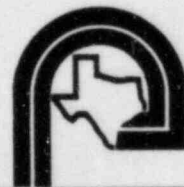


Revision 0
March 19, 1984

Control Room Design Review

Control Room Survey Validation Report

The South Texas Project



HOUSTON LIGHTING & POWER COMPANY

B404180210 B40412
PDR ADOCK 0500049B
A PDR



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

CONTROL ROOM SURVEY VALIDATION

TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
	TABLE OF CONTENTS	i
	APPENDICES	i
	PREFACE	ii
1.0	<u>INTRODUCTION</u>	1-1
2.0	<u>METHODOLOGY</u>	2-1
3.0	<u>CONCLUSIONS</u>	3-1

APPENDICES

<u>SECTION</u>	<u>TITLE</u>
A	Category A HEDs Dispositions
B	Category B HEDs Dispositions



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

PREFACE

The control room design review (CRDR) of the South Texas Project (STP) Nuclear Generating Station was started in September 1982. This review is being performed by Torrey Pines Technology for Houston Lighting & Power Company (HL&P) with Bechtel Energy Corporation (Bechtel) acting as agent.

Prior to completion of the CRDR, a decision was made by HL&P to redesign six of the ten main control panels. This redesign effort was required to accommodate design changes resulting from plant design evolution and Reg. Guide 1.97 requirements. Human engineering discrepancies determined in the CRDR have been or are in the process of correction.

The CRDR is described in the Program Plan document. It contains a detailed description of the plans for the majors task elements. Due to the control room redesign effort, a modified approach was required to complete and document the CRDR program. The following changes have been made in the CRDR Program Plan:

- A. The documentation program described in the Program Plan was changed to allow reporting of results on the individual CRDR tasks.
- B. An Implementation Plan Report, was written to describe the background and reasons for the redesign effort. It outlines the approach to be used for implementing panel layout changes.
- C. The tasks described in the Program Plan have been completed for the original design. The SFTA and the control room survey have been updated to validate any design revisions.



The following is a description of the documents covering this CRDR (see figure P-1):

- A. Program Plan - Defines the plan for performing the CRDR.
- B. Criteria Report - Provides the detailed guidelines and basis for the CRDR and describes the interface between the control room and plant systems.
- C. Operating Experience Review (OER) Report - Describes the review process results, conclusions and recommendations of the operating experience review (OER) task defined in the Program Plan.
- D. System Function and Task Analysis (SFTA) Report - Describes the methodology, results, conclusions and recommendations for the SFTA effort defined in the Program Plan.
- E. Control Room Survey (CRS) Report - Describes the review process, results, conclusions and recommendations of the control room survey task defined in the Program Plan. This report also includes the final results and dispositions for the human factor observations obtained from the OER and the SFTA.
- F. Annunciator Report - Describes the review process, results, conclusions and recommendation of the annunciator review task defined in the Program Plan.
- G. Special Studies Report - Describes details of miscellaneous studies performed as part of the CRDR. This includes the anthropometric study, the hierarchical labeling study and the demarcation study.



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

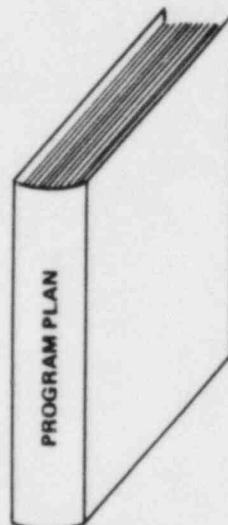
- H. Implementation Plan Report - Summarizes the CRDR, the control room design changes, and the proposed methods of implementing the design changes.
- I. SFTA Validation Report - Summarizes the second SFTA review based on relayed out panels and walk-through/talk-through validation.
- J. OER Validation Report - Summarizes the review made by operators to determine if the redesigned panels corrected concerns reported in the OER Report and if any new problems were created.
- K. CRS Validation Report - Summarizes the review made to determine if the category A and representative samples of the Category B HEDS are satisfactorily corrected and if any new problems were created.
- L. Executive Summary - Summarizes the CRDR, results, conclusions and recommendations. Technical details are in the Operating Experience Review Report, the System Function and Task Analysis Report, the Control Room Survey Report, the Special Studies Report, and the Annunciator Report.



