEM: 6.6.3.3c	DATE: 11/6/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Label	s and Location Aids	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD L	OCATION: Supervisory Panel "SJ"		Comment/Note/Reason: AIT recommends that this be included in	
	HEO DESCRIPTION		-   labeling study.	
GUIDELINE- CONS The component I System Circulat and SOP's ident "Turbine Hall C	ISTENCY (Consistency with Proced abels use "Station Air Cooling ion" while the system descriptio ify these components as closed Cooling System."	ures) : n		
	• •			
POTENTIAL OPERATOR ERROR(S)			[ ] Fromptly -   [ ] Near Term   [X] Convenient Outage -   [ ] Ontional	
Potential confusion and increased probability of error when following procedures.			MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.	
	SUGGESTED CURRECTIVE A		- [] Do Not Concur for Following Reason:	
Conduct a check procedure docur	k to correlate panel labeling wit mentation.	in	[] Reevaluate & Resubmit for Following Reason:	
			Comment/Note/Reason:	
		• • • • •	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
			APPROVE: YES[X] NO[] NOTE:	

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DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: 6.6.004	[] Concur.
TASK: Control Room Survey	HEO#: 6.6.006	[X] Concur With Comment/Note.
CL: 6.6 CL ITEM: 6.6.3.7a	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Labels and Location Aids	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight and Assessment	Panels	Comment/Note/Reason: AIT recommends that this be included in the
HEO DESCRIPTION		
GUIDELINE- FUNCTIONAL GROUPS (Functional Relat The functional relationships of controls/displ on these panels are not labeled.	ionship): ays	
RE: Photo No. 1-21		
		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR(S)		-   [] Near Term   [X] Convenient Outage -   [] Ontional
Delay in identifying functionally related cont displays.	rols and/or	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. 
SUGGESTED CORRECTIVE	ACTION	[] Do Not Concur for Following Reason:
Provide labels and mimics or demarcation to identify functionally related controls/displays and their procedural relationships.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:
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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

#### DCRDR-HE0-2

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OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch	HED#: None	- CHAIRMAN: A. ADORNO DATE: 3/13/85
TASK: Control Room Survey	HEO#: 6.6.007	[X] Concur With Comment/Note.
CL: 6.6 CL ITEM: 6.6.3.8b	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Labels and Location Aids	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight Panel "FC"		Comment/Note/Reason: AIT recommends no action because on this item
HEO DESCRIPTION		-   potentiometer is used only to center the recorder.
GUIDELINE- CONTROL POSITION LABELING (DIRECTION) Direction of motion to indicate increase-decrease is not labeled for potentiometers on panel FC, subpanels 34,35.		-   Ke-evaluation concurred with previous results.
RE: Photo No. 1-32		
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		[] Promptly -   [] Near Term
Toppose the probability of error is relies	(())	- [ [ ] Optional
control movements.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur.
SUGGESTED CORRECTIVE AC	ГІОN	- [] Concur With Comment/Note.
Provide labels and mimic arrows to indicate		- [] Do Not Concur for Following Reason:
direction of motion for increase-decrease.		[ ] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
	· .	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
		APPROVE: YES[X] NO[] NOTE:
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DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
OBSERVATION         EVALUATOR: Sabeh/Welch       HED#: None         TASK: Control Room Survey       HED#: 6.6.008         CL: 6.6       CL ITEM: 6.6.3.9a,b       DATE: 11/7/84         CL TITLE: Labels and Location Aids       HED CATEGORY: None         CONTROL BOARD LOCATION: All       HEO DESCRIPTION         GUIDELINE- ACCESS OPENING, DANGER, WARNING AND SAFETY INSTRUCTION         LABELING:       Access openings to the rear of control room panels are not labeled to identify the function of items accessible through them. There are no labels for Danger, Warning and Safety Instruction on these access openings.		AIT REVIEW - CHAIRMAN: A. ADORNO DATE: 3/13/85 [] Concur. [X] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: - AIT indicates that Con Edison policy is to label high or intermediate voltage which is complied with in CCR. - Re-evaluation concurred with previous results.	
[ X ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Potential electrical shock hazard to personnel entering these areas and the probability of damage to equipment. SUGGESTED CORRECTIVE ACTION Provide labels to identify: items accessible through each opening and identification of hazard to personnel and equipment in accordance with appropriate safety standards.		RECOMMENDED IMPLEMENTATION    RECOMMENDED IMPLEMENTATION    Recomment/Note/Reason:   ecomment/Note/Reason:  Recomment/Note/Reason:  Recomment/Recomment	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

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HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: 6.6.005	-   CHAIRMAN: A. ADORNO DATE: 3	8/13/85
TASK: Control Room Survey	HEO#: 6.6.009	[X] Concur With Comment/Note.	
CL: 6.6 CL ITEM: 6.6.4.1a(1,2)	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Labels and Location Aids	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: AII		Comment/Note/Reason: AIT recommends that this be	included in
HEO DESCRIPTION		-   labeling study.	· ·
GUIDELINE- READABILITY (CHARACTER HEIGHT): Labels for components at the same hierarchical throughout the control room use characters of heights and line thickness with some too small guideline criteria, (e.g., 40 and 41 on the assessment panel)	level different to meet	- , ,	
RE: Photo No. 2-16			· ·
		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ER	 ROR (S)	-   [] Near Term   [X] Convenient Outage	
Increases the time to identify controls and di	 splays.	-   [ ] Optional 	
		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE [X] Concur.	: 3/25/86
SUGGESTED CORRECTIVE ACTION		- [] Concur With Comment/Note.	
Conduct a labeling study to standardize label	 sizes.	- [] Do Not Concur for Following Reason:	
The effort should be included with the hierarc labeling study recommended by HEO 6.6.001.	hical	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	. * . * .
· · · · · · · · · · · · · · · · · · ·	•		
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		APPROVE: YES[X] NO[] NOTE:	DATE: 5/19/86

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION EVALUATOR: Sabeh/Weich TASK: Control Room Survey CL: 6.6 CL ITEM: 6.6.4.1b(1) CL TITLE: Labels and Location Aids CONTROL BOARD LOCATION: All HEO DESCRIPTION GUIDELINE- READABILITY (Contrast): Many component labels use white characters on a black background and thus do not conform to guideline criteria. RE: Photo No. 1-20	HED#: 6.6.006 HEO#: 6.6.010 DATE: 11/7/84 REV: HED CATEGORY: C	AIT REVIEW - CHAIRMAN: A. ADORNO DATE: 3/13/85 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: -
[ X ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR( Increases the time required for identifying components. SUGGESTED CORRECTIVE ACTI Change labels to use black characters on a white background. This observation should be included with the study recommended by HEO 6.6.001 and HEO 6.6.009.	S)	RECOMMENDED IMPLEMENTATION         [] Promptly         Near Term         [X] Convenient Outage         [] Optional         MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88         [] Concur.         [] Concur With Comment/Note.         [] Concur With Comment/Note.         [] Reevaluate & Resubmit for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         Comment/Note/Reason: Black letters on white background are an IP-2 standard to signify instrument bus channelization. No problem has been experienced with white on black background.         EXECUTIVE REVIEW       CHAIRMAN: J. Basile       DATE: 5/19/86         APPROVE: YES[X] NO[] NOTE:

HUMAN ENGINEERING OBSERVATION ASSESSMENT

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OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: 6.6.007	-   CHAIRMAN: A. ADORNO DATE: 3/13/85	
TASK: Control Room Survey	HEO#: 6.6.011	[X] Concur With Comment/Note.	
CL: 6.6 CL ITEM: 6.6.4.2c,d(1,3)	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Labels and Location Aids	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory "SJ"		Comment/Note/Reason: AIT recommends that this be included in	
HEO DESCRIPTION		-   labeling study.	
GUIDELINE- STYLE (STROKE WIDTH AND SPACING): The stroke width to character height used on the over controls on panel SJ = 31,32,33,34,35 and 3 character and line spacing below guideline crite	a labels 36 reduces aria.	-	
RE: Photo No. 1-22			
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERROR(S)		-   [ ] Near Term   [X] Convenient Outage	
Increases the time, difficulty and probability of error in reading labels.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTED CORRECTIVE A	TION	- [] Concur With Comment/Note.	
Replace labels to conform with the guideline criteria for stroke width and spacing.		<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HEO-2
OBSERVATION EVALUATOR: Sabeh/Welch TASK: Control Room Survey CL: 6.6 CL ITEM: 6.6.5.1e,f,g CL TITLE: Labels and Location Aids CONTROL BOARD LOCATION: N/A HEO DESCRIPTION GUIDELINE- USE (Mounting, Obscuration and Activat Tag outs are not fastened to the associated compon and cannot prevent actuation of a tagged control. From observation in the control room tag outs obs the label of the associated or an adjacent compon RE: Photo No. 1-19	HED#: None HEO#: 6.6.012 DATE: 11/7/84 REV: HED CATEGORY: None ion): ment cured	AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/13/85 [] Concur. [X] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: AIT indicates that there are no industry standards for this item, a tag system exists and improvements of the system will be incorporated continuously. Re-evaluation concurred with previous results.
[ X ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR Difficulty and delay in identifying or reading an obscured control or display and increases the probability of error in activating a control if the tag out is accidently removed. SUGGESTED CORRECTIVE ACT Provide tag outs that are securely affixed to a tagged component and do not obscure any labels or displays. Tag outs that prevent actuation should used on critical controls.	(S) ION bə	RECOMMENDED IMPLEMENTATION  [] Promptly [] Near Term [] Convenient Outage [] Optional  MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [] Concur. [] Concur. [X] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: [] Reevaluate & Resubmit for Following Reason: [] Reevaluate & Resubmit for Following Reason: [] Comment/Note/Reason: See procedure OAD #19.
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/88 APPROVE: YES[X] NO[] NOTE:

#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: None	-   CHAIRMAN: A. ADORNO DATE: 3/13/85   [] Concur.	
TASK: Control Room Survey	HEO#: 6.6.013	[] Concur With Comment/Note.	
CL: 6.6 CL ITEM: 6.6.5.1b	DATE: 11/7/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Labels and Location Aids	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: AIT indicates that the small tag is used for	
HEO DESCRIPTI		-   maintenance and imforms him that a MWR has been prepared on the item.	
GUIDELINE- USE (Human Factors Practices): Temporary labels are too small and tag-outs too large and clumsy.	3		
RE: Photo No. 2-23			
		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		[] Promptly [] Near Term [] Convenient Outage	
POTENTIAL OPERATOR ERROR (S)			
Difficulty, delay and increased probability reading tag-outs and temporary labels.	of error in	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur.	
SUGGESTED CORRECTI	VE ACTION	[X] Concur With Comment/Note.	
Tag-outs and temporary labels should be re-	designed to	[] Do Not Concur for Following Reason:	
conform with guideline criteria.		[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason: See procedure OAD #19.	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
		APPROVE: YES[X] NO[] NOTE:	

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW		DCRDR-HE0-2
	HUMAN ENGINEERING UBSER	
		CHAIRMAN: A. ADORNO DATE: 3/13/85
EVALUATUR: Kaben/Weich		
TASK: Control Room Survey	HEO#: 6.6.014	[] Concur With Comment/Note.
CL: 6.6 CL ITEM: 6.6.5.2b(5)	DATE: 11/7/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Labels and Location Aids	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: AIT determined that administrative procedures
HEO DESCRIPTION		-
GUIDELINE- CONTROL (Review Procedures): There is no review procedure to determine the impact temporary labels on other system components.		
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR (S)		[ ] Near Term   [ ] Convenient Outage
Increases the probability of error in determining system equipment status.	, ,	- [] Uptional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur.
SUGGESTED CORRECTIVE ACT		- [X] Concur With Comment/Note.
Prepare a procedure and training instruction on t proper use of tag-outs and temporary labels.		<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: See SAO #2004.</li> </ul>
	· · · · · ·	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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HUMAN ENGINEERING OBSERVATION ASSESSMENT		RVATION ASSESSMENT DCRDR-HE0-2
OBSERVAT	ION	AIT REVIEW
EVALUATOR: Sabeh/Weich	HED#: 6.6.008	CHAIRMAN: A. ADORNO DATE: 3/13/85
TASK: Control Room Survey	HEO#: 6.6.Ø15	   [] Concur With Comment/Note.
CL: 6.6 CL ITEM: 6.6.6.2c	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Labels and Location Aids	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason:
HEO DESCRI	PTION	-
GUIDELINE- DEMARCATION (Permanence): Lines of demarcation use an adhesive bac Portions of some lines are missing and s starting to peel off.	ked tape. ome are	
RE: Photo No. 1-18	,	
•		
		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERA	TOR ERROR(S)	[X] Convenient Outage
Possible loss of demarcations value as l degrades or lines are lost.	ine quality	- [] Uptional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORRE	CTIVE ACTION	- [] Concur With Comment/Note.
Replace present tape with a more permane or painted lines.	nt tape	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>
· · · ·		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCR	DR-HEO-2
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: 6.6.009	[X] Concur.	
TASK: Control Room Survey	HEO#: 6.6.016	[] Concur With Comment/Note.	
CL: 6.6 CL ITEM: 6.6.6.4a(3)	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:	
L TITLE: Labels and Location Aids	• HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
ONTROL BOARD LOCATION: Surpervisory Panel "SH"		Comment/Note/Reason:	
HEO DESCRIPTION		-	
GUIDELINE- USE OF MIMICS (Color): The electrical flow mimic on SH is silver on a grey panel and is difficult to follow due to poor color contrast.			·
RE: Photo No. 1-6			
		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		   [] Promptly	
POTENTIAL OPERATOR ERROR	S)	-   [ ] Near Term   [X] Convenient Outage	
Increased time, difficulty and probability of sperator error in following the mimic path.		- [] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur.	
SUGGESTED CORRECTIVE ACT		- [X] Concur With Comment/Note.	
Color mimic lines to provide adequate contrast		-   [] Do Not Concur for Following Reason:	
with panel color.		[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason: SEE HEO 6.6.020.	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE:	5/19/86
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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Weich	HED#: 6.6.010	[] Concur.	
TASK: Control Room Survey	HEO#: 6.6.017	[X] Concur With Comment/Note.	
CL: 6.6 CL ITEM: 6.6.6.4b(3)	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Labels and Location Aids	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory Panel		Comment/Note/Reason: AIT recommends that this be included in the	
HEO_DESCRIPTION		- Tabeling study.	
GUIDELINE- USE OF MIMICS (Mimic Lines): Depiction of flow direction on the RHR and auxiliary cooling mimic (Panel SG) is unsatisfactory.		-	
RE: 0ER-034			
RE: Photo No. 1-7			
		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERROR (S)		-   [ ] Near Term   [X] Convenient Outage - [ ] Ontional	
Difficulty identifying flow direction for sequencing of controls with increased probabilit of operator error.	y	- [] Concur. - [] Concur With Comment/Note.	
SUGGESTED CORRECTIVE AC	TION	- [X] Do Not Concur for Following Reason:	
Provide improved depiction of system flow by means of more prominent arrowheads.		[] Reevaluate & Resubmit for Following Reason:	
•		Comment/Note/Reason: Total fix should include moving six switches on panel. See attached sketch.	
•			
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
		APPROVE: YES[X] NO[] NOTE:	

DETAILED CONTROL RÖOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION		AIT REVIEW   AIT REVIEW -   CHAIRMAN: A. ADORNO DATE: 3/13/85
EVALUATOR: Sabeh/Welch	HED#: 6.6.011	[X] Concur.
TASK: Control Room Survey	HEO#: 6.6.Ø18	[] Concur With Comment/Note.
CL: 6.6 CL ITEM: 6.6.1.1	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Labels and Location Aids	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason:
HEO DESCRIPTION	· · · · · · · · · · · · · · · · · · ·	- · · · · · · · · · · · · · · · · · · ·
GUIDELINE- NEED FOR LABELING: CRT terminals are not labeled or identified. It possible to erase a display at one terminal by an improper entry on the keypad of another terminal. RE: OER-030 RE: Photo No. 2-13	s	
		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED	• •	[] Promptly
POTENTIAL OPERATOR ERROR	(S)	-   [ ] Near Term   [X] Convenient Outage -   [ ] Ontional
Interuption and delay in information retrieval in the event of an inadvertant erasure. SUGGESTED CORRECTIVE ACT Label terminals to coincide with keypad.	ION	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason:
	·	Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION	AIT REVIEW
VALUATOR: Sabeh/Welch HED#: 6.6.012	CHAIRMAN: A. ADORNO DATE: 3/13/85
ASK: Control Room Survey HEO#: 6.6.019	[X] Concur With Comment/Note.
L: 6.6 CL ITEM: 6.6.3.3b DATE: 11/7/84	REV: [] Do Not Concur for Following Reason:
L TITLE: Labels and Location Aids HED CATEGORY	: C [] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: N/A	Comment/Note/Reason: AIT recommends that this be included in the
HEO DESCRIPTION	labeling study.
SUIDELINE- CONSISTENCY (Internal Consistency): Words, acronyms and abbreviations are not consistent words, acronyms and abbreviations are not consistent words, acronyms and abbreviations are not consistent words, acronyms and abbreviations are not consistency words, acronyms and abbreviations are not consistency words, acronyms and abbreviations are not consistency. Will abble a constant and a constant across a constant words, across a constant across a constant abbreviations are not consistency. Words, across a constant abbreviations are not consistency. Words, across a constant abbreviations are not consistency. Words, across a constant abbreviations are not consistency. Words, across a constant abbreviations are not consistency. Words, across a constant abbreviations are not consistency. Words, across a constant abbreviations are not consistent words, across a constant abbreviations are not constant abbreviations are not constant words, across a constant abbreviations are not constant abbreviations are not constant abbreviations are not constant abbreviations are not constant abbreviations are not constant abbreviations are not constant abbreviations are not constant abbreviations are not constant abbreviations are not constant abbreviations are not constant abbreviati	
Æ: 0ER-Ø31	
] SUPPORT MATERIAL ATTACHED	[] Promptly
POTENTIAL OPERATOR ERROR(S)	
elay in associating related controls-displays when	[] Optional
lifferent words, acronyms and abbreviation are used.	WANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur.
SUGGESTED CORRECTIVE ACTION	[] Concur With Comment/Note.
itandardize words, acronyms and abbreviations for use	[] Do Not Concur for Following Reason:
on labels and in procedures. This should be part of the study recommended by HEO 6.6.001 and HEO 6.6.009.	[] Reevaluate & Resubmit for Following Reason:
	Comment/Note/Reason:
•	
	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
	APPROVE: YES [X] NO [] NOTE:
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	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION		AIT REVIEW CHAIRMAN: A. Adorno DATE: 12/10/85
EVALUATOR: R. POTTER	HED#: None	[] Concur.
TASK: VALIDATION	HEO#: 6.6.020	[] Concur With Comment/Note.
CL: 6.6 CL ITEM: 6.6.6.1	DATE: 10/7/85 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Labels and Location Aids	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory Panel S	н	Comment/Note/Reason: - I This has not been reported as a problem.
HEO DESCRIPT		
GUIDELINE- NEED FOR LOCATION AIDS: Normal feed breakers 2A and 6A (15.049, 15 to distinguish from nearby controls.	Ø52) are difficult	
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		<pre>[] Promptly - [] Near Term [] Convenient Outage - [] Optional</pre>
Difficulty or delay in selecting correct controls, possible selection of wrong controls.		
SUGGESTED CORRECT	IVE ACTION	[] Do Not Concur for Following Reason:
Add a color or switch marking to help identification of these controls.		[] Reevaluate & Resubmit for Following Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

