

Addendum 5

Control Room Design Review

Executive Summary

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HOUSTON LIGHTING & POWER COMPANY



EXECUTIVE SUMMARY

REVISION LOG

Revision No.	Date	Description	Pages Affected
0	01/30/84	Initial Issue	
Addendum No. 1	04/15/85	Provided Current Schedule Section 5.0	5-1,2,3
Addendum No. 2	12/22/86	Addendum Describing Results of Activities Between 04/15/85 and 12/22/86	N/A
Addendum No. 3	11/23/87	Addendum Describing Results of Activities Between 12/22/86 and 11/23/87	N/A
Addendum No. 4	09/30/88	Addendum Describing Results of Activities Between 11/23/87 and 09/30/88	N/A
Addendum No. 5	12/01/89	Addendum Describing Results of Activities Between 09/30/88 and 12/01/89	N/A



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

EXECUTIVE SUMMARY

ADDENDUM 5 }

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
	REVISION LOG	i
	TABLE OF CONTENTS	ii
	LIST OF TABLES	iii
	LIST OF FIGURES	iv
	ACRONYMS AND ABBREVIATIONS	v
	SUMMARY	vi
	PREFACE	vii
1.0	<u>INTRODUCTION</u>	1-1
2.0	<u>METHODOLOGY AND RESULTS</u>	2-1
2.1	METHODOLOGY	2-1
2.2	RESULTS	2-2
5.0	<u>SCHEDULE</u>	5-1



EXECUTIVE SUMMARY

ADDENDUM 5

TABLE OF CONTENTS

LIST OF TABLES

<u>Table</u>	<u>Title</u>	<u>Page</u>
2-1	SUMMARY OF STATUS: CONTROL ROOM PLANNED ACTIVITY EVALUATIONS	2-4
2-2	SUMMARY OF STATUS: ASP ROOM PLANNED ACTIVITY EVALUATIONS	2-5
2-3	NEW HEDs	2-6
2-4	DEFERRED CRITERIA ITEMS: CONTROL ROOM - WORKSPACE	2-7
2-5	DEFERRED CRITERIA ITEMS: CONTROL ROOM - COMMUNICATIONS	2-8
2-6	DEFERRED CRITERIA ITEMS: CONTROL ROOM - VISUAL DISPLAYS	2-9
2-7	DEFERRED CRITERIA ITEMS: CONTROL ROOM - COMPUTERS	2-10
2-8	PREVIOUSLY CATEGORIZED DEFERRED ITEMS - VISUAL DISPLAYS	2-11
2-9	DEFERRED CRITERIA ITEMS: ASP ROOM - WORKSPACE	2-12
2-10	DEFERRED CRITERIA ITEMS: ASP ROOM - COMMUNICATIONS	2-13
2-11	DEFERRED CRITERIA ITEMS: ASP ROOM - VISUAL DISPLAYS	2-14
2-12	DEFERRED CRITERIA ITEMS: ASP ROOM - COMPUTERS	2-15



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

EXECUTIVE SUMMARY

ADDENDUM 5

TABLE OF CONTENTS

LIST OF FIGURES

<u>Figure</u>	<u>Title</u>
P-1	STP CRDR MAJOR REPORTS
2-1	REFERENCE/COMMENT FORM
2-2	HEO ASSESSMENT FORM
2-3	HED ASSESSMENT FACTOR CRITERIA



HOUSTON
LIGHTING
&
POWER CO.

CONTROL ROOM DESIGN REVIEW

EXECUTIVE SUMMARY

ADDENDUM 5

ACRONYMS AND ABBREVIATIONS

ASP	Auxiliary Shutdown Panel
CRDR	Control Room Design Review
CRS	Control Room Survey
EOP	Emergency Operating Procedure(s)
ERFDADS	Emergency Response Facilities Data Acquisition and Display System
ESF	Engineered Safety Features
HED	Human Engineering Discrepancy
HEO	Human Engineering Observation
HL&P	Houston Lighting & Power Company
NRC	Nuclear Regulatory Commission
OER	Operating Experience Review
SFTA	System Function & Task Analysis
STP	South Texas Project



EXECUTIVE SUMMARY

ADDENDUM 5

SUMMARY

This addendum summarizes the results of the South Texas Project (STP) Control Room Design Review (CRDR) activities since issuance of Addendum 4 (dated September 30, 1988) to the Executive Summary.

The activities during this time period have been the following:

- A. Evaluations against Category E deferred criteria for the control rooms and auxiliary shutdown panel rooms of Unit 1 and Unit 2
- B. Extensive review, problem identification and problem resolution by the Annunciator Task Force
- C. Computer display reviews for the Safety Parameter Display System
- D. Miscellaneous CRDR human factors work, including review of HED resolutions and implementation, and categorization of new human engineering observations

This addendum summarizes the methodology and results of these efforts and provides an updated schedule for completion of the remaining STP CRDR activities.

As this report is an addendum to the Executive Summary, section numbers of this addendum correspond generally to the section numbers used in the Executive Summary. This addendum also uses the same format as Addenda 1 through 4.



EXECUTIVE SUMMARY

ADDENDUM 5

PREFACE

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

The program plan was presented to the NRC at the STP main control panel mock-up in October 1982. The basic review work for operator experience review, system function and task analysis, and control room survey was completed in October 1982. In November 1982 the Management Team put a hold on CRDR activities, and authorized a design study to address mounting evolutionary engineering changes and correct discrepancies with the NUREG-0700 guidelines.