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

PLANNING



REVIEW & DESIGN SUPPORT



ASSESSMENT IMPLEMENTATION EFFECTIVENESS



STP CRDR MAJOR REPORTS

Figure P-1



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

1.0 INTRODUCTION

At the time of the May 1983 NRC audit of the new layout of the STP control room panels, the "Control Room Survey Report" was not yet completed. However, a compilation of all HEOs/HEDs was furnished to the NRC to facilitate their review.

At this audit, a plan was reviewed for validating that the corrective measures taken for category "A" and "B" HEDs corrected the discrepancies and did not create new discrepancies. Category "A" HEDs are those HEDs that could have safety consequences and are considered mandatory. Category "B" HEDs are those that could enhance availability and are high priority improvements. Houston Lighting & Power committed to review all Category "A" HEDs and five representative Category "B" HEDs from each of the NUREG 0700 Section 6 review topics. This validation report presents the results of that review.



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

2.0 METHODOLOGY

All 90 selected HEDs were reviewed by a Human Factors Specialist, who compared each stated discrepancy on the half-scale mosaic with the revised panel layout, to validate that the discrepancy was resolved and that the corrective measure did not create any new problem. During this process the systems engineer was consulted as required. The results were recorded on a form.



3.0 CONCLUSIONS

3.1 Category "A" HEDs

The following Category "A" HEDs were resolved by the revised panel layouts as detailed in Main Control Panels - Equipment Layout Drawings 5-Z34-1-Z44501 through 9-Z34-1-Z44508. Appendix A contains the data for the resolution of Category "A" HEDs.

Work Space	- HED -875
Annunciator	- HEDs -510, -511, -517, -518, -526, -530, -549, -566, -567, -774
Visual Displays	- HEDs -75, -367, -484, -679, -725, -726, -727, -731, -732, -748, -749, -750, -767, -768
Labels	- HED -54
Panel Layout	- HEDs -568, -569, -577, -604, -570, -578, -605, -572, -573, -598, -593, -574, -599, -575, -576, -600, -594, -603
Control/Display Integration	-HEDs -68, -322, -498

Two of these HEDs, sheet number 322 and 498, for panels 001 and 002, are listed in the computer printout as Category B, but are discussed with the corresponding HED, sheet number 68, for control panel 003, which is Category A.



Three Category A HEDs remain to be resolved. These are; sheet number 367 which addresses the color green Rototellite indicator lights which cannot be distinguished when lit; sheet number 726 which identifies the bypass and inoperable status light legends as being unreadable due to narrow stroke width and inadequate character separation and line spacing; and sheet number 727 which states that legend messages contain more than three lines of text.

The HED (sheet number 376) concerning the scaling on the paper for recorder XR 6008 has not been resolved. The HED (sheet number 6) concerning the lack of meter zone markings has been resolved through a recommended technique that will be applied on a case-by-case basis in the field. All other Category "B" HEDs have been resolved, and no new observations created.

3.2 CATEGORY "B" HEDs

The following category "B" HEDs were reviewed by the process noted in section 2.1. Appendix B contains the data for the resolution of Category "B" HEDs.

Workspace	- HEDs -109, -111, -113, -118, -110, -112, -114, -122
Communications	- Activity Deferred
Annunciator	- HEDs -514, -520, -525, -527, -528
Controls	- HEDs -354, -460, -461, -703, -712
Visual Displays	- HEDs -006, -335, -371, -376, -376, -486
Labels	- HEDs -013, -019, -584, -591, -619



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

Process Computers - There are no Category "B" HEDs

Panel Layouts - HEDs -003, -412, -413, -571, -797

Control/Display Integration - HEDs -001, -065, -494, -495, -503



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

APPENDIX A

CATEGORY A HEDs DISPOSITIONS



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Workspace

HED CATEGORY A

SHEET NUMBER REFERENCE PARAGRAPH	OBSERVATION OR CRITERIA TITLE	DISPOSITION
S-875 P-6.1.1.1	1. Need AFW Flow Indication related to flow controller 2. Need ECW pump disch. flow indication	1. AFW flow controller was relocated on panel 006 near indicator 2. ECW Flow Data was included in data base for display on QDPS plasma display

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Annunciator

HED CATEGORY A

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-510 P-6.2.2.1	System specification provides for only one D.C. buzzer.	Five horns will be installed in the control room.
S-511 P-6.3.3.4	Specific problems or deviation are not given in some tiles.	The annunciator study group reviewed each window engraving and modified them considering this problem. See annunciator report.
S-517 P-6.3.1.4	Annunciator windows lack color engraving.	The annunciator system design was changed to include three window colors to display priorities.
S-518 P-6.3.1.3	System specification does not include "First-Out" Annunciation.	The annunciator system design was changed to include "First-Out" annunciation of all reactor and turbine trips.
S-526 P-8.5.1.1	Annunciators are not functionally grouped, not logical, and not consistent.	The annunciator study group rearranged each window box to correct this problem. See annunciator report.