DCRDR-HE0-2

HUMAN ENGINEERING OBSERVATION ASSESSMENT		
OBSERVATION		AIT REVIEW
EVALUATOR: R. POTTER	HED#: None	CHAIRMAN: A. Adorno DATE: 12/10/85 [X] Concur.
CL: 6.6 CL ITEM: 6.6.3.3b	HEO#: 6.6.021	[] Concur With Comment/Note.
CL TITLE: Labels and Location Aids	HED CATEGORY: D	[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason:
UNIRUL BUARD LOCATION: Supervisory Panel SB-2		Comment/Note/Reason:
HEO DESCRIPTION		
CUIDELINE- CONSISTENCY (Internal Consistency): Label for SI pressure (9.509) is labeled S.O. pressur	re.	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Difficulty/delay in reading correct display.		RECOMMENDED IMPLEMENTATION
		[] Promptly [] Near Term [] Convenient Outage [X] Optional
		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORRECTIVE ACTION		[] Concur With Comment/Note.
eplace label with a correctly worded label.		[] Do Not Concur for Following Reason:
		[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
•		
	· .	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

HUMAN ENGINEERING OBSERVATION ASSESSMENT			DCNDN-NEU-2	
OBSERVATION		AIT REVIEW		
EVALUATOR: R. P	OTTER	HED#: 6.6.Ø13	[X] Concur.	5
TASK: VALIDATIO	N	HEO#: 6.6.022	[] Concur With Comment/Note.	•
CL: 6.6	CL ITEM: 6.6.3.3c	DATE: 10/7/85 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Labels and Location Aids HED CATEGORY: C		[] Reevaluate & Resubmit for Following Reason:		
CONTROL BOARD LOCATION: Supervisory Panels SG, SH, SC, SB-2		Comment/Note/Reason:		
HEO DESCRIPTION		- All recommends this be part of laber study.		
GUIDELINE- CONSISTENCY (Consistency with Procedures): Labels for component cooling water pumps (14.017, 14.018, 14.019) on panel SG, 480 V bus tie breakers (15.058, 15.060, 15.062) on panel SH, auxiliary boiler feed pump steam supply valves (10.038, 10.041) on panel SC, and containment recirculation fans (9.046, 9.047, 9.049, 9.050, 9.053, 9.056, 9.057, 9.059, 9.060) on panel SB-2 does not match nomenclature in the procedure (procedure E-0).				
			RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		<pre>[] Promptly [] Near Term [X] Convenient Outage [] Optional WANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.</pre>		
POTENTIAL OPERATOR ERROR(S) Difficulty/delay in selecting correct control.				
Revise label and/or procedure to use consistent nomenclature.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:		
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		EXECUTIVE REVIEW CHAIRMAN: J. Basile DA APPROVE: YES[X] NO[] NOTE:	TE: 5/19/86	

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### HUMAN ENGINEERING OBSERVATION ASSESSMENT

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OBSERVATION		AIT REVIEW   CHAIRMAN: A. Adorno DATE: 12/10/85   [X] Concur.	
VALUATOR: R. POTTER HED#: None			
TASK: VALIDATION	HEO#: 6.6.023	[] Concur With Comment/Note.	
CL: 6.6 CL ITEM: 6.6.6.3	DATE: 10/7/85 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Labels and Location Aids	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: All panels		Comment/Note/Reason:	
HEO DESCRIPTION		-	
GUIDELINE- COLOR: Color of warning labels is not consistent throug control room.		-	
	• •		
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR	R(S)	[] Promptly - [] Near Term [] Convenient Outage	
Difficulty in identifying warning labels.		- [X] Uptional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur. - [] Concur With Comment/Note	
SUGGESTED CORRECTIVE AC	TION	- [] Do Not Concur for Following Reason	
Replace warning labels with new labels of a consistent color.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

	HUMAN ENGINEERING OBSERVATION ASSESSMENT		
OBSERVATION		AIT REVIEW	
EVALUATOR: R. POTTER	HED#: 6.6.014	[X] Concur.	
TASK: VALIDATION	HED#: 6.6.024	[] Concur With Comment/Note.	
CL: 6.6 CL ITEM: 6.6.1.1	DATE: 10/7/85 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Labels and Location Aids	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory Panel SF		Comment/Note/Reason:	
HEO DESCRIPTION			
GUIDELINE- NEED FOR LABELING: Meters 13.004 through 13.012 are not labeled.			
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S)		<pre></pre>	
Dilfficulty/delay in identifying correct maters. SUGGESTED CORRECTIVE ACTION Add identification labels to the maters.			
		<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

HUMAN ENGINEERING OBSERVATION ASSESSMENT

13

OBSERVATION		AIT REVIEW	
EVALUATOR: R. POTTER	HED#: 6.6.Ø15	CHAIRMAN: A. Adorno DATE: 12/10/85	
TASK: VALIDATION	HEO#: 6.6.025	[] Concur With Comment/Note.	
CL: 6.6 CL ITEM: 6.6.1.1	DATE: 10/7/85 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Labels and Location Aids	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Back Panel		Comment/Note/Reason:	
HEO DESCRIPTION			
GUIDELINE- NEED FOR LABELING: Containment high pressure bistable switches are p Operator has difficulty identifying correct switc	poorly labeled. ches.		
· · · · · · · · · · · · · · · · · · ·	ζ .	RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED			
POTENTIAL OPERATOR ERROR(S)		-   [ ] Near Term   [X] Convenient Outage -   [ ] Optional 	
Difficulty/delay in locating correct switches.			
		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86   [X] Concur.	
		[] Concur With Comment/Note.	
Add proper labels to switches.		[] Do Not Concur for Following Reason:	
•		[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

	DCRDR-HEO-2	
	AIT REVIEW - CHAIRMAN: A. Adorno DATE: 12/10/85	
HED#: None	[X] Concur.	
HEO#: 6.6.026	[] Concur With Comment/Note.	
DATE: 10/9/85 REV:	[] Do Not Concur for Following Reason:	
HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:	
	Comment/Note/Reason:	
ot oreting		
	RECOMMENDED IMPLEMENTATION	
· · · · · ·	[] Promptly	
::::::::::::::::::::::::::::::::::::::	- [] Near Term [] Convenient Outage - [X] Optional 	
	[] Concur With Comment/Note.	
add	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>	
	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
	HED#: None HED#: 6.6.026 DATE: 10/9/95 REV: HED CATEGORY: D	

HUMAN ENGINEERING	OBSERVATION	ASSESSMENT
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DCRDR-HE0-2

OBSERVATION AIT REVIEW CHAIRMAN: A. Adorno DATE: 12/10/85 EVALUATOR: R. POTTER HED#: None [] Concur. TASK: VALIDATION HEO#: 6.6.027 [] Concur With Comment/Note. CL: 6.6 CL ITEM: 6.6.5.2 DATE: 10/9/85 REV: [X] Do Not Concur for Following Reason: CL TITLE: Labels and Location Aids HED CATEGORY: None [] Reevaluate & Resubmit for Following Reason: CONTROL BOARD LOCATION: All Panels Comment/Note/Reason: Procedure is available. HEO DESCRIPTION GUIDELINE- USE AND CONTROL OF TEMPORARY LABELS (Review Procedures): Several indicators have been tagged out for several months. RECOMMENDED IMPLEMENTATION [] SUPPORT MATERIAL ATTACHED Promptly \_\_\_\_\_ Near Term POTENTIAL OPERATOR ERROR(S) Convenient Outage Optional Possibility of necessary information not being available to the operator due to a tagged-out indicator. MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur. [X] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: A review procedure should be instituted that requires periodic review and removal of temporary tags. [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: See OAD #19. EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HEO-2		
OBSERVATION		AIT REVIEW		
EVALUATOR: R. POTTER	HED#: None	[] Concur.		
TASK: VALIDATION	HEO#: 6.6.Ø28	[] Concur With Comment/Note.		
CL: 6.6 CL ITEM: 6.6.6.1	DATE: 10/10/85 REV:	[X] Do Not Concur for Following Reason:		
CL TITLE: Labels and Location Aids	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:		
CONTROL BOARD LOCATION: Panels FA, FB, SB-2, SC, SG, SJ, SL, SN		Comment/Note/Reason:		
HEO DESCRIPTION		-   Instrumentation is adequately labeled.		
GUIDELINE- NEED FOR LOCATION AIDS: Controls/displays for performing immedia steps 5 through 14 in procedure E-Ø are over several panels, (somewhat difficult	ate action spread out to locate).			
	· · · · · · · · · · · · · · · · · · ·	RECOMMENDED IMPLEMENTATION		
[ ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Difficulty/delay in executing immediate action steps. SUGGESTED CORRECTIVE ACTION Add location aids to identify those controls/displays required in the immediate action steps.		Promptly		
		<pre>[] Near lerm [] Convenient Outage [] Optional</pre>		
				- [] Do Not Concur for Following Reason:
		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Operators are trained on location of instrument and instruments are adequately labeled.		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:		
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	HUMAN ENGINEERING OBSET	RVATION ASSESSMENT DCRDR-HEO-2
OBSERV	ATION	AIT REVIEW
EVALUATOR: R. POTTER	HED#: None	CHAIRMAN: A. Adorno DATE: 12/10/85
TASK: VALIDATION	HEO#: 6.6.029	[] Concur With Comment/Note
CL: 6.6 CL ITEM: 6.6.6.1	DATE: 10/14/85 REV:	[ [X] Do Not Concur for Following Reason
CL TITLE: Labels and Location Aids	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory Par	nel SN	Comment/Note/Reason:
HEO DESCRIPTION		Not considered necessary.
GUIDELINE- NEED FOR LOCATION AIDS: Phase A isolation buttons (20.002, 20.0 coded on the button cover; also phase E 20.013, 20.014, 20.015) are not color o buttons are color coded but these canno covers).	103, 20.005, 20.008) are not color 3 isolation buttons (20.012, coded on the button cover. (The ot be seen due to the button	
	• •	RECOMMENDED IMPLEMENTATION
U SOFFORT MATERIAL ATTACHED		[] Promptly   [] Near Term
	ATUR ERROR(S)	[ ] Convenient Outage -   [ ] Optional
isolation.	forming containment	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORR	ECITVE ACTION	- [] Concur With Comment/Note.
Add color coding to the phase A and pha		- [] Do Not Concur for Following Reason:
button covers.		[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
	· · · ·	APPROVE: YES[X] NO[] NOTE:
	• • • • •	

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBŠERVAT	ION	AIT REVIEW
EVALUATOR: R. POTTER	HED#: None	[X] Concur.
TASK: VALIDATION	HEO#: 6.6.030	[] Concur With Comment/Note.
CL: 6.6 CL ITEM: 6.6.3.2b	DATE: 10/14/85 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Labels and Location Aids	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Air Conditioner F	'ane I	Comment/Note/Reason:
HEO DESCRIF	TION	-
Labels for CCR air conditioner control ar clear. Operators have trouble understand on labels.	nd status are not ling instructions	
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		<pre>[] Promptly [] Near Term [] Convenient Outage [X] Optional WANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur. [X] Concur With Comment/Note.</pre>
POTENTIAL OPERATOR ERROR (S)		
Increase in time and probability of error in reading CCR air conditioner status. 		
Revise labels to improve clarity of instr	uctions.	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: Coordinate with HEO 6.5.037.</li> </ul>
	• •	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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## HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW
EVALUATOR: R. POTTER	HED#: 6.6.Ø16	CHAIRMAN: A. Adorno DATE: 12/10/85
TASK: VALIDATION	HEO#: 6.6.031	[ ] Concur With Comment/Note.
CL: 6.6 CL ITEM: 6.6.2.2a, 6.6.6.4	DATE: 10/15/85 REV:	   [] Do Not Concur for Following Reason:
CL TITLE: Labels and Location Aids	HED CATEGORY: C	   [] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: All Panels		Comment/Note/Reason:
HEO DESCRIPTION		Part of demarcation study.
GUIDELINE- MOUNTING (Integrity): Some of the mimics are made from tape which is peelin Also, some of the mimics don't conform to guidelines.	g off.	
		RECOMMENDED IMPLEMENTATION
		[] Promptly   [] Near Term
Delay in locating or identifying control/display components.		[] Optional 
SUGGESTED CORRECTIVE ACTION		[X] Concur With Comment/Note.
Review mimics with regard to condition, color, design and other mimic guidelines. Replace with more permanent mimic where required.	·	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: Refer to HED 6.6.010.</li> </ul>
	• • •	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

	HUMAN ENGINEERING OBSERVA	TION ASSESSMENT
OBSERVA	TION	AIT REVIEW
EVALUATOR: Welch/Gagnon	HED#: None	[X] Concur.
TASK: Verification	HEO#: 6.6.Ø32	[] Concur With Comment/Note.
CL: 6.6 CL ITEM: 6.6.1.1	DATE: 12-10-85 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Labels and Location Aids	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight FA		_Comment/Note/Reason:
HEO DESCR	IPTION	To be done during labeling.
GUIDELINE- NEED FOR LABELING Devices 2.003 and 2.011 indicate closed 'TURBINE' is not included in the label.	-open status of turbine control valves but	
		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPER	ATOR ERROR (S)	[ ] Near lerm [ ] Convenient Outage
Delay in identifying valves with their SUGGESTED CORR Add 'TURBINE' to nameplate labels.	system. ECTIVE ACTION	<pre>MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate &amp; Resubmit for Following Reason: Comment/Note/Reason:</pre>
, ,		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW	
EVALUATOR: Welch/Sabeh/Gagnon	HED#: None	[X] Concur.	
TASK: Verification	HEO#: 6.6.Ø33	[] Concur With Comment/Note.	
CL: 6.6 CL ITEM: 6.6.3.3b	DATE: 12-11-85 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Labels and Location Aids	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory SB-1		Comment/Note/Reason:	
HEO DESCRIPTION		Do during labeling.	
GUIDELINE- CONSISTENCY(Internal Consistency): Abbreviations between and within procedures and devi not consistent for many devices in the control room, 8.095, 8.096, 8.114, 8.115, 8.104, 8.105.	ce labels are e.g.,3.105, 8.077, 8.094,		
		RECOMMENDED TMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		[] Promotily	
POTENTIAL OPERATOR ERROR (S)		- [] Near Term [] Convenient Outage	
Increases time and probability of error in selecting and making		[X] Optional	
control movements.	, J	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
		- [] Concur With Comment/Note.	
SUGGESTED CURRECTIVE ACTION	· · · · · · · · · · · · · · · · · · ·	- [] Do Not Concur for Following Reason:	
be consistent.	nd labels to	[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
•			
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
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INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW HUMAN ENGINEERING OBSER	DCRDR-HE0-2
OBSERVATION EVALUATOR: Welch/Sabeh/Gagnon HED#: None	AIT REVIEW - CHAIRMAN: A. Adorno DATE: 3/20/86 [X] Concur.
TASK: Verification       HED#: 6.6.034         CL: 6.6       CL ITEM: 6.6.3.3c       DATE: 12-11-85         CL TITLE: Labels and Location Aids       HED CATEGORY: D         CONTROL BOARD LOCATION: Panels SE,SB2,SC,SG,SF,SJ,SA,SB1         HEO DESCRIPTION         GUIDELINE- CONSISTENCY (Consistency with Procedures):         The procedure identification of device function and the device label do not agree for the following labels:	<ul> <li>[] Concur With Comment/Note.</li> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> <li>Do during labeling.</li> </ul>
7.514 8.029 9.046, 9.048, 9.049, 9.051, 9.052, 9.053, 9.054, 9.056, 9.057, 9.058, 9.059, 9.061, 9.025, 9.026, 9.513, 9.516 13.506, 13.505, 13.015 12.052, 14.031, 14.032, 16.031, 16.032, 16.033, 16.034, 16.035, 16.036. This is a constric HEO with the above shown as examples.	RECOMMENDED IMPLEMENTATION
[ X ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Confusion and increased probability of error when executing procedures.	
SUGGESTED CORRECTIVE ACTION Review and revise procedure device function descriptions to agree with the device labels.	<ul> <li>[] Concur With Comment/Note.</li> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>
	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

	HUMAN ENGINEERING OBSEF	RVATION ASSESSMENT DCRDR-HE0-2
OBSERVATION EVALUATOR: Weich/Gagnon TASK: Verification CL: 6.6 CL ITEM: 6.6.6.3	HED#: None HEO#: 6.6.035 DATE: 12-11-85 REV:	AIT REVIEW CHAIRMAN: A. Adorno DATE: 3/20/86 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason:
CL TITLE: Lables and Locations Aids CONTROL BOARD LOCATION: Supervisory SN HEO DESCRIPTION GUIDELINE- COLOR: Devices 20.021 and 20.022 apply to both Phase-A and labels are yellow which implies Phase-A only.	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: This device is not part of Phase B isolation daisy chain and as such its position is not relative for Phase B.
[ X ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S Increased probability of operator confusion and error or B isolation.	) or when identifying Phase-A	RECOMMENDED IMPLEMENTATION          [] Promptly         [] Near Term         [] Convenient Outage         [] Optional         MANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.
SUGGESTED CORRECTIVE ACTION Replace labels with bi-colored labels showing both and red for Phase-B.	yellow for Phase-A	<ul> <li>[] Concur With Comment/Note.</li> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> <li>Comment/Note/Reason:</li> <li>EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86</li> <li>APPROVE: YES[X] NO[] NOTE:</li> </ul>

#### INDIAN POINT UNIT #2 DEVICEN

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCROR-HEO-2 VATION ASSESSMENT
OBSERVATION EVALUATOR: Welch/Potter/Sabeh TASK: Verification CL: 6.6 CL ITEM: 6.6.3.8 CL TITLE: Labels and Location Aids CONTROL BOARD LOCATION: Supervisory SB-1	HED#: 6.6.017 HEO#: 6.6.037 DATE: 12-13-85 REV: HED CATEGORY: C	AIT REVIEW CHAIRMAN: A. Adorno DATE: 3/20/86 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
GUIDELINE- CONTROL POSITION LABELING(Position): The control position for device 8.067 (Hi Head Pr Alarm) is not identified.	mp Lo Suction Press	
		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED		[] Promptly   [] Near Term
POTENTIAL OPERATOR ERROR(S)		[X] Convenient Outage   [] Optional
Increases the time and probability of error in arming the control.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.
Provide discrete control positions for device 8. arming direction/position.	Ø67 to identify	[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRWAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

HUMAN ENGINEERING OBSERVATION ASSESSMENT

	HUWAN ENGINEERING UBSER		
OBSERVATION		AIT REVIEW	
EVALUATOR: Gagnon/Sabeh	HED#: None	[] Concur.	
TASK: Verification	HEO#: 6.6.Ø38	[X] Concur With Comment/Note.	
CL: 6.6 CL ITEM: 6.6.1.1	DATE: 1-28-86 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Labels & Location Aids	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight & Supervisory		Comment/Note/Reason: Include in labeling study.	
HED DESCRIPTION		-	
GUIDELINE- NEED FOR LABELING: Functional control positions are not appropria throughout the control room. Examples are: PUMP CONTROLS: Close-Open (SA: 14 thru 17), St Off-On (SB1: 11,58,62), Trip-C VALVE CONTROLS: Trip-On (SC: 41), Closed-Open FAN CONTROLS: Stop-Running (SL: 20,21), Stop-S Stopped-Started (SL: 55). BREAKER CONTROLS: Closed-Open (SJ: 509 thru 55)	ately or consistently labeled top-Start (SA: 23 thru 26) lose (SE: 52,53). (SC: 53). Start (SL: 41), 14), Trip-Close (SH: 57 thru 63),		
Cutout-Trip-Close (SH: 19). ROTARY CONTROLS: Hand-Off-Auto (SJ: 505).	•	RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increase the time and probability of error in determining control action to be taken. SUGGESTED CORRECTIVE ACTION Provide a consistent labeling nomenclature for pumps, valves, fans/motors, breakers and rotary controls throughout the control room.		[] Promptly -   [] Near Term   [] Convenient Outage	
		WANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.         [] Concur With Comment/Note.	
		[] Do Not Concur for Following Reason: [] [] Reevaluate & Resubmit for Following Reason:	
	• • •	Comment/Note/Reason:	
· · ·	•		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
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## INDIAN POINT UNIT #2