In November 1982 a decision was made by HL&P to completely relayout six main control panels and upgrade the remaining four based on the design study. This redesign effort was required to accommodate design changes resulting from plant design evolution and Regulatory Guide 1.97 requirements and to correct discrepancies with NUREG-0700. In December 1982 the Management Team selected one of five alternatives studied for design implementation.

The mock-up was revised considering the 441 identified HEDs and evolutionary engineering changes. As the Bechtel layout engineers advanced the layouts of the ten panels, Torrey Pines Technology engineers reviewed the rework for correction of known discrepancies and compliance with good human factors principles. The redesign effort on the main control panels was completed in April 1983. The NRC performed an in-progress audit in May 1983 after which the panel vendor was provided with firm layout drawings.



EXECUTIVE SUMMARY

ADDENDUM 5

The NRC audit comments required the addition of several special studies to those already in progress, e.g., demarcation and hierarchical labeling. The most significant addition, the evaluation of specified parameters, resulted in a net reduction of 51 panel meters. The extensive relay layout required a repeat of the system function and task analysis with verification and walk-through/talk-through validation. Likewise, a specially structured control room review and human factors review of the corrective measures for all Category A and representative Category B discrepancies were performed. The demarcation and hierarchical labeling studies resulted in continued upgrading of the mock-up. The completion of the panel relay layout allowed the design of the annunciator system consistent with the relocations of many systems and subsystems, and a reduction of active windows from 1055 to 642.

Following the completion of these major efforts, HLP has continued the CRDR program, including resolution of human engineering deficiencies identified, using Bechtel and Torrey Pines Technology as required.

The documentation for this program was necessarily extensive in view of its design development nature. Documentation describing the work performed during the CRDR is summarized below and in Figure P-1:

1. Program Plan - Defines the initial plan for performing the CRDR during the plant's construction phase.
2. Criteria Report - Provides the detailed guidelines and basis for the CRDR and describes the interface between the control room and plant systems. This report also includes review procedures, plant conventions, and human factors data developed during the CRDR that will facilitate future control room modifications.



EXECUTIVE SUMMARY

ADDENDUM 5

3. Operating Experience Review (OER) Report - Describes the operations personnel review process, results, conclusions, and recommendations of this task defined in the Program Plan.
4. System Function and Task Analysis (SFTA) Report - Describes the methodology, results, conclusions, and recommendations for this SFTA effort defined in the Program Plan.
5. Control Room Survey (CRS) Report - Describes the review process, results, conclusions, and recommendations of this task defined in the Program Plan. This report also includes the final results and dispositions for the human factors observations obtained from the OER and the SFTA.
6. Annunciator Report - Describes the review process, results, conclusions, and recommendations of the annunciator review task defined in the Program Plan and the annunciator study guide.
7. Special Studies Report - Describes details of miscellaneous studies performed as part of the CRDR. This includes the anthropometric study, the hierarchical labeling study, the demarcation study, evaluation of specified parameters, and many minor studies to resolve NRC audit comments.
8. Implementation Plan Report - Summarizes the control panel design changes resulting from the implementation of Regulatory Guide 1.97 requirements, engineering design requirements, and preliminary observations of the CRDR design review team. It describes the reasons for major changes to the control panel layouts.



EXECUTIVE SUMMARY

ADDENDUM 5

9. SFTA Validation Report - Summarizes the second review required because of the extensive revisions made to the control panel layouts and also includes walk-through/talk-through exercises performed in the mock-up area.
10. OER Validation Report - Summarizes the review made by operators to determine if the redesigned panels corrected reported operator concerns and evaluate if any new problems were created as a result of the corrective measures taken.
11. GRS Validation Report - Summarizes the review made to determine if the Category A and representative samples of the Category B HEDs were satisfactorily corrected and if any new problems were created.
12. Executive Summary - Summarizes the CRDR results, conclusions, recommendations, and schedules for remaining work. Technical details are in the Operating Experience Review Report, the System Function and Task Analysis Report, the Annunciator Report, the Control Room Survey Report, the Special Studies Report, the Implementation Plan Report, and various validation reports.
13. Human Engineering Discrepancy Resolution Report - Summarizes all Category A, B, C, and D HED resolutions (as of January 1, 1986).
14. Executive Summary Addenda - Summarize the results and remaining work schedules of the CRDR program following the submittal of the Executive Summary Report. Addendum 1 showed progress as of April 15, 1985; Addendum 2 as of December 22, 1986; Addendum 3 as of



EXECUTIVE SUMMARY

ADDENDUM 5

November 23, 1987; and Addendum 4 as of September 30, 1988.
Addendum 5 shows progress as of December 1, 1989.

15. Emergency Operating Procedures (EOP) Validation Report -
Summarizes the validation process used for the Emergency Operating Procedures and the results as they involve the control panels. This validation was conducted at the STP simulator during May 1986 using the draft EOPs.

16. Human Engineering Discrepancy Resolution Report Addenda -
Summarize resolutions for Category A, B, C, and D HEDs identified after January 1, 1986. Addendum 1 summarized the HED resolutions as of December 22, 1986; Addendum 2 as of November 23, 1987; and Addendum 3 as of September 30, 1988. Addendum 4 summarizes the HED resolutions as of December 1, 1989. For clarity, each addendum shows resolutions for HEDs identified after January 1, 1986, thus superseding the previous addendum in its entirety.