Note: Reference

P₁ is NUREG-0700 Section 6 number

P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

HF AREA Annunciator

HED CATEGORY A

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-530 P ₁ None P ₂ - 8.5.1.2	ESF status lights difficult to read.	All status light boxes were placed significantly lower on the panels and the window messages were reduced from four lines to three lines.
S-549 P ₁ - 6.3.3.3	Window boxes have 96 windows which exceeds the maximum of 50 criteria.	The annunciator system design was changed to limit size of window box to 48 windows. The window size was increased by 60%
S-566 P ₁ - 6.3.3.4	Tile messages are not clear.	The annunciator study group developed new text for each window that is unambiguous and addresses alert conditions.
S-567 P ₁ - 6.3.3.4	Annunciator and status window engravings are inconsistent.	The annunciator study group considered this problem in their detailed review and incorporated criteria report abbreviations in the totally revised annunciator and status engravings.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Annunciator

HED CATEGORY A

SHEET NUMBER REFERENCE PARAGRAPH	OBSERVATION OR CRITERIA TITLE	DISPOSITION
S-774 P ₁ - 6.3.3.5	Letter height are not adequate; tiles cannot be read from controls position.	The annunciator specified lettering height was changed from 0.1875 to 0.269 which provides a subtended angle of 15 minutes.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Visual Displays

HED CATEGORY A

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-367 P ₁ - 6.5.3.1 & S-484 S-679 S-725 S-748	Rototellite green light color is not distinguishable.	Design implementation
S-726 P ₁ - 6.5.3.3 & S-732 S-749 S-767	Bypass inoperable status lights are not readable due to narrow stroke width, character separation and line spacing.	Design implementation
S-727 P ₁ - 6.5.3.3 & S-731 S-750 S-768	Legend messages contain more than three lines of text.	Design implementation

Note: Reference

P₁ is NUREG-0700 Section 6 number

P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Visual Displays (Continued) HED CATEGORY A

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-0075 P ₁ - 6.5.1.6	Two indicating lights do not follow control room color conventions.	A check of the control schematic for the generator ground detector shows that the colors are correct for the applications.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Labels

HED CATEGORY A

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-054 P ₁ - 6.6.1.2	Some components are unlabeled. CP-002	All components are now labeled as part of the labeling study.

Note: Reference P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Panel Layout

HED CATEGORY A

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-568 P ₁ - 6.8.8.1 & S-576 S-603	Excess travel is required for ESF operational tasks among panels 001, 002 & 003.	The ESF systems have been relayed out to minimize travel among panels 001, 002, & 003 for operational tasks.
S-569 P ₁ - 6.8.8.1	Related ESF displays and controls are spread over three separate panels (001, 002 & 003).	These displays and controls have been relocated on panel 001, consistent with the SFTA evaluation.
S-577 P ₁ - 6.8.8.1	Related ESF displays and controls are spread over three separate panels (001, 002 & 003).	These displays and controls have been relocated on panel 002 consistent with the SFTA evaluation.
S-604 P ₁ - 6.8.8.1	Related ESF displays and controls are spread over three separate panels (001, 002 & 003).	These displays and controls have been relocated on panel 003 consistent with the SFTA evaluation.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

HF AREA Panel Layout

HED CATEGORY A

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-570 P ₁ - 6.8.8.1	Controls and displays are not grouped by importance and frequency of use. CP-001	Panel CP-001 has been redesigned to group controls and displays by importance and frequency of use.
S-578 P ₁ - 6.8.8.1	Controls and displays are not grouped by importance and frequency of use. CP-002	Panel CP-002 has been redesigned to group controls and displays by importance and frequency of use.
S-605 P ₁ - 6.8.8.1	Controls and displays are not grouped by importance and frequency of use. CP-003	Panel CP-003 has been redesigned to group controls and displays by importance and frequency of use.
S-572 P ₁ - 6.8.8.1	AFW related controls and displays for AFW pumps are widely separated.	The AFW related controls and displays for AFW pumps have been relayed out to accommodate operational task sequences.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Panel Layout