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSERVA	ATION ASSESSMENT	DCRDR-HE0-2
OBSERVATION		ATT REVIEW	
EVALUATOR: E. GAGNON	HED#: 6.6.018	CHAIRMAN: A. Adorno DATE: 3/12/8	15
TASK: Verification	HEO#: 6.6.Ø39	[ ] Concur With Comment/Note	1 1
CL: 6.6 CL ITEM: 6.6.3.8a	DATE: 5/5/86 REV:	[] Do Not Concur for Following Resson:	
CL TITLE: Label & Location Aids	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Resson:	
CONTROL BOARD LOCATION: Flight Panel FC		Comment/Note/Reason	
HEO DESCRIPTION			
GUIDELINE- CONTROL POSITION LABELING (Position The switch positions for scale selector switch are labeled 1,2,3 whereas the 3 recorder scale Source, Intermediate, and Power ranges.	): les 4.036, 4.037 for the NIS recorder as present flux values in the		
		RECOMMENDED IMPLEMENTATION	
		[] Promptly   [] Near Term	•
There are the time & probability of area is relationed to the		[X] Convenient Uutage [] Optional	
filux levels.	recting and reading reactor	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/2 [X] Concur.	5/86
SUGGESTED CORRECTIVE ACTION		[] Concur With Comment/Note.	
Change switch position labels to correspond to	recorder scale ranges.	[] Do Not Concur for Following Reason:	
	-	[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN & Basile D	ATE: 5/10/96
		APPROVE: YES[X] NO[] NOTE:	NE: 0/19/00
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### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW
EVALUATOR: Gagnon	HED#: 6.6.Ø19	[X] Concur.
TASK: Verification	HEO#: 6.6.040	[] Concur With Comment/Note.
CL: 6.6 CL ITEM: 6.6.3.3b	DATE: 1-28-86 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Labels & Location Aids	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory SG	· · · · ·	Comment/Note/Reason:
HEO DESCRIPTION		-
GUIDELINE- CONSISTENCY (Internal Consistency) The labels for valve controls 14.013 (RHR HX not consistent with their valve positions ind 14.045 (HX 22).	: 21) & 14.015 (RHR HX 22) are icators 14.044 (HX 21) &	
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		[] Promptly - [] Near Term   [X] Convenient Outage - [] Optional
POTENTIAL OPERATOR ERROR(S)		
Increased time & the probability of error in	determining valve positon.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORRECTIVE	ACTION	[] Concur With Comment/Note.
Revise labels to include "RHR".		[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:
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	HUMAN ENGINEERING OBSE	DCRDR-HED-2	
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: None	CHAIRMAN: A. Adorno DATE: 4/2/85	
TASK: Control Room Survey	HEO#: 6.7.001	[] Concur With Comment/Note.	
CL: 6.7 CL ITEM: 6.7.1.4b	DATE: 11/12/84 REV:	[X] Do Not Concur for Following Reason	
CL TITLE: Process Computer	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reasons	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: On the proteins system the operator door not	
HEO DESCRIPTION		- have to enter numerical data during his use of the system.	
GUIDELINE- DATA ENTRY KEYBOARDS (Numeric Keybo The numeric keyboard used to enter data does r conform to the guidline criteria.	ward Arrangement): not	-	
RE: 0ER-Ø38	•		
RE: Photo No. 2-14 HEO 6.7.002			
	- ·	RECOMMENDED IMPLEMENTATION	
[ X ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increase the time and the probability of error for entry of numeric data.		   [ ] Promptly   [ ] Near Term   [ ] Convenient Outage	
			[] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
		SUGGESTED CORRECTIVE	
Provide a numeric keyboard arrangement with a	"telenhone" style		
or "calculator" style matrix. This HEO should HEO 6.7.002.	be reviewed with		
		Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

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## HUMAN ENGINEERING OBSERVATION ASSESSMENT

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OBSERVATION			AIT REVIEW
EVALUATOR: Sab		HED#: None	[X] Concur.
TASK: Control	Room Survey	HEO#: 6.7.002	[] Concur With Comment/Note.
CL: 6.7	CL ITEM: 6.7.1.4i	DATE: 11/12/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Proc	ess Computer	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD	LOCATION: N/A		Comment/Note/Reason: Cover will be supplied and keys changed.
***	HEO DESCRIPTION		-
GUIDELINE- DAT Many programme board are not keyboard is no	A ENTRY KEYBOARDS (RELEVANT KEYS or keys and symbols on the "QUERT usable by the operator. The ope it user friendly.	): Y" key rator	-
RE: Photo No. HED 6.7.001	2-14		
RE: 0ER-Ø38			RECOMMENDED IMPLEMENTATION
[X] SUPPORT	MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR(S)		ROR (S)	[] Convenient Outage
Increases the for the prope	time and the probability of erro function key.	r to search	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
	SUGGESTED CORRECTIVE	ACTION	- [] Concur With Comment/Note.
Cover the pro symbols from reviewed with	grammer keys and remove the progr the "QUERTY" keys. This HEO shou HEO 6.7.001.	ammer Ild be	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> </ul>
	. · · .	•	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

		<b>9</b>	
	HUMAN ENGINEERING OBSER	VATION ASSESSMENT DCRDR-	HEO-2
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: 6.7.001	- CHAIRMAN: A. Adorno DATE: 4/2/85	
TASK: Control Room Survey	HEO#: 6.7.003	[X] Concur With Comment/Note.	
CL: 6.7 CL ITEM: 6.7.1.5d(1)	DATE: 11/12/84 REV:	[ ] Do Not Concur for Following Reason:	
CL TITLE: Process Computer	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: Master/local control is not applicable t	o the
HEO DESCRIPTION		-   proteus system. CRT identification will be supplied as recomm	ended.
GUIDELINE- COMPUTER FUNCTION CONTROLS (MASTER COM The CRT terminal does not indicate whether the display is under master or local control.	TROL) :		
RE: Photo No. 2-37 RE: HEO 6.6.018			
RE: 0ER-Ø3Ø			
		RECOMMENDED IMPLEMENTATION	
( × ) SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERROR	(S)	[X] Convenient Outage	
ne operator can destroy another operators displa ausing a delay and increasing the probability of error in performing operational tasks.	,	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTED CORRECTIVE ACT		[] Concur With Comment/Note.	
rovide a positive indication at each console		[] Do Not Concur for Following Reason:	
estimate to identity whether the display is under aster or local control.	,	[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
	·		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19	/86
		APPROVE: YES [X] NO [ ] NOTE:	

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#### HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

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OBSERVATION		AIT REVIEW		
EVALUATOR: Sabe	sh/₩elch	HED#: None		[] Concur.
TASK: Control R	Room Survey	HEO#: 6.7.004		[X] Concur With Comment/Note.
CL: 6.7	CL ITEM: 6.7.1.8a(5)(a)	DATE: 11/12/84	REV:	[] Do Not Concur for Following Reason:
CL TITLE: Proce	ess Computer	HED CATEGORY: D		[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD L	DCATION: N/A			Comment/Note/Reason: There are two parts to this HEO.
	HEO DESCRIPTION			annunciator window.
GUIDELINE- ACCE The design inc the operator to computer system installed into	ESS AIDS (COMPUTER SYSTEM PROCEDURES): ludes an alarm system that will alert o a failure or malfunction of the m. The alarm system has not been the consoles in the control room.			(b) Computer main unction indication is being studied w/manuf.
RE: 0ER-Ø42				· · ·
				RECOMMENDED IMPLEMENTATION
[] SUPPORT M	ATERIAL ATTACHED			[] Promptly
POTENTIAL OPERATOR ERROR(S)		-   [ ] Near Term   [ ] Convenient Outage		
The lack of kn viewing curren probability of	owledge as to whether the operator is t or aged data increases the operator error.			MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/88 [X] Concur.
	SUGGESTED CORRECTIVE ACTION			[] Concur With Comment/Note.
Install the al consoles to pr computer failu	arm capability on the control room ovide operators indication of re or malfunction.			[ ] Do Not Concur for Following Reason: [ ] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
	•	· .		
		· · ·		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
			•	APPROVE: YES[X] NO[] NOTE:

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCROR-HEO-2
OBSERVATION EVALUATOR: Sabeh/Welch TASK: Control Room Survey CL: 6.7 CL ITEM: 6.7.2.4k CL TITLE: Process Computer CONTROL BOARD LOCATION: N/A HEO DESCRIPTION GUIDELINE- DATA PRESENTATION FORMAT (Periods): Periods are not used after items selection or at the end of sentences.	HED#: None HEO#: 6.7.005 DATE: 11/12/84 REV: HED CATEGORY: None	AIT REVIEW CHAIRMAN: A. Adorno DATE: 4/2/85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Guidelines do not apply proteus is an integer based item selection system.
[ ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S Increases the probability of error for determining the completion of the item selected or sentences.	······································	RECOMMENDED IMPLEMENTATION          [] Promptly         [] Near Term         [] Convenient Outage         [] Optional
SUGGESTED CORRECTIVE ACTIO	۷	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> <li>EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86</li> <li>APPROVE: YES[X] NO[] NOTE:</li> </ul>

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HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

EVALUATOR: Sabeh/Welch H		- CHAIRMAN: A. Adorno DATE: 4/2/85	
	ED#: None	[] Concur.	
TASK: Control Room Survey H	EO#: 6.7.006	[] Concur With Comment/Note.	
CL: 6.7 CL ITEM: 6.7.2.41(3) D	ATE: 11/12/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Process Computer	HED CATEGORY: None	[ ] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: Proteus uses international military	
HEO DESCRIPTION		-   standard system.	
GUIDELINE- DATA PRESENTATION FORMAT (STANDARDIZED FIELDS The standardized field for date does not agree with guideline criteria of MM:DD:YY. The Proteus field used DD MMM YY.	):		
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S)		[] Promptly   [] Near Term   [] Convenient Outage   [] Optional	
SUGGESTED CORRECTIVE ACTION		- [] Concur With Comment/Note.	
Revise date field to use 6 numeric positions instead of 7 alpha numberic positions.		- [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
	· ·		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
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INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW		DCRDR-HEO-2
	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
UBSERVATION EVALUATOR: Sabeh/Welch TASK: Control Room Survey CL: 6.7 CL ITEM: 6.7.2.5h,i CL TITLE: Process Computer CONTROL BOARD LOCATION: N/A HEO DESCRIPTION GUIDELINE- SCREEN LAYOUT AND STRUCTURING (PAGE D Multiple display pages containing associated dat not contain a unique number with regard to the t number of pages.	HED#: None HED#: 6.7.007 DATE: 11/12/84 REV: HED CATEGORY: D ESIGNATION): a do otal	- CHAIRMAN: A. Adorno DATE: 4/2/85 [X] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERRO Increases the time and the probability of error operator scanning and reading requirements. SUGGESTED CORRECTIVE AC	R(S) for TION	RECOMMENDED IMPLEMENTATION
Provide a unique designation for each page of information with regard to the total number of related pages. X		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: 
	. <u></u>	APPROVE: YES [X] NO[] NOTE:

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	HUMAN ENGINEERING OBSER	VATION ASSESSMENT		
OBSERVATION		AIT REVIEW		
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.		
TASK: Control Room Survey	HEO#: 6.7.008	[] Concur With Comment/Note.		
CL: 6.7 CL ITEM: 6.7.2.6j	DATE: 11/12/84 REV:	[X] Do Not Concur for Following Reason:		
CL TITLE: Process Computer	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:		
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: System does have positive identification features.		
HEO DESCRIPTION				
GUIDELINE- MESSAGES (SELECTION FEEDBACK): Positive identification or highlighting of a d message or datum selected as an option is not identified, to indicate acknowledgement by the	isplayed positively system.			
POTENTIAL OPERATOR ER	 ROR (S)	- [] Near Term [] Convenient Outage		
Torenze the time and probability of error to identify		- [ ] Optional		
the selected message or datum.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.		
		- [] Concur With Comment/Note.		
Provide a highlighting feature to positively i	dentify	- [] Do Not Concur for Following Reason:		
the message or datum selected is acknowledged	by the	[] Reevaluate & Resubmit for Following Reason:		
		Comment/Note/Reason:		
•				
	· · · ·	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86		
		APPROVE: YES[X] NO[] NOTE:		
	<b>-</b>	<u></u>		

	HUMAN ENGINEERING OBSF	IN ASSESSMENT DCRDR-HE0-2
OBSERVATION		
EVALUATOR: Sabeh/Weich TASK: Control Room Survey CL: 6.7 CL ITEM: 6.7.2.7e(2) CL TITLE: Process Computer CONTROL BOARD LOCATION: N/A HEO DESCRIPTION GUIDELINE- GRAPHIC CODING AND HIGHLIGHTING (BLINK R The single blink rate used is 1 per second. The criteria indicates that the rate should approximate 2-3 blinks per second.	HED#: None HEO#: 6.7.009 DATE: 11/12/84 REV: HED CATEGORY: None ATES):	AIT REVIEW CHAIRMAN: A. Adorno DATE: 4/2/85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Proteus system also has a color change to indicat alarm along with blink rate.
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increases the time and the probability of error in t operator responding to siuations requiring immediate action.	he	RECOMMENDED IMPLEMENTATION          [] Promptly         [] Near Term         [] Convenient Outage         [] Optional         MANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.
SUGGESTED CORRECTIVE ACTION Increase the blink rate to 2-3 per second on the CRT anhance the operator response to a display indicatio	to n.	<pre>[] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate &amp; Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:</pre>

HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW 		
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.		
TASK: Control Room Survey	HEO#: 6.7.010	[] Concur With Comment/Note.		
CL: 6.7 CL ITEM: 6.7.2.7 (1)	DATE: 11/12/84 REV:	[X] Do Not Concur for Following Reason:		
CL TITLE: Process Computer	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:		
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: Proteus system uses magenta. The SAS system &		
HED DESCRIPTION		will use red for unsafe condition.		
GUIDELINE- GRAPHIC CODING AND HIGHLIGHTING (Co The color meaning for an unsafe condition, dan immediate operator action required uses magent instead of the commonly understood color of re	lor Meaning): ger or a d.			
	•	RECOMMENDED IMPLEMENTATION		
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR EF Increases the time and the probability of error determine an unsafe condition or critical para values out of tolerance.	ROR(S) or to meter	[] Promptly [] Near Term [] Convenient Outage - [] Optional 		
		- [] Concur With Comment/Note.		
Use the color and to identify an upperfo condi		- [] Do Not Concur for Following Reason:		
danger, immediate operator action required, or critical parameter value is out of tolerance.	· a	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:		

INDIAN	POINT	UNIT	#2

OBSERVATION EVALUATOR: Sabeh/Weich TASK: Control Room Survey CL: 6.7 CL ITEM: 6.7.3.1e(3) CL TITLE: Process Computer CONTROL BOARD LOCATION: N/A HEO DESCRIPTION	HED#: None HEO#: 6.7.Ø11 DATE: 11/12/84 REV: HED CATEGORY: None	AIT REVIEW CHAIRMAN: A. Adorno DATE: 4/2/85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: System uses backup printer to minimize informatic loss. Con Edison made a conscious management decision not to have operators change printer ribbons.	
GUIDELINE- PRINTER CHARACTERISTICS (PRINTER OPER Instructions to perform ribbon changes on the im printer are not attached to the printer. This function is performed by a technician.	ATION) : pact		
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S)		   [ ] Promptly -   [ ] Near Term   [ ] Convenient Outage	
SUGGESTED CORRECTIVE ACTION		[] Concur With Comment/Note.	
ost instructions for reloading paper and ribbon on an instruction plate attached to the printer.		- [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
• •			
· · · · · · · · · · · · · · · · · · ·		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

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INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW		DCRDR-HE0-2
	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION		AIT REVIEW - CHAIRMAN: A. Adorno DATE: 4/2/85
EVALUATUR: Saben/metch	HED#: None	[ ] Concur.
TASK: Control Room Survey	HEO#: 6.7.Ø12	[] Concur With Comment/Note.
CL: 6.7 CL ITEM: 6.7.3.1f(1)	DATE: 11/12/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Process Computer	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: Printer is not used for normal reading
HEO DESCRIPTION	· · · · · · · · · · · · · · · · · · ·	purposes.
GUIDELINE- PRINTER CHARACTERISTICS (Print Copy The operator cannot read the most recently prin line.	Accessibility): ted	
	· .	RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		
POTENTIAL OPERATOR ERROR(S)		[] Near Term [[] Convenient Outage
Increases the time and probability of error to identify the most recent alarm or printed messa	ge	- [ ] Uptional     MANAGEMENT REVIEW/APPROVAL   CHAIRMAN: V. Jayaraman DATE: 3/25/86
	۰. ۲	[X] Concur.
SUGGESTED CORRECTIVE A	CT10N	- [] Concur With Comment/Note.
Provide a feature to enable the operator to read the most recently printed message.		- [] Do Not Concur for Following Reason:
		[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
•		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
		APPROVE: YES[X] NO[] NOTE:

	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
OBSERV	ATION	AIT REVIEW CHAIRMAN: A Adorno DATE: 4/2/85	
EVALUATOR: Sabeh/Welch	HED#: None	[X] Concur.	
TASK: Control Room Survey	HEO#: 6.7.Ø13	[] Concur With Comment/Note.	
CL: 6.7 CL ITEM: 6.7.3.2a(	2) DATE: 11/12/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Process Computer	HED CATEGORY: D	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: Annunciators to be wired to computer.	
HEO DESCI	RIPTION		
GUIDELINE- ALARM MESSAGES (Alarm Record All annunciator alarms are not recorded because they are not wired up to the computer.	ds) : d		
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPE	RATOR ERROR(S)	[ ] Near Term   [ ] Convenient Outage [ [7] Ontional	
Increases the probability of missing a	n alarm.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur.	
SUGGESTED CORRECTIVE ACTION		-   DX1 Do Not Concur for Following Reason:	
Provide a feature to record all annunc	iator alarms.	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Computer is already printing the first-out alarms	
· · · · · · · · · · · · · · · · · · ·		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	
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DCRDR-HE0-2 HUMAN ENGINEERING OBSERVATION ASSESSMENT OBSERVATION AIT REVIEW CHAIRMAN: A. Adorno DATE: 4/2/85 EVALUATOR: Sabeh/Welch HED#: None [X] Concur. TASK: Control Room Survey HEO#: 6.7.014 [] Concur With Comment/Note. CL: 6.7 CL ITEM: 6.7.3.2c DATE: 11/12/84 REV: [] Do Not Concur for Following Reason: CL TITLE: Process Computer HED CATEGORY: D [] Reevaluate & Resubmit for Following Reason: CONTROL BOARD LOCATION: N/A Comment/Note/Reason: Capability to be provided. HEO DESCRIPTION GUIDELINE- ALARM MESSAGES (Operator-Requested Printout): Operator requested printouts by alarm groups, e.g., system subsystem or component, is not provided. RECOMMENDED IMPLEMENTATION [] SUPPORT MATERIAL ATTACHED Promptly Near Term POTENTIAL OPERATOR ERROR(S) Convenient Outage [X] Optional Increase the time and the probability of error to determine group type alarm actuations. MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: Provide a capability for the operator to printout actuated alarms by alarm groups in addition to alarm . [] Reevaluate & Resubmit for Following Reason: sequence. Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES [X] NO[] NOTE:

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	WATION ASSESSMENT	
OBSERVATION		AIT REVIEW   AIT REVIEW   CHAIRMAN: A. Adorno DATE: 4/2/85	
EVALUATOR: Sabeh/Welch	HED#: None	[] Concur.	
TASK: Control Room Survey	HEO#: 6.7.015	[] Concur With Comment/Note.	
CL: 6.7 CL ITEM: 6.7.3.2f(1,2)	DATE: 11/12/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Process Computer	HED CATEGORY: None	[X] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason: Defer until labeling study is completed.	
HEO DESCRIPTION			
GUIDELINE- ALARM MESSAGES (Consistent Terminology Wording in the printed alarm message is not neces the same or contain the same wording as on the ar tiles that is illuminated.	): ssarily nnunciator		
RE: 0ER-036			
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED			
POTENTIAL OPERATOR ERROR(S) Increase the time and the probability of error in responding to an alarm message. SUGGESTED CORRECTIVE ACTION		[] Convenient Outage [] Optional MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
		Provide consistent alarm message terminology tha and contains at least the information present in illuminated annunciator message tile.	t relates the
	• • •		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION			AIT REVIEW	
EVALUATOR: Sabeh	/Welch	HED#: None	-   CHAIKMAN: A. Adorno DATE: 4/2/85	
TASK: Control Ro	oom Survey	HEO#: 6.7.016	[] Concur With Comment/Note.	
CL: 6.7	CL ITEM: 6.7.1.2,6.7.1.8	DATE: 11/12/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Proces	s Computer	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LC	CATION: N/A		Comment/Note/Reason: Operators have since been given training on proteu	
**************	HEO DESCRIPTION		-   system. Un the job training is ongoing.	
GUIDELINE- OPERA Recently license received any for computer. In ad received any har	NOR-COMPUTER DIALOGUE/ACCESS AIDS: ad Reactor Operators (ROs) have not mal training on the use of the pro Idition, Experienced ROs have not Ids-on process computer training.	bocess		
RE: 0ER-041				
•			RECOMMENDED IMPLEMENTATION	
[ ] SUPPORT MATERIAL ATTACHED				
		(5)	-   [ ] Optional	
Increases the ti the process comp	ne and the probability of error in outer to enhance control room opera	n using ations.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.	
	SUGGESTED CURRECTIVE ACT.	LUN	- [] Do Not Concur for Following Reason:	
training program	i classroom and hands-on process co n.	mputer	[] Reevaluate & Resubmit for Following Reason:	
•		· · · · ·	Comment/Note/Reason:	
· • •		· · · · · · · · · · · · · · · · · · ·		
			EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION EVALUATOR: Sabeh/Welch TASK: Control Room Survey CL: 6.8 CL ITEM: 6.8.1.1a CL TITLE: Panel Layout CONTROL BOARD LOCATION: Flight/Supervisory HEO DESCRIPTION GUIDELINE- ASSIGNING PANEL CONTENTS (Grouping by The auxillary feedwater controllers on SC 23,24 operate with the atmospheric steam dump controls indicators and temperature indicators on panel 1 RE: OER-Ø19,043,044,047,052	HED#: 6.8.001 HEO#: 6.8.001 DATE: 11/7/84 REV: HED CATEGORY: C / Task Sequence): 25 and 26 a, steam generator level B.	AIT REVIEW - CHAIRWAN: A. Adorno DATE: 3/13/85 [] Concur. [X] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: AIT recommends that some form of indication be put on panel SC and flight panel.
[ ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERR Increases the time and the probability of operat performing feed flow and steam flow matching. SUGGESTED CORRECTIVE AN	DR(S) Fors in	RECOMMENDED IMPLEMENTATION          [] Promptly         [] Near Term         [X] Convenient Outage         [] Optional         MANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.         [] Concur With Comment/Note.
Evaluate the merits of relocating the controller SC to panel FB.	s on panel	- [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

OBSERVATION AIT REVIEW CHAIRMAN: A. Adorno DATE: 3/13/85 EVALUATOR: Sabeh/Welch HED#: 6.8.002 [] Concur. TASK: Control Room Survey HEO#: 6.8.002 [X] Concur With Comment/Note. CL: 6.8 CL ITEM: 6.8.2.1a(3) DATE: 11/7/84 REV: [] Do Not Concur for Following Reason: CL TITLE: Panel Layout HED CATEGORY: B [] Reevaluate & Resubmit for Following Reason: CONTROL BOARD LOCATION: Flight Comment/Note/Reason: AIT recommends that smaller recorders be assessed to improve the lineup and move PORV switch. HEO DESCRIPTION GUIDELINE- SEQUENCE, FREQUENCY OF USE, AND FUNCTIONAL CONSIDERATIONS (Sequence): The system steam generator meters on panel FB = 76,80,84 and 88 are not in line with recorders 93,95,97 and 99 or the Foxboro controllers 126,127,128,129,130,131,132,133,134,135,136 and 137. RE: HE0 6.8.001 RE: 0ER-Ø-19,043,044,047 RE: Photo No. 1-33 RECOMMENDED IMPLEMENTATION [ X ] SUPPORT MATERIAL ATTACHED Promotly ΪXΊ Near Term \_\_\_\_\_ POTENTIAL OPERATOR ERROR(S) Convenient Outage Optional Increase the time and the probability of error for matching steam and feed flows. MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. ------[] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION \_\_\_\_\_ [] Do Not Concur for Following Reason: Relocate the steam generator meters to be in line with the feed flow recorders. This HEO should be considered along with HEO 6.8.001. [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES [X] NO [ ] NOTE:

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW		DCRDR-HEO-2	
· · · · · · · · · · · · · · · · · · ·	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	
OBSERVATION		AIT REVIEW - CHAIRMAN: A. ADORNO DATE: 3/13/85	
EVALUATOR: Sabeh/Weich	HED#: 6.8.003	[X] Concur.	
TASK: Control Room Survey	HEO#: 6.8.003	[] Concur With Comment/Note.	
CL: 6.8 CL ITEM: 6.8.2.2a	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Panel Layout	HED CATEGORY: B	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason:	
HEO DESCRIPTION		- , , , , , , , , , , , , , , , , , , ,	
GUIDELINE- LOGICAL ARRANGEMENT AND LAYOUT (ORD The containment spray pumps and valve controls logically lined up 99, 100,101,103 and 102.	ER AND LABELING): are not	-	
RE: 0ER-018 and 048			
RE: 1-28			
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[] Promptly [] Near Term	
POTENTIAL OPERATOR ER	ROR (S)	[] Convenient Outage	
Increase the time and the probability of error activating the pumps.	for	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.	
SUGGESTED CORRECTIVE ACTION		[] Concur With Comment/Note.	
Exchange rotary switch control 103 with 102.		[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

## HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Welch	HED#: 6.8.004	[] Concur.	
TASK: Control Room Survey	HEO#: 6.8.004	[X] Concur With Comment/Note.	
CL: 6.8 CL ITEM: 6.8.2.2a	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Panel Layout	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight and Supervis	sory	Comment/Note/Reason:	
HE0 DESCRIPT	ION	-   All recommends:   Panel SG - to be re-arranged	
GUIDELINE- LOGICAL ARRANGEMENT AND LAYOUT Components not arranged left to right in m oder are: Panel SG - RHR pump controls 20, 21 and RH Panel SB-1 - SW pump 112 and 113 Panel SE - Indicator lights 20 Components not arranged top to bottom in m order are: FC - Indicator lights 63	(Order and Labeling): umeric or alphabetic X 23 and 24 umeric or alphabetic	Panel SE - no change required Panel FC - orientation conveys system operation Panel SD - stay as is	
SD - Indicator and lights 19 and 44		RECOMMENDED IMPLEMENTATION	
[X] SUPPORT MATERIAL ATTACHED		[ ] Promptly   [ ] Near Term	
POTENTIAL OPERATO	R ERROR (S)	[X] Convenient Outage   [ ] Optional	
Increase the time and the probability of e controls	rror in activity	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.	
SUGGESTED CORRECT	IVE ACTION	-   [] Do Not Concur for Following Reason:	
Rearrange controls and indicator lights to right and top to bottom	read left to	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
· ·			
· · · · · · · · · · · · · · · · · · ·		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

OBSERVATION       ATT REVIEW         CHAIRMAN: A. ADDRND DATE: 3/13/85         EVALUATOR: Sabeh/Weich       HED#: 6.8.025         TASK: Control Room Survey       HED#: 6.8.025         CL: 6.8       CL ITEM: 6.8.2.2a       DATE: 11/7/84         REV.LLATOR: Sabeh/Weich       HED 64: 6.8.095         CL: 6.8       CL ITEM: 6.8.2.2a       DATE: 11/7/84         REV.LL       HED CATEGORY: C       [] Do Not Concur for Following Reason:         CONTROL BOARD LDCATION: Supervisory       Commont/Note/Reason: Include in the labeling study.         MIDELINE- LOGICAL ARRANCEMENT AND LAYOUT (Order and Labeling):       commont/Note/Reason: Include in the labeling study.         RE: Photo No. 1-22       RE: Photo No. 1-22         [X] SUPPORT MATERIAL ATTACHED       [] Prompt 1/y         POTENTIAL OPERATOR ERROR(S)       [] Concur.         Increase the time and probability of error in performing service water operation.       [] Concur.         SUGGESTED CORRECTIVE ACTION       [] Concur.         SUGGESTED CORRECTIVE ACTION       [] Do Not Concur for Following Reason:         [] Do Not Concur for Following Reason:       [] Do Not Concur for Following Reason:         [] Do Not Concur for Following Reason:       [] Do Not Concur for Following Reason:         [] Do Not Concur for Following Reason:       [] Do Not Concur for Following Reason:	ETAILED CONTROL ROOM DESIGN REVIEW	HIMAN ENGINEERING OBSER	DCRDR-HE0-2
	EVALUATOR: Sabeh/Welch       HED#: 6.8.005         TASK: Control Room Survey       HED#: 6.8.005         CL: 6.8       CL ITEM: 6.8.2.2a       DATE: 11/7/84       REV:         CL TITLE: Panel Layout       HED CATEGORY: C         CONTROL BOARD LOCATION: Supervisory         HEO DESCRIPTION         GUIDELINE- LOGICAL ARRANGEMENT AND LAYOUT (Order and Labeling): The service water pumps control line up and order is confusing.         RE: Photo No. 1-22         [X]       SUPPORT MATERIAL ATTACHED         POTENTIAL OPERATOR ERROR(S)         Increase the time and probability of error in performing service water operation.         SUGGESTED CORRECTIVE ACTION         Enhance the mimic lines by using some demarcation.		AIT REVIEW AIT REVIEW (HAIRMAN: A. ADORNO DATE: 3/13/85 [] Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Include in the labeling study RECOMMENDED IMPLEMENTATION [] Promptly [] Near Term [] Convenient Outage [] Optional MNAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: [] Reevaluate
EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5 APPROVE: YES[X] NO[] NOTE:			EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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## HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW
EVALUATOR: Sabeh/Welch TASK: Control Room Survey CL: 6.8 CL ITEM: 6.8.2.3b	HED#: None HEO#: 6.8.0006 DATE: 11/7/84 REV:	CHAIRMAN: A. ADORNO DATE: 3/13/85 [] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reserve
CL TITLE: Panel Layout	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory		Comment/Note/Reason: AIT identifies this mirror implies on the
HEO DESCRIPTION		-   depection of the system and is the preferred method.
GUIDELINE- LAYOUT CONSISTENCY (Mirror-Imaging): Station service transformers 5 and 6 control 35,36,37,38 are minor imaged with 39,40,41,42.		- , ,
RE: Photo No. 1-28		
		RECOMMENDED IMPLEMENTATION
SUPPORT MATERIAL ATTACHED		[] Promptly [] Near Term
PUTENTIAL OPERATOR ERROR (S	s) 	[] Convenient Outage
		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.
SUGGESTED CORRECTIVE ACTIO	N	[] Concur With Comment/Note.
Use demarcation to enhance the mimic and minimize t detrimental effects of mirror imaging.	he	[] Do Not Concur for Following Reason:
		[] Reevaluate & Resubmit for Following Reason:
		Comment/Note/Reason:
	:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
· · · · · · · · · · · · · · · · · · ·		AFFRUVE: YES[X] NO[] NOTE:

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	DCRDR-HE0-2 VATION ASSESSMENT		
OBSERVAT	ION	AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/13/85		
EVALUATOR: Sabeh/Welch	HED#: 6.8.006	[X] Concur.		
TASK: Control Room Survey	HEO#: 6.8.007	[] Concur, With Comment/Note.		
CL: 6.8 CL ITEM: 6.8.2.4b	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:		
CL TITLE: Panel Layout	HED CATEGORY: B	[] Reevaluate & Resubmit for Following Reason:		
CONTROL BOARD LOCATION: N/A		Comment/Note/Reason:		
HEO DESCRI	PTION			
GUIDELINE- STANDARDIZATION (Simulator-to The simulator is not identical to the co hardware portion is in the process of re "outage" changes. The software is appro- behind the control room software.	p-Control Room Standardization): ntrol room. The oflecting the latest eximately 0-5 years			
RE: 0ER-049				
		RECOMMENDED IMPLEMENTATION		
[] SUPPORT MATERIAL ATTACHED		[] Promptly		
POTENTIAL OPERA	NTOR ERROR (S)	[X] Near Term   [] Convenient Outage		
The differences can effect the transfer negative manner.	of training in a	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur.		
SUGGESTED CORRECTIVE ACTION		[] Concur With Comment/Note.		
Maintain a current hardware and software simulator with the control room configuration.		[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:		
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### HUMAN ENGINEERING OBSERVATION ASSESSMENT

#### DCRDR-HE0-2

OBSERVATION			AIT REVIEW
EVALUATOR: Sab	eh/Welch	HED#: 6.8.007	[] Concur.
TASK: Control I	Room Survey	HEO#: 6.8.008a	[X] Concur With Comment/Note.
CL: 6.8	CL ITEM: 6.8.3.2c(1)	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:
CL TITLE: Pane	l Layout	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:
ONTROL BOARD I	LOCATION: Flight/Supervisory		Comment/Note/Reason: Include in the labeling study.
·	HEO DESCRIPTION		-
GUIDELINE- STR Similar compon FB = Foxboro 1 FC = RPI 509,5 SA = 1,2,3,4,5	ING OR CLUSTERS OF SIMILAR COMPONE ents that exceed a string of 5 are 18,119,120,121,122,123,124 and 125 10,511,512,515,516 ,6	NTS (Number of Components): :	-
5B-1 = 502,503 5B-2 = 502,503	,504 and 506 ,507,508 and 509		
RE: Photo No.	1–13		RECOMMENDED IMPLEMENTATION
[X] SUPPORT	MATERIAL ATTACHED		[] Promptly
	POTENTIAL OPERATOR ERRO	R(S)	[X] Convenient Outage
Increases the search time and the probability of error in component identification.		error in	MANAGEMENT REVIEW/APPROVAL
			[X] Concur.
SUGGESTED CORRECTIVE ACTION		TION	[] Concur With Comment/Note.
Provide demarcation lines to reduce operator search time.		rch time.	- [] Do Not Concur for Following Reason:
			[] Keevaluate & Kesudmit for Following Keason:
			Comment/Note/Reason:
		. ·	
	•		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86
•		·	APPROVE: YES[X] NO[] NOTE:

INDIAN POINT UNIT #2	
DETAILED CONTROL RÖOM DESIGN REVIEW	

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	DCRDR-HE0-2
OBSERVATION		AIT REVIEW	
EVALUATOR: Sabeh/Weich	HED#: 6.8.007	- CHAIRMAN: A. ADURNU DATE: 3/1	3/85
TASK: Control Room Survey	HEO#: 6.8.008b	[X] Concur With Comment/Note.	
CL: 6.8 CL ITEM: 6.8.3.2c(1)	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Panel Layout	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight/Supervisory		Comment/Note/Reason: See page a.	
HEO DESCRIPTION		-	
GUIDELINE- STRING OF CLUSTERS OR SIMILAR CO SC = 504,505,506,15,16,19,20,21,22,23,24,2 SE = FW heaters 32 and indicator lights 8 SF = 14,15,16,17,18,19,4,5,6,7,8,9,10,11 and SO = Bi-stable Indicators 501 and heat trade	MPONENTS (Number of Components): 6 and 26 and 20 ad 12 e 502		
RE: Photo No. 1-2			
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED		[] Promptly	
POTENTIAL OPERATOR ERROR (S)		[ ] Near Term   [X] Convenient Outage	
See page a		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: [X] Concur. [] Concur With Comment/Note.	3/25/86
		[] Do Not Concur for Following Reason:	
		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
		EXECUTIVE REVIEW CHAIRMAN: J. Basile APPROVE: YES[X] NO[] NOTE:	DATE: 5/19/86
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### HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION		AIT REVIEW		
EVALUATOR: R. POTTER	HED#: None	- CHAIRMAN: A. Adorno DAIE: 12/10/85 [X] Concur.		
TASK: VALIDATION	HEO#: 6.8.009	[] Concur With Comment/Note.		
CL: 6.8 CL ITEM: 6.8.2.3a	DATE: 10/7/85 REV:	[] Do Not Concur for Following Reason:		
CL TITLE: Panel Layout	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:		
CONTROL BOARD LOCATION: Supervisory Panel SG		Comment/Note/Reason:		
HEO DESCRIPTION		reflect ATTACHMENT 1.		
GUIDELINE- LAYOUT CONSISTENCY (Repeated Function Controls and displays for RHR HX 21 and 22 are consistent. Outlet stop valve controls (14.022) component cooling outlet valve controls (14.022) valves HCV-638 and HCV-640 (14.013, 14.015); and pump controls (14.020, 14.021) are not consistent	ons): not 3, 14.024); 5, 14.026); nd RHR ent.			
		RECOMMENDED IMPLEMENTATION		
[] SUPPORT MATERIAL ATTACHED		[] Promptly		
POTENTIAL OPERATOR ERROR(S)		- [ ] Near Term [ ] Convenient Outage		
Increase in time and probability of error in se correct controls.	•lecting	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.		
SUGGESTED CORRECTIVE /	ACTION	- [ ] Do Not Concur for Following Reason:		
Move controls/displays as required to place HX on left and HX 22 devices on right.	21 devices	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:		
	•			
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:		

DCRDR-HEO-2

INDIAN PO	DINT UNI	Г #2		
DETAILED	CONTROL	ROOM	DESIGN	REVIEW

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION		AIT REVIEW
EVALUATOR: R. POTTER	HED#: None	- CHAIRMAN: A. Adorno DAIE: 12/10/85
TASK: VALIDATION	HEO#: 6.8.010	[] Concur With Comment/Note.
CL: 6.8 CL ITEM: 6.8.2.1c	DATE: 10/8/85 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Panel Layout	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Supervisory Panels SB-	1, SB-2	Comment/Note/Reason:
HED DESCRIPTION	· · · · · · · · · · · · · · · · · · ·	
GUIDELINE- SEQUENCE, FREQUENCY OF USE, AND FUN (Functional Consideration): Two-is-true panel lights are not grouped funct phase A, phase B and SI lights are not functio grouped.	CTIONAL CONSIDERATIONS ionally, nally	
	• • •	RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED	R0R (S)	   [ ] Promptly   [ ] Near Term   [ ] Convenient Outage
		- [] Optional
status lights.	ACTION	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.
Either regroup the lights or add color coding functionally related lights.	for	[] Do Not Concur for Following Keason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

#### INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW DCRDR-HE0-2 HUMAN ENGINEERING OBSERVATION ASSESSMENT OBSERVATION AIT REVIEW CHAIRMAN: A. Adorno DATE: 12/10/85 [X] Concur. EVALUATOR: R. POTTER HED#: 6.8.008 TASK: VALIDATION HEO#: 6.8.011 [] Concur With Comment/Note. [] Do Not Concur for Following Reason: CL ITEM: 6.8.2.3a DATE: 10/8/85 REV: CL: 6.8 CL TITLE: Panel Layout HED CATEGORY: C [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: CONTROL BOARD LOCATION: Supervisory Panel SB-1 \_\_\_\_\_ HEO DESCRIPTION GUIDELINE- LAYOUT CONSISTENCY (Repeated Functions): Layout of spray pump controls (8.099, 8.100) and spray pump discharge valves (8.101, 8.102) is not consistent. RECOMMENDED IMPLEMENTATION Promptly [] SUPPORT MATERIAL ATTACHED Near Term

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Convenient Outage

MANAGEMENT REVIEW/APPROVAL

Optional

[X] Concur.