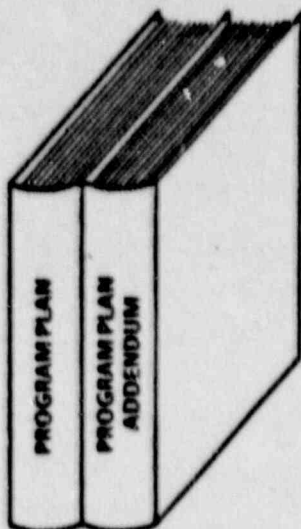
17. Program Plan Addendum - Identifies the STP CRDR Program Plan effective for the plant's operational phase.



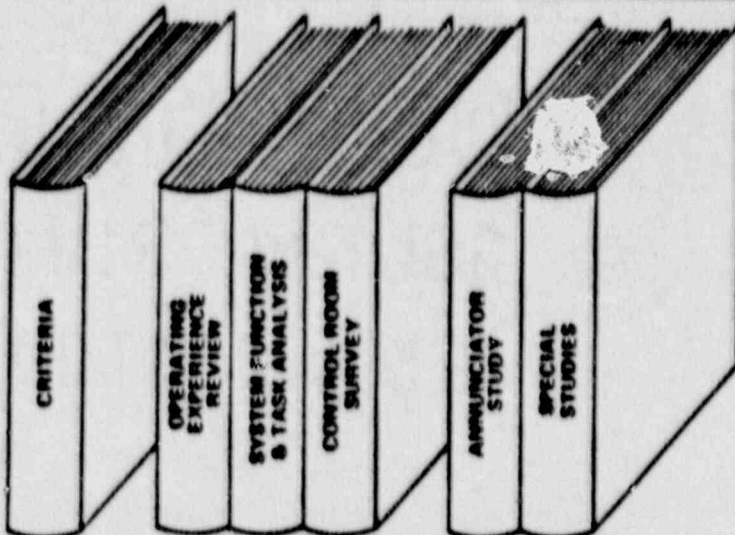
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CONTROL ROOM DESIGN REVIEW

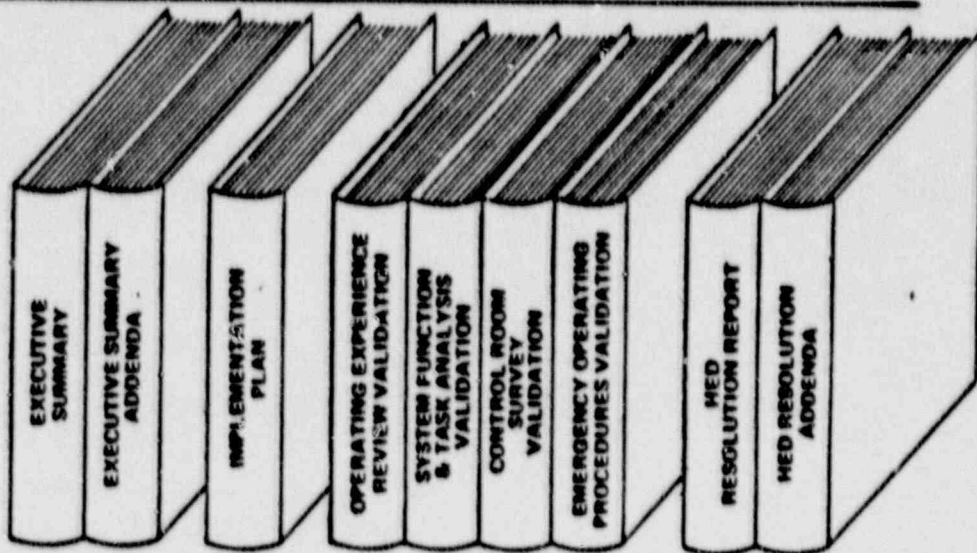
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ASSESSMENT IMPLEMENTATION EFFECTIVENESS



STP CRDR MAJOR REPORTS
Figure P-1



EXECUTIVE SUMMARY

ADDENDUM 5 }

1.0 INTRODUCTION

This addendum reports the results of activities performed towards the completion of the CRDR of the South Texas Project since Executive Summary Addendum 4, dated September 30, 1988.

Since September 1988, activities related to CRDR on Unit 1 have been the following:

- o Evaluations against Category E deferred criteria for the control room and the auxiliary shutdown panel (ASP) room
- o Extensive review, problem identification and problem resolution by the Annunciator Task Force
- o Miscellaneous control room modifications to support resolution of HEDs and to support design changes
- o Completion of vertical meter replacement (for red pointers)

Unit 1 was declared in commercial operation during August 1988.

Since September 1988, activities related to CRDR on Unit 2 have been the following:

- o Evaluations against Category E deferred criteria for the control room and ASP room
- o Completion of meter zone coding



EXECUTIVE SUMMARY

ADDENDUM 5

- o Provision of common alarms in Unit 2 control room
- o Miscellaneous control room modifications to support resolutions of HEDs and to support design changes

Unit 2 was declared in commercial operation during June 1989.

Various human engineering observations have been evaluated and categorized, as indicated in Table 2-3 and the HED Resolution Report Addendum 4. The methodology used for the evaluations against Category E deferred criteria and for the various human engineering observations is described in Section 2.