HED CATEGORY A

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-573 P ₁ - 6.8.2.3	Identical groups of sub-system displays are not arranged consistently from panel to panel.	Panel CP-001 has been relayed out with consistent sub-system grouping.
S-598 P ₁ - 6.8.8.1	Same as S-573.	Panel CP-002 has been relayed out with consistent sub-system grouping.
S-593	Same as 573.	Panel CP-003 has been relayed out with consistent sub-system grouping.
S-574 P ₁ - 6.8.2.4	Arrangement and location of controls and displays are not maintained from panel to panel. CP-001	Panel CP-001 has been redesigned and controls and displays repositioned for standardization from panel to panel.
S-599 P ₁ - 6.8.2.4	Arrangement and location of controls and displays are not maintained from panel to panel (MSIV; PURGE, VENT & H2). CP-002	Panel CP-002 has been redesigned and controls and displays repositioned standardization from panel to panel.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM
DESIGN REVIEW

HF AREA Panel Layout

HED CATEGORY A

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-575 P ₁ - 6.8.3.1	Separation between adjacent switches is less than minimum allowed. CP-001	Panel relay out work corrected problem.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Panel Layout

HED CATEGORY A

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-600 P ₁ - 6.8.3.1	Separation between adjacent switches is less than minimum allowed. CP-002	Panel relay out work corrected problem. There are a few switches on on CP-002 that still do not meet criteria. A review of their switch position versus function indicates there is no problem with switch handle interference or accidental actuation. The following switches are cited: Traveling SCR N - Start/Stop SCR N Wash Pump - Start/Stop (Train's A, B, & C)
S-0594 P.6.8.3.1	Separation between adjacent switches is less than minimum allowed. CP-003	Panel relay out work corrected the problem.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

HF AREA Control/Display Integration

HED CATEGORY A

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-068 5.7.2.2	Labeling of control and associated displays do not contain the same wording. CP-003	Consistent labels for controls and displays have been provided to conform with the labeling design guide.
S-322 5.7.2.2	Labeling of controls and associated displays do not contain the same wording. CP-001	Consistent labels for controls and displays have been provided to conform with the labeling design guide.
S-498 5.7.2.2	Labeling of controls and associated displays do not contain the same wording. CP-002	Consistent labels for controls and displays have been provided to conform with the labeling design guide.

Note: Reference P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

APPENDIX B
CATEGORY B HEDs DISPOSITIONS
(Representative Samples)



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

HF AREA Workspace

HED CATEGORY B

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-109 P -6.1.2.2 1	Switches and pushbuttons are less than two inches from the front edge of the board CP-001	A handrail is provided to the fronts of panels CP-001 through CP-010
S-111	Ditto for CP 002	
S-113	Ditto for CP 003	
S-118	Ditto for CP 007	
S-110 P -6.1.2.2 1	Controls are greater than 25 inches from edge of board CP-001	The controls were relocated as part of the redesign and meet the extended functional reach criteria recommended in the Anthropometry Study.
S-112	Ditto for CP-002	
S-114	Ditto for CP-003	
S-115	Ditto for CP-004	
S-116	Ditto for CP-005	
S-117	Ditto for CP-006	
S-118	Ditto for CP-007	
S-119	Ditto for CP-007	
S-120	Ditto for CP-008	
S-121	Ditto for CP-009	
S-122	Ditto for CP-010	

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

HF AREA Annunciator

HED CATEGORY B

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-514 P -6.3.4.2 1	Annunciator controls are not coded for easy recognition	The annunciator controls have been designed to include a unique demarcation color patch.
S-520 P2-8.4.9	Alarm conditions are not combined into multiple input windows	The Annunciator Study Group reviewed the total annunciator - ESF and optimized message combinations. The number of tiles was reduced from 1055 to 642. See Annunciator Report.
S-525 P2-8.5.1.1	RCP tiles on 1LB005A should be located on CP004. Condenser tiles on 1LB007 should be located on CP 008 and CP 009	The combined effect of the major panel redesign and the annunciator study have resulted in locating these tiles with their associated system equipment.
S-527 P1-6.3.3.5	Stroke-width-to-character-height ratio is not between 1:6 & 1:8 and stroke width is not consistent across all tiles	The character height was increased from 3/16" to 1/4" and the stroke width was increased to .04" providing a 1:6.25 ratio.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Annunciator