POTENTIAL OPERATOR ERROR(S)

Increase in time and probability of error in selecting correct controls.

#### SUGGESTED CORRECTIVE ACTION

Switch locations between devices 8.102 and 8.103.

[] Concur With Comm	ent/Note.	•
[] Do Not Concur fo	r Following Reason:	
[] Reevaluate & Res	ubmit for Following Reason:	
Comment/Note/Reason:	•	
EXECUTIVE REVIEW	CHAIRMAN: J. Basile	DATE: 5/19/86
APPROVE: YES[X] NO[]	NOTE:	

CHAIRMAN: V. Jayaraman DATE: 3/25/86

INDIAN POINT UNIT #2

DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSERV	ATION ASSESSMENT	
OBSERVATION		AIT REVIEW	
EVALUATOR: R. POTTER	HED#: None	CHAIRMAN: A. Adorno DATE: 12/10/85	
TASK: VALIDATION	HEO#: 6.8.Ø12	[] Concur With Comment/Note.	
CL: 6.8 CL ITEM: 6.8.1.1c	DATE: 10/8/85 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Panel Layout	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Supervisory Panels SB-	1, SB-2, SN	Comment/Note/Reason:	
HEO DESCRIPTION		consolidation is not required.	
GUIDELINE- ASSIGNING PANEL CUNIENIS (Grouping I Frequency of Use): Two-is-true panels are not grouped together (8 9.505, 20.501).	.505,		
		RECOMMENDED IMPLEMENTATION	
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increase time and probability of error in locating correct indicator lights.		   [] Promptly -   [] Near Term   [] Convenient Outage -   [] Optional	
		Relocate two-is-true panels to a common locati	
		[] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
	· · · · ·		
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

AIT REVIEW OBSERVATION CHAIRMAN: A. Adorno DATE: 12/10/85 HED#: None [] Concur. EVALUATOR: R. POTTER [] Concur With Comment/Note. HEO#: 6.8.013 TASK: VALIDATION [X] Do Not Concur for Following Reason: CL ITEM: 6.8.1.1b DATE: 10/8/85 REV: CL: 6.8 HED CATEGORY: None [] Reevaluate & Resubmit for Following Reason: CL TITLE: Panel Layout Comment/Note/Reason: CONTROL BOARD LOCATION: Supervisory Panels SB-2, SM BIT being removed. \_\_\_\_\_ HEO DESCRIPTION AIT recommends removal of board controls. \_\_\_\_ GUIDELINE- ASSIGNING PANEL CONTENTS (Grouping by System Function): The boron injection tank controls/displays are not grouped together. Devices 9.035, 9.036, 9.037 and 9.517 on panel SB-2, devices 19.502, 19.503 and 19.505 on panel SM. RECOMMENDED IMPLEMENTATION Promptly [] SUPPORT MATERIAL ATTACHED Near Term Convenient Outage POTENTIAL OPERATOR ERROR(S) Optional Increase the time and probability of error in MANAGEMENT REVIEW/APPROVAL locating correct device. CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note. \_\_\_\_\_ SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: \_\_\_\_\_ Relocate devices as required to group devices [] Reevaluate & Resubmit for Following Reason: together. Comment/Note/Reason: CHAIRMAN: J. Basile DATE: 5/19/86 EXECUTIVE REVIEW APPROVE: YES[X] NO[] NOTE:

# INDIAN POINT UNIT #2

DETAILED CONTROL ROOM DESIGN REVIEW		
	HUMAN ENGINEERING OBSE	RVATION ASSESSMENT DCRDR-HE0-2
UBSERVATION EVALUATOR: R. POTTER TASK: VALIDATION CL: 6.8 CL ITEM: 6.8.1.1a CL TITLE: Panel Layout CONTROL BOARD LOCATION: Panels FA, FB, SC, SN HEO DESCRIPTION GUIDELINE- ASSIGNING PANEL CONTENTS (Grouping by For task sequence "Verify Feedwater Isolation" i step 6 the feedwater and BFP controls/displays a by task sequence.	HED#: None HEO#: 6.8.014 DATE: 10/11/85 REV: HED CATEGORY: None	AIT REVIEW (] Concur. [] Concur With Comment/Note. [X] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: AIT does not consider this a problem.
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR Increases the time and probability of error in proverification of feedwater isolation. SUGGESTED CORRECTIVE ACT Review feedwater and BFP control/display layout, relocate as required to improve task grouping.	R(S) erforming FION	RECOMMENDED IMPLEMENTATION          [] Promptly         [] Near Term         [] Optional         MANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Jayaraman DATE: 3/25/86         [X] Concur.         [] Concur With Comment/Note.         [] Do Not Concur for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         [] Remember (Note/Reason:
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSER	VATION ASSESSMENT
OBSERVATION		AIT REVIEW -   CHAIRMAN: A. Adorno DATE: 12/10/85
EVALUATOR: R. POTTER	HED#: None	[] Concur.
TASK: VALIDATION	HEO#: 6.8.Ø15	[] Concur With Comment/Note.
CL: 6.8 CL ITEM: 6.8.1.1a	DATE: 10/15/85 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Panel Layout	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Assessment Panel		Comment/Note/Reason:
HEO DESCRIPTION		
GUIDELINE- ASSIGNING PANEL CONTENTS (Grouping b Control/displays for RVLIS and WR hot leg RTD recorders are not grouped by task sequence (See procedure E-3, step 2 and step 21 or ES-1.1, st	by Task Sequence): e tep 6).	
		RECOMMENDED IMPLEMENTATION
[] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERATOR ERROR(S)		-   [ ] Near Term   [ ] Convenient Outage
Delay in executing operating procedure.		MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur.
SUGGESTED CORRECTIVE	ACTION	
Move the RVLIS and WR hot leg RTD recorders to flight panels, thereby eliminating operator trips to assessment panel.		[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Assessment panel is for post accident monitoring and there will be additonal instruments added to it.
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:
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	HUMAN ENGINEERING OBSER	VATION ASSESSMENT	DCRDR-HE0-2
OBSERVATION	· · · · · · · · · · · · · · · · · · ·		
EVALUATOR: R. POTTER TASK: VALIDATION CL: 6.8 CL ITEM: 6.8.1.1a CL TITLE: Panel Layout CONTROL BOARD LOCATION: Supervisory Panels SB2, SN HEO DESCRIPTION GUIDELINE- ASSIGNING PANEL CONTENTS (Grouping by Task Controls/displays for manual SI actuation (Procedure E-Ø, step 3 alternate) are not grouped. by task sequence. (Manual SI actuation on panel SB2 requires manual phase A isolation on panel SN).	HED#: 6.8.009 HEO#: 6.8.016 DATE: 10/15/85 REV: HED CATEGORY: A	CHAIRMAN: A. Adorno DATE: 12/10/4 [] Concur. [X] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: AIT recommends rewiring Phase A logic. (see HEO 6.5.005	35 )).
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Delay or potential operator error in executing procedure.		RECOMMENDED IMPLEMENTATION          [X] Promptly         [] Near Term         [] Convenient Outage         [] Optional         MANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Javaraman DATE: 3/25/	
SUGGESTED CORRECTIVE ACTION		[ ] Concur With Comment/Note.	
take phase A isolation automatic with manual SI, r add warning label that manual phase A is equired with manual SI.		[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE APPROVE: YES[X] NO[] NOTE:	. 5/19/86

### HUMAN ENGINEERING OBSERVATION ASSESSMENT

EVALUATOR: Weich/Sabeh/Gagnon       HED#: None       [] Concur.         TASK: Verification       HED#: 6.8.017       [] Concur.         TASK: Verification       HED#: 12-13-85       REV:       [] Concur.         CL TITLE: Panel Layout       HED CATEGORY: None       [] Reevalue         CONTROL BOARD LOCATION: Supervisory SB-1       Comment/Note/       Sequence is bare trained in         CUIDELINE- LOGICAL ARRANCEMENT AND LAYOUT (Order and Labeling):       The control sequence for SI RECIRCULATION switches 1 thru 6       sequence is bare trained in         Increases the time and probability of the wrong control during a sequence of SI recirculation evolution.       [] Promptly         SUGGESTED CORRECTIVE ACTION       [] Concur.       [] Concur.         SUGGESTED CORRECTIVE ACTION       [] Do Not C       [] Do Not C         [] Do Not C       [] Concur.       [] Do Not C         [] Concur.       [] Concur.       [] Concur.         [] Do Not C       [] Do Not C       [] Do Not C         [] Do Not C       [] Reevalue       [] Do Not C	UNAIRMAN: A. ADOFNO DAIE: 3/20/00	
TASK: Verification       HED#: 6.8.017       [] Concur W         CL: 6.8       CL ITEM: 6.8.2.2s       DATE: 12-13-85       REV:       [X] Do Not C         CL TITLE: Panel Layout       HED CATEGORY: None       [] Reevalue         CONTROL BOARD LOCATION: Supervisory SB-1		
CL: 6.8       CL ITEM: 6.8.2.2a       DATE: 12-13-85       REV:       [X] Do Not C         CL TITLE: Panel Layout       HED CATEGORY: None       [] Reevalue         CONTROL BOARD LOCATION: Supervisory S8-1       Comment/Note/         MED DESCRIPTION       HED DESCRIPTION       Comment/Note/         GUIDELINE- LOGICAL ARRANCEMENT AND LAYOUT (Order and Labeling):       The control sequence for SI RECIRCULATION switches 1 thru 6       are trained in         [X] SUPPORT MATERIAL ATTACHED       [] Promptily       [] Near Terr         POTENTIAL OPERATOR ERROR(S)       [] NAMAGEMENT RED         Increases the time and probability of the wrong control during a sequence of SI recirculation evolution.       [X] Concur.         SUGGESTED CORRECTIVE ACTION       [] Do Not C         Exchange positions of devices 8.029, 8.051 and 8.052.       [] Reevalue Comment/Note/	th Comment/Note.	
CL_TITLE: Panel Layout       HED_CATEGORY: None       [] Reevalue         CONTROL BOARD LOCATION: Supervisory SB-1       Comment/Note/         HED_DESCRIPTION       HED_DESCRIPTION         GUIDELINE- LOCICAL ARRANGEMENT AND LAYOUT (Order and Labeling): The control sequence for SI RECIRCULATION switches 1 thru 6 is broken by device 8.028.       are trained in         [X] SUPPORT MATERIAL ATTACHED       [] Promptly         POTENTIAL OPERATOR ERROR(S)       [] Promptly         Increases the time and probability of the wrong control during a sequence of SI recirculation evolution.       MANAGEMENT REX         SUGGESTED CORRECTIVE ACTION       [] Concur.         Exchange positions of devices 8.029, 8.051 and 8.052.       [] Reevalue         Comment/Note/       [] Reevalue         Conveniet       [] Reevalue	oncur for Following Reason:	
CONTROL BOARD LOCATION: Supervisory SB-1       Comment/Note/         HED DESCRIPTION       Sequence is bare trained in         GUIDELINE- LOGICAL ARRANCEMENT AND LAYOUT (Order and Labeling): The control sequence for SI RECIRCULATION switches 1 thru 6 is broken by device 8.028.       Image: Comment/Note/         [ X ] SUPPORT MATERIAL ATTACHED       Image: Comment/Note/       Image: Comment/Note/         POTENTIAL OPERATOR ERROR(S)       Image: Comment/Note/       Image: Comment/Note/         Increases the time and probability of the wrong control during a sequence of SI recirculation evolution.       Image: Comment/Note/         SUGGESTED CORRECTIVE ACTION       [] Concur       [] Concur         Exchange positions of devices 8.028 and 8.047 with positions occupied by devices 8.029, 8.051 and 8.052.       [] Reevalua Comment/Note/	te & Resubmit for Following Reason:	
HED DESCRIPTION       Sequence is c         GUIDELINE- LOGICAL ARRANCEMENT AND LAYOUT (Order and Labeling):       are trained in         The control sequence for SI RECIRCULATION switches 1 thru 6	Reason:	
GUIDELINE- LOGICAL ARRANCEMENT AND LAYOUT (Order and Labeling):         The control sequence for SI RECIRCULATION switches 1 thru 6         is broken by device 8.028.         [X] SUPPORT MATERIAL ATTACHED         POTENTIAL OPERATOR ERROR(S)         Increases the time and probability of the wrong control during a sequence of SI recirculation evolution.         SUGGESTED CORRECTIVE ACTION         Exchange positions of devices 8.028 and 8.047 with positions occupied by devices 8.029, 8.051 and 8.052.	this arrangement and change would be negative	
[X] SUPPORT MATERIAL ATTACHED       [] Promptly         POTENTIAL OPERATOR ERROR(S)       [] Promptly         Increases the time and probability of the wrong control during a sequence of SI recirculation evolution.       [] WANAGEMENT REN		
[X] SUPPORT MATERIAL ATTACHED       [] Promptly         POTENTIAL OPERATOR ERROR(S)       [] Near Term         Increases the time and probability of the wrong control during a sequence of SI recirculation evolution.       [] Optional         MANAGEMENT REN       [] Converting         SUGGESTED CORRECTIVE ACTION       [] Do Not (         [] Do Not (       [] Reevalua         Comment/Note/       [] Reevalua		
[X] SUPPORT MATERIAL ATTACHED       [] Promptly         POTENTIAL OPERATOR ERROR(S)       [] Near Term         Increases the time and probability of the wrong control during a sequence of SI recirculation evolution.       [] Optional	RECOMMENDED IMPLEMENTATION	
POTENTIAL OPERATOR ERROR(S)  Increases the time and probability of the wrong control during a sequence of SI recirculation evolution.	<pre>[] Promptly - [] Near Term [] Convenient Outage</pre>	
Increases the time and probability of the wrong control during a sequence of SI recirculation evolution. 		
SUGGESTED CORRECTIVE ACTION       [] Concur y         Exchange positions of devices 8.028 and 8.047 with positions       [] Do Not (         occupied by devices 8.029, 8.051 and 8.052.       [] Reevalue         Comment/Note/	IEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86	
Exchange positions of devices 8.028 and 8.047 with positions occupied by devices 8.029, 8.051 and 8.052.	- [ [ ] Concur With Comment/Note.	
	te & Resubmit for Following Reason: Reason:	
EXECUTIVE REVI APPROVE: YES	EW CHAIRWAN: J. Basile DATE: 5/19/86 K]NO[] NOTE:	

INDIAN POINT UNIT #2 111-14 DCRDR-HE0-2 DETAILED CONTROL ROOM DESIGN REVIEW HUMAN ENGINEERING OBSERVATION ASSESSMENT OBSERVATION AIT REVIEW CHAIRMAN: A. Adorno DATE: 12/10/85 [] Concur. EVALUATOR: Gagnon HED#: 6.8.010 [X] Concur With Comment/Note. HEO#: 6.8.018 TASK: VALIDATION [] Do Not Concur for Following Reason: DATE: 5-27-86 REV: CL: 6.8 CL ITEM: 6.8.2.1c(1) [] Reevaluate & Resubmit for Following Reason: HED CATEGORY: B CL TITLE: Panel Layout Comment/Note/Reason: Move VCT level, charging flow & CONTROL BOARD LOCATION: Flight FB pressure, & letdown orifice valves to panel FB. Modify LCV-112C switch (13.032) to lock in closed position HED DESCRIPTION rather than spring-return to AUTO. GUIDELINE- SEQUENCE. FREQUENCY OF USE & FUNCTIONAL CONSIDERATIONS (Functional Considerations): For tasks concerning starting, stopping & adjusting charging flow, the operator must manipulate/observe pump controls on panel FB (3.113, 3.114, 3.115, 3.123, 3.124, 3.125) and observe/control charging flow & pressure on panel SF (13.015. 13.503), the latter being nine (9) control panels away from panel FB. Ref: E-Ø/step 41, ES-Ø.1/step 7, ES-Ø.2/step 18, FR-S.1/step 4. Ref: 0ER-049 RECOMMENDED IMPLEMENTATION Promotly **Г** ] [] "SUPPORT MATERIAL ATTACHED ĨΧĨ Near Term POTENTIAL OPERATOR ERROR(S) Convenient Outage [] Optional \_\_\_\_\_ Increases time & probability of error in regulating/monitoring charging flow. MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. \_\_\_\_\_ [] Concur With Comment/Note. SUGGESTED CORRECTIVE ACTION [] Do Not Concur for Following Reason: \_\_\_\_\_ Relocate charging pump controls from panel SF to panel FB. [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: CHAIRMAN: J. Basile DATE: 5/19/86 EXECUTIVE REVIEW APPROVE: YES [X] NO [ ] NOTE:

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	HUMAN ENGINEERING OBSER	ATION ASSESSMENT	
OBSERVATI	CN .	AIT REVIEW	••••
EVALUATOR: Sabeh/Welch	HED#: None	[X] Concur.	
TASK: Control Room Survey	HEO#: 6.9.001	[] Concur With Comment/Note.	
CL: 6.9 CL ITEM: 6.9.1.1c(1)	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:	
CL TITLE: Control-Display Integration	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Flight		Comment/Note/Reason:	
HEO DESCRIP	TION		
GUIDELINE- SINGLE CONTROL AND DISPLAY PAI Motor opreated discharge switch is not as indicator lamps 75,73 and 71 on panel FA.	RS (Association): sociated with	-	
RE: Photo No. 1-38			
RE: 0ER-Ø33			
· · · ·			
[X] SUPPORT MATERIAL ATTACHED		[ ] Promptly -   [ ] Near Term	
POTENTIAL OPERAT	OR ERROR(S)	-   [ ] Convenient Outage -   [ ] Optional	
Increase time and the probability of erro associating control with indicator lamps.	n in .	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86	
	•		
SUGGESTED CORREC	TIVE ACTION	- [] Concur With Comment/Note.	
Mimic used to enhance association appears	s satisfactory.	[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason:	
		Comment/Note/Reason:	
	•		•
	•	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	-
		APPROVE: YES[X] NO[] NOTE:	
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	HUMAN ENGINEERING OBS	ERVATION ASSESSMENT
OBSERVAT	ION	AIT REVIEW
EVALUATOR: Sabeh/Weich	HED#: Completed	[] Concur.
TASK: Control Room Survey	HEO#: 6.9.002	[] Concur With Comment/Note.
CL: 6.9 CL ITEM: 6.9.1.1c(1)	DATE: 11/7/84 REV:	[X] Do Not Concur for Following Reason:
CL TITLE: Control-Display Integration	HED CATEGORY: Comp	[] Reevaluate & Resubmit for Following Reason:
CONTROL BOARD LOCATION: Flight		Comment/Note/Reason: AIT notes that the present arrangement
HEO DESCRI	PTION	was purposely designed to all operation.
GUIDELINE- SINGLE CONTROL AND DISPLAY PA The turbine speed digital readout 506 is with the turbine controls and recorder f and boiler speed 507 over feedpump contr	IRS (Association): not associated or turbine speed ols.	Re-evaluation concurred with previous results.
RE: Photo No. 2-22		
		RECOMMENDED IMPLEMENTATION
[X] SUPPORT MATERIAL ATTACHED		[] Promptly
POTENTIAL OPERA	TOR ERROR(S)	[] Convenient Outage
Increases the time and probability of er performing turbine operations.	ror in	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur.
SUGGESTED CORRE	CTIVE ACTION	[X] Concur With Comment/Note.
Assess alternative control-display relat provide mimics/demarcation enhancements functionally related controls and displa	ionship or to associated ys.	[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: Panel has since been re-arranged.
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		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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HUMAN ENGINEERING OBSERVATION ASSESSMENT

