



**Public Service™**

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**Public Service  
Company of Colorado**

December 3, 1985  
Fort St. Vrain  
Unit No. 1  
P-85454

Director of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Attention: Mr. H.N. Berkow, Project Director  
Special and Standardization  
Project Directorate

Docket No. 50-267

SUBJECT: Fort St. Vrain Control  
Room Design Review  
Summary Report

REFERENCE: 1) NRC Letter (G-85363)  
Hunter to Lee  
Dated 8/27/85

2) PSC Letter (P-85384)  
Warembourg to Butcher  
Dated 10/29/85

Dear Mr. Berkow:

The purpose of this letter is to provide you with Public Service Company's second submittal in response to the requests of Reference 1 above.

The purpose of these submittals is to provide you with specific information relative to the proposed Control Room Design Changes. This information is submitted as Attachments 6b-5 thru 6b-11 and supplements to Attachment 9 as referenced by "Public Service Company's Response to the Nuclear Regulatory Commission's 'request for additional information'" included with reference 2.

If you have any questions, please contact M. H. Holmes at (303) 480-6960.

Very truly yours,

*D. W. Warembourg*  
D. W. Warembourg  
Manager, Nuclear  
Engineering Division

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PDR ADOCK 05000267  
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Attachments

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ATTACHMENT 6b-5

SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS  
AS APPLICABLE TO  
I-03/04



FOREWORD - NUREG-0737 Supplement 1, Section 5.1b requires that a Control Room Design Review (CRDR) be conducted to identify human engineering discrepancies. Section 5.1c requires that these discrepancies be assessed and design improvements selected to correct these discrepancies.

Public Service Company (PSC) has conducted the required review of the Fort St. Vrain Control Room. Approximately eight hundred forty eight (848) discrepancies or classes of discrepancies were cited. These discrepancies were assessed to determine their potential for causing an operating error and the potential effect of any error. (Certain discrepancies are known to have caused errors). An improvement program has been selected which meets the regulatory requirements and proposes to improve the operability and functionality of the Control Room.

The regulatory requirement for the CRDR and the follow-on improvement program was directed toward the improved handling of emergencies and not specifically toward improved production. Public Service Company's improvement program is directed toward both normal operation and the handling of emergencies.

BACKGROUND - Public Service Company has initiated an integrated improvement program based on functionality rather than particular classifications of problems. This approach is first, one of determining functional groupings, followed by demarcating, hierarchical labeling, correcting indicator scaling, complying with established conventions (color coding, switch positions, etc.).

The following steps constituted the planning portion of the integrated improvement program.

- Elevation Drawings of each control panel were color coded to show applicable HEDs as either, relabeling, relocations, scaling, deletions, or equipment changeout. This scheme provides an overview of the problems documented on each control board.
- All HEDs involving Alarm Locations, and multipoint alarms were reviewed. System function and operator response were considered in grouping, deleting and adding alarms. Paste-ups of all alarm panels were completed to show proposed rearrangements.
- Functional grouping of controls and indications was approached by first preparing point interaction sketches for various systems or by direct reference to system P&Is. This effort was, in effect, an extensive operational analysis which considered the dynamic considerations of control groups and arrangements. This activity reviewed the purpose and use of each and every component on the main control boards. Interviews with operators and training personnel were

conducted to determine operator interpretations and actions.

- Controls and indications were then arranged in functionally related groups. Associated alarm locations were rechecked to verify that the more desirable locations were selected. The function relationship of adjacent indicator and control groupings were reviewed.
- Revised drawings were prepared to show the proposed arrangements. Certain of these drawings were color coded to aid in differentiating between groupings. These drawings were then utilized to determine the scope of each change package (change notice).
- Change Notice (CN) numbers were assigned to each effort identified above.

#### IMPROVEMENT PROCESS METHODOLOGY

The Improvement Process starts with the documentation and drawings produced during the improvement planning process described in the BACKGROUND presentation portion of this summary. An individual designer is assigned the responsibility of evaluating a particular board. Since this individual may not have participated in previous efforts, an educational process is initiated to acquire a thorough understanding of each system, subsystem and component represented on the assigned control board. System descriptions, Piping & Instrument diagrams, electrical drawings, operating procedures are studied to gain this thorough understanding of each system and component function. An operational analysis is conducted for each system and component on a particular control board. (This in-depth analysis is in addition to that completed for the CRDR and planning purposes.) This Operational Analysis provides additional basis for determining any changes to functional groupings..

Operating and training personnel are interviewed to solicit operational philosophies. The Operational value and function of each control and indication is addressed. Informational requirements are again discussed. (This informational requirements effort is in addition to that conducted for Emergency Operating Procedures task analysis).

All HEDs applicable to a particular control board are reviewed and the tentative fix evaluated for its corrective value within the integrated approach. HEDs written against instruments and controls recorded by the Emergency Operating Procedure task analysis "Information and Control Requirements" effort, are reviewed with particular attention to any potential safety considerations. Any previously prepared investigative information is studied. All

factors are evaluated in considering any changes to the control board.

SPECIFIC - I-03/04 Redesign Synopsis - (Change Notice (CN)-1887 preparation packages.)

Research - During this phase the systems related to I-03/04 were studied using the applicable Operations and Maintenance Manuals, as well as related system abstracts, System Operating Procedures, Technical Specifications and system drawings. In addition, both the Technical Specifications and Final Safety Evaluation Report were reviewed to determine the operational (process) control limits and safety interactive controls and systems for each panel.

Other research included review of operator training packages and discussions with operators, trainers, and engineering support personnel. This interaction with other sectors was continued throughout the research and design phases. A review of all related HEDs was performed and design problems reviewed. (See Attachment A).

Review of the HEDs and a physical study of the panel revealed that there were problems in grouping, labeling, viewing angles for displays, physical operational problems relating to rod operations and display monitoring, as well as poorly arranged control and display groupings. Several data presentations offered potential for improvements. The original board layouts are included as Attachment B.

Conceptual Design - After the existing design was reviewed, preliminary redesign proposals were made using elevation drawings, modified to show proposed changes. Several iterations of these drawings were used to develop a new layout that answered all of the design problems encountered during the research phase. As each functional group was defined, its operational relationships were evaluated to make certain that the arrangement provided the best man-machine interface.

This design provided for placement of controls and displays within a functional group and then the integration of the functional group into the board re-design and thus the control room.

In this process, several iterations of a layout were evaluated. As the design became more viable and appeared to resolve most or all of the known problems, interviews were conducted to determine if all of the design and operational parameters were met. Sample copies of the Interview records are included as Attachment C. These interviews were conducted in the following manner:

- The final iteration of a proposed layout was presented to an operator.
- The operator was asked to describe in detail the various tasks that he would perform.

Particular attention was given to the functional grouping and the operational relationships of each grouping.

- Information and control needs were reviewed. The operator was asked to evaluate the proposed labeling and scaling presentations to verify that the required information was presented in a clear, concise and readily useable format.

This "table top" analysis was conducted with various operators, shift supervisors and trainers. (See Sample Interview records, Attachment C).

This validation effort resulted in operators expressing concern over the physical placement of the Neutron Flux display location and control rod selection switch configurations. These concerns were subsequently evaluated and resulted in a relocation of the display and a reconfiguration of the Selection Switches. These finalized proposed layouts are included as Attachment D.

A summary of changes to the I-03/04 control board is presented by Attachment E.

The final step in this conceptual design phase was to determine the final text content for functional labels. Prior operator interviews and operational analysis efforts provided the basis for these determinations. See Attachment F for Functional Label legends.

Re-evaluation of the following HEDs indicates that number 0280 and 0736 are not totally valid. The basis for this determination is as follows:

HED 0280 cites HS-1216 configuration. Fuel Loading is on the left position, OFF is at the top position, and Run is at the right position. This violates convention of DD-SWI-1 that OFF be on the left or CCW position. Re-evaluation of switch configuration determined that since HS-1216 provides permissives to the plant protection system (PPS) in Fuel Loading & Run position, the safest configuration is to go from OFF to either mode.

HED 0736 states "Rod drive controls have to be held for long periods at a time." This HED was generated from and is a logical response to an operator questionnaire. Since rod movement is accomplished by HS-1219, HS-1222, and HS-1223 and final pulls are limited to 2 inches, the safest mode of operation is spring return to OFF. This necessitates holding controls for long periods of time, and is deemed to be desirable to ensure positive control action.

The following Design Directives apply to the re-design of I-03/04 control board:

<u>NUMBER</u>	<u>ISSUE</u>	<u>DESCRIPTION</u>
DD-AAS-1	A	ABBREVIATION, SYMBOL, AND ACRONYM SELECTION
DD-APL-1	A	ANNUNCIATOR PANEL LEGENDS
DD-ASP-1	A	ANNUNCIATOR SELECTION AND PLACEMENT
** DD-CBL-1	A	CONTROL BOARD LAYOUT
DD-CRL-1	A	CATHODE RAY TUBE LOCATION
DD-CRT-1	A	CATHODE RAY TUBE SELECTION
DD-ILS-1	A	INDICATOR LIGHT SELECTION AND LOCATION
DD-KEY-1	A	KEYBOARDS
DD-LAB-1	B	PANEL AND COMPONENT LABELING
DD-SLS-1	A	SCREEN LAYOUT AND STRUCTURING
DD-SWI-1	A	SWITCH SELECTION
** IN DRAFT FORM		



ATTACHMENTS  
TO  
SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS AS APPLICABLE TO I-03/04

- A1 List of all I-03 HEDs & Copies of I-03 HEDs
- A2 List of all I-04 HEDs & Copies of I-04 HEDs
- B1 Section of I-03 Elevation Drawing Showing Original Configuration
- B2 Section of I-04 Elevation Drawing Showing Original Configuration
- C Sample Copies of Operator Interview Records
- D1 Section of I-03 Elevation Drawing Showing Proposed Configuration
- D2 Section of I-04 Elevation Drawing Showing Proposed Configuration
- E1 Summary of Proposed Changes to I-03 Board
- E2 Summary of Proposed Changes to I-04 Board
- F Label List

ATTACHMENT A1  
List of All 1-03 HEDs  
&  
Copies of 1-03 HEDs



## HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL BOARD I-03

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0014	Labeling	1b	CR	I-9303	1	Label	1887	Functionally label per DD-LAB-1
0015	Labeling	1b	I-03	ZI-1233-12	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0015	Labeling	1b	I-03	ZI-1233-13	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0015	Labeling	1b	I-03	ZI-1233-16	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0015	Labeling	1b	I-03	ZI-1233-2	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0015	Labeling	1b	I-03	ZI-1233-4	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0015	Labeling	1b	I-03	ZI-1233-6	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0015	Labeling	1b	I-03	ZI-1233-8	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0015	Labeling	1b	I-03	ZI-1233-9	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0016	Labeling	1b	I-03	ZI-1233-17	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0016	Labeling	1b	I-03	ZI-1233-20	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0016	Labeling	1b	I-03	ZI-1233-21	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0016	Labeling	1b	I-03	ZI-1233-22	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0016	Labeling	1b	I-03	ZI-1233-26	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0016	Labeling	1b	I-03	ZI-1233-27	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0016	Labeling	1b	I-03	ZI-1233-32	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0016	Labeling	1b	I-03	ZI-1233-33	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0017	Labeling	1b	I-03	ZI-1233-1	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0017	Labeling	1b	I-03	ZI-1233-10	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0017	Labeling	1b	I-03	ZI-1233-14	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0017	Labeling	1b	I-03	ZI-1233-28	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0017	Labeling	1b	I-03	ZI-1233-3	1	Label	1887	Provide instrument & functional labels per DD-LAB-1

## HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL BOARD 1-03

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0017	Labeling	1b	1-03	ZI-1233-34	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0017	Labeling	1b	1-03	ZI-1233-5	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0017	Labeling	1b	1-03	ZI-1233-7	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0018	Labeling	1b	1-03	ZI-1233-11	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0018	Labeling	1b	1-03	ZI-1233-15	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0018	Labeling	1b	1-03	ZI-1233-18	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0018	Labeling	1b	1-03	ZI-1233-19	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0018	Labeling	1b	1-03	ZI-1233-23	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0018	Labeling	1b	1-03	ZI-1233-24	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0018	Labeling	1b	1-03	ZI-1233-29	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0018	Labeling	1b	1-03	ZI-1233-35	1	Label	1887	Provide instrument & functional labels per DD-LAB-1
0019	Labeling	1b	1-03	ZI-1233-25	1	Relabel	1887	Provide instrument & functional labels per DD-LAB-1
0019	Labeling	1b	1-03	ZI-1233-30	1	Relabel	1887	Provide instrument & functional labels per DD-LAB-1
0019	Labeling	1b	1-03	ZI-1233-31	1	Relabel	1887	Provide instrument & functional labels per DD-LAB-1
0019	Labeling	1b	1-03	ZI-1233-36	1	Relabel	1887	Provide instrument & functional labels per DD-LAB-1
0019	Labeling	1b	1-03	ZI-1233-37	1	Relabel	1887	Provide instrument & functional labels per DD-LAB-1
0021	Labeling	1b	1-03	NR-1131	1	Label	1887	Functionally label per DD-LAB-1
0021	Labeling	1b	1-03	NR-1133-1	1	Label	1887	Functionally label per DD-LAB-1
0022	Labeling	1b	1-03	NQ-1199	1	Delete	1887	Instrument no longer required - delete
0023	Labeling	1b	1-03	HS-1102-1	1	Relabel	1887	Relabel per DD-LAB-1 & DD-SWI-1
0023	Labeling	1b	1-03	HS-1102-2	1	Relabel	1887	Relabel per DD-LAB-1 & DD-SWI-1
0023	Labeling	1b	1-03	HS-1104-1	1	Relabel	1887	Relabel per DD-LAB-1 & DD-SWI-1
0023	Labeling	1b	1-03	HS-1104-2	1	Relabel	1887	Relabel per DD-LAB-1 & DD-SWI-1
0023	Labeling	1b	1-03	HS-22149	1	Relabel	1887	Relocate to 1-05. Relabel per DD-LAB-1 & DD-SWI-1 by CN-1890.
0023	Labeling	1b	1-03	HS-9330	1	Relabel	1887	Relabel per DD-LAB-1 & DD-SWI-1
0024	Labeling	1b	1-03	HS-1131-2	1	Relabel	1887	Relabel per DD-LAB-1 & DD-SWI-1
0024	Labeling	1b	1-03	HS-1133-1	1	Relabel	1887	Relabel per DD-LAB-1 & DD-SWI-1
0024	Labeling	1b	1-03	HS-1218	1	Relabel	1887	Relabel per DD-LAB-1 & DD-SWI-1

## HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL BOARD I-03

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0025	Labeling	1b	I-03	FR-11262	1	Label	1878	Relocate to I-09. Functionally label per DD-LAB-1 by CN-1878.
0025	Labeling	1b	I-03	NR-1199	1	Label	1878	Relocate to I-09. Functionally label per DD-LAB-1 by CN-1878.
0025	Labeling	1b	I-03	XR-11262	1	Label	1878	Relocate to I-09. Functionally label per DD-LAB-1 by CN-1878.
0025	Labeling	1b	I-03	ZI-1202	1	Label	1887	Functionally label per DD-LAB-1
0029	Labeling	1b	I-03	HS-1246	1	Label	1887	Functionally label per DD-LAB-1
0029	Labeling	1b	I-03	NDS-1199	1	Label	1887	Functionally label per DD-LAB-1
0029	Labeling	1b	I-03	NIC-1199	1	Label	1887	Functionally label per DD-LAB-1
0029	Labeling	1b	I-03	NIM-1199	1	Label	1887	Functionally label per DD-LAB-1
0030	Labeling	1b	I-03	HS-11464	1	Label	1887	Assigned instrument number. Label per DD-SWI-1 & DD-LAB-1
0031	Labeling	1b	I-03	HS-1220	1	Delete	1887	No longer required - system function revised
0031	Labeling	1b	I-03	HS-1221	1	Delete	1887	No longer required - system function revised
0031	Labeling	1b	I-03	HS-1224	1	Delete	1887	No longer required - system function revised
0031	Labeling	1b	I-03	HS-1225	1	Delete	1887	No longer required - system function revised
0031	Labeling	1b	I-03	HS-1226	1	Delete	1887	No longer required - system function revised
0031	Labeling	1b	I-03	HS-1237	1	Relabel	1887	Functionally label per DD-LAB-1 & DD-SWI-1
0032	Labeling	1b	I-03	HS-3261	1	Label	1887	Functionally label per DD-LAB-1 & DD-SWI-1
0036	Labeling	1b	I-03	HS-1269	1	Label	1887	Assigned instrument number. Label per DD-SWI-1 & DD-LAB-1
0036	Labeling	1b	I-03	HS-1270	1	Label	1887	Assigned instrument number. Label per DD-SWI-1 & DD-LAB-1
0037	Labeling	1c	I-03	HS-21429	1	Label	1887	Functionally label per DD-LAB-1 & DD-SWI-1
0038	Labeling	1b	I-03	HS-1227	1	Label	1887	Functionally label per DD-LAB-1 & DD-SWI-1
0038	Labeling	1b	I-03	HS-1259	1	Label	1887	Functionally label per DD-LAB-1 & DD-SWI-1
0038	Labeling	1b	I-03	HS-1260	1	Label	1887	Functionally label per DD-LAB-1 & DD-SWI-1
0039	Labeling	1b	I-03	NI-1199	1	Label	1887	Replace with digital indicator. Functionally label per DD-LAB-1
0040	Labeling	1b	I-03	HS-1219	1	Relabel	1887	Functionally label per DD-SWI-1
0040	Labeling	1b	I-03	HS-1222	1	Relabel	1887	Functionally label per DD-SWI-1
0040	Labeling	1b	I-03	HS-1223	1	Relabel	1887	Functionally label per DD-SWI-1
0041	Labeling	1b	I-03	HS-1217	1	Relabel	1887	Functionally label per DD-SWI-1

## HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL BOARD 1-03

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HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0042	Labeling	1b	I-03	HS-1245	1	Delete	1887	No longer required - Delete
0044	Labeling	1b	I-03	HS-21431	1	Relabel	1887	Functionally label per DD-SWI-1
0044	Labeling	1b	I-03	ZI-21471	1	Relabel	1887	Functionally label per DD-LAB-1
0045	Labeling	1b	I-03	HS-21432	1	Relabel	1887	Functionally label per DD-SWI-1
0045	Labeling	1b	I-03	ZI-21472	1	Relabel	1887	Functionally label per DD-LAB-1
0046	Labeling	1b	I-03	HC-21446	1	Relabel	1887	Functionally label per DD-LAB-1
0046	Labeling	1b	I-03	PI-21442	1	Relabel	1887	Functionally label per DD-LAB-1
0046	Labeling	1b	I-03	PI-21443	1	Relabel	1887	Functionally label per DD-LAB-1
0046	Labeling	1b	I-03	PI-21446	1	Relabel	1887	Functionally label per DD-LAB-1
0046	Labeling	1b	I-03	PI-21447	1	Relabel	1887	Functionally label per DD-LAB-1
0132	Labeling	1d	I-03	HS-11219-1	1	Label	1887	Functionally label per DD-LAB-1 & DD-SWI-1
0132	Labeling	1d	I-03	HS-11219-2	1	Label	1887	Functionally label per DD-LAB-1 & DD-SWI-1
0280	Labeling	1c	I-03	HS-1216	4	Reevaluated	1887	No action required - see HED Disposition
0315	Instrument	2m	I-03	NA	2	Addition	1887	'Rod Withdraw Prohibit' Alarms
0496	Instrument	2b	I-03	FR-11262	4	Relocate	1878	Relocate to I-09 per CN-1887
0496	Instrument	2b	I-03	NR-1199	4	Relocate	1878	Relocate to I-09 per CN-1887
0496	Instrument	2b	I-03	XR-11262	4	Relocate & Change-out	1878	Relocate to I-09 & provide local digital indicator per CN-1887 for operator use.
0497	Instrument	2c	I-03	HS-1102-1, -2	13	Relocate	1887	Functionally group. Label per DD-LAB-1
0497	Instrument	2c	I-03	HS-1104-1, -2	13	Relocate	1887	Functionally group. Label per Dd-LAB-1
0498	Instrument	2b	I-03	XI-93128	4	Delete	1887	Not required - delete.
0538	Instrument	2e	I-03	PI-1108	1	Rescale	1887	Rescale per DD-AIS-1
0538	Instrument	2e	I-03	PI-1109	1	Rescale	1887	Rescale per DD-AIS-1
0538	Instrument	2e	I-03	PI-1110	1	Rescale	1887	Rescale per DD-AIS-1
0538	Instrument	2e	I-03	PI-1151	1	Change-out	1887	Replace with graphics display
0538	Instrument	2e	I-03	PI-1151-1	1	Change-out	1887	Replace with graphics display
0538	Instrument	2e	I-03	PI-1152	1	Change-out	1887	Replace with graphics display
0538	Instrument	2e	I-03	PI-1152-1	1	Change-out	1887	Replace with graphics display
0538	Instrument	2e	I-03	PI-1153	1	Change-out	1887	Replace with graphics display
0538	Instrument	2e	I-03	PI-1153-1	1	Change-out	1887	Replace with graphics display
0556	Instrument	2e	I-03	ZI-1233-1/-37	2	Rescale	1887	Rescale per DD-AIS-1
0557	Instrument	2f	I-03	Switches	1	Change-out	1887	Replace switch rings per DD-SWI-1
				Lights	1			Replace lights per DD-ILS-1
0559	Instrument	2e	I-03	NI-1133-3	2	Change-out	1887	Replace with digital indicator & selection switch
0559	Instrument	2e	I-03	NI-1134-3	2	Change-out	1887	Replace with digital indicator & selection switch
0559	Instrument	2e	I-03	NI-1135-3	2	Change-out	1887	Replace with digital indicator & selection switch
0559	Instrument	2e	I-03	NI-1136	2	Change-out	1887	Replace with digital indicator & selection switch
0559	Instrument	2e	I-03	NI-1137	2	Change-out	1887	Replace with digital indicator & selection switch.

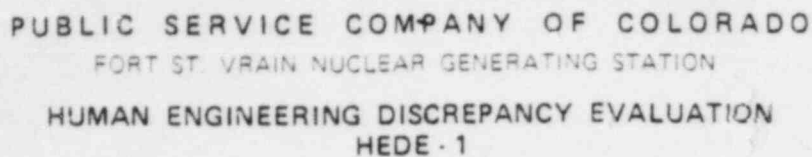


## HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL BOARD I-03

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0559	Instrument	2e	I-03	NI-1138	2	Change-out	1887	Replace with digital indicator & selection switch.
0560	Instrument	2e	I-03	NI-1199	2	Change-out	1887	Replace with digital indicator
0560	Instrument	2e	I-03	NI-1199	2	Rescale	1887	Install new dial card per DD-AIS-1
0564	Instrument	2e	I-03	NI-1131-2	2	Change-out	1887	Replace with bar graph indicators Scale per DD-AIS-1
0564	Instrument	2e	I-03	NI-1132-2	2	Change-out	1887	Replace with bar graph indicators Scale per DD-AIS-1
0564	Instrument	2e	I-03	NI-1133-2	2	Change-out	1887	Replace with bar graph indicators Scale per DD-AIS-1
0564	Instrument	2e	I-03	NI-1134-2	2	Change-out	1887	Replace with bar graph indicators Scale per DD-AIS-1
0564	Instrument	2e	I-03	NI-1135-2	2	Change-out	1887	Replace with bar graph indicators Scale per DD-AIS-1
0569	Instrument	2e	I-03	PI-1108	2	Rescale	1887	Rescale per DD-AIS-1
0569	Instrument	2e	I-03	PI-1109	2	Rescale	1887	Rescale per DD-AIS-1
0569	Instrument	2e	I-03	PI-1110	2	Rescale	1887	Rescale per DD-AIS-1
0571	Instrument	2e	I-03	NI-1131-1	2	Change-out	1887	Replace with bar graph indicators & scale per DD-AIS-1
0571	Instrument	2e	I-03	NI-1132-1	2	Change-out	1887	Replace with bar graph indicators & scale per DD-AIS-1
0591	Instrument	2e	I-03	ZI-1204	2	Change-out	1887	Replace with digital indicator
0597	Labeling	1b	I-03	HS-1131-2	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	HS-1133-1	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1131-2	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1132-2	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1133-1	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1133-2	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1133-3	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1134-1	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1134-2	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1134-3	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1135-1	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1135-2	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1135-3	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1136	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1137	1	None		Re-evaluate, no change on I-03. See HED.
0597	Labeling	1b	I-03	NI-1138	1	None		Re-evaluate, no change on I-03. See HED.
0607	Instrument	2f	I-03	HS-1260	1	Change-out	1887	Switch ring to be changed to meet DD-SWI-1
0607	Instrument	2f	I-03	HS-93475	1	Change-out	1887	Functionally revised. See HED disposition
0607	Instrument	2f	I-03	HS-93476	1	Change-out	1887	Functionally revised. See HED disposition
0607	Instrument	2f	I-03	HS-93477	1	Change-out	1887	Functionally revised. See HED disposition
0607	Instrument	2f	I-03	HS-93478	1	Change-out	1887	Functionally revised. See HED disposition
0608	Instrument	2f	I-03	HS-93125	1	Change-out	1887	Switch ring to be changed to meet

## HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL BOARD I-03

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0608	Instrument	2f	I-03	HS-93126	1	Change-out	1887	DD-SWI-1 Switch ring to be changed to meet
0608	Instrument	2f	I-03	HS-93127	1	Change-out	1887	DD-SWI-1 Switch ring to be changed to meet
0608	Instrument	2f	I-03	HS-1270	1	Change-out	1887	DD-SWI-1 Assign instrument number, change per
0610	Instrument	2e	I-03	PDI-1156	1	Rescale	1887	DD-SWI-1 Install new dial card per DD-AIS-1
0629	Instrument	2e	I-03	TR-2256	2	Relocate	1878	Relocate to I-09 & rescale
0652	Instrument	2e	I-03	TR-2256	1	Rescale	1878	Relocate to I-09 per CN-1878 (includes new chart paper)
0653	Instrument	2e	I-03	PR-1108	1	Rescale	1878	Relocate to I-09 per CN-1878 (includes new chart paper)
0653	Instrument	2e	I-03	NR-1133-2	1	Rescale	1878	Relocate to I-09 per CN-1878 (includes new chart paper)
0654	Instrument	2e	I-03	PR-1108	1	Reevaluated	1878	Not required for operational use.
0654	Instrument	2e	I-03	NR-1199	1	Reevaluated	1887	Relocate to I-09.
0655	Instrument	2cx	I-03	NR-1131	1	Relocate	1887	Not required for operational use. Relocate to I-09.
0655	Instrument	2cx	I-03	NR-1133-1	1	Relocate	1887	Relocate on I-03 to facilitate operator reading.
0655	Instrument	2cx	I-03	TR-2256	1	Relocate	1878	Relocate on I-03 to facilitate operator reading.
0656	Instrument	2e	I-03	NR-1133-2	2	Rescale	1878	See HED 0652 Relocate to I-09 and replace scale/paper per CN-1878
0661	Instrument	2e	I-03	FR-11262	2	Relocate	1878	Relocate to I-09 by CN-1878
0661	Instrument	2e	I-03	NR-1199	2	Relocate	1878	Relocate to I-09 by CN-1878
0661	Instrument	2e	I-03	XR-11262	2	Change-out	1878	Relocate to I-09 by CN-1878
0736	Instrument	2h	I-03	HS-1219	4	& Relocate	1887	Relocate to I-09 by CN-1878
0736	Instrument	2h	I-03	HS-1222	4	Reevaluated	1887	No action required. See HED disposition.
0736	Instrument	2h	I-03	HS-1223	4	Reevaluated	1887	No action required. See HED disposition.
0736	Instrument	2h	I-03	HS-1245	4	Deleted	1887	No action required. See HED disposition.
0737	Instrument	2n	I-03	HS-1102-1	1	Change-out	1887	No longer required - delete.
0737	Instrument	2n	I-03	HS-1102-2	1	Change-out	1887	Replace lights per DD-ILS-1
0737	Instrument	2n	I-03	HS-1104-1	1	Change-out	1887	Replace lights per DD-ILS-1
0737	Instrument	2n	I-03	HS-1104-2	1	Change-out	1887	Replace lights per DD-ILS-1
0739	Instrument	2k	I-03	NR-1131	1	Label	1887	Functionally label per DD-LAB-1
0739	Instrument	2k	I-03	NR-1133-1	1	Label	1887	Functionally label per DD-LAB-1
0741	Labeling	1c	I-03	HS-21431	1	Relabel	1887	Label per DD-ILS-1
0741	Labeling	1c	I-03	HS-21432	1	Relabel	1887	Label per DD-ILS-1
0832	Instrument	2d	I-03	Misc	2	Change-out	1887	Multiple Meter/Control Groups addressed specifically for each function. See HED disposition.



Log Number 014

200  
Form 344-22-4228

[illegible]



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION I-01 Labeled per DD-LAB-1

I-02 Labeled per DD-LAB-1 I

I-03 & I-04 Label per DD-LAB-1 CN 1887 WGH 10-30-85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 015HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
JOE KELEMEN			6/3/83
A. HED TITLE <u>LABELING + TAGGING CONVENTION</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
<u>ZI-1233-2</u>	<u>ROD POSITION INDICATOR</u>	<u>I-03</u>	
<u>-4</u>			
<u>-6</u>			
<u>-8</u>			
<u>-12</u>			
<u>-16</u>			
<u>-9</u>			
<u>-13</u>			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>1) INCOMPLETE INSTRUMENT NUMBERING</u> <u>IS GIVEN (ONLY THE LAST DIGIT IS LABELED). 2) NO FUNCTION LEGEND TAG</u> <u>IDENTIFICATION IS SHOWN FOR ROD POSITION INDICATORS.</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION Label instrument & functionally label  
per DD-LAB-1 CN 1887 WCH 10-30-85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 010

Form 344-22 4228

REVIEWER NAME

JOE KELEMEN

DATE

6/3/83

A. HED TITLE LABELING + TAGGING CONVENTION

B.

ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
<u>ZI-1233-17</u>	<u>ROD POSITION INDICATOR</u>	<u>I-03</u>	
<u>-20</u>			
<u>-26</u>			
<u>-32</u>			
<u>-21</u>			
<u>-27</u>			
<u>-33</u>			
<u>-22</u>			

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) 1) INCOMPLETE INSTRUMENT NUMBERING  
IS GIVEN (ONLY THE LAST DIGIT IS LABELED). 2) NO FUNCTION LEGEND TAG  
IDENTIFICATION IS SHOWN FOR ROD POSITION INDICATORS.

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE  
LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION See HED-015 with 10-30-85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 017HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
JOE KELEMEN			6/3/83
A. HED TITLE <u>LABELING + TAGGING CONVENTION</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
ZI-1233-28	ROD POSITION INDICATOR	I-03	
-34			
-1			D-69
-3			
-5			
-7			
-10			
-14			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>1) INCOMPLETE INSTRUMENT NUMBERING IS GIVEN (ONLY THE LAST DIGIT IS LABELED). 2) NO FUNCTION LEGEND TAG IDENTIFICATION IS SHOWN FOR ROD POSITION INDICATORS.</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION See HED-015 WCH 10-30-85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		





## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 018HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME

JOE KELEMEN

DATE

6/3/83

A. HED TITLE LABELING + TAGGING CONVENTION

B. ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO.
ZI-1233-18	ROD POSITION INDICATOR	I-03	
-11			
-15			
-19			
-23			
-29			
-35			
-24			

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) 1) INCOMPLETE INSTRUMENT NUMBERING IS GIVEN (ONLY THE LAST DIGIT IS LABELED). 2) NO FUNCTION LEGEND TAG IDENTIFICATION IS SHOWN FOR ROD POSITION INDICATORS.