The Annunciator Task Force effort (identified in Section 5, Item 26), regarding alarms presentation to the operator, has been continued. This effort identifies problems, studies alternatives, and resolves issues related to alarms and messages presented to the operator by the following systems:

- o Annunciator, including both annunciators and status/permissive windows
- o ESF Status Monitoring
- o Bistable Status Monitoring
- o Plant Computer
- o ERFDADS Computer

This effort is a long-term project, initially identifying problems associated with existing alarms/messages, and later identifying alarms/messages that



EXECUTIVE SUMMARY

ADDENDUM 5

could be added to enhance operator effectiveness. The initial phase of this task force, to identify and resolve nonconformances to the "black board" philosophy, has been completed. This design concept indicates that when no abnormal condition exists during full power operation, the annunciator windows should be extinguished, thus exhibiting a "black board" to the operators. Implementation of the resolutions is nearly complete on Unit 1; complete implementation on Unit 2 is targeted for the first refueling outage.

The computer displays are currently undergoing a thorough review to verify consistency with established CRDR criteria. This review encompasses various computer and display aspects, including technical correctness, effectiveness of display layout, use of symbols, abbreviations and acronyms, and the use of color. Previously identified HEDs are also reviewed for applicability to each display and appropriate resolutions identified. Review of the Safety Parameter Display System displays has been completed; the recommendations are currently being evaluated for implementation.

The schedule for remaining CRDR activities is provided in Section 5.



EXECUTIVE SUMMARY

ADDENDUM 5

2.0 METHODOLOGY AND RESULTS

2.1 METHODOLOGY

The methodology for the Category E evaluations and other planned CRDR activities varies from that used prior to January 1, 1986, since the tasks involve evaluations deferred from earlier phases in the CRDR and verification of appropriate resolution of previous HEDs.

To proceed with the "Planned Activities" remaining from January 1986 (identified in Section 5, Items 1 through 16) in an orderly fashion, each activity or HED was tabulated separately and a reference/comment form provided for it. This form is shown as Figure 2-1. During the review process, each activity or HED reference/comment form was annotated regarding compliance using one of the following:

- o N/A - Not applicable
- o Yes - In compliance
- o No - Not in compliance

If the item is identified as not in compliance, a human engineering observation (HEO) form is filled out for disposition of the observation. (See Figure 2-2.)

In some instances, the item is again deferred, since it can not be evaluated due to the current control room status. In this case, no compliance status is indicated; the item identification and the reference/comment form are retained for later evaluation.



EXECUTIVE SUMMARY

ADDENDUM 5

Additional comments and observations are made by operators or by engineering personnel. These observations are also documented on HEO forms.

The HEOs generated are then submitted for project assessment.

2.2 RESULTS

The status of the remaining evaluations of the "Planned Activities" (Section 5, Items 1 through 16 plus item 25 for the Auxiliary Shutdown Panel), is summarized on tables as shown below:

Table 2-1 Control Room

Table 2-2 Auxiliary Shutdown Panel Room

Note that these tables provide the status of evaluations for both Unit 1 and Unit 2. (Previous addenda have addressed only the Unit 1 control room.)

The auxiliary shutdown panel and Unit 2 control room Category E evaluations began with the review of the original Category E deferred items to identify which items were appropriate for review at these locations. Design and component similarities between the two control rooms and the auxiliary shutdown panels resulted in the Unit 1 control room review of many items being applicable to the ASP and the Unit 2 control room as well.

A total of 13 HEDs have been identified since September 1988 through the Category E deferred criteria evaluations. An additional six HEDs have been identified through operator or engineering observations. Table 2-3 shows the categorization of these HEDs, which are shown in more detail in the HED Resolution Report Addendum 4 (beginning with HED-1143).



EXECUTIVE SUMMARY

ADDENDUM 5

The remaining control room Category E deferred items are shown in Table 2-4 (Workspace), Table 2-5 (Communications), Table 2-6 (Visual Displays), and Table 2-7 (Computers). In addition, there are nine deferred items in the Visual Displays criteria that were previously categorized and therefore not included as Category E items (refer to Table 2-8).

The Unit 2 Category E deferred items evaluations were performed prior to fuel load, with remaining evaluations generally the same as those for Unit 1 (refer to Tables 2-4 through 2-7).

The remaining ASP Category E deferred items are shown in Table 2-9 (Workspace), Table 2-10 (Communications), Table 2-11 (Visual Displays), and Table 2-12 (Computers).

Figure 2-3 presents the HED assessment factor criteria and implementation commitments.

The schedule for the remaining work is addressed in Section 5.



EXECUTIVE SUMMARY

ADDENDUM 5

TABLE 2-1

SUMMARY OF STATUS: CONTROL ROOM

PLANNED ACTIVITY EVALUATIONS

(Items 1 through 16, Section 5)

ACTIVITY	REMAINING NUMBER OF ITEMS (Sheets) (As of 9/88) Unit 1/Unit 2	NUMBER OF CRITERIA MET (Evaluations Performed in 10/88) Unit 1/Unit 2	NUMBER OF HEDs REPORTED	NUMBER OF ITEMS DEFERRED (Tables 2-4 thru 2-8) Unit 1/Unit 2
Criteria to be Evaluated (Category E)				
Workspace	4/28	4/17	3	0/8
Communications	0/7	0/4	0	0/3
Visual Displays	8/39	8/29	0	0/10
Labels	0/9	0/9	0	0/0
Computers	1/6	0/5	0	1/1
Control/Display Integration	13/0*	13/0	0	0/0
HEDs to be Resolved	9/0*	0/0	0	9/0
TOTAL	35/89	25/64	3	10/22

* Unit 1 evaluation applicable to Unit 2.