HED CATEGORY B

SHEET NUMBER REFERENCE PARAGRAPH	OBSERVATION OR CRITERIA TITLE	DISPOSITION
S-528 P1-6.3.3.5	Space between characters is not consistently one stroke width	The labeling guide which is now part of the Criteria Report specifies in Table 1-1 a character spacing equal to the letter stroke width. The labeling guidelines are being imposed on the annunciator supplier for the STP.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM
DESIGN REVIEW

HF AREA Controls

HED CATEGORY B

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-354 P -6.4.2.1 1	The auto position on fourteen rotary selector switches on panel CP 008 are on the left position	These switches were changed to open/ auto/close.
S-460 P -6.4.1.1 1	Eight selector switches are not rotary selector switches on panel CP 007	These switches were changed to rotary selector switches and are now located on CP 006.
S-461 P -6.4.1.1 1	The following reset, actuation or trip switches are not pushbutton switches: 7S-0022 STM LN ISOL 7S-0023 STM LN ISOL 7S-0017 TURB. TRIP 7S-0011 STM LN ISOL ACT 7S-0012 STM LN ISOL ACT	Changed to pushbuttons: 7S-0022 and moved to CP 006 7S-0023 and moved to CP 006 7S-0017 and moved to CP 006 Not changed since there is no pushbutton capable of matching the switch development of the pistol grip switch.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

HF AREA Controls HED CATEGORY B

SHEET NUMBER REFERENCE PARAGRAPH	OBSERVATION OR CRITERIA TITLE	DISPOSITION
S-703 P1-6.4.3.3	Legend pushbuttons are not readily distinguishable from legend lights.	Special study recommended the "Close Corner Octagon" for marking the controls. Bechtel Engineering will implement this recommendation.
S-712	Twenty-seven switches used for pump or fan operations or for breaker control are rotary selector type switches instead of J-handled switches.	These switches have been changed to J-handled switches. A few of these switches were eliminated.

Note: Reference P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Visual Displays HED CATEGORY B

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-006 P1-6.5.2.3	Meter zone markings are not used to denote operational implications	Meter zone marking technique recommended as part of special studies will be used to mark meters in the field on a plant evaluated need basis. See special studies report for meter marking technique.
S-335	The following meter scales on CP 009 are not graduated in 1's, 2's, 5's or 10's. PI - 8509 STA AIR PRESS PI - 8563 INST OUT. AIR PRESS INST AIR DRYER XI - 8225 WIND DIRECTION LI - 6670 RESERVOIR LEVEL	Meters markings specified to comply. Meter marking specified as follows: Major div. 25 minor div. 5 Major div. 25 minor div. 5 Major div. _ minor div. _ (later) Major div. 10 minor div. 1
S-371	Space between lines of text on legend lights/pushbuttons is not one-half the character height. N1-0002M Reheat Temp. Cont. CP 008	Recommended text for each legend light/pushbutton is included as a part of special studies

Note: Reference P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Visual Displays

HED CATEGORY B

SHEET NUMBER REFERENCE PARAGRAPH	OBSERVATION OR CRITERIA TITLE	DISPOSITION
S-376 P -6.5.4.1 1	Scale on recording Paper is not the same as the scales on the recorder XR 6008	Paper will be purchased with scales to match the recorder scales.
S-486 P -6.5.3.3 1	Standard abbreviation is not used on legend lights. Drain should be DRN	The labeling study reviewed the messages of all labels in relation to the addition of hierarchial labels. The instructions to the panel fabricator show this item to be corrected per the iterative human factor's/operator review process to optimize labeling.

Note: Reference

P₁ is NUREG-0700 Section 6 number

P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Labels

HED CATEGORY B

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-013 P1-6.6.1.2	No hierarchial labeling scheme is provided.	An extensive study corrected this HED. See labeling report in Special Studies Report.
S-019 P1-6.6.3.2	Standard abbreviations are not used for the following words: Temperature, pressure. T1 - 8227 P1 - 8509 P1 - 6059	General problem corrected as above These meters have been deleted through design evolution.
S-584 P1-6.6.4.1	One hundred and seventy three labels on CP003 use 0.125 inch letter which allows a viewing distance of only 21 inches	The label study changed the letter height to 0.14 inches which increases the viewing distance (35 inches).
S-591 P1-6.6.4.1	Stroke - width-to-character height ratio is not between 1:6 and 1:8 on the service engravings and engraving is inconsistent.	This general problem was resolved by the results and implementation of the labeling study results.