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION See HED-015 10-30-85 WCH

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 019

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME <b>JOE KELEMEN</b>		DATE <b>6/3/83</b>	
<b>A. HED TITLE LABELING + TAGGING CONVENTION</b>			
<b>B.</b>			
ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
<b>ZI-1233-30</b>	<b>ROD POSITION INDICATOR</b>	<b>I-03</b>	
-36			
-25			
-31			
-37			
↓	↓	↓	
<b>C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) 1) INCOMPLETE INSTRUMENT NUMBERING IS GIVEN (ONLY THE LAST DIGIT IS LABELED). 2) NO FUNCTION LEGEND TAG IDENTIFICATION IS SHOWN FOR ROD POSITION INDICATORS.</b>			
<b>D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR _____</b>			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION SEE HED-015 WCH 10-30-85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 021

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-LAB-1 CN-1887*  
*WCH 10-30-85*

TEAM ACTION		
TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 022

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Instrument no longer required - delete*  
*CN-1887 WCH 10-3-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0023

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME <b>RON GARRETT</b>			DATE <b>6/7/83</b>
A. HED TITLE <b><u>LABELING &amp; TAGGING CONVENTION</u></b>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
<b>HS-1102-1</b>	<b>RESERVE SHUTDOWN SWITCH</b>	<b>I-03</b>	<b>A-46</b>
<b>HS-1104-1</b>	↓	↓	<b>A-46</b>
<b>HS-1102-2</b>			<b>A-46</b>
<b>HS-1104-2</b>			<b>A-46</b>
<b>HS-22149</b>	<b>LOOP PRESELECTED FOR DUMP SWITCH</b>	↓	
<b>HS-9330</b>	<b>MANUAL SCRAM SWITCH</b>		<b>A-76</b>
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <b><u>INSTR. NUMBERING AND POSITION</u></b> <b><u>LETTERING ON SWITCH PLATE IS TOO SMALL, SHOULD BE 5/32"</u></b>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *All relabel per DD-SWI-1 & DD-LAB-1 CN 1887.  
HS-22149 relocate to I-05 CN-1887, relabel per  
DD-SWI-1 & DD-LAB-1 CN 1890 10-30-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 024

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Relabel per DD-SWI-1 & DD-LAB-1 CN 1887*  
*WCH 10-30-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 025

Form 344-22-4228

REVIEWER NAME			DATE
RON GARRETT			6/8/83
A. HED TITLE LABELING & TAGGING CONVENTION			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
ZI-1202	REGULATING ROD POSITION INDICATOR	I-03	B-85
NR-1199	NUCLEAR RECORDER	↓	A-26
XR-11262	↓		A-26
FR-11262			A-26
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) RECORDER & INDICATOR HAS NO FUNCTION TAG			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION Relocate to I-09. Functionally label per  
DD-LAB-1 CN-1878. 11-8-85 WCH

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 029

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
JOE KELEMEN			6/20/83
A. HED TITLE LABELING & TAGGING CONVENTION			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
NIC-1199	FLUX CONTROLLER	I-03	G-03
HS-1246	AUTO/MANUAL MODE SELECTOR SWITCH	↓	G-03
NDS-1199	ROD RUNBACK CONTROLS		
NIM-1199	CHAMBER LINEAR DEVIATION		
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) FLUX CONTROLLER HAS NO INSTR. NUMBER TAG. HS-1246, NDS-1199 AND NIM-1199 ARE PART OF THE FLUX CONTROLLER PANEL AND ALL SHOULD HAVE INSTR. NUMBERS. THE FUNCTION LETTERING IS UNDER SIZED.			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION Functionally label per DD-LAB-1 CN1887 wCH 10/30/85

TEAM ACTION		
TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION Assign instrument number, HS-11464, & label  
per DD-SWI-1 & DD-LAB-1 CN 1887 NCH 11-5-85

TEAM ACTION		
TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 031HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22 4228

REVIEWER NAME <u>RON GARRETT</u>			DATE <u>6/9/83</u>
A. HED TITLE <u>LABELING &amp; TAGGING CONVENTION</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO.
<u>HS-1220</u>	<u>ROD SELECT - UNITS</u>	<u>I-03</u>	<u>D-77</u>
<u>HS-1221</u>	<u>ROD SELECT - TENS</u>		<u>D-77</u>
<u>HS-1224</u>	<u>ODD-EVEN GROUP SELECT</u>		<u>D-76</u>
<u>HS-1225</u>	<u>ODD GROUP SELECT</u>		<u>D-76</u>
<u>HS-1226</u>	<u>EVEN GROUP SELECT</u>		<u>D-76</u>
<u>HS-1237</u>	<u>ROD GROUP SEQUENCE</u>		<u>D-77</u>
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>INSTR., FUNCTION &amp; POSITION LETTERING</u> <u>ARE TOO SMALL, SHOULD BE 3/16"</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION HS-1220, 1221, 1224, 1225, & 1226 no longer  
required, system function revised, delete. HS-1237  
label per DD-SWI-1, CM 1887 10-30-85 WCH

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 032

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-SW1-1 & DD-LAD-1*  
*CN 1887 10-30-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Assigned instrument numbers HS-1269 & HS-1270  
Functionally label per DD-SWI-1 & DD-LAB-1 EN1887  
11-8-85 WCH.*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 037HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DP-SW11-1 & DP-LAP-1*  
*CN 1887 10-30-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
Frank Llanas			6-14-83
A. HEAD TITLE LABELING + TAGGING CONVENTION			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
HS-1227	hand switch no. <del>Identified</del>	I-03	
HS-1260	IDENTIFIED 11/25/85 GDB	I-03	
HS-1259	↓	I-03	
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) Instrument have no Indicating tags on them			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-SW11-1 & DD-LAB-1*  
*CN 1887 10-30-85 WCH*

TEAM ACTION		
TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

Form 344-22-4228

REVIEWER NAME

Frank Hannas

DATE \_\_\_\_\_

6-5-83

A. HED TITLE LABELING + TAGGING CONVENTION

8.

### ITEMS INVOLVED

ITEM TYPE

## NOMENCLATURE

LOCATION

INSTRUMENT  
DATA FILE NO.  
PHOTO NO.

NI-1199

AVERAGE 11/25/85 GDB  
~~Severe~~ neutron  
Indicator

I-03

C-73

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)

has no I.D. or function tags.

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Replace with digital indicator. Functionally label per DD-LAB-1 11-8-85 WCH.*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 040

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-SWI-1 CN 1007*  
*10-30-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-SWI-1 CN1887 10/10/85 wch*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 042

Form 344-22-4228

REVIEWER NAME

Frank Llanas

DATE \_\_\_\_\_

6-14-83

A. HED TITLE Labeling convention

8.

ITEMS INVOLVED

ITEM TYPE

## NOMENCLATURE

LOCATION

INSTRUMENT  
DATA FILE NO.  
PHOTO NO.

HS-1245

## Selector Switch

F-03

D-77

### C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)

Lettering on In about too small  $\frac{1}{2}$  should  
be  $\frac{3}{16}$  setting

Handswitch also too small should be  $\frac{3}{4}$ "

8/29/89

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Switch no longer required - delete CN-1887*  
*10-30-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 044

## HUMAN ENGINEERING DISCREPANCY EVALUATION

HEDE - 1

Form 344-22-4228

REVIEWER NAME Frank Llanas			DATE 6-14-83
A. HED TITLE Labeling and Tagging convention			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO.
HS-21431	<del>selector</del> selector switch	I-03	D-75
21-21471	Lights	I-03	
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)			
The Label HS-21431 is not in or on the switch. Lettering on Instruments are 1/8", which are too small and should be replaced with 3/16 Letters. 21-21471 letters are 1/8 and should also be 3/16.			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-SWI-1 & DD-LAB-1*  
*CN 1387 10-30-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 045

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-SWI-1 & DD-LAB-1 CN1887*  
*10-30-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-LAB-1 CN-1887 10/30/85 WCH*

TEAM ACTION		
TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0132

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME		DATE	
RON GARRETT		6/23/83	
A. HED TITLE <u>HANDSWITCH LABELING</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
HS-11219-1	RES SH DN. TEST SW GP1	I-03	A-46
HS-11219-2	RES SH DN. TEST SW GP2	I-03	A-46
HS-9139-1	HYD. OIL SW. LOOP1	I-06 SECT. 1	B-57
HS-9140-1	HYD OIL SW. LOOP2	↓	B-57
HS-31184	BFPT. 1A ABOVE SEAT DRAIN		
HS-31185	BFPT 1A BELOW SEAT DRAIN		
HS-31186	BFPT 1A 1ST STAGE DRAIN		
HS-31187	BFPT. 1C ABOVE SEAT DRAIN		
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>ALL OF THE ABOVE HANDSWITCHES DO NOT HAVE A TAG SHOWING POSITION FOR SWITCH.</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *HS-11219-1-2 functionally label per DD-SWI-1 CH1887 10/30/85 WCH*

*~~HS-9139-1 and HS-9140-1 functionally label per DD-SWI-1 CH1887 10/30/85 WCH~~*

*HS-9139-1 AND HS-9140-1 FUNCTION DELETED PRECLUDING LABELS.*

*RECORDED NOTE 11/25/85 GDB*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0280

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

*Deviation from stereotype could result in incorrect operating sequence.* *4/6/84*

*Note*

*Run Position doesn't actually energize equipment, but rather removes inhibit or inhibits certain system actions under operating modes.*

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Switch provides permissives to PPS system in Fuel Loading & Run. Safest operation is to go from OFF to either mode. CN 1887 11-5-85 WCH*  
*No action required 11-27-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0315

## HUMAN ENGINEERING DISCREPANCY EVALUATION

HEDE - 1

Form 344 22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED DELAY IN INITIATING  
CORRECTIVE ACTION UNTIL DETERMINATION OF CAUSE OF 'PWA' ALARM.

F. LIST THE CONSEQUENCES OF OPERATOR ERROR

G. CLASSIFICATION

H. CORRECTIVE ACTION OPTIONS INSTALL AN ALARM ON I-03A THAT ACTUATES  
FROM A HIGH FLUX (120%) CONDITION ONLY.

I. DISPOSITION Install betalarm on I-03 to indicate specific Rod  
Withdraw Prohibit condition. CN 1887 11-7-85 WCH

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



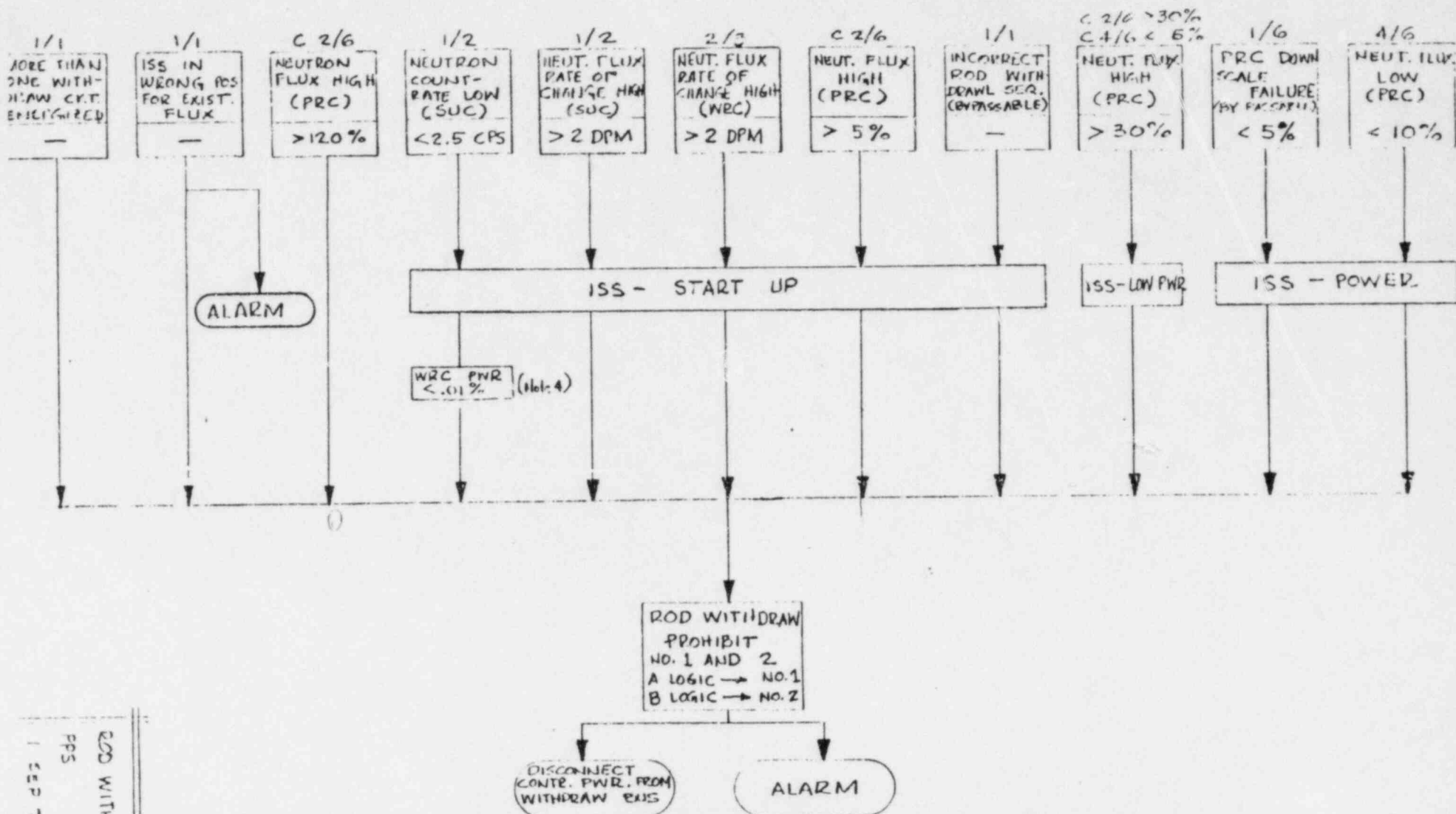
## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0315HUMAN ENGINEERING DISCREPANCY EVALUATION  
INVESTIGATIVE INFORMATIONAL RECORD

REVIEWER NAME <u>Assessment team</u>				DATE <u>4-23-84</u>	
A. HED TITLE <u>absence of Indication</u>					
B. ITEMS INVOLVED					
ITEM	LOC.	DESCRIPTION	E-1203	P & I NO.	
<u>I-03A-2-2</u>	<u>I-03</u>	<u>Red Withdrawal Prohibit</u>	<u>P-2063</u>	<u>IC-12-2</u>	
			<u>EL 163-0011</u>		
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>Red withdrawal Prohibit</u>					
<u>alarm on I-03-2-2 is a common alarm</u>					
<u>with multiple input.</u>					
EXTRINSIC or High Rate <u>STARTUP</u> CONDITIONAL DESCRIPTION OR PURPOSE:					
1st light = $flury > 120\%$					
2nd light = $F > 5\% \cdot Lp \cdot F < 25\%$					
$+ R_4 > 25\% +$					
$F < 5\% + \Sigma Fpc \cdot 20dpm \cdot$					
$F > 5cps$					
3rd light $Lp + ST + \{F > 5\% + Bp \dots F > 5\% \dots\}$					
4th light $\{R_4 \cdot F < 25\% \} \dots$					
5th light $R_4 + Lp + RSEQ$					
6th Discrete logic					
Red light - Voltage test to monitor & V/A ISS.					





- Notes:
- 1.) SUC: Start Up Channel WRC: Wide Range Channel PRC: Power Range Channel
  - 2.) "C 2/6" Denotes correct two of six logic
  - 3.) By passing one failed PRC results in a single channel scram for the associated channel
  - 4.) HV disconnected from SUC 1 and 2 when WRC power reaches .01%
  - 5.) ISS Positions:
 

0 - 5%	START UP
5% - 30%	LOW POWER
30% - 100%	POWER

ROD WITHDRAWL PROHIBIT LOGIC  
FPS  
FT ST VEAIN  
SEP 72  
WLT



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0496

Form 344-22 4228

REVIEWER NAME <u>D. Glena / S. Shaffer</u>			DATE <u>11/17/83</u>
A. HED TITLE <u>Inst. or Equip not required in Control Room</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
Recorder	NR-1199	I-03	A-26
	FR-11262		A-26
	XR-11262		A-26
<u>Reference HED # 0661</u> <u>Reference Task Analysis Walkdown</u> <u>of R. Shutdown Procedure</u>			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)			
<u>NR-1199 was selected &amp; installed for</u> <u>test services use and doesn't provide</u> <u>the operator with needed or useable</u> <u>information</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			
<u>None -</u>			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

Remove NR-1199, XR-FR 1199 from CR,  
and locate in Tech Services

Indications are that this recorder is not used by  
operators - Tech Services utilizes Info & Prefers  
the Control Room location for Recorder Service only.

I. DISPOSITION ~~REEVALUATED - NO Disposition Requested~~

Relocate to I-09 CN 1878. Replace with digital indicator  
for operator information. CN 1887 10-31-85 WCH

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0997HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME <u>D. Glenn / S. Shater / M. Madelon</u>			DATE <u>11/17/83</u>
A. HED TITLE <u>Instrument location</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
<u>Hopper Actuation</u>			
<u>Switches</u>	<u>HS-1102-1, -2</u>		<u>A-46</u>
	<u>HS-1104-1, -2</u>	<u>I-03</u>	<u>A-46</u>
<u>Reference Task Analysis Walkthru</u> <u>of Rx Shutdown Procedure</u>			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>Seven Group switches are located below</u> <u>the thirty group switches.</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR <u>Rx Shutdown</u>			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

*Rebate (Switch 7 & 30 group Hs)*

I. DISPOSITION *Functionally group & label per DD-SWI-1*  
*CN-1887 11-8-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 2498HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME <u>D. Glenn / S. Shaper</u>			DATE <u>11/17/83</u>
A. HED TITLE <u>Inst on Equip not required in Control Rm</u> <u>(erroneous indications)</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
<u>"Reactor On" light</u>	<u>XI-93128</u>	<u>I-03</u>	
<u>See HED 504</u>			
<u>Reference: Task Analysis Walkthrough of</u> <u>Rx Shutdown Procedure</u>			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)			
<u>Light serves no useful or meaningful purpose</u> <u>to the Operator</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			
<u>None</u>			



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS

*Remove "React On" light from Control Board*

I. DISPOSITION *Not required - delete CN1887 10-31-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0538

## HUMAN ENGINEERING DISCREPANCY EVALUATION

HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
<i>D. Glenn / M. Maddox</i>			<i>12-21-83</i>
A.	HED TITLE <i>Instrument Sealing</i>		
B.	ITEMS INVOLVED		
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
<i>PI-1108, 09, 10</i>	<i>Reactor Pressure</i>	<i>I-03</i>	<i>F-21</i>
<i>PI-1151-1.</i>	<i>Reactor Pressure Low trip</i>	<i>I-03</i>	<i>F-21</i>
<i>2-1 .</i>	" " "		<i>F-21</i>
<i>3-1 .</i>	" " "		<i>F-21</i>
<i>PI-1151 .</i>	<i>Reactor Pressure High trip</i>		<i>F-21</i>
<i>52 .</i>	" " "		<i>F-21</i>
<i>53 .</i>	" " "		<i>F-21</i>
<i>Reference - Task Analysis Walkthrough 12/13 &amp; 15/83 "Containment"</i>			
C.	PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)		
<i>PI-1108, 09, 10 have 0-100 increment scales with PSIA X 10 multiplier stated. Other associated indicators as well have 0-1000 PSIA Scales.</i>			
D.	LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR		

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Replace PI-1151-1, 2-1, 3-1, & PI-1151, 2, & 3 with graphic display including PI-1108, 09, & 10. Retain analog indicators for PI-1108, 09, 10. Rescale per DD-AIS-1 CN 1887 WCH 11-15-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0556

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME <b>J. KELEMEN</b>			DATE <b>1/30/84</b>
<b>A. HED TITLE</b> <u><b>INSTUMENT SCALING + USEABILITY</b></u>			
<b>B. ITEMS INVOLVED</b>			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO.
<b>PI-11215.</b>	<b>WESTINGHOUSE 252 INDICATORS</b>	<b>I-01</b>	<b>F-16</b>
<b>PI-21243.</b>		<b>I-02</b>	<b>A-79</b>
<b>PI-21244.</b>		<b>I-03</b>	<b>D-69</b>
<b>ZI-1233-1 THRU-37</b>		<b>I-06</b>	<b>C-75, B-78</b>
<b>FI-3101.</b>			<b>C-87, C-79</b>
<b>FI-3102.</b>			<b>F-22</b>
<b>FI-3103.</b>			<b>A-93</b>
<b>PI-8206.</b>			
<b>LI-4505.</b>			
<b>FI-11263.</b>			
<b>C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)</b> <u><b>DISPLAYS DO NOT HAVE UNIFORM DIVISION MARKINGS OR USUAL NUMERICAL PROGRESSION (IN PARTICULAR THE TOP OF SCALES). (REFERENCE CRS-44-1 SURVEY)</b></u>			
<b>ZI-1233-1 THRU-37 <sup>MSM</sup> <del>REF</del> UNITS OF SCALE NOT LABELED</b>			
<b>D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR</b>			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION P1-11215 low scales on indicator PN 1886 tank 36  
T-02 level instruments will be rescaled in accordance with  
DD-AIS-1 per CN 886B.  
ZI-1233-1 thru -37 rescale per DD-AIS-1 CN 1887 11-5-85 WCH

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME		D. Glenn		DATE	1-30-84
A. HED TITLE Instrument Color Coding					
B. ITEMS INVOLVED					
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.		
① Switch Ring Color Code		all Panels	N/A		
② Pushbutton Color Code		"	"		
③ Light & Lamp Color Coding		I-01, I-02, I-05 I-13 "	"		
Design Directive DD-SWI-1 establishes Convention					
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)					
①② Switch Ring & Pushbutton color codes do not follow a convention					
③ Light & lamp color assignments differ from general convention. i.e. Two (2) white lights associated with <del>I-06</del> or I-13 have to do with loop selected instead of Va Posi					
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR					



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION

*CN-1886 ~~11-27-85~~ <sup>11/27/85</sup> corrected applicable color coding discrepancies on I-01*

*CN-1886B will correct applicable color coding discrepancies on I-02.*

*I-03 correct all discrepancies per DD-SWI-1 & DD-ILS-1*

*CN-1887 WCH 11-27-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0559

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME

J. KELEMEN

DATE

1/30/84

A. HED TITLE INSTRUMENT SCALING

B.

ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
PI-2409.	INDICATING METER DISPLAY	I-01	C-84
PI-2410.		I-01	
FI-21249.		I-02	F-19, F-20
FI-21250.			F-19, F-20
FI-2297.			F-19, F-20
LI-21129.			F-19, F-20
FI-2171.			C-65, C-66
FI-2172.			C-64, C-70
FI-2173.			C-64, C-70
FI-2174.			C-64, C-70
FI-21445.		I-02	A-79, C-73
NI-1133-3.		I-03	A-79, C-73
NI-1134-3.			C-73
NI-1135-3.			C-73
NI-1136.			C-73
NI-1137.			C-73
NI-1138.			C-73

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) METER SCALES DO NOT HAVE NINE OR LESS GRADUATION MARKS BETWEEN NUMERAL INTERVALS. VIOLATES PRINCIPLE THAT DISPLAYS SHOULD HAVE SCALE DIVISIONS WITH USUAL NUMERICAL PROGRESSIONS. (REFERENCE CRS-44-2 SURVEY)

See HED 0600 for Functional Grouping of FI-21445

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *PI-2410, PI-2409 corrected per CN#1886*

*I-02 listed instruments will be resold in accordance with  
RD-AIS-1 per CN#1886B. FI-21445 will be resold also when  
relocated to I-03 per CN#1897.*

*NZ-1133-3, 34-3, 35-3, 36, 37 & 38 replace with digital indicator  
& selector switch CN1887 10-31-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *NI-1199 replace with digital indicator. NIC-1199 rescale  
per DD-AIS-1 11-7-85 WCH*

*PI9105 and PI9106 move to IOGA as part  
of the hydraulic power system functional groups.  
New dial cards per DD-AIS-1 and new functional  
labels per DD-LAB-1 Rec 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator





## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0564

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Replace with bar graph indicators per DD-AIS-1*  
*CN 1887 10-31-85-WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0569HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4220

REVIEWER NAME			DATE
J. KALEMEN			11/31/84
A. HED TITLE <u>INSTRUMENT SCALING &amp; USEABILITY</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
PI-1105	WESTINGHOUSE SS2 INDICATORS ↓	I-03	
PI-1109		↓	F-21
PI-1110		I-03	
PI-91141		I-05	F-21, D-08
PI-91142			
FI-22119			C-96, D-03
FI-22120			
SI-2105			D-02, D-11
SI-2106			
SI-2111			↓
SI-2112		I-05	
FI-7320	↓	I-15	D-01, E-65
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>DISPLAYS HAVE MULTIPLIER NUMERALS</u> <u>ORIENTED IN A VERTICAL POSITION RATHER THAN READING FROM LEFT</u> <u>TO RIGHT HORIZONTALLY. (REFERENCE CRS-45 SURVEY)</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *PI-1108, 09, & 10 rescale per DD-A15-1 CN1887 11-15-85 WCH  
PI 91141 and PI 91192 move to IOGA as part of hydraulic  
power system functional group. New functional labels  
per DD-LAB-1 and new dial cards per DD-A15-1 Dec 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0571HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344 22-4228

REVIEWER NAME			DATE
J KELEMEN			1/31/84
A. HED TITLE <u>INSTRUMENT SCALING + USABILITY</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
LI-21119.	WESTINGHOUSE 252 INDICATOR	I-C2	
LI-21129.			F-20
LI-21121.			
LI-21122.			C-65, C-66
LI-21123.			
LI-21124.		I-C2	C-64, C-70
NI-1131-1.		I-03	
NI-1132-1.		I-03	C-72
RI-2203.		I-05	
RI-2204.		I-05	D-04, D-05
RI-31193.		I-05	
FI-3101.		I-06	D-04, C-75
FI-3102.			
FI-3103.			B-78, C-81
FI-3151-3.			
LI-3144.		I-06	F-11, F-01
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>DISPLAYS DO NOT HAVE NUMBERS</u> <u>ON BOTH ENDS OF THE SCALE,</u>  <u>(REFERENCE CRS-46 SURVEY)</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *LI-21121/22/23/24/29 will be replaced in accordance with DD-AIS-1 per CN#1886B. LI-21118 is deleted per HED# 0518. NI-1131-1 & NI-1132-2 replace with bar graph indicators, scale per DD-AIS-1 2141887 10-31-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0591

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION XI-22147 no longer required - delete. ZI-1204 replace  
digital display CN1887 10-31-85 WCA

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0597HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME <u>D. Glenn</u>			DATE <u>2/3/84</u>
A. HED TITLE <u>Instrument Labeling</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
<u>HS-1131-2</u>	<u>Channel Select</u>	<u>I-03</u>	<u>C-51</u>
<u>HS 1133-1</u>	<u>Channel Select</u>	<u>I-03</u>	<u>C-52</u>
<u>NI-1131-2</u>	<u>Rate of Change</u>	<u>I-03</u>	<u>D-67</u>
<u>NI-1132-2</u>	<u>Log &amp; Power channels</u>		<u>D-67</u>
<u>NI-1133-2,3,-1</u>			<u>C-72, D-68, C-73</u>
<u>NE-1134-2,3,-1</u>			<u>C-72, D-68, C-73</u>
<u>NI-1135-2,3,-1</u>			<u>C-72, D-68, C-73</u>
<u>N-1136,37,38</u>	<u>Power Range</u>		<u>C-73</u>
<u>These Nuclear Instruments Marked in Arabic I-10</u>			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>Start up, Wide range &amp;</u>			
<u>Power (Nuclear Channels) are marked in</u>			
<u>Arabic numbers, while the corresponding references</u>			
<u>on <del>I-03</del> are in Roman numerals</u>			
<u>4/2/85</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Maintain Roman numerals on I-03 & change arabic numerals on I-10 to Roman (CN 1895). This is consistent with industry practice 11-7-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0607

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME <span style="float: right;">DATE</span>			
<u>R. GARRETT</u> <span style="float: right;"><u>2/8/84</u></span>			
A. HED TITLE <u>INSTRUMENT COLOR CODING</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
HS-1260	SLACK CABLE RESET	I-03	D-77
HS-93475	SCRAM CNT. BYPASS RED DRIVE MCC#2 ALCEIC		
HS-93476	" " " " " " " " B "		
HS-93477	" " " " " " " " A "		
HS-93478	" " " " " " " " B "	↓	↓
HS-1257	TIME LIMIT TRIP	I-04	
NO INSTR. "	OVER LD. BYPASS	I-05	E-55
" "	" " "	↓	E-58
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>COLOR OF RINGS ON HS-1260 &amp; HS-93475/6/7/8</u>			
<u>DO NOT CONFORM TO DD-SWE-1, COLOR OF ILLUM. PUSHBUTTON HS-1257 DOES NOT CONFORM TO DD-SWE-1</u>			
<u>OVER LD. BYPASS ILLUM. PUSHBUTTON COLOR DOES NOT CONFORM TO DD-SWE-1</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FRGM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *HS-1260 change ring per DD-SWI-1. HS-93475, 76, 77,  
# 78 replace with single switch per DD-SWI-1. CN 1887.  
HS-1257 <sup>deleted</sup> replaced per CN 1876 10-31-85 WCA*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

Basis For HED on Button Ring Color  
discrepancy for HS-93475, 6, 7, 8

These Pushbuttons are part of the  
Rod Insertion Override System which  
by-passes the Contactors K50, 51 (K60, 62)

These are not Stop Functions (nor PPS).  
It is possible to postulate a reset or  
enable function however that Classification  
would be subject to interpretation.

It is more advantageous to classify place  
these pushbuttons in the "Non-descript"  
category and provide sufficient labeling as  
to purpose and function.

References DD-SWI-1  
E1203 P398  
ELJ163-0011

WJH 2/6/84





E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Switch operators ~~for~~ for HE COMP A & B reset & trip  
push button switches changed to meet DD-SWI-1 SKA 10/23/85  
by CN-1886*

*Switch operators for HS-2137/38 push ~~button~~ button switches  
changed to meet DD-SWI-1 by CN-1886B. SKA 10/24/85*

*HS-931251617 & HS-1270 change switch rings per DD-SWI-1*

*CN 1887 10-31-85 WCH Assign instr. no. HS-1270 to current trip reset 11-27-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CNDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0610

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Install new dial card per <sup>DO</sup>AIS-1 CAL 1887 11-12-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0629

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Relocate to I-09 & rescale CN-1878 11-8-85 WCH*  
*Function incorporated in steam generator display*  
*11-27-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator





## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0652

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

2389  
2312

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

REMAINING CHARTS & SCALES TO BE CORRECTED AS A LAST  
ITEM BY CN-2177 (OTHER CN'S CHANGE  
RECORDERS & MAY AFFECT RANGES, SCALES & ETC)

I. DISPOSITION *Recorders remaining after all model changes and  
other corrective actions will have scale & chart coordinated by CN-2177*  
XR-3390-1, TR-4637, TR-4638, TR-2256, PDR-73335, PDR-73440 then PDR-73452, *11/25/85*  
TR-73335 & TR-73440 then TR-73452 had charts replaced in CN1878. M.H. *11/27/85*

*Note - New recorders being provided have been selected/planned  
to address chart problems cited on this HED 11/27/85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0652HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE-1

PAGE 1 OF 3

B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
PR-2559	RECORDERS	I-01	A-48
FR-2339		I-01	A-84
FR-23112		I-01	A-84
PR-2267 (G)		I-05	D-38
FR-2239 (R)		I-05	D-38
PR-2268 (PUR.)		I-05	A-33
FR-2240 (R)		I-05	A-33
XR-3390-1		I-06	B-74
FR-8422		I-06	B-70
ZR-4210 (R)		I-06	
ZR-4210 (G)		I-06	
FR-4101 (G)		I-06	B-82
FR-4101 (R)		I-06	B-82
RR-73437		I-14	E-11
PDR-11226 (R)		I-13	A-57
FR-7216 (G)		I-13	A-57
TR-4637 (R)		I-13	A-55
TR-4637 (G)		I-13	A-55
TR-4637 (B)		I-13	A-55
TR-4638 (R)		I-13	A-56
TR-4638 (G)		I-13	A-56
TR-4638 (B)		I-13	A-56
TR-2256		I-03	A-75
ER-92243 (R)	✓	I-09	



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0652HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

PAGE 2 OF 3

B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
XR-93574-3(R) RAIN	RECORDERS	I-09	
XR-93574-3(BL) DEW. P.T.C.			
XR-93574-3(R) AMB. T			
XR-93574-3(BL) DT			
<del>XR-93574-3(B) J.K.</del>			
<del>XR-93574-3(B)</del>			
PDR-73335(BL)			
TR-73335			
PDR-73440			
TR-73440			
PDR-73441			
TR-73441			
PDR-73442			
TR-73442			
PDR-73443			
TR-73443			
PDR-73444			
TR-73444			
PDR-73445			
TR-73445			
PDR-73446			
TR-73446			
PDR-73447			
TR-73447(BL)		I-09	



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0652

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

PAGE 3 OF 3

[illegible]



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0653HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME <b>JOE KELEMEN</b>			DATE <b>3/2/84</b>
<b>A. HED TITLE</b> <u><b>INSTRUMENT SCALING &amp; USEABILITY</b></u>			
<b>B. ITEMS INVOLVED</b>			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
<b>SEE ATTACHED H.E.D. LIST</b>			
<b>C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)</b> <u><b>RECORDERS DO NOT HAVE INDEX SCALES AND/OR SCALE POINTER AND/OR APPROPRIATE MARKINGS FOR THE PARAMETER(S) BEING MEASURED AND/OR PROCESSOR ENGINEERING UNITS CONSISTENT WITH THE INTEND USE.</b></u>  <u><b>FR-4101 range insufficient - Discharge rates to 3400 gpm</b></u> <u><b>(REF. CRS-59-1 THRU CRS-63 SURVEY)</b></u>			
<b>D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR</b> _____			



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION ER1351 & 52, ER6375, LR4605, PR-2559, ER2339, ER23112 off spec with  
marked on CN1882, SCALES & PAPER COORDINATION TO be Accomplished  
AS A LAST item by CN-2177 (DUE TO POSSIBLE INTERIM AFFECTS  
OF OTHER CHANGES)

Continued on attached sheet

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

## HED 653 RESOLUTION Continued

PR-1108 - Rescaled (Added PSIA) in CN1878

NR-1133-2 - Reevaluated discrepancy and found it not to be a discrepancy.