OBSERVATION			AIT REVIEW	
EVALUATOR: Sabe		HED#: 6.9.001	[] Concur.	
TASK: Control R	coom Survey	HEO#: 6.9.003	[] Concur With Comment/Note.	
CL: 6.9	CL ITEM: 6.9.1.2a(3,4)	DATE: 11/7/84 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Contr	ol-Display Integration	HED CATEGORY: C	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD L	OCATION: Supervisory		Comment/Note/Reason: AIT does not consider this a problem.	
	HEO DESCRIPTION		Re-evaluation concurred with previous results.	
GUIDELINE- MULI Service water of indicators for matrix and not	TPLE CONTROLS AND DISPLAYS (Multi controls 37,38,39,41,42,43,44,45 o pressure controls 24 are not grou located directly below the displa	ple Controls, Single Displays): perate with ped in a line or y.	-	
RE: Photo No. 1	1-22	<i>_</i>		
			RECOMMENDED IMPLEMENTATION	
[X] SUPPORT	MATERIAL ATTACHED		 [] Promptly - [] Near Term	
	POTENTIAL OPERATOR ERRO	R(S) 	[X] Convenient Outage -   [ ] Optional	
Increases the service water o	time and the probability of error operations.	in performing	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [] Concur.	
	SUGGESTED CORRECTIVE AC		- [X] Concur With Comment/Note.	
Although the m additional enh demarcation.	imic used is a decided aid to rela ancement could result from some ad	te the controls Ided color coding/	<ul> <li>[] Do Not Concur for Following Keason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: Management recommends this be re-classified to Category 'C' &amp; panel to be modified accordingly.</li> </ul>	
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			EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:	

INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REVIEW HUMAN ENGINEERING OBSERV	DCRDR-HEO-2
OBSERVATION EVALUATOR: Sabeh/Welch HED#: 6.9.002	AIT REVIEW CHAIRMAN: A. ADORNO DATE: 3/13/85 [] Concur.
TASK: Control Room Survey       HEO#: 6.9.004         CL: 6.9       CL ITEM: 6.9.1.2a(5)       DATE: 11/7/84       REV:         CL TITLE: Control-Display Integration       HED CATEGORY: C         CONTROL BOARD LOCATION: Supervisory       HEO DESCRIPTION         HEO DESCRIPTION         GUIDELINE- MULTIPLE CONTROL, AND DISPLAYS (Multiple Controls, Single Displays): The component cooling loops A and B are not arranged in a left to right sequence 26 and 33 associated with A loop and 25 and 32 associated with loop B.         RE: Photo No. 1-7       RE: OER-Ø34	<ul> <li>[X] Concur With Comment/Note.</li> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason:</li> <li>AIT recommends switches be swapped. Retain A/B labels.</li> </ul>
[ X ] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S) Increases time and probability of error in performing component cooling sequences. SUGGESTED CORRECTIVE ACTION	RECOMMENDED IMPLEMENTATION
Exchange loop B 99 and 113 with loop A 102 and 116 modify mimic lines to reflect water temperature.	[] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] ND[] NOTE:

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### HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

OBSERVATION			AIT REVIEW   CHAIRMAN: A. ADORNO DATE: 3/13/85 [] Concur.		
EVALUATOR: Sabeh/Welch HED#: None		HED#: None			
TASK: Control	Room Survey	HEO#: 6.9.005	[] Concur With Comment/Note.		
CL: 6.9	CL ITEM: 6.9.2.1a	DATE: 10/31/84 REV:	[X] Do Not Concur for Following Reason:		
CL TITLE: Con	trol-Display Integration	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:		
CONTROL BOARD	LOCATION: Supervisory	•	Comment/Note/Reason:		
	HEO DESCRIPTION				
GUIDELINE- LO (Functional I The newly ins is located ou monitoring eq located on su	CATION AND ARRANGEMENT OF CONTROL ntegrity): talled circulating water (CW) mon tside the control room on the 15 uipment is distant from the CW op bpanel SJ of the supervisory pane	-DISPLAY GROUPS itoring equipment foot level. This erating equipment I.			
			RECOMMENDED IMPLEMENTATION		
[] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERROR(S)			   [ ] Promptly   [ ] Near Term   [ ] Convenient Outage   [ ] Optional		
		ROR (S)			
Increase time monitoring fu	and probability of error in oper inctionally related displays and c	ating and ontrols.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. [] Concur With Comment/Note.		
	SUGGESTED CORRECTIVE	ACTION	- [] Do Not Concur for Following Reason:		
Relocate the to be in clos	CW monitoring equipment to the co se proximity to the CW operating e	ntrol room quipment.	[] Reevaluate & Resubmit for Following Reason:		
	. · · · ·		Comment/Note/Reason:		
	· · · · · · · · · · · · · · · · · · ·		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:		

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INDIAN POINT UNIT #2 DETAILED CONTROL ROOM DESIGN REV	IEW HUMAN ENGINEERING OBS	ERVATION ASSESSMENT
HUMAN ENGINEERING OBSERVATION         OBSERVATION         EVALUATOR: Sabeh/Weich         HED#: 6.9.0003         TASK: Control Room Survey         HED#: 6.9.0006         CL: 6.9         CL ITEM: 6.9.2.2e         DATE: 11/7/84         REV:         CL ITEM: 6.9.2.2e         DATE: 11/7/84         REV:         HED DESCRIPTION         GUIDELINE- SINGLE PANEL ARRANCEMENTS (Control/Display Packages): <td>AIT REVIEW  AIT REVIEW (X) Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate &amp; Resubmit for Following Reason: Comment/Note/Reason: </td>		AIT REVIEW AIT REVIEW (X) Concur. [] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: 
RE: OER-Ø45 RE: Photo No. 2-17 [X] SUPPORT MATERIAL ATTACHED POTENTLI Increase the time and probability monitors and meters with recorder	AL OPERATOR ERROR(S) y of error in relating rod rs.	RECOMMENDED IMPLEMENTATION
The mimic lines are a decided aid demarcation is needed to enhance	d additional mimics or this association.	<pre> [] Do Not Concur for Following Reason:   [] Reevaluate &amp; Resubmit for Following Reason:   Comment/Note/Reason:</pre>
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:

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### HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

OBSERVATION			AIT REVIEW		
EVALUATOR: Sabeh/Welch HED#: 6.9.004		HED#: 6.9.004	[] Concur.		
TASK: Control Room Survey HEO#: 6.9.007		HED#: 6.9.007	[X] Concur With Comment/Note.		
CL: 6.9	CL ITEM: 6.9.2.1a	DATE: 11/7/84 REV:	[] Do Not Concur for Following Reason:		
CL TITLE: Contr	rol-Display Integration	HED CATEGORY: B	[] Reevaluate & Resubmit for Following Reason:		
CONTROL BOARD L	LOCATION: Flight/Supervisory		Comment/Note/Reason: AIT recommends that the automatic tap changes		
	HEO DESCRIPTION	*	the control.		
GUIDELINE- LOCA (Functional Int The UAT volts f from the UAT co display cannot	ATION AND ARRANGEMENT OF CONTROL-DI tegrity): for generator display SH 13 is dist ontrols located on the rear of FC w be seen.	SPLAY GROUPS ant here			
RE:0ER-051					
			RECOMMENDED IMPLEMENTATION		
[] SUPPORT M	ATERIAL ATTACHED		[] Promptly		
	POTENTIAL OPERATOR ERROR	?(S)	[X] Near lerm   [] Convenient Outage		
Increases the lowering or ra	time and the probability of error ising voltage.	n	- [] Concur.		
	SUGGESTED CORRECTIVE ACT		- [X] Concur With Comment/Note.		
Duplicate the FC in close pr	display on panel SH on the rear of oximity of the UAT control.	panel	<ul> <li>[] Do Not Concur for Following Reason:</li> <li>[] Reevaluate &amp; Resubmit for Following Reason:</li> <li>Comment/Note/Reason: Also consider the suggested corective action.</li> </ul>		
	• • • • • • • • • • • • • • • • • • •				
			EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86 APPROVE: YES[X] NO[] NOTE:		

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DETAILED CONTROL ROOM DESIGN REVIEW	HUMAN ENGINEERING OBSFR	D D	CRDR-HE0-2
OBSERVATION EVALUATOR: Sabeh/Welch TASK: Control Room Survey CL: 6.9 CL ITEM: 6.9.2.1a CL TITLE: Control-Display Integration CONTROL BOARD LOCATION: Flight	HUMAN ENGINEERING OBSER HED#: 6.9.005 HEO#: 6.9.008 DATE: 11/7/84 REV: HED CATEGORY: C	VATION ASSESSMENT AIT REVIEW CHAIRMAN: A. Adorno DATE: 12/10/85 [] Concur. [X] Concur With Comment/Note. [] Do Not Concur for Following Reason: [] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason: - AIT recommends movement of PORVs.	
WIDELINE- LOCATION AND ARRANGEMENT OF CONTROL-O Functional Integrity): he pressurizer pressure and level controls 108 10,111,113,114,115 and controllers 120,121,122 24,125 are separated from meter 58 and 73 by se low - feed flow recorder 93. E: Photo No. 1-33	DISPLAY GROUPS 109, 123, ceam	-	
E: OER-050 [X] SUPPORT MATERIAL ATTACHED POTENTIAL OPERATOR ERRO Increases the time and the probability of error the control of pressure and level. SUGGESTED CORRECTIVE AC Incorporate a demarcation or color scheme to dep unctinal integrity of these controls and displa this HEO should be considered with HEO 6.8.001.	R(S) in TION ict the ys.	RECOMMENDED IMPLEMENTATION          [] Promptly         [] Near Term         [X] Convenient Outage         [] Optional         MANAGEMENT REVIEW/APPROVAL         CHAIRMAN: V. Jayaraman DATE: 3/25/84         [] Concur.         [] Concur With Comment/Note.         [] Do Not Concur for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         [] Reevaluate & Resubmit for Following Reason:         Comment/Note/Reason: PORVs & block valves should be cons	6 idered.
		EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE APPROVE: YES[X] NO[] NOTE:	: 5/19/86

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HUMAN ENGINEERING OBSERVATION ASSESSMENT

DCRDR-HE0-2

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OBSERVATION		AIT REVIEW	
EVALUATOR: R. POTTER	HED#: None	[] Concur.	
TASK: VALIDATION	HEO#: 6.9.009	[] Concur With Comment/Note.	
CL: 6.9 CL ITEM: 6.9.2.2d	DATE: 10/11/85 REV:	[X] Do Not Concur for Following Reason:	
CL TITLE: Control-Display Integration	HED CATEGORY: None	[] Reevaluate & Resubmit for Following Reason:	
CONTROL BOARD LOCATION: Panels FB, SN		Comment/Note/Reason:	
HEO DESCRIPTION			
GUIDELINE- SINGLE PANEL ARRANGEMENTS (Consisten Feedwater regulating valves (3.134, 3.135, 3.13 on panel FB use the two-is-true panel (20.501) for open/close status. This is not consistent feedwater system valves.	t Practice): 6, 3.137) on panel SN with other		
[] SUPPORT MATERIAL ATTACHED		[] Promptly   [] Near Term	
POTENTIAL OPERATOR ERROR(S)		[ ] Convenient Outage -   [ ] Optional	
Difficulty/delay in verifying status of feedwat	er valves.	MANAGEMENT REVIEW/APPROVAL CHAIRMAN: V. Jayaraman DATE: 3/25/86 [X] Concur. - [] Concur With Comment/Note.	
SUGGESTED CORRECTIVE	ACTION	- [] Do Not Concur for Following Reason:	
Add status lights to panel FB near the FW cont	-ollers.	[] Reevaluate & Resubmit for Following Reason: Comment/Note/Reason:	
	• :		
	1	EXECUTIVE REVIEW CHAIRMAN: J. Basile DATE: 5/19/86	
•		APPROVE: YES[X] NO[] NOTE:	

# APPENDIX B

# OPERATING EXPERIENCE REVIEW SUMMARY

### A. Room Workspace

This appendix presents a summary of responses by operators to interview questions grouped together as various observation topics, as appropriate.

- <u>OER OO1 Temperature/Humidity (Comfort Zone)</u>: The variation in temperature coupled with the low humidity level produces an uncomfortable operating environment. The static resulting from the low humidity level influences the meter values and shocks the operator. (HEO 6.1.011)/(6.1.5.1a).
- <u>OER 002 Ventilation (Air Velocity)</u>: The variation in air velocity within the control room was of concern to many operators. (HEO 6.1.002)/(6.1.5.2b)
- <u>OER 003 Illumination (Glare)</u>: The glare produced by the control room overhead lights interferes with operator instrument reading. The operators must adjust their viewing angles to compensate for the glare on the instrument face. (HEO 6.1.017/(6.1.5.3f)
- <u>OER 004</u> <u>Accessibility of Instrumentation/Equipment (Arranged to</u> <u>Facilitate Coverage)</u>: Air conditioning and ventilation status lights are on the "SO" panel and are difficult for the operators to discriminate between a dim and bright lighted window. In addition, the bistable trip status lights on panel "SO" are not conveniently located for operator monitoring. (HEO 6.1.018)/(6.1.1.1b)
- <u>OER 005 Nonessential Personnel Access</u>: The traffic to the supervisors (SRO) console, usually at the start of a shift, is heavy. The excessive traffic is disruptive to the operators. (Administrative Controls are now in place to control traffic to SRO console/6.1.1.7)

B-1

- <u>OER 006 Auditory Environment (Noise Distractions)</u>: The alarms for Unit 1 that are not associated with or of concern to the Unit 2 control room are a distraction to the operators. (HEO 6.1.004/(6.1.5.5d) and (HEO 6.1.003)/(6.1.5.7b3)
- <u>OER 007 Vertical Panels (Display Height and Orientation)</u>: The Rod Position Indicators (RPIs), RWST level indicator and T-avg indicator were identified as being located too high or their orientation such that they are difficult to read. (HEO 6.1.012)/(6.1.2.2e1 and 6.1.2.5a1)

## B. Communications

Operations personnel expressed the following concerns regarding control room communications:

- <u>OER 008 Announcing Systems (Priority)</u>: The control room does not have priority over any other user on the paging system. In addition, the overuse of the paging system results in interference with intra-communications within the primary operating area. (HEO 6.2.008)/(6.2.1.6f)
- <u>OER 009 Announcing System (Coverage)</u>: There are several areas throughout the plant where the paging system cannot be heard. The "dead spots" identified included portions of the following:
  - o Containment building
  - o Auxiliary building, feedwater pump and piping penetration areas
  - o Turbine hall
  - o Service water strainer pit
  - o Main boiler feedpump area

 $(HE0 \ 6.2.005)/(6.2.1.6a2)$ 

- <u>OER 010 Emergency Messages (Outgoing)</u>: During emergency or abnormal operations the communications system becomes overloaded and makes it difficult for an operator to transmit "call-up" messages. (HEO 6.2.009)/(6.2.1.1c1)
- <u>OER 011 Announcing Systems (Intelligibility and Coverage)</u>: Nuclear Power Operators or Equipment Operators in the controlled area of the service water pump must leave the area to respond to a page. (HEO 6.2.010)/(6.2.1.6a2)

### C. Annunciator Warning System

Operations personnel expressed the following concerns regarding the control room Annunciator Warning Systems:

- <u>OER 012 Visual Annunciator Panel (Location)</u>: Some annunciator tiles are not located above their related controls and displays, e.g., main boiler feedpump tile is on the far side of the supervisory panel and the operator control is located on the flight panel. A Gibbs and Hill report recommended 37 additional tiles be relocated to panels above their controls and displays. (Corrected at previous outage)/(6.3.3.1a)
- <u>OER 013 Cleared Alarms (Auditory Signal)</u>: The same sound is used for actuating and clearing the alarm. (HEO 6.3.005)/(6.3.1.5a)
- <u>OER 014 Prioritization (Priority Coding)</u>: The permissives panel utilizes only a visual indication to alert the operator to a status change. A visual indication without an auditory tone may be missed by the operator. (HEO 6.3.020)/(6.3.1.4b2)

B-3

<u>OER 015 - Alarm Parameter Selection (Multi Unit Alarms)</u>: Alarms from Unit 1 that do not concern Unit 2 are still active. The additional alarms are a source of confusion and should be deactivated. (HEO 6.3.021)/(6.3.1.2d and 6.3.1.2b)

## D. Controls

Operations personnel expressed the following concerns regarding Controls:

- OER 016 General Principles (Economy): Some controls were identified as no longer being in use, e.g., "SO" control for load changing. (HEO 6.4.001)/(6.4.1.1b1)
- <u>OER 017 Prevention of Accidental Activation (Proper Location)</u>: The turbine generator base adjustment control and the volt regulator exciter breaker control are lined up with each other and are identical in their shape (one below the other). The location, orientation and shape of these two controls could make accidental activation of a wrong control possible. (HEO 6.4.006)/(6.4.1.2a)
- <u>OER 018 Coding of Controls (Location Coding)</u>: There are two containment spray pumps with two valve controls to each pump and a common control. The location of the controls could be confused with their associated pumps. (HEO 6.8.003)/(6.4.2.2b)
- <u>OER 019 Coding of Controls (Location Coding)</u>: The Auxiliary Boiler feedpump controllers located on the Supervisory panel are used with the flow indicators located on the flight panel. In addition, the boric acid flow control located on the flight panel is used with the volume control tank located halfway down the supervisory panel.