EXECUTIVE SUMMARY

ADDENDUM 5

TABLE 2-2

SUMMARY OF STATUS: ASP ROOM

PLANNED ACTIVITY EVALUATIONS

(Item 25, Section 5)

ACTIVITY	REMAINING NUMBER OF ITEMS (Sheets) (As of 9/88) Unit 1/Unit 2	NUMBER OF CRITERIA MET (Evaluations Performed in 10/88) Unit 1/Unit 2	NUMBER OF HEDs REPORTED	NUMBER OF ITEMS DEFERRED (Tables 2-9 thru 2-12) Unit 1/Unit 2
----------	---	---	-------------------------------	--

Criteria to be Evaluated
(Category E)

Workspace	47/47	32/28	8*	0/9
Communications	37/37	35/30	1	1/7
Annunciators	5/5	5/5	0	0/0
Controls	1/1	1/1	0	0/0
Visual Displays	28/28	25/25	1*	1/0**
Labels	3/3	3/3	0	0/0
Computers	6/6	6/4	0	0/2
Control/Display Integration	6/6	6/6	0	0/0
TOTAL	133/133	113/102	10	2/18

* Several items combined into similar HEDs.

** Unit 1 evaluations applicable to Unit 2.



EXECUTIVE SUMMARY

ADDENDUM 5

TABLE 2-3

NEW HEDs

ACTIVITY	CATEGORY				TOTAL
	A	B	C	D	
HEDs Identified through Category E Deferred Item Evaluations					
Workspace	0	1	2	8	11
Communications	0	0	0	1	1
Visual Displays	0	0	0	1	1
HEDs Identified by Operators or Engineering					
	0	3	2	1	6
TOTALS	0	4	4	11	19



EXECUTIVE SUMMARY

ADDENDUM 5

TABLE 2-4

DEFERRED CRITERIA ITEMS: CONTROL ROOM

HF AREA: WORKSPACE

CRITERIA TITLE	STP CRITERIA	SHEET NUMBER	REMARKS
<u>Unit 1</u>			
Completed			
<u>Unit 2</u>			
Document Organization and Storage	6.1.1.4	0097	Deferred for later review.
Expendables	6.1.1.5	0102 0105 0106	Deferred for later review.
Emergency Equipment	C.1.B C.1.G C.1.I C.1.H	0158 0163 0164 0165	Deferred for later review.



EXECUTIVE SUMMARY

ADDENDUM 5

TABLE 2-5

DEFERRED CRITERIA ITEMS: CONTROL ROOM

HF AREA: COMMUNICATIONS

CRITERIA TITLE	STP CRITERIA	SHEET NUMBER	REMARKS
<u>Unit 1</u>			
Completed			
<u>Unit 2</u>			
Background Noise	7.6	0282 0283	Deferred for later review.
Sound-powered Telephones	7.3	0256	Deferred for later review.



EXECUTIVE SUMMARY

ADDENDUM 5

TABLE 2-6

DEFERRED CRITERIA ITEMS: CONTROL ROOM

HF AREA: VISUAL DISPLAYS

CRITERIA TITLE	STP CRITERIA	SHEET NUMBER	REMARKS
<u>Unit 1</u>			
Completed			
<u>Unit 2</u>			
Expendable Materials	I.3	0296 0307 0318 0375 0488 0685 0770 0793 0923 1004	Deferred for later review.



EXECUTIVE SUMMARY

ADDENDUM 5

TABLE 2-7

DEFERRED CRITERIA ITEMS: CONTROL ROOM

HF AREA: COMPUTERS

CRITERIA TITLE	STP CRITERIA	SHEET NUMBER	REMARKS
<u>Unit 1</u>			
Plant Computer - Access Aids	Appendix P, P.4	0824	Deferred for later review.
<u>Unit 2</u>			
Plant Computer - Access Aids	Appendix P, P.4	0824	Deferred for later review.



EXECUTIVE SUMMARY

ADDENDUM 5

TABLE 2-8

PREVIOUSLY CATEGORIZED DEFERRED ITEMS

HF AREA: VISUAL DISPLAYS

CRITERIA TITLE	STP CRITERIA	SHEET NUMBER	REMARKS
Visual Displays - Scale Marking	Appendix F	0331 0362 0477 0652 0721 0745 0761 0784 0673	Deferred for later review.



EXECUTIVE SUMMARY

ADDENDUM 5

TABLE 2-9

DEFERRED CRITERIA ITEMS: ASP ROOM

HF AREA: WORKSPACE

CRITERIA TITLE	STP CRITERIA	SHEET NUMBER	REMARKS
<u>Unit 1</u>			
Completed			
<u>Unit 2</u>			
Document Organization and Storage	6.1.1.4	0097	Deferred for later review.
		0098	
		0099	
		0100	
		0101	
Expendables	6.1.1.5	0102	Deferred for later review.
		0104	
		0105	
Reference Materials	A.6	0145	Deferred for later review.