TR-31115 - Points Required for operation will be displayed by a digital indicator installed in CN1891. TR31115 will be changed out to a new style recorder, moved to IO9, Relabeled and Rescaled in CN1878

CR-3390-2 - Rescaled in CN1878

XR-3390-1 - Rescaled in CN1878

GR-5154 - changed out to a new style recorder, moved to IO9, Relabeled and rescaled.

TR-92105 - changed out to a new style recorder, moved to IO9, Relabeled and rescaled.

TR-4637 - Added a pointer for the fixed scale in CN1878

TR-4638 - Added a pointer for the fixed scale in CN1878

PDR-73448 - changed out to a new style recorder, moved to IO9, Relabeled and rescaled.

FR-2222 - changed out to a new style recorder, moved to IO9, Relabeled and rescaled.

Mike Anderson 11/19/85



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0653

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO.
FR-6351 (B)	RECORDER	I-01	A-81
FR-6352 (R)			A-81
FR-6315 (G)			A-81
LR-4605 (R)			A-80
LR-4605 (G)			A-80
PR-2559			A-48
FR-2339 (R)			A-49
FR-23112 (G)		↓	A-49
PR-1108		I-03	A-74
NR-1133-2		↓	A-47
PR-2267 (G)		I-05	D-38
FR-2239 (R)			D-38
PR-22129 (B)			A-28
TR-22122 (R)			E-51
TR-22121 (B)			F-51
MR-9306 (R)			A-41
RR-2263 (B)			A-41
RR-2264 (G)			A-41
PR-22130 (R)			F-52
PR-2262 (PUR)			A-33
FR-2240 (R)		↓	A-33
TR-31115 PT 4		I-06	B-72
TR-31115 PT 5		↓	B-72
TR-31115 PT 7	↓	↓	B-72



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0654

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION PR-1108 & NR-1199 alternate instr. changed CN1887 10/31/85 WCM  
PR-1108, NR-1199, TR-4637 & TR-4638 AR. used for historical data and  
are being moved to IO9, therefore, they will not be located  
adjacent to similar instruments per CN1878 M. Wilson 11/27/85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0654

[illegible]



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0655

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME

JOE KELEMEN

DATE \_\_\_\_\_

3/6/84

A. HED TITLE INSTRUMENT SCALING & USEABILITY

8.

ITEMS INVOLVED

ITEM TYPE

## NOMENCLATURE

LOCATION

INSTRUMENT  
DATA FILE NO.  
PHOTO NO.

SEE ATTACHED H.E.D. LIST

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <sup>RECORDERS</sup> SCALES ARE NOT CLEARLY READABLE AND RESOLVEABLE FROM THE OPERATING POSITION.

(REF. CRS-59-1 THRU CRS-63 SURVEY)

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION ~~FR-6351/2, FR-6375, LR-4605/6, FR-23112, FR-23112~~

FR-6351/2, FR-6375, LR-4605/6, FR-23112 FUNCTIONAL LABELING

~~PLAT~~ AND PARAMETER MARKINGS CORRECTED PER CN-1886. INDEX

NAVALY scales & Paper Coordination To be Accomplished by CN-2177

NR-1131/NR-1133-1 relocate CN-887. TR-2256 relocate CN-1879 10-31-85 WCH

Continued on attached sheet

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

HED GSS Resolution Continued

TR-2256 - Rescaled in CN1878

GR-5154 - Changed out to a new style recorder, moved to IO9.  
Rescaled and relabeled in CN1878.

TR-4637 - Reevaluated - no discrepancy

TR-4638 - Reevaluated - no discrepancy

PDR-73348 - Changed out to a new style recorder, moved to IO9.  
Rescaled and relabeled in CN1878

Mike Henderson 11/19/85



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0655

SHEET 1 OF 2

B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
FR-6351 (B)	RECORDER	I-01	A-81
FR-6352 (R)			A-81
FR-6375 (G)			A-81
LR-4605 (R)			A-80
LR-4605 (G)			A-80
FR-23112 (C)		Y	A-84
NR-1131 (R)		I-03	E-50
NR-1131-1 (R)			E-50
NR-1131-1 (B)			E-50
IR-2256		Y	A-75
PR-2267 (G)		I-05	D-38
FR-2239 (R)			D-38
PR-22127 (R)			D-39
MR-9306 (R)			A-41
RR-2263 (R)			A-41
RR-2264 (G)			A-41
PR-22130 (R)			E-52
PR-2268 (P4R)			A-33
FR-2239 (R)			D-38
TR-22122 (R)			E-51
TR-22121 (B)			E-51
FR-2240 (R)		Y	A-33
FR-8422	Y	I-06	B-70



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0656

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION ~~TR-2227 & TR-2255~~ <sup>SAFETY</sup> ~~MOVED TO I-09~~ <sup>11/14/85</sup> MOVED TO I-09. Recorder  
Scale & Paper Coordination To be per CN-2177  
(Function of TR-2227 & TR-2255 To be replaced by Graphics Display on I-04)  
NR-1133-2 re/peaks I-09 CN 1878, scale coord. CN 2177 11-18-85 WCH

Continued on attached sheet

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator



## HED 656 Resolution Continued

- TR-2227 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878.
- TR-2255 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878.
- NR-1133-2 - Rescaled in CN1878
- TR-31115 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878
- GR-5154 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878
- TR-5154 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878
- TR-92105 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878
- TR-2322 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878
- TR-2321 - Removed from the control room in CN1878  
Mike Hederson 11/19/85



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0661

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
JOE KELEMEN			3/7/84
A. HED TITLE INSTRUMENT SCALING & USEABILITY			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
NR-1199 (1) PT.	RECORDER	I-03	A-26
XR-11262 (2,3,4) PTS.	↓	↓	A-26
FR-11262 (5) PT	↓	↓	A-26
Ref HED-0496			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) ① RECORDER CHART DOESN'T HAVE NUMERICAL MARKINGS. (REQUIRES OPERATOR TO COMPARE CURRENT RECORDING WITH A POSTED "KEY" IN ORDER TO RESOLVE RECORDED VALVES. ② CURRENT VALVES ARE NOT VISIBLE TO OPERATOR. (RECORDER CHART MUST BE ADVANCED TO READ CURRENT VALVES.			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION ~~Relocate to IO9 CN 1878 & chart paper~~  
~~coordination by CN 2177 #885 WE #5A.~~ A mass flow indicator  
is being added by CN1887. THIS RECORDER IS NOT AN OPERATOR TOOL AND  
WILL BE USED BY TECH SERVICES. THIS RECORDER PRINTS IT'S OWN CHART AND  
CANT BE CHANGED. IT WILL BE MOVED TO IO9 AND USED FOR HISTORICAL DATA  
ONLY IN CN1878 M. Heleson 4/23/85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0736

Form 344-22-4228

REVIEWER NAME			DATE
Assessment Committee			3/29/84
A. HED TITLE Instrument - Credibility & Usability			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO
HS 1219		I03	D-76
HS 1222		I03	D-76
HS 1223		I03	D-76
HS 1245		I03	N/A <del>DEF</del>
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) 101 drive controls have to be held for long periods at a time			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS

*group rods (3ea) thru a  
single switch*

I. DISPOSITION

*HS-1245 no longer required - delete. Safest condition  
is spring return to stop. No disposition 11-5-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0736

HUMAN ENGINEERING DISCREPANCY EVALUATION  
INVESTIGATIVE INFORMATIONAL RECORD

REVIEWER NAME

D. Glenn

DATE

4/17/84

A. HED TITLE

Instrument - Credibility & Usability

B.

ITEMS INVOLVED

ITEM	LOC.	DESCRIPTION	E-1203	P & I NO.
HS-1219/22/23	I-03	Rod 4/B/C, Actuate	FP-93-I-1-16 (ELT-163-0003)	N/A
HS-1245	I-03	Individual Rod Actuate	FP-93-I-1-16 (ELT-163-0003)	N/A

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)

Rod drive Controls have to be held for long periods at a time

FUNCTIONAL DESCRIPTION OR PURPOSE:





## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0731

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Replace with square status lights per DD-ILS-1*  
*CN 1887 10-31-85 WCH*

TEAM ACTION		
TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0737

HUMAN ENGINEERING DISCREPANCY EVALUATION  
INVESTIGATIVE INFORMATIONAL RECORD

REVIEWER NAME <u>D. GLENN</u>		DATE <u>4/17/84</u>	
A. HED TITLE <u>INDICATING Light Convention</u>			
B. ITEMS INVOLVED			
ITEM	LOC.	DESCRIPTION	E-1203 P & I NO.
<u>HS-1102-1/-2 I-03</u>		<u>Reserve Shutdown</u>	<u>and 300</u>
<u>HS-1104-1/-2 I-03</u>		<u>" " 7 Gey</u>	
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)			
FUNCTIONAL DESCRIPTION OR PURPOSE:			
<p>Relay (CR-1113 <sup>Typ.</sup>) energized which picks all Solenoids in circuit</p> <p>Press</p> <p>Power available applied to circuit (Fuse intact plus test switch in normal)</p> <p>Diagram: A box labeled "CLOSE" and "OPEN" with a circle "R" and a circle "A" connected by an arrow.</p>			

## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0739

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label to clarify per DD-LAB-1*  
*CN1887 10-31-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		





E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-ILS-1 CN 1887*  
*10-31-85 WCH*

TEAM ACTION		
TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0832

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
Assessment Team			4/25/84
A. HED TITLE Instrument - Separation			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
Meters / Controls		I01 / I02 / I03 I05 / I06 / I09 I12 / I15	
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) Multiple meter / control groups have different scales & parameters, with no spacing in between			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION

~~Re group associated indicators into functional groups of not more than 5 and located above associated controls.~~ *Classified Disposition 10/14/85*

*Re grouped associated indicators into functional groups of not more than 5 and located above associated controls.*

*(see attached sheet)*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator

I-03 Reactor pressure indicators replaced by situational display. Nuclear linear range indicators replaced by digital indicator and selector switch. ~~the~~ Rod position indicators remain unchanged. All read same scale & parameter. 11-27-85 CN-1887 WCH

ATTACHMENT A2  
List of All 1-04 HEDs  
&  
Copies of 1-04 HEDs

## HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL BOARD 1-04

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0014	Labeling	1b	1-04	1-9304	1	Label	1887	Functionally label per DD-LAB-1
0033	Labeling	1b	1-04	XI-11139	1	Label	1887	Functionally label per DD-LAB-1
0033	Labeling	1b	1-04	XI-11140	1	Label	1887	Functionally label per DD-LAB-1
0033	Labeling	1b	1-04	XI-11141	1	Label	1887	Functionally label per DD-LAB-1
0033	Labeling	1b	1-04	XI-22147	1	Delete	1887	No longer required - delete.
0033	Labeling	1b	1-04	XI-22148	1	Delete	1887	No longer required - delete.
0034	Labeling	1b	1-04	XI-1247	1	Delete	1887	No longer required - delete.
0034	Labeling	1b	1-04	XI-1248	1	Delete	1887	No longer required - delete.
0034	Labeling	1b	1-04	XI-1249	1	Delete	1887	No longer required - delete.
0034	Labeling	1b	1-04	XI-1250	1	Relabel	1887	Functionally label per DD-LAB-1
0034	Labeling	1b	1-04	XI-1251	1	Relabel	1887	Functionally locate by display
0034	Labeling	1b	1-04	XI-1252	1	Relabel	1887	Functionally label per DD-LAB-1
0043	Labeling	1b	1-04	HS-1212-1	1	Relabel	1887	Relabel per DD-SWI-1
0043	Labeling	1b	1-04	HS-1212-2	1	Relabel	1887	Relabel per DD-SWI-1
0096	Labeling	1b	1-04	Core Graphics	1	Relabel	1887	Reformat selector switch legend
0096	Labeling	1b	1-04	HS-22147-1	1	Delete	1887	Not required - Delete
0096	Labeling	1b	1-04	HS-22147-2	1	Delete	1887	Not required - Delete
0096	Labeling	1b	1-04	HS-22147-3	1	Delete	1887	Not required - Delete
0096	Labeling	1b	1-04	HS-22147-4	1	Delete	1887	Not required - Delete
0096	Labeling	1b	1-04	HS-22147-5	1	Delete	1887	Not required - Delete
0096	Labeling	1b	1-04	HS-22147-6	1	Delete	1887	Not required - Delete
0096	Labeling	1b	1-04	HS-22148-1	1	Delete	1887	Not required - Delete
0096	Labeling	1b	1-04	HS-22148-2	1	Delete	1887	Not required - Delete
0096	Labeling	1b	1-04	HS-22148-3	1	Delete	1887	Not required - Delete
0096	Labeling	1b	1-04	HS-22148-4	1	Delete	1887	Not required - Delete
0096	Labeling	1b	1-04	HS-22148-5	1	Delete	1887	Not required - Delete
0096	Labeling	1b	1-04	HS-22148-6	1	Delete	1887	Not required - Delete
0097	Labeling	1b	1-04	HS-1212-3	1	Relabel	1887	Functionally label per DD-SWI-1
0098	Labeling	1b	1-04	EI-1253	1	Label	1887	Functionally label per DD-LAB-1
0098	Labeling	1b	1-04	EI-1254	1	Label	1887	Functionally label per DD-LAB-1
0099	Labeling	1b	1-04	HS-1212-4	1	Label	1887	Functionally label per DD-SWI-1
0100	Labeling	1b	1-04	HS-11266	1	Label	1887	Functionally label per DD-SWI-1
0503	Operations	3e	1-04			Referred		General training requirements-referred to training
0503	Instruments	2h	1-04	XI-2222 Typ 2	2	Delete	1887	No longer required
				XI-11142/3/4	2	Delete	1887	No longer required



## HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL BOARD 1-04

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHARGE NOTICE	
0506	Labeling	1b	1-04	TDI-22147	1	Delete	1887	No longer required - Delete
0506	Labeling	1b	1-04	TDI-22148	1	Delete	1887	No longer required - Delete
0506	Labeling	1b	1-04	TI-1187	1	Change-out	1887	Replace per DD-AIS-1 & functionally labeled per DD-LAB-1
0506	Labeling	1b	1-04	TI-22147	1	Delete	1887	No longer required - Delete
0506	Labeling	1b	1-04	TI-22148	1	Delete	1887	No longer required - Delete
0506	Labeling	1b	1-04	XI-11139	1	Relabel	1887	Functionally label per DD-LAB-1
0506	Labeling	1b	1-04	XI-11140	1	Relabel	1887	Functionally label per DD-LAB-1
0506	Labeling	1b	1-04	XI-11141	1	Relabel	1887	Functionally label per DD-LAB-1
0506	Labeling	1b	1-04	XI-11142	1	Delete	1887	No longer required - Delete
0506	Labeling	1b	1-04	XI-11143	1	Delete	1887	No longer required - Delete
0506	Labeling	1b	1-04	XI-11144	1	Delete	1887	No longer required - Delete
0506	Labeling	1b	1-04	XI-2222	1	Delete	1887	No longer required - Deleted
0506	Labeling	1b	1-04	ZI-1247	1	Relabel & Change-out	1887	Replace per DD-AIS-1 & functionally label per DD-LAB-1
0506	Labeling	1b	1-04	ZI-1247/8/9	1	Relabel & Change-out	1887	Replace per DD-AIS-1 & functionally label per DD-LAB-1
0506	Labeling	1b	1-04	ZI-1250/1/2	1	Relabel & Change-out	1887	Replace per DD-AIS-1 & functionally label per DD-LAB-1
0591	Instrument	2e	1-04	XI-22147	2	Delete	1887	No longer required - Delete
0607	Instrument	2f	1-04	HS-1257	1	Delete	1887	No longer required - Delete
0644	Labeling	1b	1-04	XI-1247	1	Delete	1887	No longer required
0644	Labeling	1b	1-04	XI-1248	1	Delete	1887	No longer required
0644	Labeling	1b	1-04	XI-1249	1	Delete	1887	No longer required
0644	Labeling	1b	1-04	XI-1250	1	Label	1887	Functionally label per DD-LAB-1.
0644	Labeling	1b	1-04	XI-1251	1	Label	1887	Functionally locate by display.
0644	Labeling	1b	1-04	XI-1252	1	Label	1887	Functionally label per DD-LAB-1.
0742	Instrument	2h	1-04	HS-1212-3	3	Reevaluated	1876	Circuit redesigned
0743	Instrument	2h	1-04	TI-1187	2	Change-out	1887	Replace per DD-AIS-1
0744	Maintenance	4b	1-04	No Instr. #	3	Referred		To Training, GSAR-789
0745	Labeling	1c	1-04	EI-1257	1	Delete	1876	No longer required - Delete
0745	Labeling	1c	1-04	EI-1258	1	Delete	1876	No longer required - Delete
0745	Labeling	1c	1-04	HS-1257	1	Delete	1876	No longer required - Delete



PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 014

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

200  
Form 344-22-4228

REVIEWER NAME JOE KELEMEN DATE 6/1/83

A. HED TITLE MAIN CONTROL BOARD - TAGGING + LABELING SURVEY

B. ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
I-01.	MAIN CONTROL BOARD (PANELS) ↓	CONTROL ROOM	
I-02.			
I-03.			
I-04.			
I-05.			
I-06.			
I-09.			
I-10.			
I-13.			
I-14.			
I-15.			

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) VARIOUS MAIN CONTROL BOARDS ARE NOT IDENTIFIED (LABELED OR TAGGED) IN CONTROL ROOM.

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION I-01 Labeled per DD-LAB-1

I-02 Labeled per DD-LAB-1 <sup>MISS</sup> I

I-03 & I-04 Label per DD-LAB-1 CN 1887 WCH 10-30-85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 033HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME

JOE KELEMEN

DATE

6/10/93

A. HED TITLE LABELING AND TAGGING CONVENTION

B. ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
XI-22147	MODULE NUMBER DISPLAY	I-04	A-53
XI-22148	" "	I-04	A-54
XI-11139	REGION NO. DISPLAY X	I-04	A-53
XI-11140	" Y	I-04	A-53
XI-11141	" Z	I-04	A-54

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) DIGITAL READ-OUT INDICATORS DO NOT HAVE INSTRUMENT NUMBER TAGS (NO IDENTIFICATION). PROBABLY FUNCTION TAGS FOR XI-22147 AND XI-22148 SHOULD INCLUDE "STEAM GENERATOR" FOR CLEAR TERMINOLOGY.

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *XI-22147 & 8 no longer required - delete. Functionally label XI-11139, 40, & 41 per DD-LAB-1 on 1987 10-31-85 WCH.*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		





## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 034HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

200

Form 344-22-4228

REVIEWER NAME

JOE KELEMEN

DATE

6/10/83

A. HED TITLE LABELING & TAGGING INDICATING LIGHT IDENTIFICATION.

B.

## ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
XI-1247	CONTROL ROD POSITION INDICATING SELECTION DISPLAY	I-04	D-36
XI-1248			D-36
XI-1249			D-36
XI-1250	ORFICE POSITION REGION INDICATING SELECTION DISPLAY	↓	D-36
XI-1251			D-36
XI-1252			D-36

*Duplication of HED 0644*

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) WHITE INDICATING LIGHTS ARE NOT IDENTIFIED AS TO FUNCTION OR WHAT INSTRUMENT THEY ARE ASSOCIATED. FUNCTION TAG INCLUDING INSTR. NUMBERS SHOULD BE MADE AND EACH INDICATING LIGHT SHOULD BE DEMARCATED WITH ASSOCIATED "ROD POSITIO  
OR ORFICE POSITION INDICATORS.

*Reference HED 0506 - Digital indicators*

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE  
LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION XI-1247.8, & 9 no longer required - delete.  
XI-1250, 1, & 2 functionally label per DD-LAB-1 &  
relocate next to appropriate display CN-1887 10/31/85 WGH

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CROR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 043

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-SWI-1 CN1807*  
*10-31-85 WKH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 096

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION No longer required - delete CN1827 11-8-85 WCH  
Deletion only applies to HS-22147-1 thru -6 and  
HS-22148-1 thru -6. Core graphics display relabeled  
as required. 11-27-85 WCH

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 097HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME

F Llanas

DATE

6-16-83A. HED TITLE Labeling and Tagging convention

B.

ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
<u>HS-1212-3</u>	<u>Orificemeter cont.</u>	<u>E04</u>	

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)

Setting too small should be 3/16.D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE  
LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-SWI-1 CN-1087*  
*10-31-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 018

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME

FLtanas

DATE

6-16-83

A. HED TITLE Labeling and Tagging convention

B. ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
EI-1253	Power on	I 04	
EI-1254	motor Run	I 04	

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)

has no Instrument tag.

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE  
LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-LAB-1 CN 1887 10/31/85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 099

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME

Fllanas

DATE

6-16-83

A. HED TITLE Labeling and Tagging Convention

B.

ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
HS-1212-4	Select	I 04	

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)

has no Instrument tag.

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE  
LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-SWI-1 CN1881*  
*10-31-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0100

See GDR  
024

Form 344-22-4228

REVIEWER NAME

FLlanas

DATE

6-16-83

A. HED TITLE Labeling and tagging convention

B.

ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
HS-11266	Lamp test	I 04	E-90

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) has no Instrument tag.  
FOR LAMP TEST HAND SWITCH.

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE  
LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Functionally label per DD-SW1-1 CN1087*  
*10-31-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0503

Form 344-22-4228

REVIEWER NAME

M. Maddox / D. Glenn

DATE

11/17/83

A. HED TITLE

Procedures & Training &  
Instrument Inaccuracies -

B.

ITEMS INVOLVED

CREDIBILITY & USABILITY

ITEM TYPE

NOMENCLATURE

LOCATION

INSTRUMENT  
DATA FILE NO.  
PHOTO NO.

General

II-04

N/A

examples

① - Region Power Index Displays XI-11142/3/4

② - Module pair Feedwater Flow Selector Ind

Reference: Task Analysis Walkthrough - R<sub>x</sub> Shutdown  
11/21/83

(See HED-0506)

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)

Operators exhibited tendencies to disregard  
or avoid II-04 as either symptomatic or  
diagnostic.

①② Operators Cite Instrument Accuracies and  
lack of meaning to display. Rod Positions extraneous

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE  
LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

R<sub>x</sub> Shutdown - Core Cooling

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION XI-11142, 3, & 4 no longer required for operation.  
Delete per DCAR-571 & incorporate in CN1887 11-11-85 WCH  
XI-2222 no longer required - delete CN1887 11-27-85 WCH

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0506

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
D. GLENN / M. Maddox			11/21/83
A. HED TITLE <u>Erroneous Indications</u> <u>Inst. Labeling</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
① ZI-1247	Rod Position (X Region)	I-04	<del>A-25</del> D-36
① ZI-1249	" " (Y Region)	I-04	A-25
② XI-11142/3/4	Region Power Index	I-04	A-25
② FI-22147/8	Module Reheat Steam temp	I-04	A-53/A54
② TOI-22147/8	Module <del>Reheat</del> Steam temp Deviation	I-04	A-53/A-54
② ZI-1250/1/2	Orifice Position	I-04	A-53 D-36
② ZI-1247/8/9	Rod Position	I-04	D-36
② <del>FI-11182/3/4</del> <del>FI-11183/4</del>	Region Outlet temp Core Inlet temp	<del>I-04</del> <del>I-04</del>	<del>A-25</del> <del>A-24</del>
② XI-2222	Feed water flow	I-04	A-24
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)			
① Digital Readouts display an accuracy not consistent with system design			
② Digital Indicators display inches temp (°F) or Flow While the range of the voltmeter (digital) is marked on the front as D.C. volts.			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			
Core Cooling			
(See HED-503)			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED

① Attention to irrelevant detail due to two decimal place readings  
② Mis-interpretation of parameter displayed

F. LIST THE CONSEQUENCES OF OPERATOR ERROR

G. CLASSIFICATION

H. CORRECTIVE ACTION OPTIONS

① Select indicator (or Block decimal places) consistent with parameter resolution of System. ② Wash out "D.C. Volts".

I. DISPOSITION TDI-22147, 48, TI-22147, 48, XI-11142, 43, & 44

no longer required - delete. Replace remaining with new digital meters - scale per DD-AIS-1 & functionally label per DD-LAB-1 CN 1887 11-11-85 WCH

XI-2222 No longer required - delete CN 1-1887 11-27-85 WCH

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		





## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0591

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION XI-22147 no longer required - delete. ZI-1204 replace  
digital display CN1887 10-31-85 wca

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0607

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME <span style="float: right;">DATE</span>		
<div style="display: flex; justify-content: space-between;"> <span><u>R. GARRETT</u></span> <span><u>2/8/84</u></span> </div>		
A. HED TITLE <u>INSTRUMENT COLOR CODING</u>		
B. ITEMS INVOLVED		
ITEM TYPE	NOMENCLATURE	<div style="display: flex; justify-content: space-between;"> <div>LOCATION</div> <div>INSTRUMENT DATA FILE NO PHOTO NO.</div> </div>
HS-1260	SLACK CABLE RESET	I-03 D-77
HS-93475	SCRAM CNT. BYPASS ROD DRIVE MCG#2 ALCOBIC	↓
HS-93476	" " " " " " " " B "	↓
HS-93477	" " " " " " " " #1 A "	↓
HS-93478	" " " " " " " " B "	↓
HS-1257	TIME LIMIT TRIP	I-04
NO INSTR #	OVER LD. BYPASS	I-05 E-55
" "	" " "	↓ E-58
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>COLOR OF RINGS ON HS-1260 &amp; HS-93475/6/7/8</u>		
<u>DO NOT CONFORM TO DD-SWI-1. COLOR OF ILLUM. PUSHBUTTON HS-1257 DOES NOT CONFORM TO DD-SWI-1</u>		
<u>OVER LD. BYPASS ILLUM. PUSHBUTTON COLOR DOES NOT CONFORM TO DD-SWI-1</u>		
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR		

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *HS-1260 change ring per DD-SWI-1. HS-93475, 76, 77,  
# 78 replace with single switch per DD-SWI-1. CN 1887.  
HS-1257 <sup>deleted</sup> replaced per CN 1876 10-31-85 WCA*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

Basis For HED on Button Ring Color  
discrepancy for HS-93475, 6, 7, 8

These Pushbuttons are part of the  
Rod Insertion Override System which  
by-passes the Contactors K50, 51 (K60, 62)

These are not Stop Functions (nor PPS).  
It is possible to postulate a reset or  
enable function however that classification  
would be subject to interpretation.

It is more advantageous to classify place  
these pushbuttons in the "Non-descript"  
category and provide sufficient labeling as  
to purpose and function.

References DD-SWI-1  
E1203 P398  
ELJ163-0011

WJH 2/6/84



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0644

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22 4228

REVIEWER NAME

JOE KELEMEN

DATE

2/22/84

A. HED TITLE LABELING & TAGGING CONVENTION / INDICATING LITE CONVENTION

B.

ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
XI-1250	ORIFICE POSITION REGION SELECTION	I-04	D-36
XI-1251	"	"	D-36
XI-1252	"	"	D-36
XI-1247	ROD POSITION REGION SELECTION		D-36
XI-1248	"	"	D-36
XI-1249	"	"	D-36
Duplication of HED -0034			

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) WHITE INDICATING LITES ARE NOT LABELED AS TO FUNCTION AND CONFUSION CAN EXIST TO ASSOCIATION WITH DIGITAL READOUT DISPLAY BOTH ABOVE AND BELOW LITES. THESE INDICATING LITES SHOULD BE BLUE IN COLOR FOR "ENABLE", THAT IS THE ROD SELECTION OR ORIFICE SELECTION HAND SWITCHES AND THE CORE GRAPHIC PANEL SELECTION HAND SWITCH ARE ALL IN AGREEMENT BEFORE CHANGES CAN BE MADE.

SEE H.E.D. 0506

REF GDR #025

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE  
LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION See HED-034

~~XI-1247~~ XI-1247, 8, & 9 no longer required - delete.  
XI-1250, 1, & 2 functionally label per DD-LAB-1 &  
relocate next to appropriate display CN-1887  
10/3/85 WCH

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator





PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0742

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

*Install instrumentation to allow  
Reset position selection and any required  
drive control to preclude the need for  
the operator to continually hold or handle  
actuate handle or "pushbuttons on Special Box"*

I. DISPOSITION *Circuit redesigned per CN1876 11-8-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator

PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0743

Form 344-22-4228

REVIEWER NAME

Assessment Committee

DATE \_\_\_\_\_

5/29/84

A. HED TITLE

Instrument - Credibility & Usability

8.

ITEMS INVOLVED

[illegible]

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) Correction factor must be used  $< 400^\circ$

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION Change to new digital meter per DD-AIS-1  
CN 1087 WCA 11-11-85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

## HUMAN ENGINEERING DISCREPANCY EVALUATION

HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
Assessment Committee			3/29/84
A. HED TITLE Maintenance - Methods			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
	Coe graphics display panel	ID4	A34
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) Basic lack of knowledge on how to replace lamp			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Referred to Training Dept. for increasing operator familiarity with lamp replacement selection and methods. 11-25-85 WCH*

TEAM ACTION		
TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
Assessment Committee			3/29/84
A. HED TITLE <u>Labeling - functional</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
EI-1258	Operator Error	I-04	N/A
HS-1257	Time Limit Trip	↓	N/A
EI-1257	" " "	↓	N/A
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>Insufficient functional</u> <u>label</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

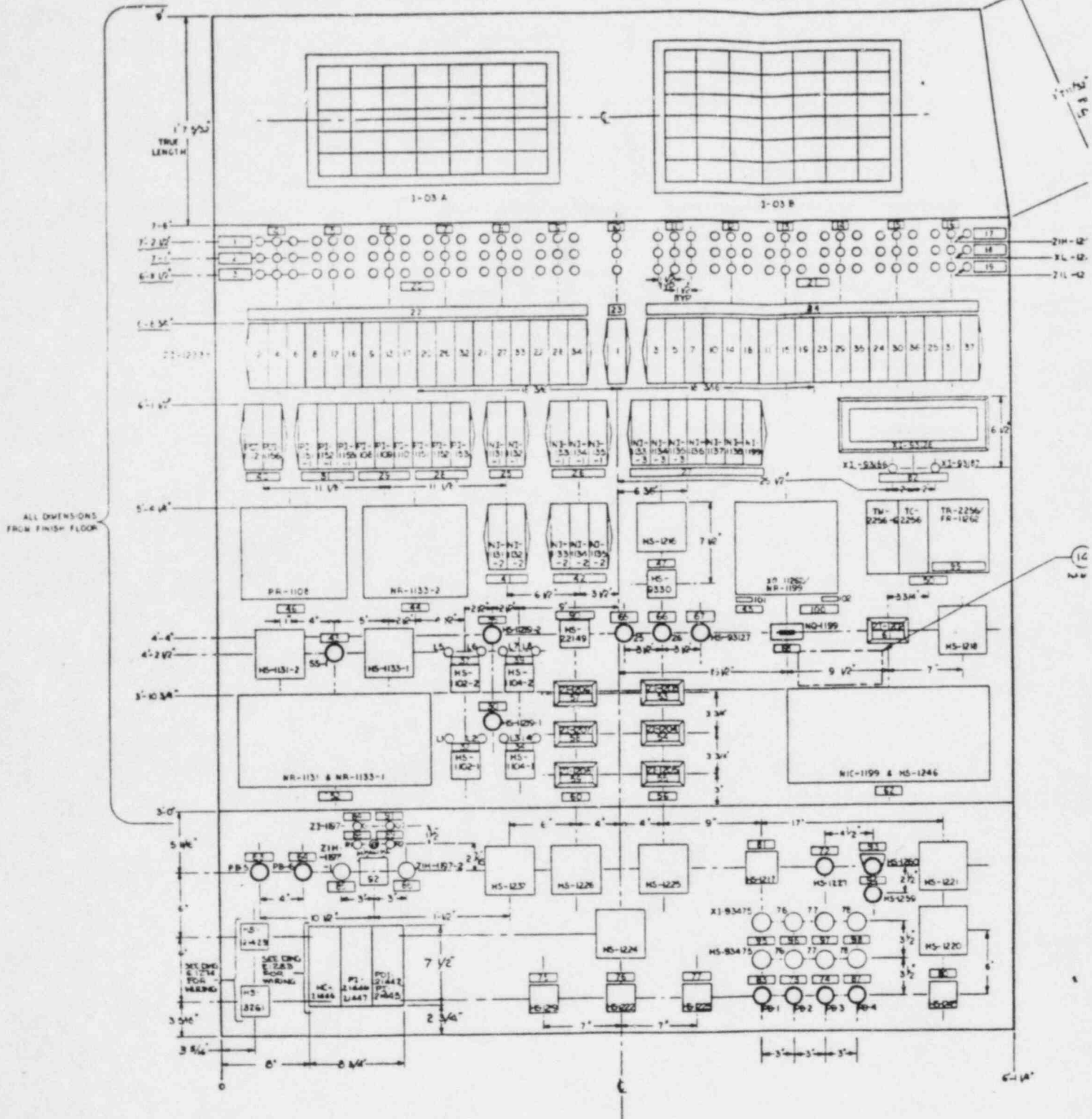
I. DISPOSITION Replaced per CN 1876 - delete 11-5-85 WCH  
Delete - circuit function redesigned 11-27-85 WCH

TEAM ACTION

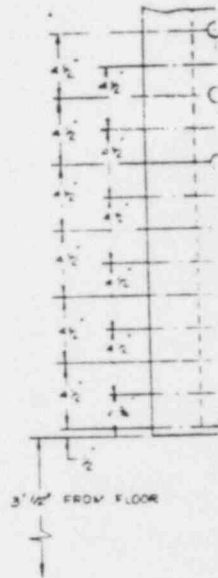
TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

# ATTACHMENT B1

Section of Elevation Drawing  
Showing Original Configuration  
of I-03



Section of Elevation Drawing  
Showing Original Configuration  
of I-04



NOTES :

1 SEE ELECT PARTS LIST ELA143-D100 FOR RELAYS  
K14-2 THRU K21-3

ATTACHMENT C

SAMPLE COPIES OF  
OPERATOR INTERVIEW RECORDS



INVESTIGATIVE INFORMATIONAL RECORD

Sht. 1 of     

Investigator's Name George McKenna

DATE 27 Aug 85

Problem Description: Reactor Pressure (Indicators, I-03)

- Review new Display proposal

Willard Ashmore

ITEMS INVOLVED

ITEM	LOC.	DESCRIPTION	E-1203	P & I NO.
<u>Rx Pres</u>	<u>I-03</u>	<u>Rx Pres INDICATORS</u>		

Questions: - What Rx Pressure <sup>information</sup> do you need to operate?  
- How much do you have on I-03? How much do you need on I-03?  
- Look at this display - would this display help operations at I-03

Responses (Include Respondent's Name) Willard Ashmore (EO w/Training)

- Rx Pressure, set points (ref. op. Pressure envelope) ΔP core and PDI-1156
- we have everything we need (except trend) on I-03 but it is in a very hard to use form. It takes a good bit of time to find where you are in Pressure.
- we need Rx Pres + a ΔP core & PDI-1156 and an indication of history would be nice.
- (~ 5min) Where will my pressure indicators be? Rx core will work. This shows a good status. No this won't be hard to teach. This looks good as long as I also have a pressure indicator (Numbers) on I-03.