Note: Reference

P₁ is NUREG-0700 Section 6 number

P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Labels

HED CATEGORY B

SHEET NUMBER REFERENCE PARAGRAPH	OBSERVATION OR CRITERIA TITLE	DISPOSITION
S-619 P1-6.6.4.1	Space between characters on the service engraving is not at least one stroke width.	The labeling guide which is now part of the Criteria Report specifies in Table 1-1 a spacing equal to the lettering width.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Panel Layouts HED CATEGORY B

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-003 P -6.8.3.2 1	More than five similar components are in an unbroken row on CP 004	CP004 has been totally redesigned with extensive use of mimics. The problem no longer exists.
S-412 P -6.8.8.1 1	Steam Dump Selector Switches are separated from the Steam Dump Controllers.	A review of the rearranged Steam Dump Subsystem shows this problem is corrected.
S-413 P -6.8.1.3 1	Enhancement techniques are not used to separate turbine controls from main steam control.	A major panel redesign resulted in excellent separation (on two separate panels), each demarcated and hierarchial labeled.
S-571	The controls and displays at the system level are not arranged according to frequency of use or importance CP-006.	CP 006 has been rearranged and this problem no longer exists.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Panel Layouts

HED CATEGORY B

SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-797 P -6.8.2.1 1	<ol style="list-style-type: none">1. PORV's & related block valves are not arranged in left to right configuration. (PCV-0655A, 0656A, RC-0001A, RC-0001B.)2. Pressurizer heaters not arranged in L-T-R or T-T-B order of use.3. Pressurizer spray and pressurizer controls are not in a L-T-R or T-T-B order of use (PK 0655A, B, C)4. PRT valves are not arranged in a L-T-R or T-T-B order of use. (FV 3653, 3652, 3650, 3651, LV 3655.)	The major panels redesign has corrected these observations.

Note: Reference

P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Control/Display
Integration HED CATEGORY B

SHEET NUMBER REFERENCE PARAGRAPH	OBSERVATION OR CRITERIA TITLE	DISPOSITION
S-001 P1-6.9.2.2	Corresponding controls and displays do not occupy the same relative position (switches - 0010S, -0009S, - 0012S, - 0011S, meters FI-0530, FI-0531, FI-0540 and FI-0541, CP-006.)	These devices have been rearranged and integrated. The switch transmitter position is now directly below the indicator (new switch type).
S-065 P1-6.9.1.1	Displays separated by a non-related display. (P1-0830, L1-0832A) CP-003.	These devices have been rearranged and integrated. They are now located on CP 002.
S-494 P1-6.9.1.1	Related controls are not grouped (switches - 0040, 0052 and 0050). Labels do not identify control & display the same (letdown HX, etc., PI-0135, Proc. Controller 0006 & switch 0001). CP-004.	These devices have been rearranged in mimic format.

Note: Reference P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number



HOUSTON
LIGHTING
&
POWER CO.

**CONTROL ROOM
DESIGN REVIEW**

HF AREA Control/Display
Integration HED CATEGORY B

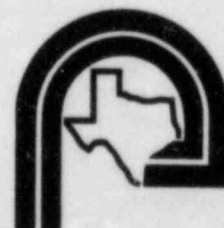
SHEET NUMBER	OBSERVATION OR CRITERIA TITLE	DISPOSITION
REFERENCE PARAGRAPH		
S-0495 P1-6.9.1.1	The following displays are not directly above their associ- ated controls T1-9732 P1-0862 TR-0875 L1-0952 CP-002	These devices have been rearranged and are now located in close proxi- mity to their associated controls with each subsystem. These are further enhanced by color demarcation patches and hierarchial labels.
S-503 P1-6.9.1.1	Six displays are located above eye level T1-0451 T1-0461 T1-0471 T1-0452 T1-04762 T1-0472 TR-0612 CP-005	The meters were integrated with the QDPS. All parameters are still available and located in the prime eye level area of the panels. The recorder is at eye level.

Note: Reference P₁ is NUREG-0700 Section 6 number
P₂ is STP criteria report number

Control Room Design Review

Program Plan

The South Texas Project



HOUSTON LIGHTING & POWER COMPANY