EXECUTIVE SUMMARY

ADDENDUM 5

TABLE 2-10

DEFERRED CRITERIA ITEMS: ASP ROOM

HF AREA: COMMUNICATIONS

CRITERIA TITLE	STP CRITERIA	SHEET NUMBER	REMARKS
<u>Unit 1</u>			
Background Noise & Communication	7.6	0282	Deferred for resolution with noise HEDs.
<u>Unit 2</u>			
Sound-powered Telephones	7.3	0256 0257	Deferred for later review.
Announcing System	7.5	0276 0277 0279 0280	Deferred for later review.
Background Noise & Communication	7.6	0282	Deferred for resolution with noise HEDs.



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CONTROL ROOM
DESIGN REVIEW

EXECUTIVE SUMMARY

ADDENDUM 5

TABLE 2-11

DEFERRED CRITERIA ITEMS: ASP ROOM

HF AREA: VISUAL DISPLAYS

CRITERIA TITLE	STP CRITERIA	SHEET NUMBER	REMARKS
Visual Displays - Scale Graduations	Appendix F	0958	Deferred for later review. Unit 1 evaluation applicable to Unit 2.



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CONTROL ROOM DESIGN REVIEW

EXECUTIVE SUMMARY

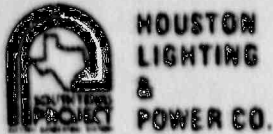
ADDENDUM 5

TABLE 2-12

DEFERRED CRITERIA ITEMS: ASP ROOM

HF AREA: COMPUTERS

CRITERIA TITLE	STP CRITERIA	SHEET NUMBER	REMARKS
<u>Unit 1</u>			
Completed			
<u>Unit 2</u>			
CRT Display	Q.1.B	0826	Deferred for later review.
Characteristics	Q.1.C	0827	



**CONTROL ROOM
DESIGN REVIEW**

FIGURE 2-1

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

OBSERVER: _____ DATE: _____ PAGE ____ OF ____
LOCATION: _____

GUIDELINE CRITERIA ITEM NO.: _____ NED REFERENCE NO.: _____
COMPLIANCE: N/A _____ YES _____ NO _____

CRITERIA ELEMENT NO.	PANEL/ CONSOLE NO.	SUBPANEL	REFERENCE/COMMENT

DIAGRAM/PHOTO NO.: _____

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



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FIGURE 2-2

CONTROL ROOM
DESIGN REVIEW

TYPICAL HEO ASSESSMENT FORM

STP HUMAN ENGINEERING OBSERVATION ASSESSMENT

HEO NO. _____ REV. _____

HED NO. _____ CAT. _____

TITLE: _____ REF: _____

ORIGINATOR: _____ DATE: _____

UNIT APPLICABILITY: UNIT 1 _____ UNIT 2 _____ BOTH UNITS _____

HEO DESCRIPTION:

POTENTIAL OPERATOR ERROR:

RECOMMENDED RESOLUTION:

PRT REVIEW: [] CONCUR [] CONCUR WITH COMMENTS
[] NOT A HUMAN ENGINEERING DISCREPANCY

COMMENTS:

CHAIRMAN: _____ DATE: _____

RECOMMENDED IMPLEMENTATION:

- [] MANDATORY IMMEDIATE CORRECTIVE ACTION
- [] AT EARLIEST OPPORTUNITY (HIGH PRIORITY)
- [] CONVENIENT REFUELING OUTAGE (NOT TO EXCEED 2 YEARS) (ROUTINE)
- [] OPTIONAL
- [] OTHER _____



FIGURE 2-3

HED ASSESSMENT FACTOR CRITERIA		
CATEGORY	ASSESSMENT FACTOR	IMPLEMENTATION (RATING)
A	SAFETY CONSEQUENCES	MANDATORY IMMEDIATE CORRECTIVE ACTION
B	PLANT AVAILABILITY ENHANCEMENT	AT EARLIEST OPPORTUNITY (HIGH PRIORITY)
C	EQUIPMENT / PLANT RELIABILITY ENHANCEMENT	CONVENIENT REFUELING OUTAGE (NOT TO EXCEED 2 YRS) (ROUTINE)
D	MINOR	OPTIONAL



EXECUTIVE SUMMARY

ADDENDUM 5 }

5.0 SCHEDULE

This section lists the activities planned for completion as part of this CRDR. These activities will be tracked for completion as part of the STP CRDR program (see Program Plan Addendum 1) and the STP Licensing Commitment Tracking System.

Items 1 through 17 are those initially listed in Section 5 of Addendum 1 and updated in Addendum 2. For clarity, no items have been deleted from the list. As items become resolved, the resolution has been shown rather than the schedule for completion. Items have been added as required to reflect additional planned activities.

<u>Planned Activity</u>	<u>Resolution/Completion Timeframe</u>
1. Check visibility of green rototellite indicating lights (Category A HEDs S-367, 484, 679, 725, and 748)	COMPLETED 12-86. Meets criteria. Evaluation is applicable to Unit 1 and Unit 2. Refer to HED Resolution Report: Current Addendum.
2. Correct poor readability of bypass/inoperable status lights (Category A HEDs S-726, 732, 749, and 767)	COMPLETED 04-85. Meets criteria. Evaluation is applicable to Unit 1 and Unit 2. Refer to initial HED Resolution Report, Page A-5.