Provide Conclusion on separate or final sheet.

George McKenna  
Investigator's Signature

27 Aug 85  
Date





INVESTIGATIVE INFORMATIONAL RECORD

Sht \_\_\_\_\_ of \_\_\_\_\_

Investigator's Name

George McKenna

DATE

3 Sept 85

Problem Description:

Evaluation of I-03 Proposed Redesign

ITEMS INVOLVED

ITEM	LOC.	DESCRIPTION	E-1203	P & I NO.
I-03	CR	I-03 Layout		

Questions: \_\_\_\_\_

Responses (Include Respondent's Name) MIKE FRAZIER (RO)

ROO Control: layout is "Great" - better than 3 switches  
this makes more sense the two sides  
are grouped right.

R Mode Swt.: This switch could accidentally be turned  
off if it is on the edge of the panel.  
Does not need to be with SPARM.

#Rc Power: Centralize the display. Rod following  
alarm will be a help.

B Alert: would be a help. Eliminate guess work.

Provide Conclusion on separate or final sheet.

George McKenna  
Investigator's Signature

6 Sept 85  
Date



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 020

## INVESTIGATIVE INFORMATIONAL RECORD

Sht. \_\_\_\_\_ of \_\_\_\_\_

Investigator's Name

George McKenna

DATE

11 Sept 85

Problem Description:

Evaluation of T-03 layout proposal

## ITEMS INVOLVED

ITEM	LOC.	DESCRIPTION	E-1203	P & I NO.
I03	CR	I03 layout		

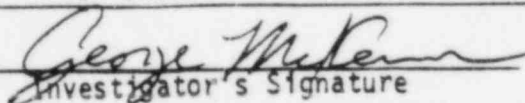
Questions: \_\_\_\_\_

Responses (Include Respondent's Name)

(KEW ENIG)

- Rod Control: Easy. Just looking at the drawing I can tell how it works. This is a good layout for operations ~~and~~, it will be easy to tell where you are.
- Rx Fur: With the power display in the center you can track your progress very easy. Good layout.
- I-03: General board layout is good!

Provide Conclusion on separate or final sheet.

  
Investigator's Signature11 Sept 85  
Date



INVESTIGATIVE INFORMATIONAL RECORD

Sht \_\_\_\_\_ of \_\_\_\_\_

Investigator's Name

W. C. Holmes

DATE

10-3-85

Problem Description:

I-04 Redesign

ITEMS INVOLVED

ITEM	LOC.	DESCRIPTION	E-1203	P & I NO.
<u>I-04</u>	<u>CR</u>			

Questions: 1. Function & use of TI-22147, TI-22148, TDI-22147 & TDI-22148. 2. Need for Control Rod digital position 2I-1247, 1248, & 1249. 3. Use of power index XI-11142, XI-11143, & XI-11144. 4. USE of Hyper Power Index XI-2222

Responses (Include Respondent's Name) Steve Skifer (S&O)

1. Very seldom used. Tend to use recorder & watch trend
2. Thinks that inter Tech spec. change requires dual digital indication. (Not required - wch)
3. Never used - remove.
4. Feed flow seldom used.

Provide Conclusion on separate or final sheet.

William C. Holmes  
Investigator's Signature

10-3-85  
Date



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 037

INVESTIGATIVE INFORMATIONAL RECORD

Sht \_\_\_\_\_ of \_\_\_\_\_

Investigator's Name

W.C. Holmes

DATE

10-4-85

Problem Description:

I-04 Redesign

ITEMS INVOLVED

ITEM	LOC.	DESCRIPTION	E-1203	P & I NO.
<u>I-04</u>	<u>CR</u>			

Questions: 1. Function & use of TI-22147, 22148, TDE-22147 & 22148  
2. Need for control rod digital position. 3. Use of  
power index XI-11142, 11143, & 11144.

Responses (Include Respondent's Name) Jack Weller

1. Very seldom used.

2. Nice back-up & presently logged but may not  
be required.

3. Never used

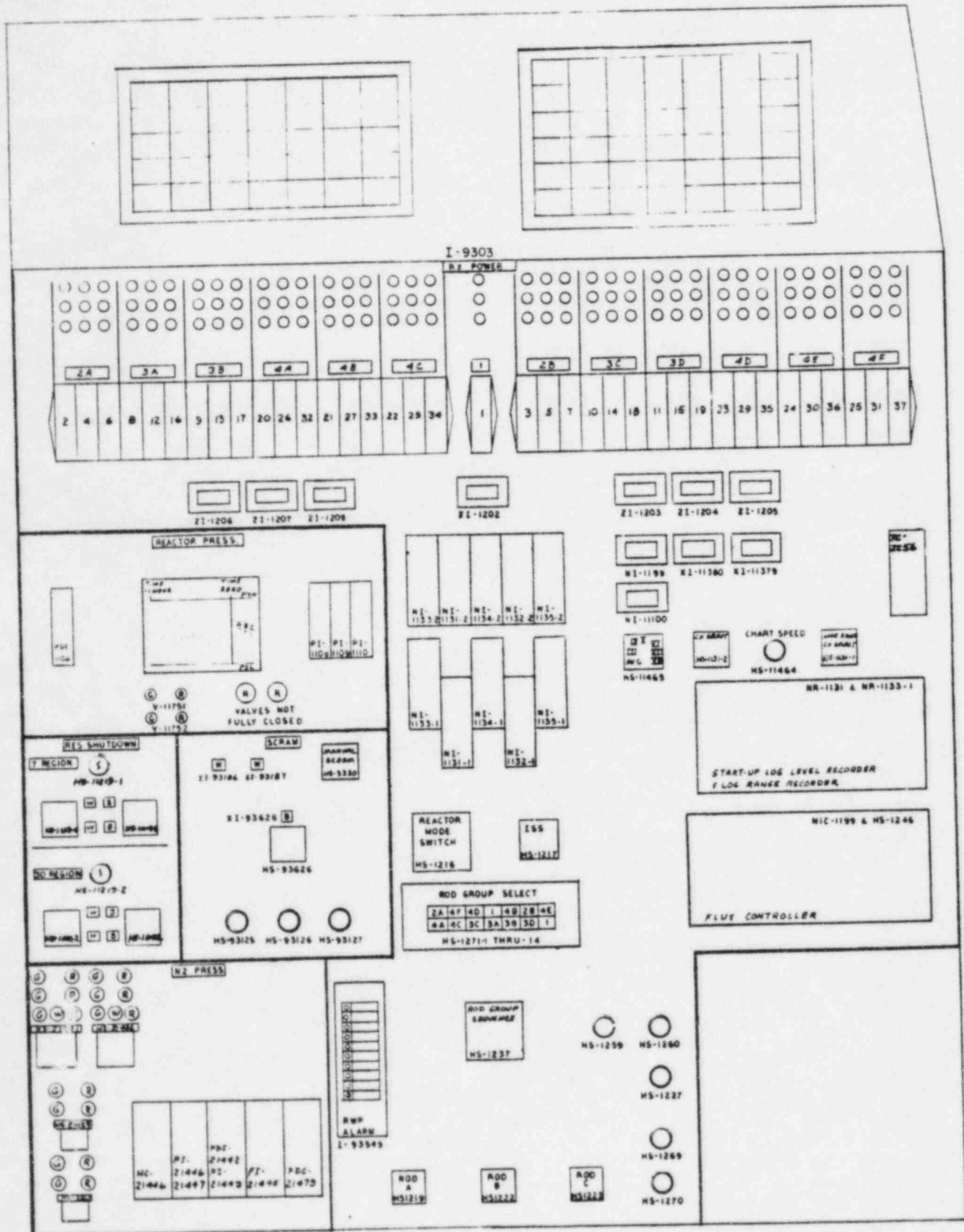
Provide Conclusion on separate or final sheet.

William C. Holmes  
Investigator's Signature

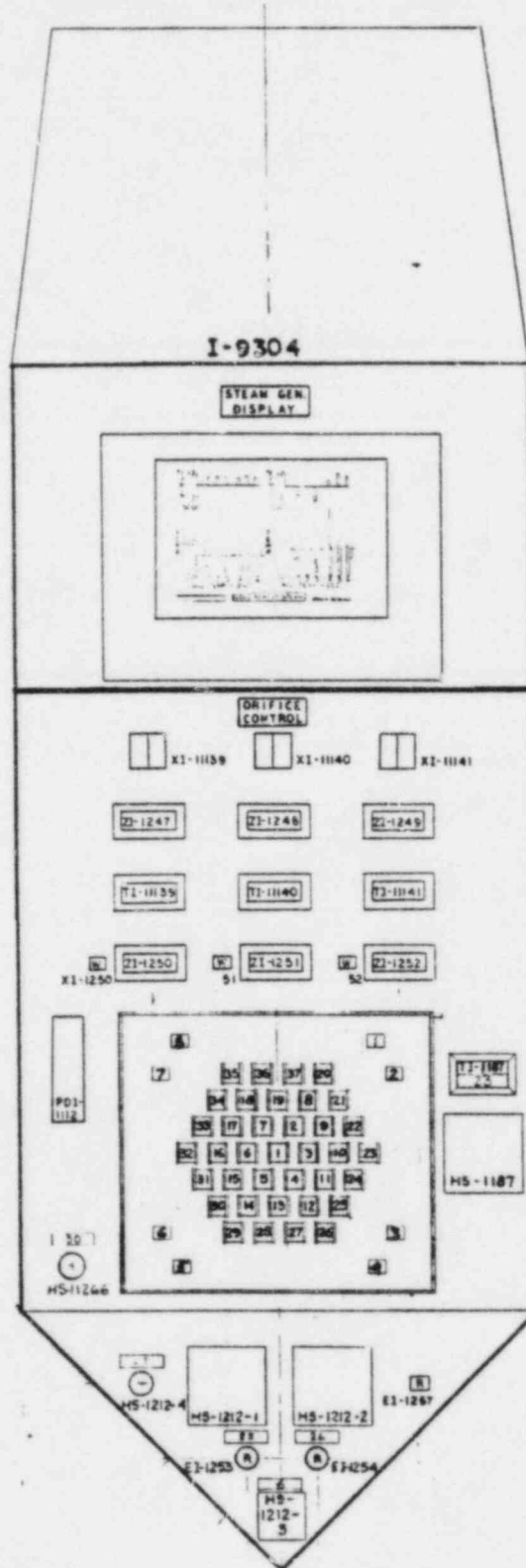
10-4-85  
Date

ATTACHMENT D1

Section of Elevation Drawing  
Showing Proposed Configuration  
of I-03









ATTACHMENT E1  
SUMMARY OF  
PROPOSED CHANGES TO  
I-03

1. Relocates:

- Relocate PR-1108, XR-11262/NR-1199, TR-2256 & NR-1133-2 to recorder board I-09 (CN-1878).
- Relocate PDI-1112 to I-04.
- Relocate HS-22149 to I-05.
- Relocate TM-2256-6 to Auxiliary Equipment Room.

2. Removal:

- Delete XI-93128 & NQ-1199.

3. Replacements:

- Replace function of PI-1151-1, PI-1152-1, PI-1108, PI-1109, PI-1110, PI-1151, PI-1152, & PI-1153 with Reactor Pressure Video Display. Retain analog indicators for displaying reactor pressure channels (PI-1108, PI-1109, and PI-1110).
- Replace NI-1131-1 thru NI-1135-1, NI-1131-2 thru NI-1135-2 with Bar Graph indicators.
- Replace NI-1133-3, NI-1134-3, NI-1135-3, NI-1136, NI-1137 & NI-1138 with digital indicator NI-11100 & selector switch HS-11465.
- Replace HS-93475 thru HS-93478 & XI-93475 thru XI-93478 with single switch HS-93626 & light XI-93636.
- Replace HS-1220, HS-1221, HS-1224, HS-1225, HS-1226, & HS-1245 with group select matrix switch HS-1271-1 thru -14.
- Replace all existing Calico digital indicators with new digital indicators.

4. Additions:

- Add PDC-21479 from I-01.
- Add FI-21445 from I-02.
- Add Betaalert annunciator for specific rod withdraw prohibit alarms I-93545.

5. Functionally group all controls and related indicators.
6. Demarcate system panels or divisions.
7. Rescale indicators.
8. Label Board and System Panels.
9. Relabel instruments and controls.
10. Re-design rod group selection.

ATTACHMENT E2  
SUMMARY OF  
PROPOSED CHANGES TO  
I-04

1. Removals:

- Delete XI-2222
- Delete XI-22147 & XI-22148.
- Delete XI-1247, XI-1248, & XI-1249.
- Delete XI-11142, XI-11143, & XI-11144.
- Delete HS-22147-1 thru 6 & HS-22148-1 thru 6.
- Delete HS-2222-1 thru -6

2. Replacements:

- Replace TI-22147, TI-22148, TDI-22147, & TDI-22148 and incorporate function in Steam Generator Temperature & Flow Display.
- Replace all existing Calico digital indicators with new digital indicators.

3. Additions:

- Add PDI-1112 from I-03.

4. Functionally group all controls and related indicators.

5. Demarcate system panels (divisions).

6. Label Board & System divisions.

7. Relabel instruments and controls.

ATTACHMENT F

LABEL LIST

LABELING LEGEND LIST

CONTROL BOARD #	INSTRUMENT #	STYLE	FUNCTIONAL LABEL	STYLE	HED # (if applicable)
I-03			I-9303	1 BLACK	014
I-03			RX PWR	2 BLK	
I-03			RX PRESS	SPECIAL BLK	
I-03			N <sub>2</sub> PRESS	SPECIAL BLK	
I-03			RESERVE SHUTDOWN	4X BLK	
I-03			SCRAM	4 BLK	
I-03			ROD OUT	8b BLK	
I-03			SLACK CABLE	8b BLK	
I-03			ROD IN	8b BLK	
I-03	ZI-1233-1	SPECIAL	ROD 1 POSITION	9b BLK	017
I-03	ZI-1233-2	SPECIAL	ROD 2 POSITION	9b BLK	015
I-03	ZI-1233-3	SPECIAL	ROD 3 POSITION	9b BLK	017
I-03	ZI-1233-4	SPECIAL	ROD 4 POSITION	9b BLK	015
I-03	ZI-1233-5	SPECIAL	ROD 5 POSITION	9b BLK	017
I-03	ZI-1233-6	SPECIAL	ROD 6 POSITION	9b BLK	015
I-03	ZI-1233-7	SPECIAL	ROD 7 POSITION	9b BLK	017
I-03	ZI-1233-8	SPECIAL	ROD 8 POSITION	9b BLK	015
I-03	ZI-1233-9	SPECIAL	ROD 9 POSITION	9b BLK	015
I-03	ZI-1233-10	SPECIAL	ROD 10 POSITION	9b BLK	017

LABELING LEGEND LIST

CONTROL BOARD #	INSTRUMENT #	STYLE	FUNCTIONAL LABEL	STYLE	HED # (if applicable)
I-03	ZI-1233-11	SPECIAL	ROD 11 POSITION	9b BLK	018
<del>I-03</del>	ZI-1233-12	SPECIAL	ROD 12 POSITION	9b BLK	015
I-03	ZI-1233-13	SPECIAL	ROD 13 POSITION	9b BLK	015
I-03	ZI-1233-14	SPECIAL	ROD 14 POSITION	9b BLK	017
I-03	ZI-1233-15	SPECIAL	ROD 15 POSITION	9b BLK	018
I-03	ZI-1233-16	SPECIAL	ROD 16 POSITION	9b BLK	015
I-03	ZI-1233-17	SPECIAL	ROD 17 POSITION	9b BLK	016
I-03	ZI-1233-18	SPECIAL	ROD 18 POSITION	9b BLK	018
I-03	ZI-1233-19	SPECIAL	ROD 19 POSITION	9b BLK	018
I-03	ZI-1233-20	SPECIAL	ROD 20 POSITION	9b BLK	016
I-03	ZI-1233-21	SPECIAL	ROD 21 POSITION	9b BLK	016
I-03	ZI-1233-22	SPECIAL	ROD 22 POSITION	9b BLK	016
I-03	ZI-1233-23	SPECIAL	ROD 23 POSITION	9b BLK	018
I-03	ZI-1233-24	SPECIAL	ROD 24 POSITION	9b BLK	018
I-03	ZI-1233-25	SPECIAL	ROD 25 POSITION	9b BLK	019
I-03	ZI-1233-26	SPECIAL	ROD 26 POSITION	9b BLK	016
I-03	ZI-1233-27	SPECIAL	ROD 27 POSITION	9b BLK	016
I-03	ZI-1233-28	SPECIAL	ROD 28 POSITION	9b BLK	017
I-03	ZI-1233-29	SPECIAL	ROD 29 POSITION	9b BLK	016



LABELING LEGEND LIST

CONTROL BOARD #	INSTRUMENT #	STYLE	FUNCTIONAL LABEL	STYLE	HED # (if applicable)
I-03	ZI-1233-30	SPECIAL	ROD 30 POSITION	9b BLK	019
I-03	ZI-1233-31	SPECIAL	ROD 31 POSITION	9b BLK	019
I-03	ZI-1233-32	SPECIAL	ROD 32 POSITION	9b BLK	016
I-03	ZI-1233-33	SPECIAL	ROD 33 POSITION	9b BLK	016
I-03	ZI-1233-34	SPECIAL	ROD 34 POSITION	9b BLK	018
I-03	ZI-1233-35	SPECIAL	ROD 35 POSITION	9b BLK	019
I-03	ZI-1233-36	SPECIAL	ROD 36 POSITION	9b BLK	019
I-03	ZI-1233-37	SPECIAL	ROD 37 POSITION	9b BLK	025
I-03	ZI-1202	10 BLK	ROD 1	5a BLK	
I-03	ZI-1203	10 BLK	ROD A	5a BLK	
I-03	ZI-1204	10 BLK	ROD B	5a BLK	
I-03	ZI-1205	10 BLK	ROD C	5a BLK	
I-03	ZI-1206	10 BLK	ROD A	5a BLK	
I-03	ZI-1207	10 BLK	ROD B	5a BLK	
I-03	ZI-1208	10 BLK	ROD C	5a BLK	
I-03	NI-1131-1	11 BLK	POWER LEVEL START-UP CHANNEL I	SPECIAL BLK	
I-03	NI-1131-2	11 BLK	RATE OF CHANGE START-UP CHANNEL I	SPECIAL BLK	
I-03	NI-1132-1	11 BLK	POWER LEVEL START-UP CHANNEL II	SPECIAL BLK	
I-03	NI-1132-2	11 BLK	RATE OF CHANGE START-UP CHANNEL II	SPECIAL BLK	

LABELING LEGEND LIST

CONTROL BOARD #	INSTRUMENT #	STYLE	FUNCTIONAL LABEL	STYLE	HED # (if applicable)
I-03	NI-1133-1	11 BLK	POWER LEVEL WIDE RANGE CHANNEL III	SPECIAL BLK	
I-03	NI-1133-2	11 BLK	RATE OF CHANGE WIDE RANGE CHANNEL III	SPECIAL BLK	
I-03	NI-1134-1	11 BLK	POWER LEVEL WIDE RANGE CHANNEL IV	SPECIAL BLK	
I-03	NI-1134-2	11 BLK	RATE OF CHANGE WIDE RANGE CHANNEL IV	SPECIAL BLK	
I-03	NI-1135-1	11 BLK	POWER LEVEL WIDE RANGE CHANNEL V	SPECIAL BLK	
I-03	NI-1135-2	11 BLK	RATE OF CHANGE WIDE RANGE CHANNEL V	SPECIAL BLK	
I-03	TC-2256	10 BLK	HOT REHEAT TEMP.	79 BLK	
I-03	HS-1131-1	ON SWITCH PLATE	WIDE RANGE CHANNEL SELECT	5C BLK	024
I-03	HS-1131-2	ON SWITCH PLATE	START-UP CHANNEL SELECT	5C BLK	024
I-03	NI-1199	10 BLK	POWER LEVEL	5a BLK	039
I-03	XI-11379	11 BLK	PWR. TO FLOW RATIO	5a BLK	
I-03	HS-11464	ON SWITCH PLATE	CHART SPEED	SPECIAL BLK	030
I-03	NR-1131	SPECIAL	START-UP CHANNEL	SPECIAL BLK	021
I-03	NR-1133-1	SPECIAL	WIDE RANGE CHANNEL	SPECIAL BLK	021
I-03	HS-1216	ON SWITCH PLATE	REACTOR MODE	SPECIAL BLK	
I-03	HS-1237	ON SWITCH PLATE	ROD WITHDRAWAL SEQUENCE	SPECIAL BLK	031
I-03	HS-1271	SPECIAL	ROD GROUP SELECT	5a BLK	
I-03	HS-1217	10 BLK	INTERLOCK SEQUENCE	5b BLK	041
I-03	HS-1219	ON SWITCH PLATE	ROD A CONTROL	5b BLK	040

LABELING LEGEND LIST

CONTROL BOARD #	INSTRUMENT #	STYLE	FUNCTIONAL LABEL	STYLE	HED # (if applicable)
I-03	HS-1222	ON SWITCH PLATE	ROD B CONTROL	5b BLK	040
I-03	HS-1223	ON SWITCH PLATE	ROD C CONTROL	5b BLK	040
I-03	HS-1260	ON SWITCH PLATE	ROD POSITION LAMP	SPECIAL BLK	038
I-03	HS-1259	ON SWITCH PLATE	ROD POSITION LAMP TEST	SPECIAL BLK	038
I-03	HS-1227	ON SWITCH PLATE	SLACK CABLE BYPASS	SPECIAL BLK	038
I-03	HS-1269	ON SWITCH PLATE	ROD WITHDRAWAL LOAD TEST	SPECIAL BLK	036
I-03	HS-1270	ON SWITCH PLATE	ROD WITHDRAWAL LOAD TRIP RESET	SPECIAL BLK	036
I-03	I-93545	11 BLK	RWP ALARM	5b BLK	
I-03	ZI-1197-1	12b BLK	ISO VALVE (V-11751) ZI-1197-1	12b BLK	
I-03	ZI-1197-2	12b BLK	ISO VALVE (V-11752) ZI-1197-2	12b BLK	
I-03	PDI-1156	SPECIAL	REACTOR TO ATM $\Delta P$	9c BLK	
I-03	HS-9330	ON SWITCH PLATE	MANUAL SCRAM	5b BLK	023
I-03	HS-93125	ON SWITCH PLATE	PPS CHANNEL 'A' RESET	SPECIAL BLK	
I-03	HS-93126	ON SWITCH PLATE	PPS CHANNEL 'B' RESET	SPECIAL BLK	
I-03	HS-93127	ON SWITCH PLATE	PPS CHANNEL 'C' RESET	SPECIAL BLK	
I-03	HS-93626	ON SWITCH PLATE	EMERGENCY CRD INSERT ENABLE	5d BLK	0740
I-03	XI-93186	11 BLK	LOGIC 'A' SCRAM	IND LIGHT	
I-03	XI-93187	11 BLK	LOGIC 'B' SCRAM	IND LIGHT	
I-03	HS-1102-2	ON SWITCH PLATE	30 REGION DUMP	59 BLK	023

LABELING LEGEND LIST

CONTROL BOARD #	INSTRUMENT #	STYLE	FUNCTIONAL LABEL	STYLE	HED # (if applicable)
I-03	XI-93626	11 BLK	INSERT ENABLE	IND LIGHT	
I-03	HS-1104.2	ON SWITCH PLATE	30 REGION DUMP	59 BLK	023
I-03	HS-1102-1	ON SWITCH PLATE	7 REGION DUMP	59 BLK	023
I-03	HS-1104-1	ON SWITCH PLATE	7 REGION DUMP	59 BLK	023
I-03	XI-11385	BLK	CKT. TEST	IND LIGHT	
I-03	XI-11381	BLK	DUMP ENABLE	IND LIGHT	
I-03	XI-11386	BLK	CKT. TEST	IND LIGHT	
I-03	XI-11382	BLK	DUMP ENABLE	IND LIGHT	
I-03	XI-11387	BLK	CKT. TEST	IND LIGHT	
I-03	XI-11383	BLK	DUMP ENABLE	IND LIGHT	
I-03	XI-11388	BLK	CKT. TEST	IND LIGHT	
I-03	XI-11384	BLK	DUMP ENABLE	IND LIGHT	
I-03	HS-11219-1	ON SWITCH PLATE	7 REGION DUMP CIRCUIT TEST	SPECIAL BLK	0132
I-03	HS-11219-2	ON SWITCH PLATE	30 REGION DUMP CIRCUIT TEST	SPECIAL BLK	0132
I-03	PI-21443	SPECIAL	COMPR. INLET PRESSURE	SPECIAL BLK	046
I-03	PDI-21442	SPECIAL	LOW PRESS. SEPERATOR PRESSURE	SPECIAL BLK	046
I-03	PI-21447	SPECIAL	DEAERATOR HEATER PRESSURE	SPECIAL BLK	046
I-03	PI-21446	SPECIAL	PELTON CAVITY PRESSURE	SPECIAL BLK	046
I-03	HC-21446	11 BLK	N2 MAKE-UP PRESS. SETPOINT	7C BLK	046 0638



LABELING LEGEND LIST

CONTROL BOARD #	INSTRUMENT #	STYLE	FUNCTIONAL LABEL	STYLE	HED # (if applicable)
I-03	HS-21429	ON SWITCH PLATE	OPERATING MODE	5b BLK	037
I-03	ZI-21429	12b BLK	RECYCLE VA (HV-214 ) ZI-214	12b BLK	
I-03	ZI-21430	12b BLK	N <sub>2</sub> MAKE-UP (HV-21430) ZI-21430	12b BLK	
I-03	HS-21431	ON SWITCH PLATE	COMPRESSOR A	5b BLK	044, 0741
I-03	ZI-21431	12b BLK	INLET VALVE (HV-21431) ZI-21431	12b BLK	044
I-03	ZI-21471	12b BLK	SEAL WATER SUPPLY VALVE ZI-21471	12b BLK	
I-03	HS-21432	5b BLK	COMPRESSOR B	5b BLK	045, 0741
I-03	ZI-21432	12b BLK	INLET VALVE (HV-21432) ZI-21432	12b BLK	045
I-03	ZI-21472	12b BLK	SEAL WATER SUPPLY VALVE ZI-21472	12b BLK	
I-03	PDC-21479	11 BLK	PELTON CAVITY ΔP	7A BLK	
I-03	HS-3261	ON SWITCH PLATE	DEAERATOR VENT	5b BLK	032, 0137
I-03	ZI-3261-1	12b BLK	DA VENT VA (HV-3261-1) ZI-3261-1	b BLK	
I-03	ZI-3261-2	12b BLK	RECYCLE VA (LP SEP) ZI-3261-2	12b BLK	
I-03	FI-21445	SPECIAL	COMPR. OUTLET FLOW	SPECIAL BLK	
I-03	XI-11380	11 BLK	RX MASS FLOW	5a BLK	
I-03	PI-1108	SPECIAL	PRESSURE CHANNEL A	9a BLK	
I-03	PI-1109	SPECIAL	PRESSURE CHANNEL B	9a BLK	
I-03	PI-1110	SPECIAL	PRESSURE CHANNEL C	9a BLK	
I-03	ZIH-1197-1/2	11 BLK	PLRV RUPTURE DISC ISOLATION VALVES NOT OPEN (V-11751, V-11752)	SPECIAL	

### LABELING LEGEND LIST

[illegible]



LABELING LEGEND LIST

CONTROL BOARD #	INSTRUMENT #	STYLE	FUNCTIONAL LABEL	STYLE	HED # (if applicable)
I-04			I-9304	1 BLK	014
I-04			ORIFICE CONTROL	SPECIAL BLK	
I-04			STM GEN DISPLAY	SPECIAL BLK	
I-04	XI-11139	11 BLK	REGION X (BLACK)	6a BLK	033
I-04	XI-11140	11 BLK	REGION Y (GRAY)	6a BLK	033
I-04	XI-11141	11 BLK	REGION Z (WHITE)	6a BLK	033
I-04	ZI-1247	10 BLK	ROD POSITION	5a BLK	
I-04	ZI-1248	10 BLK	ROD POSITION	5a BLK	
I-04	ZI-1249	10 BLK	ROD POSITION	5a BLK	
I-04	TI-11139	11 BLK	OUTLET TEMP	5a BLK	
I-04	TI-11140	11 BLK	OUTLET TEMP	5a BLK	
I-04	TI-11141	11 BLK	OUTLET TEMP	5a BLK	
I-04	ZI-1250	10 BLK	ORIFICE POSITION	5a BLK	
I-04	ZI-1251	10 BLK	ORIFICE POSITION	5a BLK	
I-04	ZI-1252	10 BLK	ORIFICE POSITION	5a BLK	
I-04	XI-1250	10 BLK	ORIFICE CONT. SELECT	IND LIGHT	
I-04	XI-1251	10 BLK	ORIFICE CONT. SELECT	IND LIGHT	
I-04	XI-1252	10 BLK	ORIFICE CONT. SELECT	IND SELECT	
I-04	HS-11266	ON SWITCH PLATE	LAMP TEST	SPECIAL BLK	0100

LABELING LEGEND LIST

[illegible]

ATTACHMENT 6b-6

SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS  
AS APPLICABLE TO  
THE REMOTE, I-06J AND I-15  
ANNUNCIATOR UNIT INSTALLATIONS

FOREWORD - NUREG-0737 Supplement 1, Section 5.1b requires that a Control Room Design Review (CRDR) be conducted to identify human engineering discrepancies. Section 5.1c requires that these discrepancies be assessed and design improvements selected to correct these discrepancies.

Public Service Company (PSC) has conducted the required review of the Fort St. Vrain Control Room. Approximately eight hundred forty eight (848) discrepancies or classes of discrepancies were cited. These discrepancies were assessed to determine their potential for causing an operating error and the potential effect of any error. (Certain discrepancies are known to have caused errors). An improvement program has been selected which meets the regulatory requirements and proposes to improve the operability and functionality of the Control Room.

The regulatory requirement for the CRDR and the follow-on improvement program was directed toward the improved handling of emergencies and not specifically toward improved production. Public Service Company's improvement program is directed toward both normal operation and the handling of emergencies.

BACKGROUND - Public Service Company has initiated an integrated improvement program based on functionality rather than particular classifications of problems. This approach is first, one of determining functional groupings, followed by demarcating, hierarchial labeling, correcting indicator scaling, complying with established conventions (color coding, switch positions, etc.).

The following steps constituted the planning portion of the integrated improvement program.

- Elevation Drawings of each control panel were color coded to show applicable HEDs as either, relabeling, relocations, scaling, deletions, or equipment changeout. This scheme provides an overview of the problems documented on each control board.
- All HEDs involving Alarm Locations, and multipoint alarms were reviewed. System function and operator response were considered in grouping, deleting and adding alarms. Paste ups of all alarm panels were completed to show proposed rearrangements.
- Functional grouping of controls and indications was approached by first preparing point interaction sketches for various systems or by direct reference to system P&Is. This effort was, in effect, an extensive operational analysis which considered the dynamic considerations of control groups and

arrangements. This activity reviewed the purpose and use of each and every component on the main control boards. Interviews with operators and training personnel were conducted to determine operator interpretations and actions.