(HEO 6.8.001 and 6.8.002)/(6.4.2.2b and 6.8.1.1a)

- <u>OER 020 Direction of Movement</u>: The controller movements do not conform with convention in that increase can be in either the clockwise direction or counterclockwise direction with "100%" indicating either full closed or full open. For example, auxiliary boiler feedpump control has 100% full closed and the electrical boiler flow control has "0%" full closed. (HEO 6.4.007)/(6.4.2.1)
- <u>OER 021 Coding of Controls (Shape Coding)</u>: Controls for the RHR, containment spray and SIS are in a row on the safeguard panel with the main boiler feedpump governor control located next to the main turbine control. These controls are difficult to discriminate because of their close proximity to each other and the sequence of their manipulation. (Initially corrected by demarcation and being studied for further enhancement./(6.4.2.2d)
- <u>OER 022 Coding of Controls (Location Coding)</u>: The RHR valve controls are located on two separate panels, i.e., SB-1 Safeguard and SB-2 Auxiliary Cooling Panels. (HEO 6.4.008)/(6.4.2.2b)

## E. Visual Displays

Operations personnel expressed the following concerns regarding Visual Displays:

- <u>OER 023 Information to be Displayed (Completeness of Information)</u>: The hot leg temperature  $(T_h)$  indication is needed on the flight panel. (HEO 6.5.004)/(6.5.1.1b)
- <u>OER 024 Usability of Displayed Values (Elimination of Operator</u> <u>Conversion)</u>: Instruments identified as difficult to read and interpret are:

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- o Component Cooling Flow Meter
- o Containment Sump Pump Level
- o Reactor Cavity Meter
- o Rod Position Indicator Scale

(HEO 6.5.002, 6.5.006 and 6.5.008)/(6.5.1.2 and 6.5.1.5a)

- <u>OER 025 Information to be Displayed (Completeness of Information)</u>: The containment isolation status lights are on two panels separated by about 25-30 ft. The separation increases the time necessary to determine whether containment isolation is complete. (HEO 6.5.005)/(6.5.1.1b)
- <u>OER 026 Information to be Displayed (Completeness of Information)</u>: The RCP seal injection flow instruments are remote from the RCP meters. (Instruments have been relocated to provide acceptable functional grouping)/(6.5.1.1 and 6.8.2.1)
- <u>OER 027 General Characteristics of Graphite Recorders (Visibility)</u>: The position Pasqual recorder reading is difficult to determine because the pen is located too far back on the roller. (HEO 6.5.018)/(6.5.4.1)
- <u>OER 028 Specific Recorder Types (Channel Identification on Recordings)</u>: The charts produced by the Esterline Angus multipoint recorder located on the side of the assessment panel are difficult to read. (HEO 6.5.021)/(6.5.4.2b3)
- <u>OER 029 Electronic Counters (Contrast)</u>: Digital counters are disliked because too much information is lost in terms of rate of change, operating scale range and limits, and contrast of character display. (HEO 6.5.020)/(6.5.4.2)

## F. Labels and Location Aids:

Operations personnel expressed the following concerns regarding Labels and Location Aids:

- <u>OER 030 Need for Labeling</u>: The CRT terminals are not labeled and operators have difficulty by displays being erased from another station. (HEO 6.6.018 and 6.7.003)/(6.6.1.1 and 6.7.1.5d1)
- OER 031 Consistency (Internal Consistency): Abbreviations on labels are not used consistently. (HE0 6.6.019)/6.6.3.3b)
- <u>OER 032 (Consistency with Procedures)</u>: The condensate flow path instruments are labeled A, B and C, but the procedures identify them as 1, 2 and 3 with A equivalent to 2. (Procedures have been revised to correspond to instrument labels)/(6.6.3.3c)
- <u>OER 033 Use of Mimics</u>: The electrical breakers on the flight panel to swap buses could possibly use mimics or labels to indicate direction of power flow. (HEO 6.9.001)/(6.6.6.4 and 6.9.1.1c1)
- <u>OER 034 Use of Mimics</u>: The arrangement of the RHR and the auxiliary cooling system components is confusing. (HEO 6.6.017 and 6.9.004)/(6.6.6.4 and 6.9.1.2.a5)
- <u>OER 035 Color</u>: The instrument buses and electrical feed to all panels are difficult to associate with each other. (This is not a human factors engineering concern and therefore is outside the scope of the DCRDR)/(6.6.6.3)

### G. Process Computer

Operations personnel expressed the following concerns regarding the Process Computer:

- <u>OER 036 Operator/Computer Dialogue (Language Characteristics)</u>: There is an inconsistency between the programmer-developed computer language and that used by the operators. (HEO 6.7.015)/(6.7.1.2a and 6.7.3.2f1,2)
- <u>OER 037 Prompting and Structuring (Operator Requests)</u>: When an operator makes a wrong entry the computer system initiates a "bootstrap" routine, that restarts program. The restart is time consuming and bothersome resulting in loss of confidence by the operator. (Not applicable, the Proteus computer is not going to be used for SPDS functions)/(6.7.1.3a)
- <u>OER 038 Computer Function Controls (Control Design)</u>: The data entry device is a programmer type keyboard that is not user friendly. (HEO 6.7.001 and 6.7.002)/(6.7.1.4.6 and 4i)
- <u>OER 039 Computer Response Time to Operator Queries</u>: The computer response time (Proteus) is too slow, e.g., CVCS status can be determined faster by the meters than the computer system. (Not applicable, the Proteus computer is not going to be used for SPDS functions)/(6.7.1.7a)

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- <u>OER 040 Data Presentation Format (Useability of Data)</u>: The operators indicated that displays look nice but provide little usable data other than for trending. (Not applicable, the Proteus computer is not going to be used for SPDS functions)/(6.7.2.4a)
- <u>OER 041 Access Aids (Computer System Procedures)</u>: The operators have not received any practical "hands on" training with the Proteus System. (HEO 6.7.016)/(6.7.1.2 and 6.7.1.8)
- <u>OER 042 Computer Failure (Reliability)</u>: There is no clear indication when the computer has failed resulting in a lack of confidence in the system by the operator. It is recommended that computer

operating status indication be continuously presented to the operator. This observation is unique to the Operating Experience Review as having human factors implications but does not violate any guideline criteria. This observation is noted as a concern of the operation personnel and submitted for consideration during review of system architecture and software design. (No HEO)/(No Specific Checklist Item)

### H. Panel Layout

Operations personnel expressed the following concerns regarding Panel Layout:

- <u>OER 043 Assigning Panel Contents (Grouping by Task Sequence)</u>: The makeup controls during startup require the operator to run back and forth between the flight panel and the supervisory panel for the VCT and CVCS operation. (HEO 6.8.001 and 6.8.002)/(6.8.1.1a and 6.8.2.1a3)
- <u>OER 044 Assigning Panel Contents (Grouping by System Function)</u>: The auxiliary feedwater regulator should be on the same panel with the main feedwater controls. (HEO 6.8.001 and 6.8.002)/(6.8.1.1a and 6.8.2.1a3)
- <u>OER 045 Assigning Panel Contents (Grouping by System Function)</u>: The assessment panel is not properly laid out, e.g., the radiation monitor (R-27) recorder is approximately 3 ft away from its associated meter. (HEO 6.9.006)/(6.8.1.1b and 6.9.2.2c)
- <u>OER 046 Layout Consistency (Repeated Funcions)</u>: The containment spray controls are not symmetrical, i.e., same positions from pump to pump. (HEO 6.8.003)/(6.8.2.3a and 6.8.2.2a)

- OER 047 Sequence, Frequency of Use and Functional Considerations (Sequence): The steam generator meters are not in line with the feed flow recorder and associated controls on the Flight Panel (FP). (HEO 6.8.001 and 6.8.002)/(6.8.1.1a and 6.8.2.1a3)
- <u>OER 048 Standardization (Simulator-to-Control Room Standardization)</u>: The simulator has not been modified to keep up with latest control room changes. (HEO 6.8.007)/(6.8.2.4b)

### I. Control-Display Integration

Operations personnel expressed the following concerns regarding Control-Display integration:

- <u>OER 050 Location and Arrangement of Control-Display Groups (Functional</u> <u>Integrity</u>): The pressurizer controls associated with the pressurizer meters are separated by the feed flow recorders. The recommendation suggested for OER-047 for relocating the pressurizer meters and control appears to be a good human engineering fix. (HEO 6.9.009)/(6.9.2.1a)
- <u>OER 051 Location and Arrangement of Control-Display Groups (Functional</u> <u>Integrity)</u>: The station auxiliary transformer controls are located on the back of the flight panel and the voltage indicator is on the supervisor panel. The task of lowering or raising the voltage requires two operators. (HEO 6.9.007)/(6.9.2.1a)
- <u>OER 052 Location and Arrangement of Control-Display Groups (Functional</u> <u>Integrity)</u>: The auxiliary boiler feed pump control is on the supervisory panel whereas the narrow range indicator for the feed pump is on the flight panel. (HEO 6.8.001)/(6.9.2.1a)

# APPENDIX C

# HED/DEVICE CROSS REFERENCE TABLE

PANEL	DEVICE NO	HED	HED CATEGORY
AS AS	1.001 1.001	6.1.004 6.9.003	B C
AS	1.012	6.9.003	C C
AS	1.016	6.1.004	В
AS	1.020	6.5.003	C
AS	1.021	6.5.003	C
AS	1.022	6.5.003	C
AS AS	1.029 1.029	6.1.004 6.9.003	B C
AS	1.038	6.9.003	C
AS	1.039	6.1.004	В
AS	1.040	6.6.005	C
AS	1.041	6.6.005	C
AS	1.043	6.9.003	C
AS	1.044	6.9.003	C
AS	1.045	6.9.003	C
AS	1.046	6.5.003	C
AS	1.507	6.1.004	В
AS AS	1.511 1.511	6.5.003 6.5.006	C C

PANEL	DEVICE NO	HED	HED CATEGORY
	•		
FA	2.003	None	D
FA	2.011	None	D
FA	2.019	6.1.006	C
FA FA	2.020 2.020	6.1.006 6.5.003	C C
FÅ	2.022	6.1.006	<b>C</b>
FA	2.024	6.5.003	С
FA	2.028	6.1.006	C
FA	2.029	6.1.006	C
FA	2.038	6.1.006	C ·
FA FA	2.039 2.039	6.1.006 6.5.003	C C
FA	2.042	6.1.006	C
FA	2.043	6.1.006	C
FA	2.044	6.1.006	С
FA	2.045	6.1.006	C
FA	2.046	6.1.006	Č C
FA FA FA	2.047 2.047 2.047	6.1.006 6.5.003 6.5.005	C C C

PANEL	DEVICE NO	HED	HED CATEGORY
FA	2.049	6.5.003	C
FA FA	2.050 2.050	6.5.003 6.5.005	C C
FA	2.067	6.5.003	C
FA	2.084	None	D
FA	2.092	6.5.003	C
FA	2.093	6.5.003	C
FA	2.094	6.5.003	C
FA	2.109	None	D
FA	2.113	None	D
FA FA	2.503 2.503	6.1.006 6.6.002	C C
FA FA	2.504 2.504	6.1.006 6.5.003	C C
FA	2.505	6.1.006	С
FA	2.508	6.6.002	С
FB .	3.001	6.1.006	C
FB	3.002	6.1.006	C
FB	3.009	6.1.006	С

PANEL	DEVICE NO	HED	HED CATEGORY
FB	3.010	6.1.006	C
FB	3.010	6.5.003	C
FB	3.010	6.5.005	C
FB	3.013	6.1.006	C
FB	3.013	6.5.003	C
FB	3.013	6.5.005	C
FB	3.016	6.1.006	C
FB	3.016	6.5.003	C
FB	3.016	6.5.005	C
FB	3.021	6.1.006	C
FB	3.021	6.5.003	C
FB	3.024	6.1.006	C
FB	3.024	6.5.003	C
FB	3.027	6.5.003	с
FB	3.036	6.1.006	C
FB	3.036	6.5.003	C
FB	3.036	6.5.005	C
FB	3.037	6.1.006	C
FB	3.037	6.5.003	C
FB	3.037	6.5.005	C
FB	3.038	6.1.006	C
FB	3.038	6.5.003	C
FB	3.038	6.5.005	C
FB	3.039	6.1.006	C
FB	3.039	6.5.003	C
FB	3.039	6.5.005	C
FB	3.048	6.1.006	C
FB	3.048	None	D

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PANEL	DEVICE NO	HED	HED CATEGORY
FB FB	3.049 3.049	6.1.006 None	C D
FB FB	3.050 3.050	6.1.006 None	C D
FB FB	3.051 3.051	6.1.006 None	C D
FB FB FB	3.056 3.056 3.056	6.5.005 6.5.008 6.9.005	C C C
FB	3.060	None	Ď
FB	3.061	None	D
FB	3.062	None	D
FB	3.063	None	D
FB	3.071	6.5.003	C
FB	3.073	6.9.005	C
FB	3.076	6.8.002	В
FB	3.080	6.8.002	В
FB	3.084	6.8.002	В
FB	3.088	6.8.002	В
FB FB	3.093 3.093	6.8.002 6.9.005	B C
FB	3.095	6.8.002	В
PANEL	DEVICE NO	HED	HED CATEGORY
----------------------	---	--	-----------------
			•
FB	3.097	6.8.002	В
FB	3.099	6.8.002	В
FB	3.105	None	D
FB	3.108	6.9.005	C
FB	3.109	6.9.005	C
FB	3.110	6.9.005	С
FB	3.111	6.9.005	С
FB FB	3.113 3.113	6.8.010 6.9.005	B C
FB FB	3.114 3.114	6.8.010 6.9.005	B C
FB FB	3.115 3.115	6.8.010 6.9.005	B C
FB FB	3.118 3.118	6.5.003 6.8.007	C C
FB FB	3.119 3.119	6.5.003 6.8.007	C C
FB FB FB	3.120 3.120 3.120	6.5.003 6.8.007 6.9.005	C C C
FB FB FB FB	3.121 3.121 3.121 3.121 3.121	6.1.009 6.5.003 6.8.007 6.9.005	с с с

PANEL	DEVICE NO	HED	HED CATEGORY
FB FB FB FB	3.122 3.122 3.122 3.122 3.122	6.1.009 6.5.003 6.8.007 6.9.005	C C C C
FB FB FB FB	3.123 3.123 3.123 3.123 3.123	6.5.003 6.8.007 6.8.010 6.9.005	C C B C
FB FB FB FB	3.124 3.124 3.124 3.124 3.124	6.5.003 6.8.007 6.8.010 6.9.005	C C B C
FB FB FB FB	3.125 3.125 3.125 3.125 3.125	6.5.003 6.8.007 6.8.010 6.9.005	C C B C
FB	3.126	6.5.003	C
FB	3.126	6.5.008	C
FB	3.126	6.8.002	B
FB	3.127	6.5.003	C
FB	3.127	6.5.008	C
FB	3.127	6.8.002	B
FB	3.128	6.5.003	C
FB	3.128	6.5.008	C
FB	3.128	6.8.002	B
FB	3.129	6.5.003	C
FB	3.129	6.5.008	C
FB	3.129	6.8.002	B
FB	3.130	6.5.003	C
FB	3.130	6.8.002	B
FB	3.131	6.5.003	C
FB	3.131	6.8.002	B

PANEL	DEVICE NO	HED	HED CATEGORY
FB FB	3.132 3.132	6.5.003 6.8.002	C B
FB FB	3.133 3.133	6.5.003 6.8.002	C B
FB FB	3.134 3.134	6.5.003 6.8.002	C B
FB FB	3.135 3.135	6.5.003 6.8.002	C B
FB FB	3.136 3.136	6.5.003 6.8.002	C B
FB FB	3.137 3.137	6.5.003 6.8.002	C B
FC	4.019	None	D
FC	4.030	6.5.009	с
FC	4.036	6.6.018	c
FC	4.037	6.6.018	. <b>C</b>
FC	4.054	6.4.006	С
FC	4.055	6.4.006	C
FC	4.056	6.4.006	С
FC	4.057	6.4.006	С
FC	4.062	6.5.003	C

1.2

PANEL	DEVICE NO	HED	HED CATEGORY
FC	4.063	6.8.004	С
FC	4.502	6.1.006	С
FC	4.503	6.1.006	С
FC	4.504	6.1.006	С
FC	4.505	6.1.006	C
FC FC FC	4.506 4.506 4.506	6.1.006 6.5.003 6.5.005	C C C
FC FC	4.507 4.507	6.1.006 6.5.005	C C
FC FC FC	4.508 4.508 4.508	6.1.006 6.5.004 6.5.005	C C C
FC FC FC FC	4.509 4.509 4.509 4.509	6.1.006 6.5.004 6.5.005 6.8.007	с с с
FC FC FC FC FC	4.510 4.510 4.510 4.510 4.510 4.510	6.1.006 6.5.004 6.5.005 None 6.8.007	
FC FC FC FC	4.511 4.511 4.511 4.511	6.1.006 6.5.004 6.5.005 6.8.007	с с с с
FC FC	4.512 4.512	6.1.006 6.5.004	C C

PANEL	DEVICE NO	HED	HED CATEGORY
FC	4.512	6.5.005	C
FC	4.512	6.8.007	C
FC	4.513	6.1.006	C
FC	4.513	6.5.004	C
FC	4.513	6.5.005	C
FC	4.514	6.1.006	C
FC	4.514	6.5.004	C
FC	4.514	6.5.005	C
FC	4.515	6.1.006	C
FC	4.515	6.5.004	C
FC	4.515	6.5.005	C
FC	4.515	6.8.007	C
FC FC FC FC	4.516 4.516 4.516 4.516	6.1.006 6.5.004 6.5.005 6.8.007	C C C
FD	5.002	6.1.007	C
FD	5.002	None	D
FD	5.502	6.1.006	C
FD	5.503	6.1.006	C
FD	5.508	6.5.003	C
FD	5.508	6.5.005	C
FD	5.509	6.5.005	С
FD	5.510	6.5.005	С
FD	5.518	6.5.003	C
FD	5.518	6.5.005	C
SA1	6.001	6.1.006	c
SA1	6.001	6.5.003	c

PANEL	DEVICE NO	HED	HED CATEGORY
		· · · · · · · · · · · · · · · · · · ·	
SA1 SA1	6.002 6.002	6.1.006 6.5.003	C C
SA1 SA1	6.003 6.003	6.1.006 6.5.003	C C
SA1	6.004	6.5.003	С
SA1	6.005	6.5.003	C
SA1	6.006	6.5.003	С
SA1	6.007	6.5.003	С
SA1	6.008	6.5.003	С
SA1	6.009	6.5.003	С
SA1	6.010	6.5.003	С
SA1	6.011	6.5.003	C
SA SA SA	7.001 7.001 7.001	6.5.003 6.5.005 6.8.007	C C C
SA ,	7.002	6.8.007	С
SA	7.003	6.8.007	С
SA	7.004	6.8.007	с
SA SA SA	7.005 7.005 7.005	6.5.003 6.5.005 6.8.007	C C C

PANEL	DEVICE NO	HED	HED CATEGORY
SA SA SA	7.006 7.006 7.006	6.5.003 6.5.005 6.8.007	C C C
SA	7.014	None	D
SA	7.015	None	D
SA	7.016	None	D
SA	7.017	None	D
SA	7.023	None	D
SÁ	7.024	None	D
SA	7.026	None	D
SA	7.038	6.1.005	C
SA	7.039	6.1.005	C
SA	7.040	6.1.005	C
SA	7.043	6.1.005	C
SA	7.044	6.1.005	C
SA	7.045	6.1.005	C
SA	7.046	6.1.005	C
SA	7.051	6.1.005	C

PANEL	DEVICE NO	HED	HED CATEGORY
SG	14.023	6.8.004	C
SG	14.024	6.8.004	C
SG	14.025	6.9.002	C
SG	14.026	6.9.002	C
SG	14.031	None	D
SG SG	14.032 14.032	None 6.9.002	D C
SG	14.033	6.9.002	C
SG	14.044	6.6.019	C
SG	14.045	6.6.019	C
SG	14.502	6.1.006	C
SG SG SG	14.503 14.503 14.503	6.1.006 6.5.002 6.5.005	C C C
SG	14.504	6.1.006	C
SG	14.505	6.1.006	C
SG	14.506	6.5.005	C
SH	15.001	6.1.006	C
SH SH	15.002 15.002	6.1.006 6.5.003	C C

PANEL	DEVICE NO	HED	HED CATEGORY	
· · ·				
SH	15.003	6.1.006	С	
SH	15.004	6.1.006	C	
SH	15.004	6.5.003	C	
SH	15.005	6.1.006	C	
SH	15.005	6.5.003	C	
SH	15.005	6.5.005	C	
SH	15.006	6.1.006	C	
SH	15.006	6.5.003	C	
SH	15.007	6.1.006	C	
SH	15.007	6.5.003	C	
SH	15.011	6.1.006	С	
SH	15.013	6.1.006	C	
SH	15.013	6.9.004	B	
SH	15.014	6.1.006	C	
SH	15.014	6.5.003	C	
SH	15.015	6.1.006	C	
SH	15.019	6.1.005	C	
SH	15.019	None	D	
SH	15.057	6.1.005	C	
SH	15.057	None	D	
SH	15.058	6.1.005	C	
SH	15.058	6.6.013	C	
SH	15.058	None	D	
SH	15.059	6.1.005	C	
SH	15.059	None	D	