EXECUTIVE SUMMARY

ADDENDUM 5

<u>Planned Activity</u>	<u>Resolution/Completion Timeframe</u>
3. Completion of meter zone coding (Category B HEDs S-006, 288, 676, 299, 310, 764, 787, 480, 364, 060, 912, 961, and 998)	COMPLETED 06-89. Methodology evaluated 12-86, meets criteria. Evaluation is applicable to both units. Implementation COMPLETED for Unit 1, 11-87. Implementation COMPLETED for Unit 2, 06-89. Refer to HED Resolution Report Current Addendum.
4. Random sample label checkout to verify readability	COMPLETED 12-86. Meets criteria. Evaluation is applicable to Unit 1 and Unit 2.
5. Review of QDPS plasma displays as replacement for panel meters	COMPLETED 12-86. Meets criteria. Evaluation is applicable to Unit 1 and Unit 2.
6. Check effectiveness of annunciator horns (Category A HED S-510)	COMPLETED 12-86. Meets criteria. Evaluation is applicable to Unit 1 and Unit 2. Refer to HED Resolution Report Current Addendum.
7. Random sample annunciator tile checkout to verify readability	COMPLETED 12-86. Meets criteria. Evaluation is applicable to Unit 1 and Unit 2.



EXECUTIVE SUMMARY

ADDENDUM 5

<u>Planned Activity</u>	<u>Resolution/Completion Timeframe</u>
8. Random sample review of demarcation painting	COMPLETED 12-86. Evaluation is applicable to Unit 1 and Unit 2. Resulted in new HED. Refer to HED Resolution Report Current Addendum: HED-1045.
9. Implementation of use of lever handles for "select" functions and review to confirm correction of switch position readability (Category B HEDs S-711, 734, 695, 705, 699, and 459)	COMPLETED 12-86. Meets intent of criteria. Evaluation is applicable to Unit 1 and Unit 2. Refer to HED Resolution Report Current Addendum.
10. Review corrective action to address live zero indication (Category B HEDs S-715, 665, 738, 646, 754, 777, 469, 356, 332, 328, 891, 941, and 977)	COMPLETED 04-85. Evaluation is applicable to Unit 1 and Unit 2. Refer to initial HED Resolution Report, page B-14.
11. Complete corrective action to replace meter scales and random sample checkout to verify readability (Category B HEDs S-878, 879, 881, 870, 874, 883, 799, 803, 807, 892, 716, 666, 739, 776, 470, 877, 880, 882, 872, 873, 884, 800, 804, 808, 718, 668, 741, 757, 778,	Partial completion 12-86. All items have been evaluated. Evaluation is applicable to Unit 1 and Unit 2. Refer to Table 2-8 for remaining open items, which have been deferred for further review. Refer to HED Resolution Report



EXECUTIVE SUMMARY

ADDENDUM 5

<u>Planned Activity</u>	<u>Resolution/Completion Timeframe</u>
11. (Continued) 471, 404, 406, 719, 670, 742, 649, 759, 781, 475, 359, 334, 329, 671, 743, 650, 782, 360, 392, 720, 672, 744, 651, 760, 783, 476, 361, 721, 673, 745, 652, 761, 784, 477, 362, 331, 871, and 885)	Current Addendum.
12. Random sample legend light engraving checkout to verify readability	COMPLETED 12-86. Meets criteria. Evaluation is applicable to Unit 1 and Unit 2.
13. Complete corrective action on recorder chart paper (Category B HEDs S-376 and 771) and random sample checkout to verify readability and accessibility of supplies.	After completion of recorder chart paper replacement, in conjunction with Table 2-6 items. Refer to initial HED Resolution Report, Page B-21.
14. Implementation of corrective action to paint all vertical meter pointers red and random sample checkout (Category B HEDs S-724, 675, 747, 655, 763, 786, 479, 408, 911, 960, and 997).	Painting pointers leads to instrument inaccuracies. Vertical meters without red pointers are to be replaced. Unit 1: COMPLETED 11-89. Unit 2: Prior to startup from first refueling outage. Refer to HED Resolution Report Current Addendum.



EXECUTIVE SUMMARY

ADDENDUM 5

<u>Planned Activity</u>	<u>Resolution/Completion Timeframe</u>
15. Operator review of status light interpretation on SGFP Turbine Control Panel	COMPLETED 12-86. Meets criteria. Evaluation is applicable to Unit 1 and Unit 2.
16. Completion of Control Room Category E Criteria reviews:	
A. Workspace criteria including:	Unit 1: COMPLETED 10-88. Evaluations 12-86, 01-87, 06-87, and 10-88. Some evaluations applicable to Unit 2.
o Furniture and equipment layout	
o Document organization and storage	Unit 2: Partial completion 10-88 for criteria that could not be evaluated with Unit 1 reviews (e.g., ventilation, illumination, auditory). See Table 2-4 for remaining open items.
o Spare parts, operating expendables and tools	
o Nonessential personnel access	
o Reference material placement	
o Desk dimensions	Resulted in new HEDs.
o Chair dimensions	Refer to HED Resolution Report
o Emergency equipment	Current Addendum: HED-1029,
o Ventilation	1030, 1060, 1061, 1062, 1063,
o Illumination	1086, 1087, 1088, 1143, 1150,
o Emergency lighting	and 1156.
o Auditory	
o Ambience and comfort	



EXECUTIVE SUMMARY

ADDENDUM 5

Planned Activity

Resolution/Completion Timeframe

16. (Continued)

Workspace criteria reviews
for the sit-down consoles
and work stations and for
the vertical panels

Random sample check of
accessibility to controls
and potential for inadvertent
actuation

B. Communications criteria
including:

- o Information exchange
- o Convenience of use
- o Reliability
- o Interference
- o Allocation of functions
- o Voice communication links
- o Conventional powered
telephone system
- o Sound powered telephone
system
- o Radio transceivers
- o Walkie-talkie radio
transceivers

Unit 1: COMPLETED 06-87.