- Controls and indications were then arranged in functionally related groups. Associated alarm locations were rechecked to verify that the more desirable locations were selected. The function relationship of adjacent indicator and control groupings were reviewed.
- Revised drawings were prepared to show the proposed arrangements. Certain of these drawings were color coded to aid in differentiating between groupings. These drawings were then utilized to determine the scope of each change package (change notice).
- Change notice (CNs) numbers were assigned to each effort identified above.

#### IMPROVEMENT PROCESS METHODOLOGY

The Improvement Process for the annunciator system starts with the documentation and drawings produced during the improvement planning process described in the BACKGROUND presentation portion of this summary. An individual designer was assigned the responsibility of evaluating the annunciator system. Since this individual had not participated in previous efforts, an educational process was initiated to acquire a thorough understanding of the annunciator system and each alarm. System descriptions, Piping & Instrument diagrams, electrical drawings, operating procedures and O & M manuals were studied to gain this thorough understanding. An operational analysis was conducted for the system. (This in-depth analysis was in addition to that completed for the CRDR and planning purposes.) This Operational Analysis provided additional basis for determining any changes to the annunciator control switches.

Operating and training personnel are interviewed to solicit operational philosophies for the annunciator system. The Operational value and function of each alarm was addressed. Informational requirements are again discussed. (This informational requirements effort is in addition to that conducted for Emergency Operating Procedures task analysis).

All HEDs applicable to the annunciator system are reviewed and the tentative fix evaluated for its corrective value within the integrated approach. HEDs written against the alarms and control switches recorded by the Emergency Operating Procedure task analysis "Information and Control Requirements" effort, are reviewed with



particular attention to any potential safety considerations. Any previously prepared investigative information was studied. All factors were evaluated in considering any changes to the system.

SPECIFIC - The Remote, I-06J and I-15 Annunciator Unit Installations - (Change Notice (CN)-1924 preparation package.)

Research - CN-1924 was not generated as a direct result of an HED; however, this CN is an important part of the integrated redesign of the control room annunciator system. Presently the annunciator system for the Fort St. Vrain control room is nearly 100% utilized - very few spare annunciator windows are available. With this constraint on the annunciator system, the integrated redesign (i.e., functional grouping, adding new alarms, splitting out existing alarms, etc.) is difficult to achieve. The Control Room Design Improvement Group, realizing this constraint, investigated methods for increasing the number of spare alarm windows available in the control room. This investigation resulted in three proposed solutions to this problem:

- 1) A small number of alarms could be deleted.
- 2) Certain groups of alarms, those for which no corrective action can be initiated within the control room and those which require operator dispatch for remote corrective action, could be relocated out of the control room to remote equipment panels functionally grouped with their associated controls. A general dispatch alarm in the control room would direct an operator to the panel.
- 3) Install two new alarm panels in the control room.

Design - A design was adopted that incorporated the proposals of the improvement group. A small number of alarms will be deleted by CN-1924:

- 1) FAL-2517 - N<sub>2</sub> Recondenser 1A malfunction trip
- 2) FAL-2518 - N<sub>2</sub> Recondenser 1B malfunction trip
- 3) FAL-2527 - N<sub>2</sub> Recondenser 1C malfunction trip

Five remote annunciator units will be installed in the following plant locations:

- 1) I-9322
- 2) I-2301
- 3) Boiler Feed Pump A
- 4) Boiler Feed Pump C
- 5) Refueling Deck (Fuel Storage Well Alarms)



When an alarm exists at the remote annunciator unit, a general dispatch alarm will sound in the control room directing an operator to the remote panel in order to learn the exact nature of the alarm and to initiate corrective action.

Two new annunciator panels will be installed in the control room. One panel will be mounted on I-06 section A for the Hydraulic System. One panel will be mounted on I-15 for the HVAC System. A new annunciator control station will be installed on panel I-15.

The following Design Directives apply to CN-1924:

<u>NUMBER</u>	<u>ISSUE</u>	<u>DESCRIPTION</u>
DD-ASP-1	A	ANNUNCIATOR SELECTION AND PLACEMENT
DD-AAS-1	A	ABBREVIATION, SYMBOL, AND ACRONYM SELECTION
DD-APL-1	A	ANNUNCIATOR PANEL LEGENDS
DD-CBL-1	A	CONTROL BOARD LAYOUT
DD-LAB-1	B	CONTROL ROOM PANEL AND COMPONENT LABELING
DD-SWI-1	A	SWITCH SELECTION

ATTACHMENTS  
TO  
SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS

- A Remote Annunciator Unit Alarm Layout
- B New Control Room Annunciator Unit Alarm Layout
- C Summary of Changes to the Annunciator System

ATTACHMENT A

REMOTE ANNUNCIATOR UNIT  
ALARM LAYOUT

PURIF COOLER  
TRAIN A WELL  
PRESS HIGH  
1-1

PURIF COOLER  
TRAIN B WELL  
PRESS HIGH  
1-2

PURIFICATION  
EQUIP WELLS  
PRESS HIGH  
1-3

LOW TEMP EXCH  
REGEN GAS  
TEMP HIGH  
1-4

KNOCKOUT DRUM  
WATER LEVEL  
HIGH-LOW  
1-5

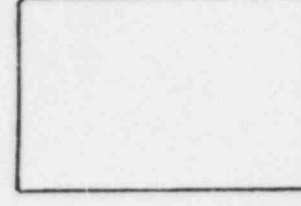
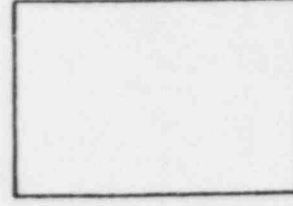
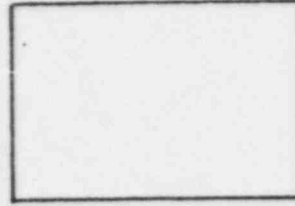
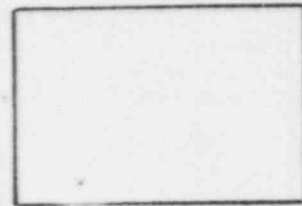
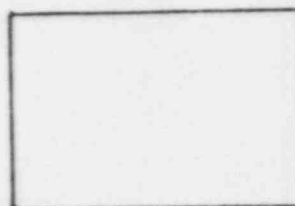
KNOCKOUT DRUM  
EQUALIZING VA  
CLOSED  
2-1

REGEN COOLER  
INLET TEMP  
LOW  
2-2

REGEN COOLER  
OUTLET TEMP  
HIGH  
2-3

REGEN COMPR  
CONTMT TANK  
WTR LEV HIGH  
2-4

REGEN HEATER  
TEMPERATURE  
HIGH  
2-5



CN-1924  
NEW DRAWING

TITLE: ELEVATION  
ANNUNCIATOR  
UNIT I22

DWG No.: E-1203, P.2247

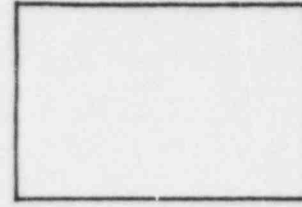
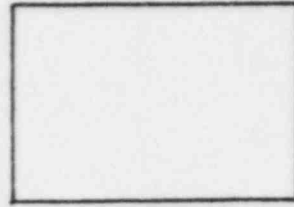
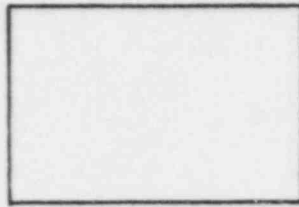
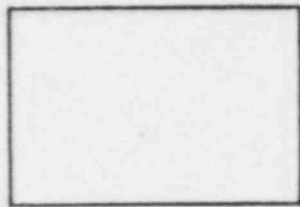
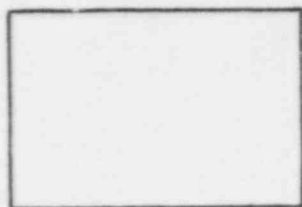
H2 GETTER  
UNIT A OUTLET  
TEMP HIGH  
1-1

H2 GETTER  
UNIT B OUTLET  
TEMP HIGH  
1-2

H2 GETTER  
HEATER  
TEMP HIGH  
1-3

H2 REMOVAL  
FILTER  
DP HIGH  
1-4

HOBART UNIT  
"A" OR "B"  
TRIP  
1-5



CN-1924  
NEW DRAWING

TITLE: ELEVATION  
ANNUNCIATOR  
UNIT I-2301

DWG No.: E-1203, P. 2254

CH-1924  
NEW  
DRAWING

HYDRAULIC OIL PRESS LOW 1-1	THRUST BRG WEAR TRIP 1-2	OIL RESERVOIR LEVEL HIGH-LOW 1-3	OIL FILTER $\Delta P$ HIGH 1-4	1-5	1-6
SUCTION STRAINER $\Delta P$ HIGH 2-1	THRUST BRG WEAR TRIP LOCKOUT 2-2	BEARING OIL DRAIN TEMP HIGH 2-3	2-4	2-5	2-6


TITLE: ELEVATION  
ANNUNCIATOR  
UNIT BFP A

DWG. No.: E-1203, P. 2261

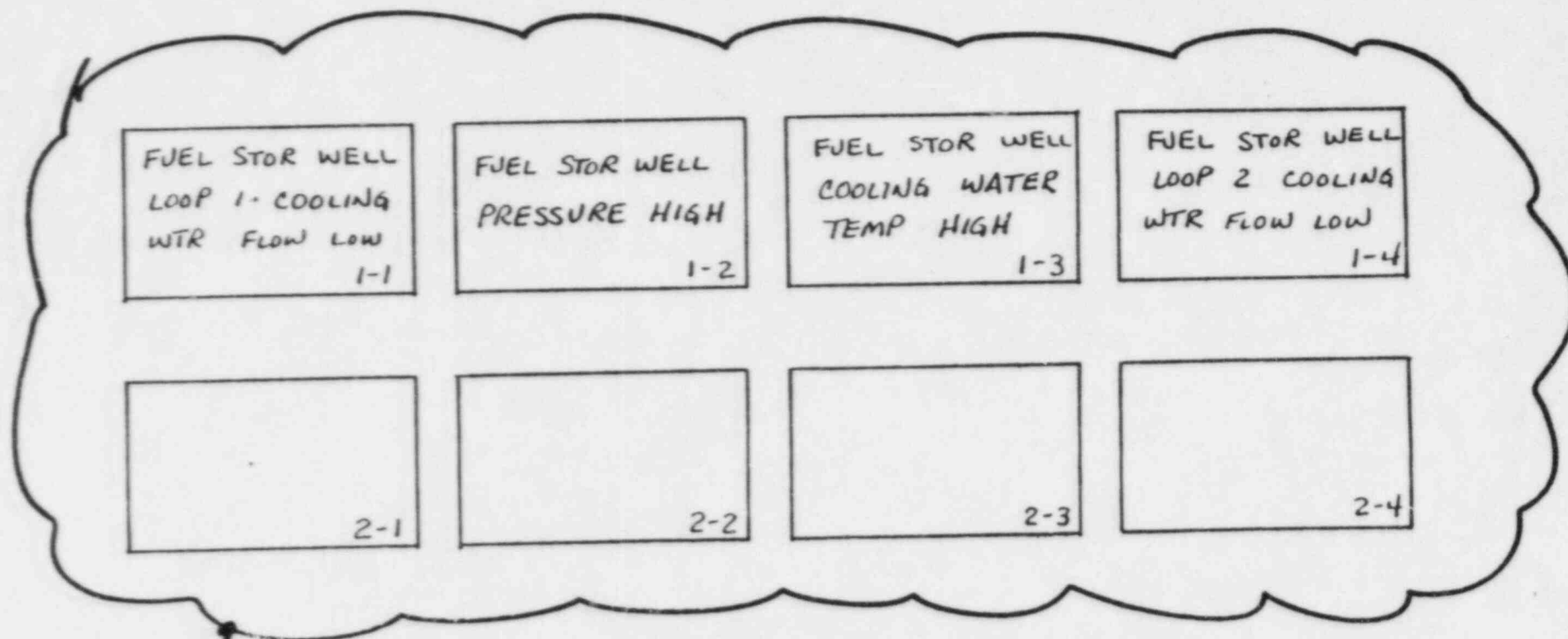


CN-1924  
NEW DRAWING

HYDRAULIC OIL PRESS LOW 1-1	THRUST BRG WEAR TRIP 1-2	OIL RESERVOIR LEVEL HIGH-LOW 1-3	OIL FILTER ΔP HIGH 1-4	1-5	1-6
SUCTION STRAINER ΔP HIGH 2-1	THRUST BRG WEAR TRIP LOCKOUT 2-2	BEARING OIL DRAIN TEMP HIGH 2-3	BFP B GLAND SEAL FLTR ΔP HIGH 2-4	2-5	2-6

TITLE: ELEVATION  
ANNUNCIATOR  
UNIT BFP  C

DWG. NO. : E-1203, P. 2264



CN-1924  
NEW DRAWING

TITLE: ELEVATION  
FUEL STORAGE WELL  
ANNUNC UNIT

DWG. NO. : E-1203 P. 2267

ATTACHMENT B

NEW CONTROL ROOM ANNUNCIATOR UNIT  
ALARM LAYOUT

HYDRAULIC POWER SYSTEM				
LOOP 1		LOOP 2		

HYDRAULIC OIL PUMP TRIP 1-1	POWER SYSTEM MALFUNCTION 1-2	HYDRAULIC OIL PUMP TRIP 1-3	POWER SYSTEM MALFUNCTION 1-4	SPARE 1-5
HEADER A PRESSURE LOW 2-1	HEADER B PRESSURE LOW 2-2	HEADER A PRESSURE LOW 2-3	HEADER B PRESSURE LOW 2-4	SPARE 2-5
GAS BOTTLE PRESSURE LOW 3-1	OIL TO GAS $\Delta P$ LOW-LOW 3-2	GAS BOTTLE PRESSURE LOW 3-3	OIL TO GAS $\Delta P$ LOW-LOW 3-4	SPARE 3-5
RESERVOIR LEVEL LOW-LOW 4-1	OIL TO GAS $\Delta P$ LOW 4-2	RESERVOIR LEVEL LOW-LOW 4-3	OIL TO GAS $\Delta P$ LOW 4-4	SPARE 4-5
RESERVOIR LEVEL LOW 5-1	CLEANUP SYS MALFUNCTION 5-2	RESERVOIR LEVEL LOW 5-3	CLEANUP SYS MALFUNCTION 5-4	SPARE 5-5

IOGJ

DOM WTR

HVAC

BOOSTER PUMP TRIP 1-1	BLDG HEAT SYS EXCH LEVEL HIGH 1-2	ACKNOWLEDGE I-7504X ALARM 1-3	ACKNOWLEDGE I-7301X (SX) ALARM 1-4	PCR V PIPING CAVITY RECIRC FAN TRIP 1-5	SPARE 1-6
SUPPLY PRESSURE LOW 2-1	BLDG HEAT SYS CIRCULATING PUMP TRIP 2-2	ACKNOWLEDGE I-7503X ALARM 2-3	ACKNOWLEDGE I-7304X ALARM 2-4	PCR V PIPE CAV/ SUP RING AREA TEMP HIGH 2-5	SPARE 2-6
STORAGE TANK LEVEL HIGH-LOW 3-1	BLDG HEAT SYS EXCH OUTLET TEMP LOW 3-2	ACKNOWLEDGE I-7501X ALARM 3-3	REACTOR PLANT EXHAUST FAN AUTO START 3-4	DATA ACQUISITION RM TEMP HIGH 3-5	SPARE 3-6
SPARE 4-1	BLDG HEAT SYS EXPAN TANK LEVEL LOW 4-2	CONTROL RM OR AUX ROOM SMOKE ALARM 4-3	REACTOR PLANT EXHAUST STACK FLOW LOW 4-4	SERVICE BLDG SU OR RTN FAN ΔP HIGH 4-5	SPARE 4-6
SPARE 5-1	SPARE 5-2	SPARE 5-3	SPARE 5-4	SPARE 5-5	SPARE 5-6

I-15

ATTACHMENT C

SUMMARY OF CHANGES TO THE  
ANNUNCIATOR SYSTEM



## ATTACHMENT C

### SUMMARY OF CHANGES TO THE ANNUNCIATOR SYSTEM

A) Five remote annunciator units will be installed at the following locations:

- 1) I-9322
- 2) I-2301
- 3) Boiler Feed Pump A
- 4) Boiler Feed Pump C
- 5) Refueling Deck (Fuel Storage Well)

Several control room alarms will be relocated to these remote annunciator units.

B) Two new annunciator alarm panels will be installed in the control room. A new I-06 section A alarm panel will contain the Hydraulic Power System alarms. An new I-15 alarm panel will contain the HVAC alarms.

C) An annunciator control station will be installed at the I-15 panel.

ATTACHMENT 6b-7

SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS  
AS APPLICABLE TO  
I-09 RECORDER MOVE

FOREWORD - NUREG-0737 Supplement 1, Section 5.1b requires that a Control Room Design Review (CRDR) be conducted to identify human engineering discrepancies. Section 5.1c requires that these discrepancies be assessed and design improvements selected to correct these discrepancies.

Public Service Company (PSC) has conducted the required review of the Fort St. Vrain Control Room. Approximately eight hundred forty eight (848) discrepancies or classes of discrepancies were cited. These discrepancies were assessed to determine their potential for causing an operating error and the potential effect of any error. (Certain discrepancies are known to have caused errors). An improvement program has been selected which meets the regulatory requirements and proposes to improve the operability and functionality of the Control Room.

The regulatory requirement for the CRDR and the follow-on improvement program was directed toward the improved handling of emergencies and not specifically toward improved production. Public Service Company's improvement program is directed toward both normal operation and the handling of emergencies.

BACKGROUND - Public Service Company has initiated an integrated improvement program based on functionality rather than particular classifications of problems. This approach is first, one of determining functional groupings, followed by demarcating, hierarchial labeling, correcting indicator scaling, complying with established conventions (color coding, switch positions, etc.).

The following steps constituted the planning portion of the integrated improvement program.

- Elevation Drawings of each control panel were color coded to show applicable HEDs as either, relabeling, relocations, scaling, deletions, or equipment changeout. This scheme provides an overview of the problems documented on each control board.
- All HEDs involving Alarm Locations, and multipoint alarms were reviewed. System function and operator response were considered in grouping, deleting and adding alarms. Paste-ups of all alarm panels were completed to show proposed rearrangements.
- Functional grouping of controls and indications was approached by first preparing point interaction sketches for various systems or by direct reference to system P&Is. This effort was, in effect, an extensive operational analysis which considered the dynamic considerations of control groups and arrangements. This activity reviewed the purpose and use of each and every component on the main control boards. Interviews with operators and training personnel were

conducted to determine operator interpretations and actions.

- Controls and indications were then arranged in functionally related groups. Associated alarm locations were rechecked to verify that the more desirable locations were selected. The function relationship of adjacent indicator and control groupings were reviewed.
- Revised drawings were prepared to show the proposed arrangements. Certain of these drawings were color coded to aid in differentiating between groupings. These drawings were then utilized to determine the scope of each change package (change notice).
- Change Notice (CN) numbers were assigned to each effort identified above.

#### IMPROVEMENT PROCESS METHODOLOGY

The Improvement Process starts with the documentation and drawings produced during the improvement planning process described in the BACKGROUND presentation portion of this summary. An individual designer is assigned the responsibility of evaluating a particular board. Since this individual may not have participated in previous efforts, an educational process is initiated to acquire a thorough understanding of each system, subsystem and component represented on the assigned control board. System descriptions, Piping & Instrument diagrams, electrical drawings, operating procedures are studied to gain this thorough understanding of each system and component function. An operational analysis is conducted for each system and component on a particular control board. (This in-depth analysis is in addition to that completed for the CRDR and planning purposes.) This Operational Analysis provides additional basis for determining any changes to functional groupings.

Operating and training personnel are interviewed to solicit operational philosophies. The Operational value and function of each control and indication is addressed. Informational requirements are again discussed. (This informational requirements effort is in addition to that conducted for Emergency Operating Procedures task analysis).

All HEDs applicable to a particular control board are reviewed and the tentative fix evaluated for its corrective value within the integrated approach. HEDs written against instruments and controls recorded by the Emergency Operating Procedure task analysis "Information and Control Requirements" effort, are reviewed with particular attention to any potential safety considerations. Any previously prepared investigative information is studied. All

factors are evaluated in considering any changes to the control board.

SPECIFIC - I-09 Recorder Move Synopsis - (Change Notice (CN)-1878 preparation package.)

Research - In an effort to generate more room on the main control boards to facilitate the rearrangement of controls and indicators, various recorders are to be moved from the main control boards to the I-09 panel or local to the location of operator action.

The recorder display survey was reviewed to determine which recorders were not required for plant operation and which recorders provided pertinent information that could be presented to the operator in a more direct and readily useable manner.

After the records to be relocated were identified, all HEDs associated with these were reviewed to determine problems with labeling, scaling, grouping, and useability. (See Attachment A)

Conceptual Design - The initial conception was to move the recorders not required for plant operation and those being replaced with another means of display out of the control room. Other selected recorders, which were determined to be necessary in the control room, but were not required in making control manipulations or system adjustments were to be moved to I-09.

This idea was presented to several operators and trainers for comment. It was concluded that those recorders listed as not necessary for plant operation do provide valuable trend information and should be left in the control room. As a result of this survey, it was decided to place this group of recorders on I-09. These recorders were functionally grouped and labeled per the applicable Design Directives. The final layout is included in Attachment B.

The following Design Directives apply to the I-09 Recorder Moves.

	<u>NUMBER</u>	<u>ISSUE</u>	<u>DESCRIPTION</u>
	DD-AAS-1	A	ABBREVIATION, SYMBOL, AND ACRONYM SELECTION
**	DD-CBL-1		CONTROL BOARD LAYOUT
	DD-LAB-1	B	PANEL AND COMPONENT LABELING
**	DD-RSN-1		RECORDER SELECTION
	** IN DRAFT FORM		



ATTACHMENTS  
TO  
SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS AS APPLICABLE TO I-09 RECORDER MOVE

- A List of all associated HEDs and copies of HEDs
- B I-09 Recorder Layout
- C Recorders being replaced by other means of display
- D Summary of Changes made by the I-09 Recorder Move
- E DD-RSN-1
- F Label List

ATTACHMENT A  
List of 1-09 Recorder Move HEDs  
&  
Copies of 1-09 Recorder Move HEDs

## HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL BOARD I-09

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0025	Labeling	1b	I-03	NR-1199	1	Labeled	1878	Relocate to I-09 & Relabel
0025	Labeling	1b	I-03	XR-11262	1	Labeled	1878	Relocate to I-09 & Relabel
0025	Labeling	1b	I-03	FR-11262	1	Labeled	1878	Relocate to I-09 & Relabel
0168	Labeling	1b	I-06	TR-31115	1	Relabel	1878	Change-Out, Relocate to I-09 & Relabel
0168	Labeling	1b	I-06	TR-3118	1	Relabel	1878	Change-Out, Relocate to I-09 & Relabel
0252	Labeling	1b	I-15	TR-5156	1	Relabel	1878	Change-Out, Relocate to I-09 & Relabel
0269	Labeling	1b	I-13	FR-2222	1	Relabel	1878	Change-Out, Relocate to I-09 & Relabel
0269	Labeling	1b	I-13	TR-2322	1	Relabel	1878	Change-Out, Relocate to I-09 & Relabel
0269	Labeling	1b	I-13	TR-2321	1	Relabel	1878	Change-Out, Relocate locally & Relabel
0269	Labeling	1b	I-13	TR-2232	1	Relabel	1878	Change-Out, Relocate to I-09 & Relabel
0384	Instrument	2cx	I-13	TR-2232	2	Relocate	1878	Change-Out, Relocate to I-09 & Relabel
0384	Instrument	2cx	I-13	TR-4637	2	Relocate	1878	Change-Out, Relocate to I-09 & Relabel
0384	Instrument	2cx	I-13	TR-4638	2	Relocate	1878	Change-Out, Relocate to I-09 & Relabel
0384	Instrument	2cx	I-15	TR-5156	2	Relocate	1878	Change-Out, Relocate to I-09 & Relabel
0384	Instrument	2cx	I-09	PDR-73335	3	Relocate	1878	Model change-out combined all PDR functions on one recorder
0384	Instrument	2cx	I-09	PDR-73440	3	Relocate		Combine with/PDR-73335 and Relabel
0384	Instrument	2cx	I-09	PDR-73441	3	Relocate		Combine with/PDR-73335 and Relabel
0384	Instrument	2cx	I-09	PDR-73442	3	Relocate		Combine with/PDR-73335 and Relabel
0384	Instrument	2cx	I-09	TR-73445	3	Relocate		Combine with/TR-73445 and Relabel
0384	Instrument	2cx	I-09	TR-73446	3	Relocate		Combine with/TR-73445 and Relabel
0384	Instrument	2cx	I-09	TR-73447	3	Relocate		Combine with/TR-73445 and Relabel
0384	Instrument	2cx	I-09	TR-73448	3	Relocate		Combine with/TR-73445 and Relabel
0384	Instrument	2cx	I-09	PDR-73449	3	Relocate		Combine with/PDR-73335 and Relabel
0384	Instrument	2cx	I-09	PDR-73450	3	Relocate		Combine with/PDR-73335 and Relabel
0384	Instrument	2cx	I-09	PDR-73451	3	Relocate		Combine with/PDR-73335 and Relabel
0384	Instrument	2cx	I-09	PDR-73452	3	Relocate		Combine with/PDR-73335 and Relabel
0384	Instrument	2cx	I-09	TR-73449	3	Relocate		Combine with/TR-73445 and Relabel
0384	Instrument	2cx	I-09	TR-73450	3	Relocate		Combine with/TR-73445 and Relabel
0384	Instrument	2cx	I-09	TR-73451	3	Relocate		Combine with/TR-73445 and Relabel
0384	Instrument	2cx	I-09	TR-73452	3	Relocate		Combine with/TR-73445 and Relabel
0384	Instrument	2cx	I-15	TR-92105	2	Relocate	1878	Change-Out, Relocate to I-09 & Relabel
0496	Instrument	2b	I-03	NR-1199	4	None	1878	Indication not required, moved to I-09
0496	Instrument	2b	I-03	XR-11262	4	None	1878	Indication not required, moved to I-09
0496	Instrument	2b	I-03	FR-11262	4	None	1878	Indication not required, moved to I-09
0504	Instrument	2c	I-01	TR-2227	3	Change-out	1887	Function displayed on CRT installed on I-04 by CN-1887
0504	Instrument	2c	I-01	TR-2255	3	Change-out	1887	Function displayed on CRT installed on I-04 by CN-1887
0517	Labeling	1b	I-01	TR-2227	1	Relabel	1878	Change-Out, Relocate to I-09 & Relabel
0517	Labeling	1b	I-01	TR-2255	1	Relabel	1878	Change-Out, Relocate to I-09 & Relabel

## HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL BOARD 1-09

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0544	Labeling	1b	1-13	TR-2321	1	Relabel	1878	Change-Out, Relocate locally & Relabel
0544	Labeling	1b	1-13	TR-2322	1	Relabel	1878	Change-Out, Relocate to 1-09 & Relabel
0630	Instrument	2e	1-06	TR-3118	2	None	1878	See HED Resolution
0630	Instrument	2e	1-06	TR-31115	2	Change-out	1878	See HED Resolution
0652	Instrument	2e	1-06	XR-3390-1	1	Change-out	1878	Replace chart paper only
0652	Instrument	2e	1-13	TR-4637	1	Change-out	1878	Replace chart paper only
0652	Instrument	2e	1-13	TR-4638	1	Change-out	1878	Replace chart paper only
0652	Instrument	2e	1-03	TR-2256	1	Change-out	1878	Replace chart paper only
0652	Instrument	2e	1-09	PDR-73335	1	Change-out	1878	Model change-out combined all PDR functions on one recorder (includes new chart paper)
0652	Instrument	2e	1-09	TR-73335	1	Change-out	1878	Model change-out combined all TR functions on one recorder (includes new chart paper)
0652	Instrument	2e	1-09	PDR-73440	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73440	1	None		Combined on single recorder, TR-73335
0652	Instrument	2e	1-09	PDR-73441	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73441	1	None		Combined on single recorder, TR-73335
0652	Instrument	2e	1-09	PDR-73442	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73442	1	None		Combined on single recorder, TR-73335
0652	Instrument	2e	1-09	PDR-73443	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73443	1	None		Combined on single recorder, TR-73335
0652	Instrument	2e	1-09	PDR-73444	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73444	1	None		Combined on single recorder, TR-73335
0652	Instrument	2e	1-09	PDR-73445	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73445	1	None		Combined on single recorder, TR-73335
0652	Instrument	2e	1-09	PDR-73446	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73446	1	None		Combined on single recorder, TR-73335
0652	Instrument	2e	1-09	PDR-73447	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73447	1	None		Combined on single recorder, TR-73335
0652	Instrument	2e	1-09	PDR-73448	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73448	1	None		Combined on single recorder, TR-73335
0652	Instrument	2e	1-09	PDR-73449	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73449	1	None		Combined on single recorder, TR-73335
0652	Instrument	2e	1-09	PDR-73450	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73450	1	None		Combined on single recorder, TR-73335
0652	Instrument	2e	1-09	PDR-73451	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73451	1	None		Combined on single recorder, TR-73335
0652	Instrument	2e	1-09	PDR-73452	1	None		Combined on single recorder, PDR-73335
0652	Instrument	2e	1-09	TR-73452	1	None		Combined on single recorder, TR-73335
0653	Instrument	2e	1-03	PR-1108	1	Rescale	1878	Move to 1-09 & Rescale

## HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL BOARD I-09

HED NO.	PROBLEM CLASSIFICATION		LOCATION		INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)	IDENTIFICATION				RESOLUTION	CHANGE NOTICE	
0653	Instrument	2e	I-03		NR-1133-2	1	None		Reevaluated, no discrepancy
0653	Instrument	2e	I-06		TR-31115	1	Change-out	1878	Replace with digital indicator in CN-1891 & move to I-09
0653	Instrument	2e	I-06		CR-3390-2	1	Rescale	1878	Move to I-09 & Rescale
0653	Instrument	2e	I-06		XR-3390-1	1	Rescale	1878	Move to I-09 & Rescale
0653	Instrument	2e	I-06		GR-5154	1	Change-out	1878	Change-Out, Move to I-09, Relabel and Rescale
0653	Instrument	2e	I-15		TR-92105	1	Change-out	1878	Change-Out, Move to I-09, Relabel and Rescale
0653	Instrument	2e	I-13		TR-4637	1	Add pointer	1878	Add pointer to fixed scale
0653	Instrument	2e	I-13		TR-4638	1	Add pointer	1878	Add pointer to fixed scale
0653	Instrument	2e	I-13		FR-2222	1	Change-out	1878	Change-Out, Move to I-09, Relabel and Rescale
0653	Instrument	2e	I-09		PDR-73448 (Typ)	1	Change-out	1878	Combined on single recorder, PDR-73335. Relabel and Rescale
0654	Instrument	2e	I-03		PR-1108	1	Relocate	1878	See HED Resolution
0654	Instrument	2e	I-03		NR-1199	1	Relocate	1878	See HED Resolution
0654	Instrument	2e	I-13		TR-4637	1	Relocate	1878	See HED Resolution
0654	Instrument	2e	I-13		TR-4638	1	Relocate	1878	See HED Resolution
0655	Instrument	2e	I-03		TR-2256	1	Rescale	1878	Move to I-09 & Rescale
0655	Instrument	2e	I-06		GR-5154	1	Change-out	1878	Change-Out, Move to I-09, Relabel and Rescale
0655	Instrument	2e	I-13		TR-4637	1	None		Reevaluated, no discrepancy
0655	Instrument	2e	I-13		TR-4638	1	None		Reevaluated, no discrepancy
0655	Instrument	2e	I-09		PDR-73448 (Typ)	1	Change-out	1878	Combine on single recorder, PDR-73335. Rescale and Relabel
0656	Instrument	2e	I-01		TR-2227	12	Rescale	1878	Change-Out, Move to I-09 and Rescale
0656	Instrument	2e	I-01		TR-2255	12	Rescale	1878	Change-Out, Move to I-09 and Rescale
0656	Instrument	2e	I-03		NR-1133-2	12	Rescale	1878	Move to I-09 and Rescale
0656	Instrument	2e	I-06		TR-31115	12	Rescale	1878	Change-Out, Move to I-09 and Rescale
0656	Instrument	2e	I-06		CR-3390-2	12	Rescale	1878	Move to I-09 and Rescale
0656	Instrument	2e	I-06		XR-3390-1	12	Rescale	1878	Move to I-09 and Rescale
0656	Instrument	2e	I-06		GR-5154	12	Rescale	1878	Change-Out, Move to I-09 and Rescale
0656	Instrument	2e	I-15		TR-5156	12	Rescale	1878	Change-Out, Move to I-09 and Rescale
0656	Instrument	2e	I-15		TR-92105	12	Rescale	1878	Change-Out, Move to I-09 and Rescale
0656	Instrument	2e	I-13		TR-2322	12	Rescale	1878	Change-Out, Move to I-09 and Rescale
0656	Instrument	2e	I-13		TR-2321	12	Rescale	1878	Change-Out, Relocate locally and Rescale
0657	Instrument	2e	I-01		TR-2255	11	Label	1878	Functionally label
0657	Instrument	2e	I-01		TR-2227	11	Label	1878	Functionally label
0657	Instrument	2e	I-06		GR-5154	11	Relabel	1878	Change-Out, Move to I-09 and Relabel
0657	Instrument	2e	I-15		TR-5156	11	Relabel	1878	Change-Out, Move to I-09 and Relabel

## HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL BOARD I-09

HED NO.	PROBLEM CLASSIFICATION		LOCATION		INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)	IDENTIFICATION				RESOLUTION	CHANGE NOTICE	
0657	Instrument	2e	I-15	TR-92105	1	Relabel	1878		Change-Out, Move to I-09 and Relabel
0657	Instrument	2e	I-09	PDR-73448 (Typ)	1	Label	1878		Combine to single recorder, PDR-73335. Rescale and Relabel
0657	Instrument	2e	I-13	TR-2321	1	None			Remove from Control Room
0658	Instrument	2e	I-01	TR-2255	2	Change-out	1878		See HED Resolution
0658	Instrument	2e	I-01	TR-2227	2	Change-out	1878		See HED Resolution
0658	Instrument	2e	I-06	TR-31115	2	Change-out	1878		See HED Resolution
0658	Instrument	2e	I-06	TR-3118	2	Change-out	1878		See HED Resolution
0658	Instrument	2e	I-06	GR-5154	2	None			See HED Resolution
0658	Instrument	2e	I-15	TR-5156	2	None			See HED Resolution
0658	Instrument	2e	I-15	TR-92105	2	None			See HED Resolution
0658	Instrument	2e	I-13	FR-2222	2	Change-out	1878		See HED Resolution
0658	Instrument	2e	I-13	TR-2321	2	None			See HED Resolution
0658	Instrument	2e	I-13	TR-2232	2	Change-out	1878		See HED Resolution
0659	Instrument	2e	I-06	GR-5154	3	Change-out	1878		Model Change-Out, Relocate to I-09 and Relabel
0659	Instrument	2e	I-15	TR-5156	3	Change-out	1878		Model Change-Out, Relocate to I-09 and Relabel
0659	Instrument	2e	I-13	TR-2321	3	None			Remove from Control Room
0661	Instrument	2e	I-03	TR-1199	2	None			See HED Resolution
0661	Instrument	2e	I-03	XR-11262	2	None			See HED Resolution
0661	Instrument	2e	I-03	FR-11262	2	None			See HED Resolution
0662	Instrument	2e	I-06	TR-31115	2	None			See HED Resolution
0695	Instrument	2c	I-13	TR-4637	3	Relocate	1878		Relocate to I-09
0695	Instrument	2c	I-13	TR-4638	3	Relocate	1878		Relocate to I-09
0746	Instrument	2c	I-13	TR-2232	3	Relocate	1878		Change-Out, Relocate to I-09 & Relabel
0746	Instrument	2c	I-13	FR-2222	3	Relocate	1878		Change-Out, Relocate to I-09 & Relabel
0786	Instrument	2c	I-13	TR-2321	3	None			Remove from Control Room
0786	Instrument	2c	I-13	TR-2322	3	Relocate	1878		Change-Out, Relocate to I-09 & Relabel



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0168

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION TR-31115 & TR-3118 Relabeled in CN1878 M. Henderson 11/22/85

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

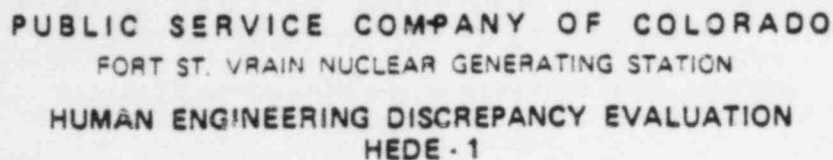
F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION TR-5156 Rejected in CN1878 M. Anderson 11/27/85

TEAM ACTION		
TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



Log Number 0269

200  
Form 344-22-4220

REVIEWER NAME			DATE
F Llonas			7-14-83
A. HED TITLE Labeling and Tagging convention			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
FR-2222	steam Gen module FW flow	I-013	E-07
TR-2322	He Purif system temperatures	I-013	E-06
TR-2321	He Purif system temperatures	I-013	E-05
TR-2232	steam Gen module COH	I-013	E-04
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)			
Lettering on function tags is too small should be 5/32. on TR-2232 should be 3/16. Also on TR-2232 no instrument tag is shown.			
Legend tag has acronyms that require clarification			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION TR-2232, TR-2322 & FR2222 Relabeled ! TR-2321 removed  
from the control room in CN 1878. M Henderson 11/22/85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		





PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0384

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION See attached sheet

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator

HED 0384 RESOLUTION

PDR-73335, PDR-73440, PDR-73441, PDR-73442, PDR-73449, PDR-73450, PDR-73451 & PDR-73452 WERE COMBINED INTO A SINGLE RECORDER AND LOCATED WITHIN THE HEIGHT LIMITATIONS.

TR-73445, TR-73446, TR-73447, TR-73448, TR-73449, TR-73450, TR-73451 & TR-73452 WERE COMBINED INTO A SINGLE RECORDER AND LOCATED WITHIN THE HEIGHT LIMITATIONS.

TR-2232, TR-4637, TR-4638, TR-5156 & TR-92105 WERE RELOCATED TO 109 AND LOCATED BY HEIGHT LIMITATIONS.

TR-2321 WAS REMOVED FROM THE CONTROL ROOM

Mike Henderson 11/22/85

## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 025

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME

RON GARRETT

DATE \_\_\_\_\_

618183

A. HED TITLE LABELING & TAGGING CONVENTION

B.

### ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
ZI-1202	REGULATING ROD POSITION INDICATOR	I-03	B-85
NR-1199	NUCLEAR RECORDER	↓	A-26
XR-1262	↓		A-26
FR-11262	↓		A-26

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) RECORDER + INDICATOR HAS NO FUNCTION TAG

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION Relocate to I-09. Functionally label per  
DD-LAB-1 CN-1878. 11-8-85 WCH

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

A review of HED-0384 reflects the following:

(1) The following instruments/indicators are used by the operators in conducting plant normal & Emergency operations.

TSH-22136	105 - P10
- 22137	205 - P10
- 22135	305 - P10

RWP Logic	102 - P3/4
" "	302 P3/4

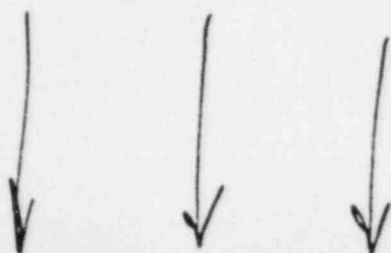
XI - 93236/7	} - { above 101	
XI - 93181/2		" 202
XI - 93193/235		" 301

RIS - 93251-11	402 P11/12
RIS - 93252-11	502 P11/12
RIS - 93250-11	602 P11/12

CS-2EB	702 P7/8
CS-2EA	902 P7/8

RIS-93251-10	1002 P11/12
RIS-93252-10	1102 P11/12
RIS-93250-10	1202 P11/12

XCR Bin. (modules)



101	P9/10
301	P9/10
401	P9/10
601	P9/10
701	P9/10
901	P9/10
1001	P9/10
1201	P9/10



TR - 2232  
TR - 4637  
TR - 4638

I-13  
I-13  
I-13

FI-11263  
PI-1130

I-13  
I-13

## ⑤ Recorders

- ⑥ TI-21267 is above the recommended elevation however due to the size of the indicator ~~and~~ the scale increment the instrument may be read to within  $10^{\circ}\text{F}$  which is adequate for the intended purpose.
- ⑦ MI-11155/6-~~11173/4/5/6~~ are not used ~~in~~ under the present~~ly~~ operating philosophy. (These devices ~~to~~ should be removed)
- ⑧ Radiation Induction Switches - Walk-thru reflected that operators use indicators to verify a trip. (This is applicable during Emergency "Containment") The dose assessment and any requirement for reading the meters on the RIS comes in the present RERP.
- Ambiguity exist between existing procedural steps & operating ~~philosophies~~ as to call & values. (Does site Emergency planning encompass Emergency "Containment"?)
- Due to this ambiguity and the unanswered question as to the possible result of consequences of our error,

the assessment team elected to classify this as a cat 1.

Radiation Indic Switches located in bins 204, 304, & 404 are  $1\frac{1}{2}$ " below the 41" value. The probability of ~~error~~ making an error due to elevation is considered only a minimal percentage higher than those located above 41".

these RIS's are not req'd for dose assessment nor is quantitative info required. The Operator may verify a trip and verify an up scale ~~trip~~ reading only before proceeding to locate and isolate.

XRP's (Diff Relaying & Metering) on I-15 is categorized as a 4 since these are not operator use items.

HS - maintained position - If operator actuates switch, the probability of an error is considered minimal

Can recognize a switch (proper identification & position recognition and then ...

TR-8901/2/3 & River Temp Monitor Panels rated Category 4 & HED 0833 initiated for these items as ex-unused equip.



CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

FORM 344 22-4227

CRS- 10

File # 014

Sheet 1 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

SEQ.	PANEL	Record Instr. Numbers if No	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?		REMARKS
				YES	NO	YES	NO	
					HED#		HED#	
	I-7507X			✓				
	I-7507X					✓		
	I-09				✓			see survey
	I-09						✓	checklist see survey
	I-10				✓			checklist see survey
	I-10						✓	checklist see survey
	I-13				✓			checklist see survey
	I-13						✓	checklist see survey
	I-14				✓			checklist see survey
	I-14						✓	checklist see survey



CONTROL BOARDS  
(Vertical)

## CONTROL ROOM SURVEY CHECKLIST

File # 015

Sheet 2 of 34

FORM 344-22-4227

CRS - 10

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

[illegible]

PRINCIPLE:

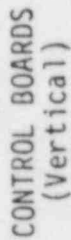
### 3.2.2.5 Controls should be located so they are reachable and accessible.

copy

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?			Are all indicators located above a Panel Elevation of 41"?			REMARKS	CATEGORIZATION		
				YES	HED#	NO	YES	HED#	NO		A	B	C
	I-09 PANEL #2	FIR-4104	33"	SEE HED # 0645			✓			1/3	3		
		FQ-4104-2	40 1/2"				✓			4			
		FQ-4104-1	38 3/4"				✓			4			
	PANEL #3	PDR-73355	76 1/2"			✓				1/3	3		
		PDR-73440				✓				1/3	3		
		PDR-73441				✓				1/3	3		
		PDR-73442				✓				1/3	3		
		TR-73445	35"						✓	1/3	3		
		TA-73446							✓	1/3	3		
		TA-73447							✓	1/3	3		







PRINCIPLE:

### 3.2.2.5 Controls should be located so they are reachable and accessible.

copy

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?			Are all indicators located above a Panel Elevation of 41"?			CATEGORIZATION				
				YES	HED#	NO	YES	HED#	NO	REMARKS				
										A	B	C		
	I-09 PANEL # 5	CONDENSOR VACUUM + BAROMETER	32"									1/3		
	I-09 Panel 6	F 7302-1 May-24	17" 21"										4	
	I-09- Panel 6	F 7303-1 THru-24	73" 73"										4	
	I-09- Panel 4	Temp Monitoring panel has a reset switch also better sig & labeling location	75"										4	



CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

File #

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FORM 344 22-4227

CRS: 10

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*COPY*

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?			Are all indicators located above a Panel Elevation of 41"?			CATEGORIZATION		
				YES	HED#	NO	YES	HED#	NO	REMARKS		
										A	B	C
	I-09 PANEL #6	XR-935743 XR-934453	81 1/2"			✓						
	I-09 PANEL #5	11" WELD MEGAWATTS	75 3/4"						✓			
		S315 LINE	22"						✓			
		SGR-S2	22"						✓			
		S319 LINE	22"						✓			
		SGR-S2	22"						✓			
		S313 LINE	22"						✓			
	PANEL #4	SGR-S2	22"						✓			
		S317 LINE	22"						✓			
		SGR-S2	22"						✓			
		S306 LINE	1"						✓			
	PANEL #3	SGR-S2	22"						✓			
		S307 LINE	22"						✓			
		SGR-S2	22"						✓			
		S311 LINE	22"						✓			
	PANEL #2	SGR-S2	22"						✓			
		S310 LINE	22"						✓			
		SGR-S2	22"						✓			





CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

File # \_\_\_\_\_

FOIIM 344 22-4227

CRS - 10

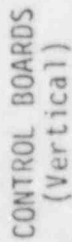
Sheet 8 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*COPY*

SEQ.	PANEL	Record Instr. Numbers if No	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?		CATEGORIZATION		
				YES	NO	YES	NO	REMARKS		
					HED#		HED#	A	B	C
	<i>MODULE</i>									
	<i>I-10</i>	<i>POWER CHANNEL "B"</i> <i>1084 MH</i>	<i>39"</i>				<input checked="" type="checkbox"/>	<i>A-08</i>	<i>1/3</i>	<i>3</i>
		<i>NSH-1137-1</i> <i>NSH-1137-2</i> <i>NSH-1137-3</i>								
		<i>NSH-1137-4</i> <i>NSH-1134-3</i> <i>NSH-1134-4</i>					<input checked="" type="checkbox"/>	<i>A-08</i>	<i>1/3</i>	<i>3</i>
		<i>NSH-1134-5</i> <i>NSH-1134-6</i>					<input checked="" type="checkbox"/>	<i>A-08</i>	<i>1/3</i>	<i>3</i>
		<i>NSH-1138-1</i> <i>NSH-1138-2</i> <i>NSH-1138-3</i>					<input checked="" type="checkbox"/>	<i>B-98</i>	<i>1/3</i>	<i>3</i>
		<i>NSH-1138-4</i> <i>NSH-1135-3</i> <i>NSH-1135-4</i>					<input checked="" type="checkbox"/>	<i>B-98</i>	<i>1/3</i>	<i>3</i>
		<i>NSH-1135-5</i> <i>NSH-1135-6</i>					<input checked="" type="checkbox"/>	<i>B-98</i>	<i>1/3</i>	<i>3</i>
		<i>NSH-1136-1</i> <i>NSH-1136-2</i> <i>NSH-1136-3</i>					<input checked="" type="checkbox"/>	<i>B-97</i>	<i>1/3</i>	<i>3</i>
		<i>NSH-1136-4</i> <i>NSH-1133-3</i> <i>NSH-1133-4</i>					<input checked="" type="checkbox"/>	<i>B-97</i>	<i>1/3</i>	<i>3</i>
		<i>NSH-1133-5</i> <i>NSH-1133-6</i>					<input checked="" type="checkbox"/>	<i>B-97</i>	<i>1/3</i>	<i>3</i>
		<i>PSL-1109-1</i> <i>PSL-1109-2</i>	<i>28 3/4"</i>				<input checked="" type="checkbox"/>	<i>B-97</i>	<i>1/3</i>	<i>3</i>
	<i>1085 MH P3</i>							<i>B-96</i>	<i>1/3</i>	<i>3</i>



# CONTROL ROOM SURVEY CHECKLIST

File #

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CAS-10

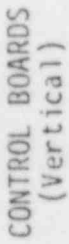
PRINCIPLE:

### 3.2.2.5 Controls should be located so they are reachable and accessible.

copy

SEQ.	PANEL	Record Instr. Numbers if No	Dist. if No	Are all indicators located below a Panel Elevation of 70"?			Are all indicators located above a Panel Elevation of 41"?			REMARKS	CATEGORIZATION
				YES	HED#	NO	YES	HED#	NO		
	I-10	105	P4	PSH-1109-1	28 3/4"						
			P10	TSH-22136						B-96	1/3 3
		205	P1	XMS-11262-15						B-96	1/2 1/2 2
			P3	PSL-1110-1						B-95	1/3 3
			P4	PSH-1110-1						B-95	1/3 3
				PSL-1110						B-95	1/2 1/2 2
			P10	TSH-22137						B-95	1/3 3
		305	P1	TSH-1238						B-94	1/3 3
			P3	PSH-1108-2						B-94	1/3 3
			P4	PSL-1108-1						B-94	1/3 3
			P10	PSH-1108-1						B-94	1/2 1/2 2

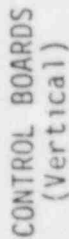




### 3.2.2.5 Controls should be located so they are reachable and accessible.

copy

SEQ.	PANEL	Record Instr. Numbers if No	Dist. if NO	Are all indicators located below a Panel Elevation of 70"?			Are all indicators located above a Panel Elevation of 41"?			REMARKS	CATEGORIZATION			
				YES	HED#	NO	YES	HED#	NO		A	B	C	
	I-10	106	P1	TSN-1176 TSL-1176	17 1/2"						B-93	1/3	3	
			P2	TSN-1172 TSL-1172							B-93	1/3	3	
			P3	TM-1152-2							B-93	1/3	3	
			P4	TM-1152-1							B-93	1/3	3	
			P5	TM-1152-3							B-93	1/3	3	
			P6	TSN-93473							B-93	1/3	3	
		206	P1	TSN-1177 TSL-1177							B-92	1/3	3	
			P2	TSN-1173 TSL-1173							B-92	1/3	3	
			P3	TM-1153-2							B-92	1/3	3	
			P4	TM-1153-1							B-92	1/3	3	



## PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

copy

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CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

FORM 344-22-4227

CRS- 10

File # \_\_\_\_\_

Sheet 12 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*COPY*

SEQ.	PANEL	Record Instr. Numbers if No	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?		CATEGORIZATION	REMARKS		
				YES	NO	YES	NO		A	B	C
					HED#		HED#				
	I-10	II-93177	76"		✓			C-04	1/3	3	
		II-93179	76"		✓			C-05	1/3	3	
		SCRAM BRAKE PWR SUPPLY NO. 1	91 1/2"		✓				1/3	3	
		SCRAM BRAKE PWR SUPPLY NO. 2	91 1/2"		✓				1/3	3	
		SCRAM CONTACTORS	XI-93235 85 1/2"		✓				4		
			XI-93181		✓				4		
			XI-93237		✓				4		
			XI-93183		✓				4		
			XI-93236		✓				4		
			XI-93182		✓				4		



CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

FORM 344-22-4227

CRS- 10

File # \_\_\_\_\_

Sheet 13 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*COPY*

SEQ.	PANEL	Record Instr. Numbers if No	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?		REMARKS	CATEGORIZATION		
				YES	NO	YES	NO		A	B	C
					HED#		HED#				
	I-10	402	P12	RIS-93251	1175"			E-35	1/2	1/2	2
		405	P1	SM-21170-2	39 1/2"		✓	C-18	1/3	3	
			P2	SM-21170-1			✓	C-18	1/3	3	
			P6	FSL-22104			✓	C-18	1/3	3	
			P8	FM-2212			✓	C-18	1/3	3	
			P10	SM-21164-2			✓	C-18	1/3	3	
			P11	ST-21164			✓	C-18	1/3	3	
		406	P2	PDS-21550-1 PDS-21550-2	28 3/4"		✓	C-17	1/3	3	
			P3	PDS-21548-1 PDS-21548-2			✓	C-17	1/3	3	
			P4	FSL-2212-3			✓	C-17	1/3	3	





CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

File #

FORM 344-22-4227

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Sheet 15 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

COPY

SEQ.	PANEL	Record Instr. Numbers if No	Dist. if No	Are all indicators located below a Panel Elevation of 70"?			Are all indicators located above a Panel Elevation of 41"?			CATEGORIZATION REMARKS		
				YES	HED#	NO	YES	HED#	NO	A	B	C
I-10	502	P13	"			✓				1/2	1/2	C
	505	P1	75"							1/3	1/3	2
		P2	39 1/2"						✓	1/3	1/3	
		P6							✓	1/3	1/3	
		P8							✓	1/3	1/3	
		P10							✓	1/3	1/3	
		P11							✓	1/3	1/3	
	506	P2							✓	1/3	1/3	
		P3							✓	1/3	1/3	
		P4							✓	1/3	1/3	





# CONTROL BOARDS (Vertical)

## CONTROL ROOM SURVEY CHECKLIST

FORM 344-22-4227

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File # \_\_\_\_\_

Sheet 16 of 34

### PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

COPY

SEQ.	PANEL	Record Instr. Numbers if No	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?		CATEGORIZATION	REMARKS		
				YES	NO	YES	NO		A	B	C
					HED#		HED#				
	I-10	506	P5	SSL-21172-1 SSL-21172-2	28 3/4"		✓	C-16	1/3	3	
			P6	SSH-21172 SSH-21172-1			✓	C-16	1/3	3	
			P8	XSH-93470C			✓	C-16	1/3	3	
			P10	FSL-2214-1 FSL-2214-2			✓	C-16	1/3	3	
			P11	SSL-21166-1 SSL-21166-2			✓	C-16	1/3	3	
			P17	SSH-21166 SSH-21166-1			✓	C-16	1/3	3	
		602	P12	RTS-93250-11	75"	✓		E-37	1/2	1/2	2
		605	P1	SM-21168-2	39 1/2"		✓	C-20	1/3	3	
			P2	SM-21168-1			✓	C-20	1/3	3	
			P6	TSL-22102			✓	C-20	1/3	3	



CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

FORM 344-22-4227

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File # \_\_\_\_\_

Sheet 17 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*COPY*

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?		REMARKS	CATEGORIZATION		
				YES	NO	YES	NO		A	B	C
					HED#		HED#				
	I-10	605	P8	FM-2210	39 1/2"		✓	C-20	1/3	3	
			P10	SM-21162-2			✓	C-20	1/3	3	
			P11	SM-21162-1			✓	C-20	1/3	3	
			P2	PDS-21546-1 PDS-21546-2	28 3/4"		✓	G-09	1/3	3	
			P3	PDS-21544-1 PDS-21544-2			✓	G-09	1/3	3	
			P4	FSL-2110-3			✓	G-09	1/3	3	
			P5	SSL-21168-1 SSL-21168-2			✓	G-09	1/3	3	
			P6	SSH-21168 SSH-21168-1			✓	G-09	1/3	3	
			P8	SSH-43470A			✓	G-09	1/3	3	
			P10	FSL-2210-1 FSL-2210-2			✓	G-09	1/3	3	



CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

File # \_\_\_\_\_

FORM 344-22-4227

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Sheet 18 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*copy*

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?		REMARKS	CATEGORIZATION		
				YES	NO	YES	NO		A	B	C
					HED#		HED#				
	I-10	606	P11	SSL-21162-1 SSL-21162-2	28 3/4"		✓	G-09	1/3	3	
		↓	P12	SSH-21162 SSH-21162-1	↓		✓	G-09	1/3	3	
		705	P5	XSH-93456B	39 1/2"		✓	C-21	1/3	3	
			P7	XSH-93454B	↓		✓	C-21	1/3	3	
			P9	XSH-93457B	↓		✓	C-21	1/3	3	
		↓	P11	XSH-93455B	↓		✓	C-21	1/3	3	
		802		TR-1192	75"	✓		C-23	1/3	3	
		905	P5	XSH-93456A	39 1/2"		✓	E-43	1/3	3	
			P7	XSH-93454A	↓		✓	E-43	1/3	3	
		↓	P9	XSH-93457A	↓		✓	E-43	1/3	3	



# CONTROL BOARDS (Vertical)

## CONTROL ROOM SURVEY CHECKLIST

File #

CRS- 10

Sheet 19 of 34

FORM 344 22-4227

### PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*copy*

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?			Are all indicators located above a Panel Elevation of 41"?			ELEVATION	REMARKS		
				YES	HED#	NO	YES	HED#	NO		A	B	C
	I-10	9105	P11	XSH-93755A	39 1/2"					E-43	1/3	3	C
		1002	P12	RIS-43755A	75"					C-09	1/2	1/2	2
		1005	P1	SM-31169-2	39 1/2"					E-44	1/3	3	
			P2	SM-31169-1						E-44	1/3	3	
			P6	ISL-22103						E-44	1/3	3	
			P8	FM-2211						E-44	1/3	3	
			P10	SM-31163-2						E-44	1/3	3	
			P11	SM-31163-1						E-44	1/3	3	
		1006	P2	PDS-21551-1 PDS-21551-2	28 3/4"					E-44	1/3	3	
			P3	PDS-21549-1 PDS-21549-2						C-11	1/3	3	



CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

File # \_\_\_\_\_

FORM 344-22 4227

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Sheet 20 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*COPY*

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?			CATEGORIZATION					
				YES	NO	YES	NO		REMARKS					
									HED#	HED#	A	B	C	
	I-10	1006	P4	FSL-2211-3	28 <sup>3</sup> / <sub>4</sub> "				✓	C-11	1/3	3		
	↓		P5	SSX-21169-1 SSL-21169-2					✓	C-11	1/3	3		
			P6	SSH-21169 SSH-21169-1					✓	C-11	1/3	3		
			P8	XSH-43471B					✓	C-11	1/3	3		
			P10	FSL-2211-1 FSL-2211-2					✓	C-11	1/3	3		
			P11	SSL-21163-1 SSL-21163-2					✓	C-11	1/3	3		
			P12	SSH-21163 SSH-21163-1					✓	C-11	1/3	3		
			1102	P12	RIS-93252-10	75"		✓			C-08	1/2	1/2	2
			1105	P1	SM-21171-2	34 <sup>1</sup> / <sub>2</sub> "				✓	G-06	1/3	3	
		↓		P2	SM-21171-1					✓	G-06	1/3	3	





CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

FORM 344-22-4227

CRS- 10

File # \_\_\_\_\_

Sheet 21 of 34

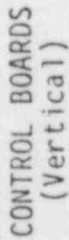
PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*COPY*

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?			CATEGORIZATION			
				YES	NO	YES	NO		REMARKS			
									A	B	C	
	I-10	1105	P6	TSL-22105	39 1/2"		✓	G-06	1/3	3		
	↓		P8	FM-2213			✓	G-06	1/3	3		
			P10	SM-21165-2			✓	G-06	1/3	3		
			P11	SM-21165-1	↓		✓	G-06	1/3	3		
		1106	P2	PDS-21555-1 PDS-21555-2	28 3/4"		✓	G-07	1/3	3		
			P3	PDS-21553-1 PDS-21553-2			✓	G-07	1/3	3		
			P4	FSL-2213-3			✓	G-07	1/3	3		
			P5	SSL-21171-1 SSL-21171-1			✓	G-07	1/3	3		
			P6	SSH-21171-1 SSH-21171-1			✓	G-07	1/3	3		
		↓		P8	XSH-93471C	↓		✓	G-07	1/3	3	





## CONTROL ROOM SURVEY CHECKLIST

File #

FORM 344-22-4227

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Sheet 23 of 34

PRINCIPLE:

### 3.2.2.5 Controls should be located so they are reachable and accessible.

copy

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?			Are all indicators located above a Panel Elevation of 41"?			REMARKS	CATEGORIZATION		
				YES	HED#	NO	YES	HED#	NO		A	B	C
	I-10	1106	P10	FSL-2215-1 FSL-2215-2	28 3/4"					G-07	1/3	3	
			P11	SSL-21165-1 SSL-21165-2						G-07	1/3	3	
			P12	SSH-21165 SSH-21165-1						G-07	1/3	3	
		1207	P12	RIS-43250-10	75"					C-06	1/2	1/2	2
		1205	P1	SM-21167-2	39 1/2"					A-69	1/3	3	
			P2	SM-21167-1						A-69	1/3	3	
			P6	TSL-22101						A-69	1/3	3	
			P8	FM-22209						A-69	1/3	3	
			P10	SM-21162-2						A-69	1/3	3	
			P11	SM-21161-1						A-69	1/3	3	



CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

File #

FORM 344-22-4227

CRS. 10

Sheet 23 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

copy

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?			Are all indicators located above a Panel Elevation of 41"?			CATEGORIZATION			
				YES	HED#	NO	YES	HED#	NO		REMARKS		
										A	B	C	
	I-10	1206	P2	PDS-21542-1 PDS-21542-2	28 3/4"						1/3	3	
			P3	PDS-21545-1 PDS-21545-2							1/3	3	
			P4	FSL-2209-3							1/3	3	
			P5	SSL-21167-1 SSL-21167-2							1/3	3	
			P6	SSH-21167 SSH-21167-1							1/3	3	
			P8	XSH-93471A							1/3	3	
			P10	FSL-2209-1 FSL-2209-2							1/3	3	
			P11	SSL-21161-1 SSL-21161-2							1/3	3	
			P12	SSH-21161 SSH-21161-1							1/3	3	





CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

File #

Sheet 25 of 34

FORM 344 22-4227

CRS-10

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*copy*

SEQ.	PANEL	Record Instr. Numbers if No	Dist. if No	Are all indicators located below a Panel Elevation of 70"?			Are all indicators located above a Panel Elevation of 41"?			CATEGORIZATION	REMARKS
				YES	HED#	NO	YES	HED#	NO		
	I-13	M1-11173	81"							A	4
	I-13	M1-11175	81"							A	4
	I-13	M1-11174	81"							A	4
	I-13	M1-11176	81"							A	4
	I-13	T1-21267	75 1/4"							B	4
	I-10 West End by 400	XS-93515 THRU XS-93520	24" ↓						X	B	4



CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

File # \_\_\_\_\_

FORM 344-22-4227

CRS- 10

Sheet 26 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*COPY*

SEQ.	PANEL	Record Instr. Numbers if No	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?		CATEGORIZATION		
				YES	NO	YES	NO	REMARKS		
					HED#		HED#	A	B	C
	I-14	21-2106	76 $\frac{1}{4}$ "		X			A-09	4	
	I-14	21-2105	76 $\frac{1}{4}$ "		X			A-10	4	
	I-14	RR-93252-12	35 $\frac{1}{2}$ "			X		A-35	$\frac{1}{2}$	$\frac{1}{2}$ 1
	I-14	AR-9303	35 $\frac{1}{2}$ "			X		A-18	$\frac{1}{3}$	3
	I-14 204 J3, J4	mt 93250-13 RIS-93252-13	35 $\frac{1}{2}$ "			X		E-17	$\frac{1}{3}$	3
	I-14 204 J7, J8	RIS-93252-2	37 $\frac{1}{2}$ "			X		E-17	$\frac{1}{3}$	3
	I-14 204 J9, J10	RIS-93252-1	39 $\frac{1}{2}$ "			X		E-17	$\frac{1}{3}$	3
	I-14 204 J11, J12	RIS-93252-2	39 $\frac{1}{2}$ "			X		E-17	$\frac{1}{3}$	3
	I-14 304 J3, J4	RIS-93252-4	39 $\frac{1}{2}$ "			X		E-16	$\frac{1}{3}$	3
	I-14 304 J5, J6	RA-93250-14	39 $\frac{1}{2}$ "			X		E-16	$\frac{1}{3}$	3





CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

File #

FORM 344 22 4227

CRS-10

Sheet 27 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*copy*

SEQ.	PANEL	Record Instr. Numbers if No	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?		CATEGORIZATION REMARKS		
				YES	NO	YES	NO	A	B	C
	I-14 J7, J6 304	R15-93251-1	37 1/2"				X		1/3	3
	I-14 J1, J10 304	R15-93251-3	37 1/2"				X		1/3	3
	I-14 J11, J12 304	R15-93252-4	37 1/2"				X		1/3	3
	I-14 J3, J4 404	R15-93250-2	37 1/2"				X		1/3	3
	I-14 J5, J6 404	R15-93250-1	37 1/2"				X		1/3	3
	I-14 J7, J8 404	R15-93250-3	37 1/2"				X		1/3	3
	I-14 J9, J10 404	R15-93251-8	37 1/2"				X		1/3	3
	I-14 J11, J12 404	R15-93250-5	37 1/2"				X		1/3	3
	I-14	R15-93251-7	24 1/2"				X		1/2	1/2
	I-14	R15-93251-1	26 1/2"				X		1/2	1/2





CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

File #

FORM 344 22 4227

CRS-10

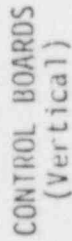
Sheet 28 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

Copy

SEQ.	PANEL	Record Instr. Numbers if NO	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?		CATEGORIZATION REMARKS		
				YES	NO	YES	NO	A	B	C
	I-14	<sup>2</sup> R15-932527	26 1/2				X	1/2	1/2	1
	I-14	205 J9, J10	28 1/2				X	1/2	1/2	1
	I-14	205 J11, J12	28 1/2				X	1/2	1/2	1
	I-14	205 J1, J2	28 1/2				X	1/2	1/2	1
	I-14	305 J3, J4	28 1/2				X	1/2	1/2	1
	I-14	305 J7, J8	28 1/2				X	1/2	1/2	1
	I-14	305 J9, J10	28 1/2				X	1/2	1/2	1
	I-14	305 J11, J12	28 1/2				X	1/2	1/2	1
	I-14	405 J1, J2	28 1/2				X	1/2	1/2	1
	I-14	406 J5, J6	28 1/2				X	1/2	1/2	1



## CONTROL ROOM SURVEY CHECKLIST

File #

FOI# 344-22-4227

CRS-10

Sheet 29 of 34

**PRINCIPLE:**

### 3.2.2.5 Controls should be located so they are reachable and accessible.

copy

[illegible]

TABLE 1-4 (CONTINUED)

## RECORDER CHANNELS AND RADIATION TRANSMITTERS

CHANNELS	RR 93537	RR 93538	RR 93539	RR 93540
1	93251-1	6212	7324-1	6314-1
2	7325-2	6213	7324-2	6314-2
3	SPARE	7325-1 <del>31193</del>	31193 <del>7325-1</del>	SPARE

\* CHANNEL 93251-1 HAS A RANGE OF  $10^{-1}$  TO  $10^4$  R/HR.