PANEL	DEVICE NO	HED	HED CATEGORY
SH	15.060	6.1.005	C
SH	15.060	6.6.013	C
SH	15.060	None	D
SH	15.061	6.1.005	C
SH	15.061	None	D
SH	15.062	6.1.005	C
SH	15.062	6.6.013	C
SH	15.062	None	D
SH	15.063	6.1.005	C
SH	15.063	None	D
SH	15.070	None	D
SH	15.071	None	D
SH	15.073	None	D
SH	15.074	None	D
SH	15.075	None	D
SH	15.077	6.1.005	C
SH	15.077	None	D
SH	15.079	6.1.005	C
SH	15.079	None	D
SH	15.081	6.1.005	C
SH	15.081	None	D
SH	15.083	6.1.005	C
SH	15.083	None	D
SJ	16.014	6.1.006	C

PANEL	DEVICE NO	HED	HED CATEGORY
	· ·		
SJ	16.015	6.1.006	C
SJ	16.018	6.1.006	С
SJ SJ	16.022 16.022	6.1.006 6.5.003	C C
SJ	16.023	6.1.006	C.
SJ SJ SJ	16.024 16.024 16.024 16.024	6.1.006 6.5.003 6.5.005 6.9.001	C C C C
SJ	16.028	6.5.003	С
SJ SJ	16.031 16.031	6.6.007 None	C D
SJ SJ	16.032 16.032	6.6.007 None	C D
SJ SJ	16.033 16.033	6.6.007 None	C D
SJ SJ	16.034 16.034	6.6.007 None	C D
SJ SJ	16.035 16.035	6.6.007 None	C D
SJ SJ	16.036 16.036	6.6.007 None	C D
SJ	16.037	6.9.001	С
SJ	16.038	6.9.001	C

PANEL	DEVICE NO	HED	HED CATEGORY
~ = = = =			
SJ	16.039	6.9.001	С
SJ	16.041	6.9.001	C
SJ	16.042	6.9.001	С
SJ	16.043	6.9.001	С
SJ	16.044	6.9.001	C
SJ	16.045	6.9.001	c
SJ	16.047	6.1.005	С
SJ	16.048	6.1.005	С
SJ SJ	16.505 16.505	6.4.006 None	C D
SJ SJ	16.509 16.509	6.1.005 None	C D
SJ SJ	16.510 16.510	6.1.005 None	C D
SJ SJ	16.511 16.511	6.1.005 None	C D
SJ SJ	16.512 16.512	6.1.005 None	C D
SJ SJ	16.513 16.513	6.1.005 None	C D
SJ SJ	16.514 16.514	6.1.005 None	C D

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PANEL	DEVICE NO	HED	HED CATEGORY
SK	17.001	6.1.006	C
SL	18.020	None	D
SL	18.021	None	. <b>D</b>
SL	18.041	None	D
SL	18.048	6.1.005	C
SL	18.049	None	D
SL	18.055	None	D
SL SL	18.502 18.502	6.5.003 6.5.005	C C
SL	18.504	6.6.002	C
SM	19.006	6.5.003	С
SM	19.012	6.1.005	С
SM	19.039	6.1.005	C
SM	19.040	6.1.005	C
SM	19.041	6.1.005	C
SM	19.042	6.1.005	C
SM	19.043	6.1.005	C
SM	19.044	6.1.005	c

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PANEL	DEVICE NO	HED	HED CATEGORY
SM	19.502	6.1.006	С
SM SM	19.503 19.503	6.1.006 6.5.003	C C
SM SM	19.504 19.504	6.1.006 6.5.003	C C
SM	19.505	6.1.006	C
SM	19.506	6.1.006	С
SN	20.001	6.1.005	C
SN	20.002	6.5.001	A
SN	20.005	6.5.001	A
SN	20.008	6.1.005	C
SN	20.035	None	D
SN	20.036	None	. <b>D</b>
SN	20.038	6.1.005	C
SN	20.039	6.1.005	С
SN	20.040	6.1.005	C
SN	20.041	6.1.005	C
SN	20.042	6.1.005	С

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PANEL	DEVICE NO	HED	HED CATEGORY
SN	20.043	6.1.005	c
SN	20.044	6.1.005	C
SN	20.046	6.1.005	<b>C</b> ·
SN	20.047	6.1.005	С
SN	20.504	6.4.005	С
S0 S0	21.501 21.501	6.1.006 6.8.007	C C
S0 S0 S0 S0	21.502 21.502 21.502 21.502 21.502	6.4.001 6.4.003 6.4.004 6.8.007	C C C C
SO	21.503	6.5.005	C

PANEL	DEVICE NO	HED	HED CATEGORY
SF SF	13.514 13.514	6.1.006 6.5.005	C C
SF SF	13.515 13.515	6.1.006 6.5.005	C C
SF SF	13.516 13.516	6.1.006 6.5.003	C C
SF	13.517	6.1.006	С
SF	13.518	6.1.006	С
SF	13.519	6.1.006	c
SF	13.521	6.1.006	c
SF	13.522	6.1.006	с
SG	14.013	6.6.019	c
SG	14.014	6.5.003	С
SG	14.015	6.6.019	C C
SG	14.017	6.6.013	С
SG	14.018	6.6.013	С
SG	14.019	6.6.013	С
SG	14.020	6.8.004	C
SG	14.021	6.8.004	С

PANEL	DEVICE NO	HED	HED CATEGORY
	j		
SF	13.035	6.1.005	<b>C</b>
SF SF	13.036 13.036	6.1.005 6.4.006	C C
SF SF	13.037 13.037	6.1.005 6.4.006	C C
SF SF	13.502 13.502	6.1.006 6.5.003	C C
SF SF	13.503 13.503	6.1.006 6.8.010	C B
SF	13.504	6.1.006	C
SF SF	13.505 13.505	6.1.006 None	C D
SF SF SF	13.506 13.506 13.506	6.1.006 6.5.003 None	C C D
SF	13.507	6.1.006	C
SF	13.508	6.1.006	С
SF	13.509	6.1.006	c
SF	13.510	6.1.006	C
SF	13.511	6.1.006	C
SF	13.512	6.1.006	C
SF	13.513	6.1.006	C

PANEL	DEVICE NO	HED	HED CATEGORY
SF	13.009	6.5.005	C
SF	13.009	6.6.014	C
SF	13.009	6.8.007	C
SF	13.010	6.1.006	C
SF	13.010	6.6.014	C
SF	13.010	6.8.007	C
SF SF SF SF SF	13.011 13.011 13.011 13.011 13.011 13.011	6.1.006 6.5.003 6.5.005 6.6.014 6.8.007	
SF SF SF SF SF	13.012 13.012 13.012 13.012 13.012 13.012	6.1.006 6.5.003 6.5.005 6.6.014 6.8.007	С С С С С
SF	13.014	6.5.003	C
SF	13.014	6.8.007	C
SF SF SF SF	13.015 13.015 13.015 13.015 13.015	6.5.003 None 6.8.007 6.8.010	C D C B
SF	13.016	6.5.003	C
SF	13.016	6.8.007	C
SF	13.017	6.5.003	C
SF	13.017	6.8.007	C
SF	13.018	6.5.003	C
SF	13.018	6.8.007	C
SF	13.019	6.5.003	C
SF	13.019	6.8.007	C
SF	13.032	6.8.010	В

PANEL	DEVICE NO	HED	HED CATEGORY
SE	12.504	6.1.006	C
SE	12.505	6.1.006	С
SE	12.506	6.1.006	C
SE	12.507	6.1.006	С
SE	12.508	6.1.006	C .
SE	12.509	6.1.006	C
SF SF SF SF	13.004 13.004 13.004 13.004	6.1.006 6.5.005 6.6.014 6.8.007	C C C C
SF SF SF SF SF	13.005 13.005 13.005 13.005 13.005	6.1.006 6.5.003 6.5.005 6.6.014 6.8.007	С С С С С С С
SF SF SF SF SF	13.006 13.006 13.006 13.006 13.006	6.1.006 6.5.003 6.5.005 6.6.014 6.8.007	CCCC
SF SF SF	13.007 13.007 13.007	6.1.006 6.6.014 6.8.007	C C
SF SF SF SF SF	13.008 13.008 13.008 13.008 13.008	6.1.006 6.5.003 6.5.005 6.6.014 6.8.007	с с с с
SF SF	13.009 13.009	6.1.006 6.5.003	C C

PANEL	DEVICE NO	HED	HED CATEGORY
SD	11.013	6.1.006	C
SD	11.016	6.1.006	С
SD SD SD	11.019 11.019 11.019	6.1.006 6.5.003 6.8.004	C C C
SD	. 11.022	6.1.006	С
SD	11.041	6.5.003	C
SD	11.042	6.5.003	, <b>C</b> ,
SD	11.043	6.1.006	С
SD	11.044	6.8.004	C
SE	12.008	6.8.007	С
SE SE	12.020 12.020	6.8.004 6.8.007	C C
SE SE	12.032 12.032	6.1.006 6.8.007	C C
SE	12.047	6.5.003	С
SE SE	12.052 12.052	None None	D D
SE	12.053	None	D
SE	12.503	6.1.006	с

PANEL	DEVICE NO	HED	HED CATEGORY
SC	10.501	None	D
SC	10.502	6.1.006	C
SC	10.503	6.1.006	C
SC SC	10.504 10.504	6.1.006 6.8.007	C C
SC SC	10.505 10.505	6.1.006 6.8.007	C C
SC SC	10.506 10.506	6.1.006 6.8.007	C C
SC	10.508	None	D
SC	10.509	None	D
SC	10.510	None	D
SC	10.511	None	D
SC	10.512	None	D
SC	10.513	6.1.005	С
SD SD	11.001 11.001	6.1.006 6.5.003	C C
SD	11.004	6.1.006	C
SD	11.007	6.1.006	C
SD	11.010	6.1.006	C

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PANEL	DEVICE NO	HED	HED CATEGORY
SC	10.054	6.1.005	C
SC	10.055	6.1.005	C
SC	10.055	6.4.006	C
SC	10.056	6.1.005	C
SC	10.056	6.4.006	C
SC	10.059	6.1.005	C
SC	10.059	6.4.006	C
SC	10.061	6.1.005	C
SC	10.061	6.4.006	C
SC	10.063	6.1.005	C
SC	10.063	6.4.006	C
SC	10.065	6.1.005	C
SC	10.065	6.4.006	C
SC	10.067	6.1.005	C
SC	10.068	6.1.005	C
SC	10.068	6.4.006	C
SC	10.070	6.1.005	C
SC	10.070	6.4.006	C
SC	10.072	6.1.005	C
SC	10.072	6.4.006	C
SC	10.074	6.1.005	C
SC	10.074	6.4.006	C
SC	10.076	6.1.005	C
SC	10.078	6.1.005	C

PANEL	DEVICE NO	HED	HED CATEGORY
			 ,
SC SC SC SC	10.024 10.024 10.024 10.024	6.5.003 6.5.008 6.8.001 6.8.007	с с с
SC SC SC SC	10.025 10.025 10.025 10.025	6.5.003 6.5.008 6.8.001 6.8.007	
SC SC SC SC	10.026 10.026 10.026 10.026	6.5.003 6.5.008 6.8.001 6.8.007	с с с
SC SC	10.038 10.038	6.1.006 6.6.013	C C
SC SC	10.041 10.041	6.6.013 None	C D
SC	10.044	6.1.005	C
SC	10.045	6.1.005	C
SC	10.046	6.1.005	Ç
SC	10.049	6.1.005	С
SC	10.050	6.1.005	C
SC	10.051	6.1.005	` c
SC	10.052	6.1.005	c
SC SC	10.053 10.053	6.1.005 None	C D

PANEL	DEVICE NO	HED	HED CATEGORY
SC	10.001	6.1.006	C
SC	10.001	6.5.003	C
SC	10.002	6.1.006	C
SC	10.002	None	D
SC	10.006	6.1.006	C
SC	10.006	6.5.005	C
SC	10.007	6.1.006	С
SC	10.010	6.1.006	C
SC	10.010	6.5.003	C
SC	10.011	6.1.006	C
SC	10.011	6.5.003	C
SC	10.015	6.1.006	C
SC	10.015	6.8.007	C
SC	10.016	6.1.006	C
SC	10.016	6.8.007	C
SC	10.019	6.5.003	C
SC	10.019	6.8.007	C
SC	10.020	6.5.003	C
SC	10.020	6.8.007	C
SC	10.021	6.5.003	C
SC	10.021	6.8.007	C
SC	10.022	6.5.003	C
SC	10.022	6.8.007	C
SC	10.023	6.5.003	C
SC	10.023	6.5.008	C
SC	10.023	6.8.001	C
SC	10.023	6.8.007	C

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PANEL	DEVICE NO	HED	HED CATEGORY
SB2	9.061	None	D
SB2	9.062	6.1.005	C
SB2	9.501	6.3.003	C
SB2 SB2	9.502 9.502	6.1.006 6.8.007	C C
SB2 SB2 SB2	9.503 9.503 9.503	6.1.006 6.5.005 6.8.007	C C C
<b>SB2</b>	9.504	6.1.006	С
SB2	9.506	6.1.006	C
SB2 SB2 SB2	9.507 9.507 9.507	6.1.006 6.5.003 6.8.007	C C C
SB2 SB2	9.508 9.508	6.1.006 6.8.007	C C
SB2 SB2 SB2	9.509 9.509 9.509	6.1.006 None 6.8.007	C D C
SB2 SB2	9.510 9.510	6.1.006 6.5.003	C C
SB2 SB2	9.511 9.511	6.1.006 6.5.003	C C
SB2	9.513	None	D
SB2	9.516	None	D .

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PANEL	DEVICE NO	HED	HED CATEGORY
SB2 SB2 SB2 SB2	9.049 9.049 9.049	6.1.005 6.6.013 None	C C D
SB2	9.050	6.1.005	C
SB2	9.050	6.6.013	C
SB2	9.051	6.1.005	C
SB2	9.051	None	D
SB2	9.052	6.1.005	C
SB2	9.052	None	D
SB2	9.053	6.1.005	C
SB2	9.053	6.6.013	C
SB2	9.053	None	D
SB2	9.054	6.1.005	C
SB2	9.054	None	D
SB2	9.056	6.1.005	C
SB2	9.056	6.6.013	C
SB2	9.056	None	D
SB2	9.057	6.1.005	C
SB2	9.057	6.6.013	C
SB2	9.057	None	D
SB2	9.058	6.1.005	C
SB2	9.058	None	D
SB2	9.059	6.1.005	C
SB2	9.059	6.6.013	C
SB2	9.059	None	D
SB2	9.060	6.1.005	C
SB2	9.060	6.6.013	C
SB2	9.061	6.1.005	С

PANEL	DEVICE NO	HED	HED CATEGORY
SB1	8.511	6.1.006	C
SB2	9.015	6.1.005	C
SB2	9.020	6.5.003	C
SB2	9.021	6.5.001	Α
SB2	9.022	6.5.001	A
SB2	9.025	None	D
SB2	9.026	None	D
SB2	9.039	6.1.005	C
SB2	9.041	6.1.005	C
SB2	9.042	6.1.005	C
SB2	9.043	6.1.005	C
SB2	9.044	6.1.005	C
SB2	9.045	6.1.005	С
SB2 SB2 SB2	9.046 9.046 9.046	6.1.005 6.6.013 None	C C D
SB2 SB2	9.047 9.047	6.1.005 6.6.013	C C
SB2 SB2	9.048 9.048	6.1.005 None	C D

PANEL	DEVICE NO	- HED	HED CATEGORY
SB1 SB1 SB1	8.114 8.114 8.114	6.1.005 None 6.8.005	C D C
SB1 SB1 SB1	8.115 8.115 8.115	6.1.005 None 6.8.005	C D C
SB1	8.120	6.1.005	C
SB1	8.121	6.1.005	C
SB1	8.122	6.1.005	C
SB1	8.123	6.1.005	C
SB1 SB1 SB1	8.502 8.502 8.502	6.1.006 6.5.003 6.8.007	C C C
SB1 SB1 SB1 SB1 SB1	8.503 8.503 8.503 8.503 8.503	6.1.006 6.5.003 6.5.005 6.8.007	C C C C
SB1 SB1 SB1 SB1 SB1	8.504 8.504 8.504 8.504	6.1.006 6.5.003 6.5.005 6.8.007	C C C C
SB1 SB1 SB1 SB1	8 506 8 506 8 506 8 506	6.1.006 6.5.003 6.5.005 6.8.007	C C C
SB1	8.509	6.1.006	С
SB1	8.510	6.1.006	С

PANEL	DEVICE NO	HED	HED CATEGORY
SB1	8.100	6.8.008	С
SB1	8.101	6.8.003	B
SB1	8.101	6.8.008	C
SB1	8.102	6.1.005	C
SB1	8.102	6.8.003	B
SB1	8.102	6.8.008	C
SB1	8.103	6.8.003	В
SB1	8.104	6.1.005	C
SB1	8.104	6.4.006	C
SB1	8.104	None	D
SB1	8.104	None	D
SB1 SB1 SB1 SB1	8.105 8.105 8.105 8.105 8.105	6.1.005 6.4.006 None None	C C D D
SB1	8.107	6.1.005	C
SB1	8.107	6.6.002	C
SB1	8.108	6.1.005	C
SB1	8.108	6.6.002	C
SB1	8.109	6.1.005	C
SB1	8.109	6.6.002	C
SB1	8.110	6.1.005	C
SB1	8.110	6.6.002	
SB1	8.112	6.1.005	C
SB1	8.112	6.8.004	C
SB1	8.112	6.8.005	C
SB1	8.113	6.1.005	C
SB1	8.113	6.8.004	C
SB1	8.113	6.8.005	C

PANEL	DEVICE NO	HED	HED CATEGORY
SB1	8.047	6.1.005	С
SB1	8.051	None	D
SB1	8.052	None	D
SB1	8.054	None	D
SB1	8.055	None	D
SB1	8.056	None	D
SB1	8.057	None	D
SB1	8.058	None	D :
SB1	8.062	None	D
SB1	8.067	6.6.017	с
SB1	8.077	None	D
SB1	8.093	6.1.005	С
SB1 SB1	8.094 8.094	6.1.005 None	C D
SB1 SB1	8.095 8.095	6.1.005 None	C D
SB1	8.096	None	D
SB1 SB1	8.099 8.099	6.8.003 6.8.008	B C
SB1	8.100	6.8.003	В

PANEL	DEVICE NO	HED	HED CATEGORY
SA SA	7.503 7.503	6.5.003 6.5.005	C C
SA SA	7.504 7.504	6.5.003 6.5.005	C C
SA	7.507	6.5.005	C
SA SA	7.508 7.508	6.5.003 6.5.005	C C
SA	7.514	None	D
SA	7.515	6.1.006	С
SB1	8.011	None	D
SB1 SB1 SB1	8.021 8.021 8.021	6.1.006. 6.5.002 None	C C D
SB1 SB1	8.022 8.022	6.1.006 6.5.002	C C
SB1	8.028	6.1.005	C
SB1 SB1	8.029 8.029	6.1.005 None	C D
SB1	8.030	None	D
SB1	8.031	None	D
SB1	8.032	None	. D
SB1	8.037	None	D