Some evaluations applicable to
Unit 2.

Unit 2: Partial completion
10-88. See Table 2-5 for
remaining open items.

Resulted in new HEDs.

Refer to HED Resolution Report
Current Addendum: HED-1083,
1084, and 1085.



EXECUTIVE SUMMARY

ADDENDUM 5

<u>Planned Activity</u>	<u>Resolution/Completion Timeframe</u>
16. (Continued)	
c Fixed-base UHF transceivers	
o Announcing system	
o Background noise	
o Emergency face masks	
C. Annunciation criteria for:	COMPLETED 12-86.
o Computer display/annunciation/printer features	Meets criteria. Evaluation is applicable to Unit 1 and Unit 2.
D. Controls criteria for compatibility with emergency gear	COMPLETED 12-86. Meets criteria. Evaluation is applicable to Unit 1 and Unit 2.
E. Visual display criteria for:	Unit 1: COMPLETED 10-88. Evaluations 12-86 and 10-88. Meets criteria. Some evaluations applicable to Unit 2.
o Meters	
o Ambient light sources/light intensity	Unit 2: Partial completion 10-88 for criteria that could not be evaluated with Unit 1 reviews (e.g., ambient light sources/light intensity). See Table 2-6 for remaining open items.
o Interchanging of indicator lenses	
o Expendable materials	



EXECUTIVE SUMMARY

ADDENDUM 5

<u>Planned Activity</u>	<u>Resolution/Completion Timeframe</u>
16. (Continued)	
F. Labels criteria	COMPLETED 10-88. Unit 1 evaluations 12-86. Meets criteria. Some evaluations applicable to Unit 2. Unit 2 evaluations 10-88. Meets criteria.
G. Computer criteria for:	
o Plant computer	Unit 1: Partial completion 12-86 and 9-88. Some evaluations applicable to Unit 2. See Table 2-7 for remaining open item.
o ERFDADS, including SPDS	
o QDPS	Unit 2: Partial completion 10-88 for criteria that could not be evaluated with Unit 1 reviews (e.g., glare on CRT). See Table 2-7 for remaining open item. Resulted in new HEDs. Refer to HED Resolution Report Current Addendum: HED-1033, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, and 1049.



EXECUTIVE SUMMARY

ADDENDUM 5

<u>Planned Activity</u>	<u>Resolution/Completion Timeframe</u>
16. (Continued) H. Control/display integration criteria	COMPLETED 10-88. Evaluations 12-86 and 10-88. Meets criteria. Evaluations are applicable to Unit 1 and Unit 2.
17. EOP Validation (including confirmation of instrumentation and control functions)	COMPLETED 05-86. Evaluation is applicable to Unit 1 and Unit 2. Refer to EOP Validation Report.
18. Label reviews for accuracy, adequacy, and conformance to standard abbreviations	Ongoing review of label changes in current plant modifications. Review of existing labels deferred for later evaluations.
19. Computer display reviews	Reviews and revisions prior to end of third refueling outage of Unit 1 and the second refueling outage of Unit 2, with exception of QDPS (revisions prior to end of third refueling outage on each unit). SPDS displays review completed 11-89. Recommendations being evaluated for implementation.



EXECUTIVE SUMMARY

ADDENDUM 5

<u>Planned Activity</u>	<u>Resolution/Completion Timeframe</u>
20. Implementation of Category A HED resolutions (excluding QDPS)	Unit 1: COMPLETED prior to commercial operation (August 1988). Unit 2: COMPLETED prior to fuel load (December 1988).
21. Implementation of Category B HED resolutions (excluding QDPS)	Unit 1: COMPLETED prior to commercial operation (August 1988), for HEDs up to and including HED-1096. For HEDs from HED-1096 to HED-1142, COMPLETED prior to end of first refueling outage. Unit 2: COMPLETED prior to commercial operation (June 1989), for HEDs up to and including HED-1142. For HEDs after HED-1142, implementation is targeted to be in accordance with Figure 2-3, with implementation prior to end of first refueling outage after categorization.



EXECUTIVE SUMMARY

ADDENDUM 5

<u>Planned Activity</u>	<u>Resolution/Completion Timeframe</u>
22. QDPS HED resolutions (Refer to HED Resolution Report Current Addendum, Disposition Note CPT-1.)	COMPLETED 11-89. Exceptions are resolutions for HED-1022, 1041, and 1126 for which implementation is prior to end of third refueling outage on each unit.
23. Implementation of Category C HED resolutions	Implementation integrated into plant modification schedule, with implementation targeted for prior to end of the third refueling outage of Unit 1 and the second refueling outage of Unit 2.
24. Implementation of Category D HED resolutions	Implementation integrated into plant modification schedule based on priority.
25. Category E evaluations for Auxiliary Shutdown Panel	Partial completion 10-88. See Tables 2-9 through 2-12 for remaining open items. Resulted in new HEDs. Refer to HED Resolution Report Current Addendum: HED-1146, 1147, 1148, 1149, 1151, 1152, 1153, 1154, 1155, and 1157.
26. Annunciator Task Force	Ongoing.