CONTROL BOARDS  
(Vertical)

FORM 344-22 4227

CONTROL ROOM SURVEY CHECKLIST

File #

CRS-10

Sheet 30 of 34

PRINCIPLE:

copy

3.2.2.5 Controls should be located so they are reachable and accessible.

SEQ.	PANEL	Record Instr. Numbers if No	Dist. if No	Are all indicators located below a Panel Elevation of 70"?			Are all indicators located above a Panel Elevation of 41"?			REMARKS		
				YES	HED#	NO	YES	HED#	NO	A	B	C
	I-15	TI-7316	77"			✓				1/3	3	
		TI-7317				✓				1/3	3	
		TI-7318				✓				1/3	3	
		TI-7321				✓				1/3	3	
		MI-7322				✓				1/3	3	
		PDI-7319				✓				1/3	3	
		FI-7320				✓				1/2	1/2	1
		TI-7553				✓				1/3	3	
		MI-7554				✓				1/3	3	
		PDI-7556	✓			✓				1/3	3	

\* \*



CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

FORM 344-22-4227

CRS - 10

File # \_\_\_\_\_

Sheet 31 of 34

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

*COPY*

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?		Are all indicators located above a Panel Elevation of 41"?		CATEGORIZATION		
				YES	NO	YES	NO	REMARKS		
					HED#		HED#	A	B	C
	I-15	TI-7555	77"		✓			E-65	1/3	3
		TI-7557	77"		✓			E-65	1/3	3
		TR-5156	80"		✓			C-34	1/2	1/2 2
		TR-92103	80"		✓			C-33	1/2	1/2 2
		XRP-92183	104 1/2"		✓				4	
		XRP-92184			✓				4	
		XRP-93185			✓			F-50	4	
		AVTO-SVNC. RYPASS P.B			✓				4	
		XRP-92193	98 3/4"		✓			F-48	4	
		XRP-92186	98 3/4"		✓			F-48	4	



CONTROL BOARDS  
(Vertical)

CONTROL ROOM SURVEY CHECKLIST

File #

Sheet 32 of 34

FORM 344 22-4227

CRS-10

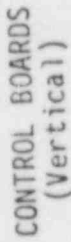
PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

COPY

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?			Are all indicators located above a Panel Elevation of 41"?			CATEGORIZATION REMARKS
				YES	HED#	NO	YES	HED#	NO	
	I-15	XRP-92187	98 3/4"			✓				A
		XRP-92188	↓			✓				4
		XRP-92195	97 3/4"			✓				4
		XRP-92120	85 3/4"			✓				4
		XRP-92116	↓			✓				4
		XRP-92115	↓			✓				4
		XRP-92194	86 1/2"			✓				4
		XRP-92189	↓			✓				4
		XRP-92190	↓			✓				4
		XRP-92191	↓			✓				4





## CONTROL ROOM SURVEY CHECKLIST

File #

Sheet 33 of 34

CRS-10

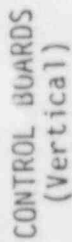
FORM 344-22-4227

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

copy

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all indicators located below a Panel Elevation of 70"?				Are all indicators located above a Panel Elevation of 41"?				REMARKS	CATEGORIZATION			
				YES		NO		YES		NO			A	B	C	
				HED#		HED#		HED#		HED#						
	I-15	XRP-92196	85 1/2"				✓						C-50	4		
		XRP-92124	79"				✓						F-64	4		
		XRP-92125	↓				✓						F-64	4		
		XRP-92126	↓				✓						F-44	4		
		XRD-92127	72 1/2"				✓						B-05	4		
		XRP-92109	74 3/4"				✓							4		
		XRP-92110	↓				✓							4		
		XRP-92111	↓				✓							4		
		XRP-92119					✓						E-46	4		
		XRP-92112	33 3/4"										B-14	4		



## CONTROL ROOM SURVEY CHECKLIST

File #

CAS- 10

Sheet 34 of 34

FORM 344-22-4227

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

copy

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## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0496HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME <u>D. Glavin / S. Shaffer</u>			DATE <u>11/17/83</u>
A. HED TITLE <u>Instr or Equip not required in Control Room</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
<u>Recorder</u>	<u>NR-1199</u>	<u>I-03</u>	<u>A-26</u>
	<u>FR-11262</u>		<u>A-26</u>
	<u>XR-11262</u>		<u>A-26</u>
<u>Reference HED # 0661</u> <u>Reference Task Analysis Walkthru</u> <u>of R<sub>2</sub> Shutdown Procedure</u>			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)			
<u>NR-1199 was selected &amp; installed for</u> <u>Test Services use and doesn't provide</u> <u>the Operator with needed or useable</u> <u>information</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			
<u>None -</u>			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

*Remove NR-1199, XR-FR 1199 from CR.  
and locate in Tech Services*

*Indications are that this recorder is not used by  
operators - Tech Services utilizes Info & Prefers  
the control Room location for Recorder Service only.*

I. DISPOSITION ~~RE-EVALUATED - No Disposition Required~~  
*Relocate to I-09 CN 1878. Replace with digital indicator  
for operator information. CN 1887 10-31-85 WCH*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0504

Form 344-22-4228

REVIEWER NAME <u>TH. Maddox / D. Glenn</u>			DATE <u>11/17/83</u>
A. HED TITLE <u>Instrument location</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
TR-2227	Sta Gen Module Mx Strm Temp	I-03-I-01	C-45
TR-2255	" " " Pkt " "	I-03-I-01	A-44 <sup>MH</sup> G-04
See HED 0517			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)			
<u>Main SM &amp; Reheat Strm recorders</u> <u>are not functionally located - Should</u> <u>be near I-05</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			
<u>Core Cooling</u>			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS

*Select more compact means of recording*

*& Relocate to I-03*

*"Rx ON" lite extraneous (See HED 0498)*

*"NR-1179" could be removed from C.R. (See HED 0496)*

I. DISPOSITION *TR-2255, TR-2227 relocated to recorder panel (I-09)*

*a computer driven display will be installed to provide  
steam generator temperature and flow information on I-04*

*Leo 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator





E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *Recorders being moved to I-09 Board Label  
\* Tagging to be accomplished by CN-18758 in  
accordance with DD-LAB-1. (Recorders were moved  
from I-01 to accommodate CN-1886 Chp. *Elsh* 12/14/85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-42218

REVIEWER NAME		DATE	
D. GLENN / M Maddox		12-22-83	
A. HED TITLE INSTRUMENT Labeling			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
HS-2505, 85	Low Temp ABSORBER LN2 Emergency Supply	I-01	F-93
HS-2501, 03	Low Temp ABSORBER LN2 Supply	I-01	F-94
HS-2502, 04	Low Temp ABSORBER LN2 Return	I-01	F-94
TR-2322	NAME PLATE Shows Low Temp ABS	I-13	E-06
TR-2321	"	I-13	E-05
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) LTFA Nomenclature is inconsistent PIS-2324-3 & -4 correctly references ADSORBERS. Other Listed INSTR. Function Tags Show ABSORBERS			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

*Correct to ADSORBERS*

I. DISPOSITION *New labels made for HS-2501-06. per CN-1886*  
*TR-2322 Relabeled and TR 2321 was removed from the control room*  
*per CN1878. M. Johnson 11/22/95*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0630

Form 344-22-4228

[illegible]



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION Parameters required for operation will be displayed on a digital indicator @ IO6 installed by CN1891. TR3118 & TR3115 will be relocated to IO9 and used for historical information only by CN1878.  
Present ~~resol~~<sup>2nd</sup> resolution is adequate. Ref CRS 62-1 M. Hansen 11/23/95

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		





## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0652

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]

2389  
2/12

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

REMAINING CHARTS & SCALES TO BE CORRECTED AS A LAST  
ITEM BY CN-2177 (OTHER CN'S CHANGE  
RECORDERS & MAY AFFECT RANGES, SCALES & ETC)

I. DISPOSITION *Recorders remaining after all model changes and  
other corrective actions will have scale & chart coordinated by CN-2177*

XR-3390-1, TR-4637, TR-4638, TR-2256, PDR-73335, PDR-73440 then PDR-73452,  
TR-73335 & TR-73440 then TR-73452 had charts replaced in CN-1878. M.H. 11/24/85

Note - New recorders being provided have been selected/planned  
to address chart problems cited on this HED 11/24/85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0652

PAGE 1 OF 3

B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
PR-2559	RECORDERS	I-01	A-48
FR-2339		I-01	A-84
FR-23112		I-01	A-84
PR-2267 (G)		I-05	D-38
FR-2239 (R)		I-05	D-38
PR-2268 (PUR.)		I-05	A-33
FR-2240 (R)		I-05	A-33
XR-3390-1		I-06	B-74
FR-8422		I-06	B-70
ZR-4210 (R)		I-06	
ZR-4210 (G)		I-06	
FR-4101 (G)		I-06	B-82
FR-4101 (R)		I-06	B-82
RR-73437		I-14	E-11
PDR-11226 (R)		I-13	A-57
FR-7216 (G)		I-13	A-57
TR-4637 (R)		I-13	A-55
TR-4637 (G)		I-13	A-55
TR-4637 (B)		I-13	A-55
TR-4638 (R)		I-13	A-56
TR-4638 (G)		I-13	A-56
TR-4638 (B)		I-13	A-56
TR-2256		I-03	A-75
ER-92243 (R)	✓	I-09	



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0652

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

PAGE 2 OF 3

B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
XR-93574-3(R) RAIN	RECORDERS	I-09	
XR-93574-3(BL) DEW. P.T.C.			
XR-93574-3(R) AMB. T			
XR-93574-3(BL) DT			
<del>XR-93574-3(BL) DT</del>			
<del>XR-93574-3(BL) DT</del>			
PDR-73335(BL)			
TR-73335			
PDR-73440			
TR-73440			
PDR-73441			
TR-73441			
PDR-73442			
TR-73442			
PDR-73443			
TR-73443			
PDR-73444			
TR-73444			
PDR-73445			
TR-73445			
PDR-73446			
TR-73446			
PDR-73447			
TR-73447(BL)		I-09	



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0652

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

PAGE 3 OF 3

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**PUBLIC SERVICE COMPANY OF COLORADO**  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
**HUMAN ENGINEERING DISCREPANCY EVALUATION**  
**HEDE - 1**

Log Number 0653

Form 344-22-4228

[illegible]



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION ER6351 & 52, ER6375, LR 4605, PR-2559, FR2339, FR23112 appropriately marked per CN1882, SCALES & PAPER COORDINATION TO BE ACCOMPLISHED AS A LAST item by CN-2177 (DUE TO POSSIBLE INTERIM AFFECTS OF OTHER CHANGES)

Continued on attached sheet

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

## HED 653 RESOLUTION Continued

PR-1108 - Rescaled (Added PSIA) in CN1878

NR-1133-2 - Reevaluated discrepancy and found it not to be a discrepancy.

TR-31115 - Points Required for operation will be displayed by a digital indicator installed in CN1891. TR31115 will be changed out to a new style recorder, moved to IO9, Relabeled and Rescaled in CN1878

CR-3390-2 - Rescaled in CN1878

XR-3390-1 - Rescaled in CN1878

GR-5154 - changed out to a new style recorder, moved to IO9, Relabeled and rescaled.

TR-92105 - changed out to a new style recorder, moved to IO9, Relabeled and rescaled.

TR-4637 - Added a pointer for the fixed scale in CN1878

TR-4638 - Added a pointer for the fixed scale in CN1878

PDR-73448 - changed out to a new style recorder, moved to IO9, Relabeled and rescaled.

FR-2222 - changed out to a new style recorder, moved to IO9, Relabeled and rescaled.

Mike Henderson 11/19/85



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0653

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
FR-6351 (B)	RECORDER	I-01	A-81
FR-6352 (R)			A-81
FR-6315 (G)			A-81
LR-4605 (R)			A-80
LR-4605 (G)			A-80
PR-2559			A-48
FR-2339 (R)			A-49
FR-23112 (G)		↓	A-49
PR-1108		I-03	A-74
NR-1133-2		↓	A-47
PR-2267 (G)		I-05	D-38
FR-2239 (R)			D-38
PR-22129 (B)			A-28
TR-22122 (R)			E-51
TR-22121 (B)			E-51
MR-9306 (R)			A-41
RR-2263 (B)			A-41
RR-2264 (G)			A-41
PR-22130 (R)			E-52
PR-2262 (PUR)			A-33
FR-2240 (R)		↓	A-33
TR-31115 PT 4		I-06	B-72
TR-31115 PT 5		↓	B-72
TR-31115 PT 7	✓	↓	B-72



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0653

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
TR-31115 PT. 16	RECORDER	I-06	B-72
CR-3390-2			B-74
XR-3390-1			B-74
FR-3151			B-71
FR-8422			B-70
PDR-3380 (R)			B-70
XR-3387-1 (G)			B-70
ZR-5155 (G)			B-65
ZR-5155 (A)			B-65
GR-5154			B-76
FR-4210 (R)			B-81
FR-4210 (G)			B-81
FR-4101 (G)			B-82
FR-4101 (R)		V	B-82
TR-92105		I-15	C-33
ER-92107		↓	E-45
IR-92108		↓	E-45
AR-9303		I-14	A-18
RR-93252-12		↓	A-35
RR-73437		↓	E 11
PDR-11226 (R)		I-13	A-57
TR-4637 (R)		↓	A-55
TR-4638 (R)		↓	A-56
XR-93574-3 (R) RAIN	V	I-09	



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0653

[illegible]



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0654

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

Form 344-22-4228

REVIEWER NAME

DATE

R. GARRETT

3-5-84

A. HED TITLE

INSTRUMENT SCALING & RANGE

B. ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
SEE ATTACHED H.E.D. LIST			

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)

RECORDER SCALE MARKINGS AND/OR RANGE  
DO NOT AGREE WITH ALTERNATE INSTRUMENTATION.

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE  
LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION PR-1108 & NR-1199 alternate instr. changed CN1887 10/31/85 WCH  
PR-1108, NR-1199, TR-4637 & TR-4638 ARE USED FOR HISTORICAL DATA AND  
ARE BEING MOVED TO IO9, THEREFORE THEY WILL NOT BE LOCATED  
ADJACENT TO SIMILAR INSTRUMENTS per CN1878. M. Williams 11/22/85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0654

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

[illegible]



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0655

## HUMAN ENGINEERING DISCREPANCY EVALUATION

HEDE - 1

Form 344-22-4228

REVIEWER NAME <b>JOS KELEMEN</b>			DATE <b>3/6/84</b>
A. HED TITLE <b><u>INSTRUMENT SCALING &amp; USEABILITY</u></b>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
<b>SEE ATTACHED H.E.D. LIST</b>			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <sup>RECORDER?</sup> <b>SCALES ARE NOT CLEARLY READABLE AND RESOLVEABLE FROM THE OPERATING POSITION.</b>			
<b>(REF. CRS-59-1 THRU CRS-63 SURVEY)</b>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR _____			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION ~~FR-6351/2, FR-6375, LR-4605/6, FR-23112, INDEX~~

FR-6351/2, FR-6375, LR-4605/6, FR-23112 FUNCTIONAL LABELING

~~FR-6351/2~~ AND PARAMETER MARKINGS CORRECTED PER CN-1886. INDEX

SCALE & Paper Coordination To be Accomplished by CN-2177

NR-1131/NR-1133-1 relocate CN-1887. TR-2256 relocate CN-1878 10-31-85 WCM

Continued on attached sheet

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

HED GSS Resolution Continued

TR-2256 - Rescaled in CN1878

GR-5154 - Changed out to a new style recorder, moved to IO9  
Rescaled and relabeled in CN1878.

TR-4637 - Reevaluated - no discrepancy

TR-4638 - Reevaluated - no discrepancy

PDR-73348 - Changed out to a new style recorder, moved to IO9,  
Rescaled and relabeled in CN1878

Mike Henderson 11/19/85



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0655

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE-1

SHEET 1 OF 2

B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
FR-6351 (B)	RECORDER	I-01	A-81
FR-6352 (R)			A-81
FR-6375 (G)			A-81
LR-4605 (R)			A-80
LR-4605 (G)			A-80
FR-23112 (G)		Y	A-84
NR-1131 (B)		I-03	E-50
NR-1131-1 (B)			E-50
NR-1131-1 (B)			E-50
IR-2256		Y	A-75
PR-2267 (G)		I-05	D-38
FR-2239 (R)			D-38
PR-22129 (R)			D-39
MR-9306 (R)			A-41
RR-2263 (B)			A-41
RR-2264 (G)			A-41
PR-22130 (R)			E-52
PR-2268 (PUR)			A-33
FR-2239 (R)			D-38
TR-22122 (R)			E-51
TR-22121 (B)			E-51
FR-2240 (R)		Y	A-33
FR-8422	Y	I-06	B-70





## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST VRAIN NUCLEAR GENERATING STATION

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0655

SHEET 2 OF 3

B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
* PDR-3380 (R)	RECORDER	I-06	B-70
* XR-3387-1 (G)			B-70
* TR-5153			E-77
<del>IN ERROR J.R. 3/1/84 FR-5342</del>			
* ZR-5155 (G)			B-65
* ZR-5155 (B)			B-65
* GR-5154			B-76
FR-4210 (R)			B-81
FR-4217 (G)			B-81
* FR-4101 (G)			B-82
* FR-4101 (R)		Y	B-82
TR-4637 (R)		I-13	A-55
TR-4637 (G)			A-55
TR-4637 (B)			A-55
TR-4638 (R)			A-56
TR-4638 (G)			A-56
TR-4638 (B)		Y	A-56
* XR-93574-3 (R) RAIN		I-09	
* XR-93574-3 (BL) DEW PTC			
* XR-93574-3 (R) AMB. T			
* XR-93574-3 (BL) DT			
* PDR-73443 (AL)		Y	
NR-1131-1 (R)		I-49	
NR-1134-1 (B)	Y	Y	



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION ~~TR-2227 & TR-2255~~ <sup>2016</sup> ~~MOVED TO I-09~~ <sup>11/18/85</sup> MOVED TO I-09. Recorder-  
Scale & Paper Coordination To be per CN-2177  
(Function of TR-2227 & TR-2255 To be replaced by Graphics Display on I-04)  
NR-1133-2 replace I-09 CN1878, scale coord. CN 2177 11-18-85 WCH

Continued on attached sheet

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

## HED 656 Resolution Continued

- TR-2227 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878.
- TR-2255 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878.
- NR-1133-Z - Rescaled in CN1878
- TR-31115 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878
- GR-5154 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878
- TR-5154 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878
- TR-92105 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878
- TR-2322 - Changed out to a new style recorder, moved to IO9,  
Relabeled and rescaled in CN1878
- TR-2321 - Removed from the control room in CN1878

Mike Hedgeram 11/19/85



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0656

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

SHEET 1 OF 1

B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
TR-2227	RECORDER	I-01	C-45
TR-2255		↓	G-04
NR-1133-2		I-03	A-47
FR-2239 (R)		I-05	D-38
FR-2240 (R)		↓	A-33
TR-3115 PT. 4		I-06	B-72
TR-3115 PT. 5			B-72
TR-3115 PT. 7			B-72
TR-3115 PT. 16			B-72
CR-3390-2			B-74
XR-3390-1			B-74 p. 1. k.
<del>FR-2422</del> p. 1. k.			<del>B-70</del>
XR-3387-1 (G)			B-70
CR-5154			B-76
TR-5153			E-77
FR-4101 (G)		↓	B-82
TR-5156		I-15	C-34
TR-42105		↓	C-33
AR-9303		I-14	A-18
PDR-11226 (R)		I-13	A-57
TR-2322			E-06
TR-2321	Y	Y	E-05



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0657HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME

JOE KELEMEN

DATE

3/6/84A. HED TITLE INSTRUMENT SCALING & USEABILITY

B. ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
	<u>SEE ATTACHED H.E.D. LIST</u>		

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) RECORDER (CHANNEL) TRACES OR POINTS ARE NOT CLEARLY IDENTIFIED BY PARAMETER AND/OR UN-ASSIGNED POINTS ARE NOT LABELED AS SUCH.

(REF. CRS-60-1 & CRS-61-1 SURVEY)

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION FR-6351/2, FR6375 TRACES IDENTIFIED WITH APPROPRIATE  
PARAMETER ~~STAMP~~ MARKINGS. TR-2255, TR-2256<sup>2227</sup> MOVED TO I-09 AND  
WILL BE ~~REPLACED~~ <sup>REPLACED</sup> WITH NEW  
RECORDERS AND LABELED BY CN-1878 GR-5154, TR5156,  
TR-92105 & PDR-73448 WERE RELABELED AND TR-2321 WAS REMOVED FROM THE  
CONTROL ROOM IN CN1878 M. Anderson 11/22/85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0657

SHEET 1 OF 2

B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO
FR-6351(B)	RECORDER	I-01	A-81
FR-6352 (R)			A-81
FR-6375 (G)			A-81
TR-2255			G-04
TR-2227		Y	C-45
MR-9306 (R)		I-05	A-41
RR-2263 (B)			A-41
RR-2264 (G)			A-41
FR-2240 (R)		Y	A-33
PDR-3380 (R)		I-06	B-70
XR-3387-1 (G)			B-70
GR-5154 (PT. 12)			B-76
TR-5153 (PT. 19)			E-77
ZR-5155 (G)			B-65
ZR-5155 (B)			B-65
FR MR-4210 (R)			B-81
FR MR-4210 (G)		Y	B-81
TR-5156 (PT. 24)		I-15	C-34
TR-42105 (PTS. 12 & 24)		Y	C-33
RR-73437		I-14	E-11
RR-93537			A-90
RR-93538			A-90
RR-93539			A-89
RR-93540	Y	Y	A-89

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0657

SHEET 2 OF 2

[illegible]



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0658

Form 344-22-4228

REVIEWER NAME <div style="font-size: 1.2em; font-family: cursive;">JOE KELEMEN</div>			DATE <div style="font-size: 1.2em; font-family: cursive;">3/6/84</div>
A. HED TITLE <u>INSTRUMENT SCALING &amp; USEABILITY</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
	SEE ATTACHED H.E.D. LIST		
C. PROBLEM DESCRIPTION (GUIDELINES VIOLATED) <u>RECORDER HAS MORE THAN (6) POINTS OR CHANNELS BEING RECORDED.</u>			
(REF. CRS-61-2 SURVEY)			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *TR2255 & TR2227 removed from I-01 - The function of these recorders is to monitor Steam Generator temperatures during bail-out. A new graphics display (situational display) is being proposed for I-01, with these recorders serving as hard-copy back-ups. The information derived from these recorders is trend type with the important information being a single point deviating from the other 11 points, therefore 12 points being printed together is desirable for this particular application.*

*(Continued on ATTACHED SHEET)*

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator

HED 0658 RESOLUTION CONTINUED

TR-31115, TR3118, FR-2222, & TR2232 ARE BEING REPLACED BY ALTERNATE INDICATION AND MOVED TO IO9 TO BE USED FOR HISTORICAL INFORMATION. TR-2321 IS BEING REMOVED FROM THE CONTROL ROOM. GR-5154, TR-5156 & TR-92105 ARE USED TO MONITOR PLANT PARAMETERS, ~~however required~~<sup>not required on a continued basis</sup> from which plant adjustments are made, however not required on a continued basis. The resolution for these is adequate. M. H. L. 11/22/85



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0658

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

SHEET 1 OF 1

[illegible]

## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0659

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME

JOE KELEMEN

DATE \_\_\_\_\_

3/6/84

A. HED TITLE INSTRUMENT SCALING & USEABILITY

B.	ITEMS INVOLVED
1.	1. 1964 Oldsmobile Delta 88
2.	2. 1964 Oldsmobile Delta 88
3.	3. 1964 Oldsmobile Delta 88
4.	4. 1964 Oldsmobile Delta 88
5.	5. 1964 Oldsmobile Delta 88
6.	6. 1964 Oldsmobile Delta 88
7.	7. 1964 Oldsmobile Delta 88
8.	8. 1964 Oldsmobile Delta 88
9.	9. 1964 Oldsmobile Delta 88
10.	10. 1964 Oldsmobile Delta 88
11.	11. 1964 Oldsmobile Delta 88
12.	12. 1964 Oldsmobile Delta 88
13.	13. 1964 Oldsmobile Delta 88
14.	14. 1964 Oldsmobile Delta 88
15.	15. 1964 Oldsmobile Delta 88
16.	16. 1964 Oldsmobile Delta 88
17.	17. 1964 Oldsmobile Delta 88
18.	18. 1964 Oldsmobile Delta 88
19.	19. 1964 Oldsmobile Delta 88
20.	20. 1964 Oldsmobile Delta 88
21.	21. 1964 Oldsmobile Delta 88
22.	22. 1964 Oldsmobile Delta 88
23.	23. 1964 Oldsmobile Delta 88
24.	24. 1964 Oldsmobile Delta 88
25.	25. 1964 Oldsmobile Delta 88
26.	26. 1964 Oldsmobile Delta 88
27.	27. 1964 Oldsmobile Delta 88
28.	28. 1964 Oldsmobile Delta 88
29.	29. 1964 Oldsmobile Delta 88
30.	30. 1964 Oldsmobile Delta 88
31.	31. 1964 Oldsmobile Delta 88
32.	32. 1964 Oldsmobile Delta 88
33.	33. 1964 Oldsmobile Delta 88
34.	34. 1964 Oldsmobile Delta 88
35.	35. 1964 Oldsmobile Delta 88
36.	36. 1964 Oldsmobile Delta 88
37.	37. 1964 Oldsmobile Delta 88
38.	38. 1964 Oldsmobile Delta 88
39.	39. 1964 Oldsmobile Delta 88
40.	40. 1964 Oldsmobile Delta 88
41.	41. 1964 Oldsmobile Delta 88
42.	42. 1964 Oldsmobile Delta 88
43.	43. 1964 Oldsmobile Delta 88
44.	44. 1964 Oldsmobile Delta 88
45.	45. 1964 Oldsmobile Delta 88
46.	46. 1964 Oldsmobile Delta 88
47.	47. 1964 Oldsmobile Delta 88
48.	48. 1964 Oldsmobile Delta 88
49.	49. 1964 Oldsmobile Delta 88
50.	50. 1964 Oldsmobile Delta 88
51.	51. 1964 Oldsmobile Delta 88
52.	52. 1964 Oldsmobile Delta 88
53.	53. 1964 Oldsmobile Delta 88
54.	54. 1964 Oldsmobile Delta 88
55.	55. 1964 Oldsmobile Delta 88
56.	56. 1964 Oldsmobile Delta 88
57.	57. 1964 Oldsmobile Delta 88
58.	58. 1964 Oldsmobile Delta 88
59.	59. 1964 Oldsmobile Delta 88
60.	60. 1964 Oldsmobile Delta 88
61.	61. 1964 Oldsmobile Delta 88
62.	62. 1964 Oldsmobile Delta 88
63.	63. 1964 Oldsmobile Delta 88
64.	64. 1964 Oldsmobile Delta 88
65.	65. 1964 Oldsmobile Delta 88
66.	66. 1964 Oldsmobile Delta 88
67.	67. 1964 Oldsmobile Delta 88
68.	68. 1964 Oldsmobile Delta 88
69.	69. 1964 Oldsmobile Delta 88
70.	70. 1964 Oldsmobile Delta 88
71.	71. 1964 Oldsmobile Delta 88
72.	72. 1964 Oldsmobile Delta 88
73.	73. 1964 Oldsmobile Delta 88
74.	74. 1964 Oldsmobile Delta 88
75.	75. 1964 Oldsmobile Delta 88
76.	76. 1964 Oldsmobile Delta 88
77.	77. 1964 Oldsmobile Delta 88
78.	78. 1964 Oldsmobile Delta 88
79.	79. 1964 Oldsmobile Delta 88
80.	80. 1964 Oldsmobile Delta 88
81.	81. 1964 Oldsmobile Delta 88
82.	82. 1964 Oldsmobile Delta 88
83.	83. 1964 Oldsmobile Delta 88
84.	84. 1964 Oldsmobile Delta 88
85.	85. 1964 Oldsmobile Delta 88
86.	86. 1964 Oldsmobile Delta 88
87.	87. 1964 Oldsmobile Delta 88
88.	88. 1964 Oldsmobile Delta 88
89.	89. 1964 Oldsmobile Delta 88
90.	90. 1964 Oldsmobile Delta 88
91.	91. 1964 Oldsmobile Delta 88
92.	92. 1964 Oldsmobile Delta 88
93.	93. 1964 Oldsmobile Delta 88
94.	94. 1964 Oldsmobile Delta 88
95.	95. 1964 Oldsmobile Delta 88
96.	96. 1964 Oldsmobile Delta 88
97.	97. 1964 Oldsmobile Delta 88
98.	98. 1964 Oldsmobile Delta 88
99.	99. 1964 Oldsmobile Delta 88
100.	100. 1964 Oldsmobile Delta 88

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
GR-5154	RECORDER	I-06	B-76
TR-5153	↓	↓	E-77
TR-5156	↓	I-15	C-34
TR-2321	↓	I-13	E-05
		↓	

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) RECORDER HAVE UN-ASSIGNED POINTS  
OR CHANNELS BEING DISPLAYED.

REF. (CRS-61-2 SURVEY)

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION GR-5154 & TR-5156 are being replaced with new recorders that bypass unused points. TR-2321 is being removed from the control room in CN1878. M. Hurlman 11/22/85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0661

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
JOE KELEMEN			3/7/84
A. HED TITLE INSTRUMENT SCALING & USEABILITY			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
NR-1199 (1) PT.	RECORDER	I-03	A-26
XR-11262 (2,3,4) PTS.	↓	↓	A-26
FR-11262 (5) PT	↓	↓	A-26
Ref HED-0496			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) ① RECORDER CHART DOESN'T HAVE NUMERIAL MARKINGS. (REQUIRES OPERATOR TO COMPARE CURRENT RECORDING WITH A POSTED "KEY" IN ORDER TO RESOLVE RECORDED VALVES. ② CURRENT VALVES ARE NOT VISIBLE TO OPERATOR. (RECORDER CHART MUST BE ADVANCED TO READ CURRENT VALVES.			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION ~~Refers to IO9 CN 1878 & chart preparation~~  
~~coordination by CN 2177 #885 W6#JTM~~ A mass flow indicator  
is being added by CN1887. THIS RECORDER IS NOT AN OPERATOR TOOL AND  
WILL BE USED BY TECH SERVICES. THIS RECORDER PRINTS IT'S OWN CHART AND  
CANT BE CHANGED. IT WILL BE MOVED TO IO9 AND USED FOR HISTORICAL DATA  
ONLY IN CN1878. M. H. Leeson 1/27/85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0662

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM MED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION The points on this recorder required by the operators will be displayed by a digital indicator on I/O installed by CN1891. This recorder will be moved to IO9 and be used for historical data only. The scale is considered adequate. M.H. Dene, 11/22/85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION TR-4637 & TR-4638 are Relocated to IO9 west end  
in CN1878. M. H. Deen 11/22/85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0746HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
Assessment Committee			3/29/84
A. HED TITLE <u>Instrument - Functional Location</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
TR 2232	Steam Gen. Module Cold Reheat Steam Temp.	I13	E04
FR 2222	Steam Gen. Module Feedwater Flow	I13	E07
REF. HEDs	# 0504, 0517, 0656, 0657, 0658, 0705 0269, 0384		
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>Not functionally grouped</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION TR-2232 & FR-2222 moved to I09 & Functionally grouped  
M. L. L. 11/27/85

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

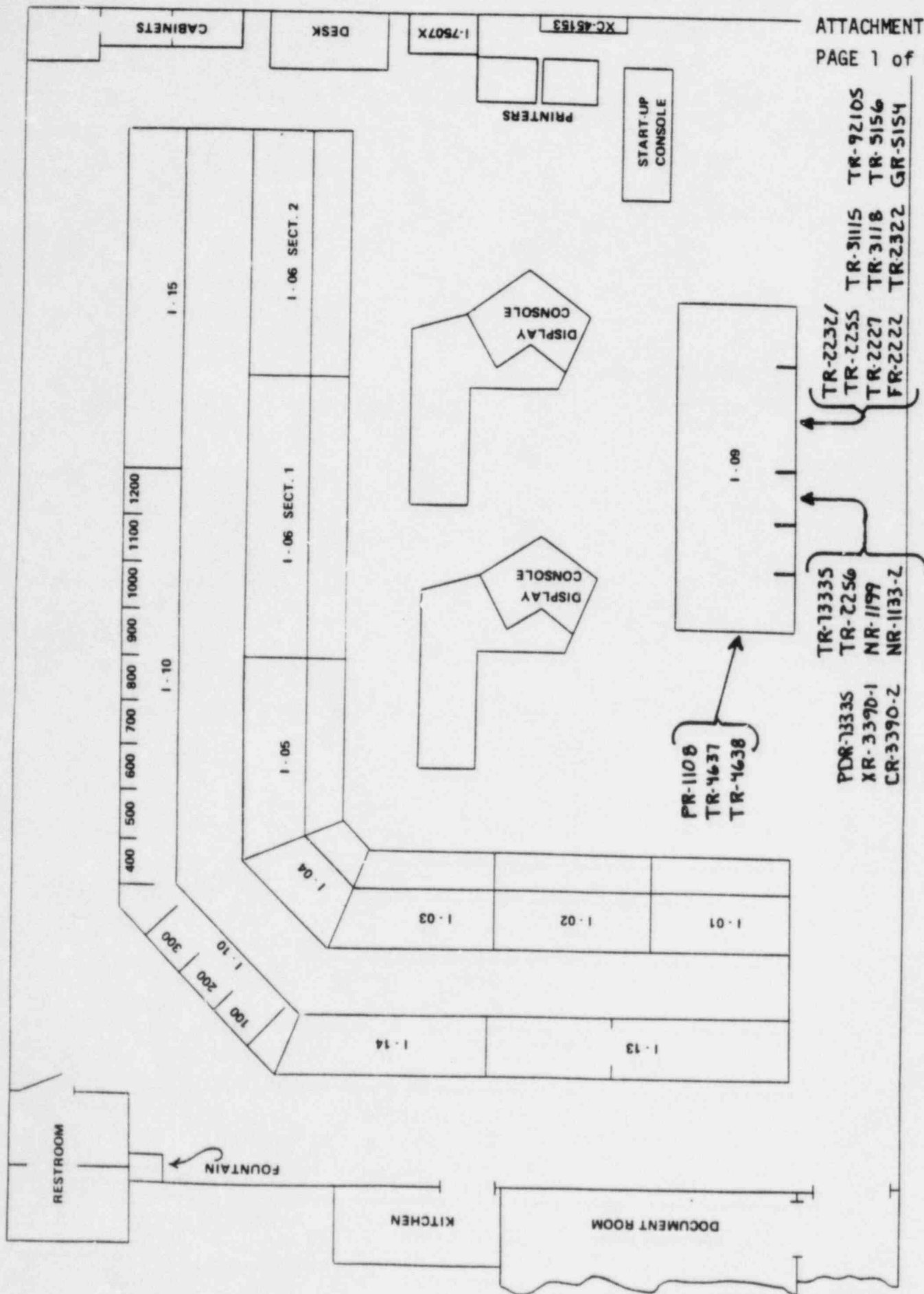
I. DISPOSITION TR-2321 Removed from the control room, TR-2322  
relocated to IO9 in CN1878. M. J. Davis 11/22/95

TEAM ACTION

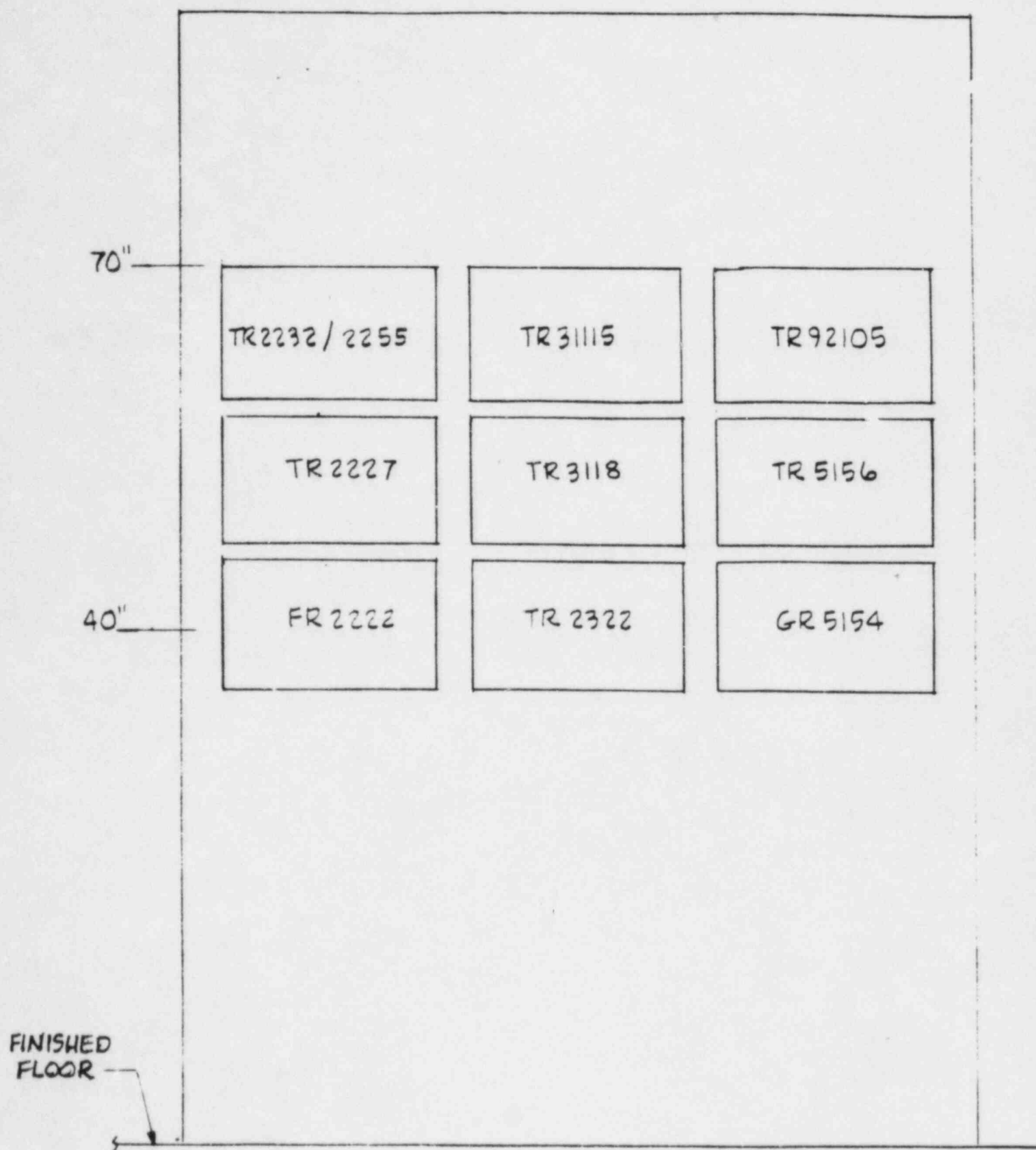
TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

ATTACHMENT B

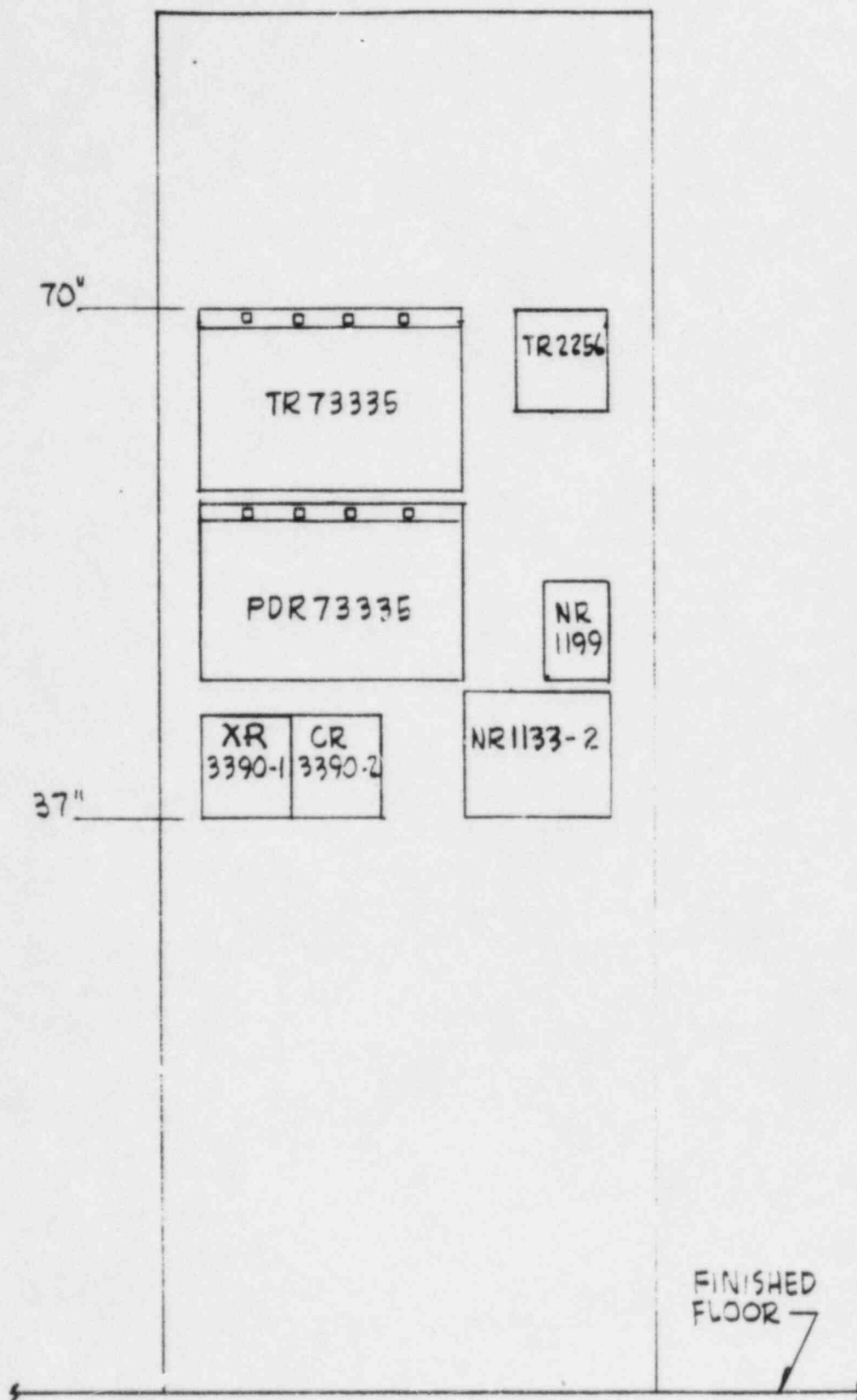
I-09 RECORDER LAYOUT



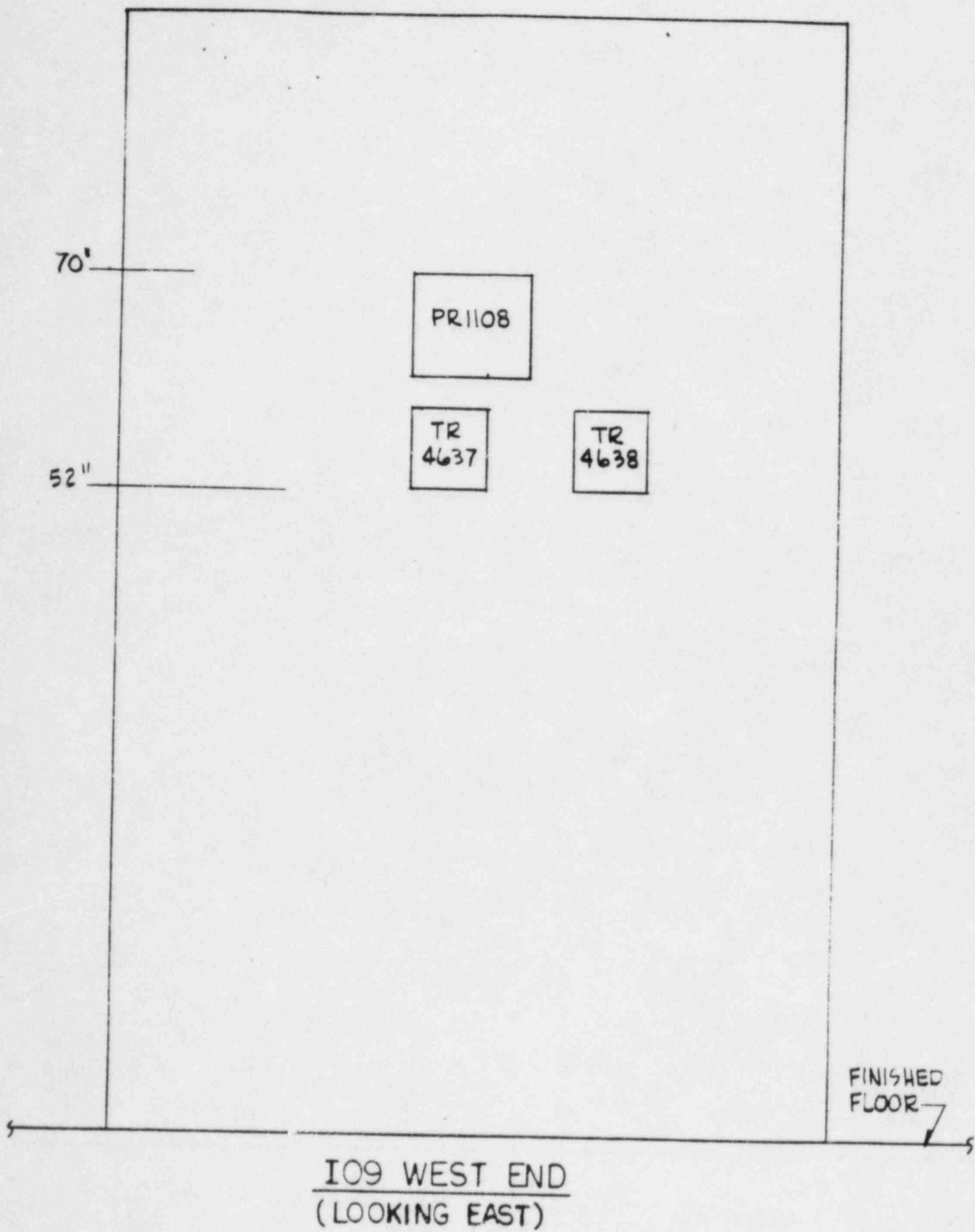
N



I09 SOUTH SIDE  
(EAST END-LOOKING NORTH)



I 09, S-3  
( LOOKING NORTH)





## ATTACHMENT C

### RECORDER DISPLAYS BEING PROVIDED TO THE OPERATOR BY OTHER DISPLAYS

- TR-2227 - Steam Generator Module Main Steam Temperature,
- TR-2255 - Steam Generator Module Hot Reheat Steam Temperature,
- TR-2232 - Steam Generator Module Cold Reheat Steam Temperature,
- TR-2222 - Steam Generator Module Feed Water Flow, and
- TR-2256 - Reheat Steam Average Temperature Indications will be displayed on I-04 with a CRT installed by CN-1887.
  
- TR-31115- Miscellaneous operating temperatures, has four points that are required for plant operation and these will be displayed on a new digital indicator installed by CN-1891.
  
- NR-1199 - Control Channel Average Signal,
- XR-11262- Power/Flow Ratio Measure will be displayed on a new Mass Flow Ratio Indicator installed by CN-1887.

## ATTACHMENT D

### SUMMARY OF CHANGES MADE BY RECORDER MOVE

1. TR-2227 moved from I-01 to I-09  
TR-2255 moved from I-01 to I-09  
PR-1108 moved from I-03 to I-09  
NR-1133-2 moved from I-03 to I-09  
NR-1199/XR-11262/FR-11262 moved from I-03 to I-09  
TR-2256 moved from I-03 to I-09  
TR-31115 moved from I-06 to I-09  
TR-3118 moved from I-06 to I-09  
GR-5154 moved from I-06 to I-09  
XR-3390-1 moved from I-06 to I-09  
CR-3390-2 moved from I-06 to I-09  
FR-2222 moved from I-13 to I-09  
TR-2322 moved from I-13 to I-09  
TR-2232 moved from I-13 to I-09  
TR-2321 moved from I-13 to Local Station  
TR-4637 moved from I-13 to I-09  
TR-4638 moved from I-13 to I-09  
TR-5156 moved from I-15 to I-09  
TR-92105 moved from I-15 to I-09
2. TR-2232 and TR-2255 combined into a single recorder.
3. TR-73335, TR-73440 thru TR-73452 combined into a single recorder.
4. PDR-73335, PDR-73440 thru PDR-73452 combined into a single recorder.
5. Add TE-2321-1, Helium Purification Cooling Water 1A Outlet, TE-2321-2, Helium Purification Cooling Water 1B Outlet, TE-2321-5, High Temperature Filter Absorber (A-2301) Outlet, and TE-2321-6, High Temperature Filter Absorber (A-2302) Outlet to TR-2322.
6. Remove TSL-2232, TT-2232, TM-2232, TM-2232-1, PM-2232, PM-2243-3, and PM-2244-3. This was the alarm circuitry for TAL-2232 and will be replaced with a computer installed by CN-1888.

ATTACHMENT E

DRAFT COPY OF  
DD-RSN-1  
"DESIGN DIRECTIVE FOR  
THE SELECTION OF RECORDERS"

## DESIGN DIRECTIVE FOR THE SELECTION OF RECORDERS

FOREWORD: The purpose of recorders is to display and provide a permanent graphic record of relative or absolute values representing a system or process parameter. Recorders are a vital link in the operators interface with the control loop. The effectiveness of this interface depends on what information and how that information is presented.

The use to which the operator will put the information presented, should serve to influence the level of information, as well as the manner in which that information is presented.

This Design Directive will provide guidance in selecting recorders for use in the Fort St. Vrain Control Room.

### SELECTION CONSIDERATION

#### I. RECORDER USE

- A. Generally, recorders are used for data acquisition and display in one of the following ways.
  - 1. For quantitative reading (and recording) of an exact numerical value: reading time from a clock, reading pressure from a gauge, or electrical potential from a voltmeter.
  - 2. For qualitative reading (and recording): this means judging the approximate value, trend, rate of change, or direction of deviation from a desired value. It differs from quantitative reading in that the operator does not read an exact numerical value. Examples include noting that a ship has veered to the right of a desired course, or that steam temperature is rising.
  - 3. Data logging: the collection and storage of data including the means to transfer that data to other data handling or processing equipment. This particular function is primarily for analytical purposes and is not generally for immediate operational use.
- B. Recorders that are to be used for quantitative readings shall have sufficient range and scale resolution to enable the operator to make a rapid and accurate determination of the displayed value.

## II. RECORDER TYPES

There are many variations of several basic types of recorders, however only those acceptable for Fort St. Vrain use are listed.

- A. Multipoint recorders have a single processing and printing mechanism which alternately scans a large number of inputs.
- B. Dedicated Channel recorders have separate signal conditioning and pens or stylus for each input. This type of recorder is usually limited to three or four channels.

## III. SELECTION OF RECORDER TYPE

While certain technical requirements may suggest the type of recorder, panel layout, convention and operator expectations are important factors to be considered.

It is not the intent of this directive to preclude the use of particular types of recorders, but rather encourage the use of those types that meet the majority of operational, maintenance, human factors and data logging functions.

### A. SELECTION CONSIDERATIONS

1. Operational interface - recorders selected for control room use shall be so designed and structured to facilitate operator control and ease of function selection. The following items are to be considered as minimum requirements.
  - a. Only operator controls are to be visible on the recorder panel.
  - b. All operator used controls shall be on the recorder front panel.
  - c. Controls (buttons-switches) shall meet the requirements of DD-SWI-1 (Switch Selection).
  - d. All control labels and legends shall meet the requirements of DD-LAB-1 (Labeling) and DD-AAS-1 (Abbreviations, Symbols and Acronym Selection)
  - e. Operator controls shall include "point selection", "chart speed selection", "paper advance" and "fast enable". (fast enable will allow speed change from a remote source)

- f. Paper Change operations shall be accomplished without the use of special tools or equipment. Any required instructions shall be posted or otherwise shown on the recorder structure.
- g. Data printed shall be immediately visible to the user without the use of the paper advance feature.
- h. Print size and Numerical displays (if applicable) shall be in accordance with DD-AIS-1 (Selection of Analog displays.)
- i. Contrast - Character-to background contrast ratio shall be between 15:1 and 20:1.
- j. Bezel Markings - Recorder front or Bezel areas shall be free of logos, range markings, and printed material not directly related to the recorder function, parameter or value displayed.
- k. The recorder scale range shall be consistent with the parameter range being recorded.
- l. The number of points assigned to a recorder for quantitative reading shall be limited to ensure readability of each point.

## 2. FUNCTIONAL CONSIDERATIONS

- a. The recorder shall be equipped with an EIA-STD-RS-232C port.
- b. The recorder shall be equipped to perform the following functions:
  - Common time update including the year, month, day, hour, minute and second. (hour designations shall be based on the 24 hour clock)
  - Data transmission at a rate of at least 1200 BAUD and in an eight bit with or without parity configuration.
  - Remote programming (down load from a P.C.)
- c. The recorder shall have a back-up power supply or include another means of retaining the operating program in the event of primary power failure.



### 3. PHYSICAL CONSIDERATIONS

- a. Terminal connections shall be of the screw type capable of accomodating a ring-tongue compression type terminal.
- b. Printing or marking shall be by a thermal or dry ink process. (Liquid marking mediums are not acceptable)
- c. The recorder assembly shall be of a "pull-out" design (removable from the case assembly without disassembling)
- d. The recorder weight shall not exceed 68 pounds.

### 4. ENVIRONMENTAL CONSIDERATIONS

- a. The recorder shall be capable of operating continuously in an environment of 60 to 110 degree F.
- b. Sound pressure levels as measured directly in front of the operating and fully functional recorder shall not exceed 6 db above background as measured on the weighted 'B' scale.

### 5. MISCELLANEOUS CONSIDERATIONS

- a. Parts availability shall be documented by the vendor.
- b. Circuit boards shall be of the plug-in type.
- c. Circuit boards shall be field repairable.
- d. Documentation shall include detailed calibration and repair procedures.
- e. Any recorder selection shall consider the availability of competent technically qualified personnel to conduct on-site training of maintenance personnel.

### ASSOCIATED DIRECTIVES

DD-DD-1 Requirements and Guidance for Preparing Design Directives

DD-AAS-1 Abbreviations, Symbols, & Acronyms

DD-AIS-1 Design Directive For The Selection Of Analog Indicators  
DD-CBL-1 Design Control Board Layout  
DD-LAB-1 Labeling  
DD-SWI-1 Design Directive For Switch Selection

SOURCE MATERIALS AND REFERENCES

- Human Factors in Engineering & Design, McCormick-Sanders,  
Fifth Edition
- Human Engineering Guide to Equipment Design--Van Cott-Kinkade, 1972
- MIL-STD-14272D
- NUREG-0700

ATTACHMENT F

LABELING LEGEND LIST  
&  
EXAMPLES OF LABEL  
FORMAT & PLACEMENT  
DETAILS

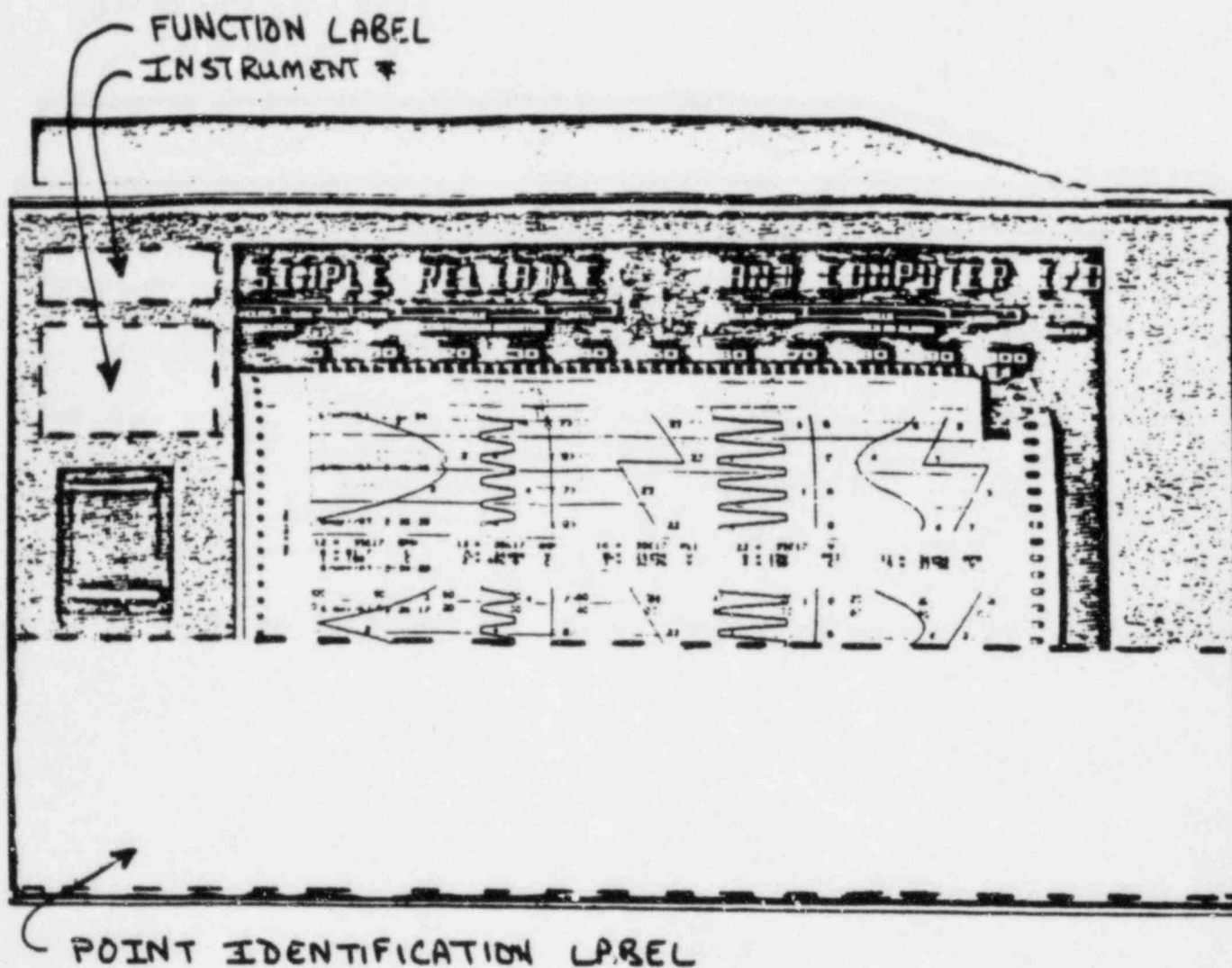
LABELING LEGEND LIST

Attachment F  
Page 1 of 7

CONTROL BOARD #	INSTRUMENT #	STYLE	FUNCTIONAL LABEL	STYLE	HED # (if applicable)
I09	TR-2232/ TR-2255	SPECIAL	STEAM GEN REHEAT TEMPERATURES	7b BLK	0269, 0517
I09	TR-31115	11 BLK	MISC OPERATING TEMPERATURES	7b BLK	0168
I09	TR-92105	11 BLK	TURB GENERATOR & TRANSFORMER TEMP	7b BLK	
I09	TR-2227	10 BLK	STEAM GEN MODULE TEMPERATURES	7c BLK	0517
I09	TR-3118	10 BLK	STM CYCLE & HTR TEMPERATURES	7c BLK	0168
I09	TR-5156	10 BLK	MAIN/BFP TURBINE BRG/DRAIN TEMP	7c BLK	0252
I09	GR-5154	10 BLK	MAIN/BFP TURBINE VIBRATION	SPECIAL	
I09	FR-2222	10 BLK	STEAM GEN FDWTR FLOWS	SPECIAL	0269
I09	TR-2322	10 BLK	HE PURIF TEMPERATURES	SPECIAL	0269, 0544
I09	CR-3390-2	11 BLK	ECONOMIZER INLET CONDUCTIVITY	7c BLK	
I09	XR-3390-1	11 BLK	ECONOMIZER INLE PH	7c BLK	
I09	TR-4637	10 BLK	PCR V COOLING WTR LOOP 1 TEMP	7c BLK	
I09	TR-4638	10 BLK	PCR V COOLING WTR LOOP 2 TEMP	7c BLK	
I09	TR-2256	10 BLK	STEAM GEN REHEAT AVG TEMP	7b BLK	
I09	NR-1199	SPECIAL	AVERAGE REACTOR POWER LEVEL	SPECIAL	025
I09	FR-11262	SPECIAL	TOTAL MASS FLOW	SPECIAL	025
I09	XR-11262	SPECIAL	PWR TO FLOW RATIO	SPECIAL	025
I09	NR-1133-2	11 BLK	RX POWER LEVELS	SPECIAL	
I09	PR-1108	10 BLK	RX PRESSURE	SPECIAL	

LABELING LEGEND LIST

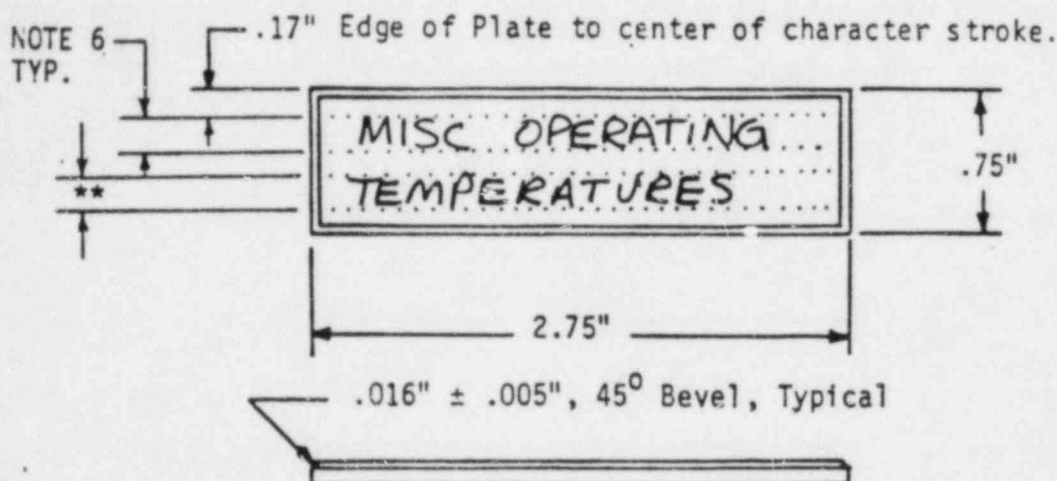
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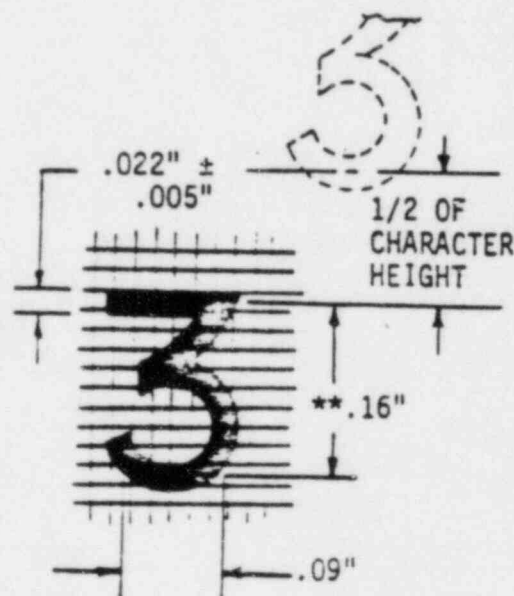


TR-31115

LEGEND LABEL DETAIL SHEETSTYLE 7b  
(BLACK)

## NOTES:

1. - ALL DIMENSIONS SHALL BE  $\pm .010$ " UNLESS OTHERWISE SHOWN.
2. - ALL CHARACTERS SHALL BE OF A GOTHIC STYLE CONFORMING TO THE DIMENSIONS SHOWN.
3. - NAMEPLATE MATERIAL SHALL BE ONE EIGHTH (1/8) INCH THICK, THREE (3) PLY LAMICOID (OR EQUAL), ADHESIVE BACKED PLATE, SURFACE SHALL BE BLACK. CORE MATERIAL SHALL BE WHITE.
4. - ENGRAVE LAMICOID (OR EQUAL) 3 PLY PLATE THROUGH SURFACE PLY, INTO CENTER PLY USING A ROUNDED OR SQUARE END CUTTER. ("V" SHAPED GROOVES ARE NOT ACCEPTABLE)
5. - ALL TEXT SHALL BE CENTERED ON THE VERTICAL CENTER LINE OF THE PLATE.
6. - DISTANCE BETWEEN LINES OF TEXT SHALL BE 1/2 OF CHARACTER HEIGHT AS MEASURED FROM CENTER OF STROKE WIDTHS.

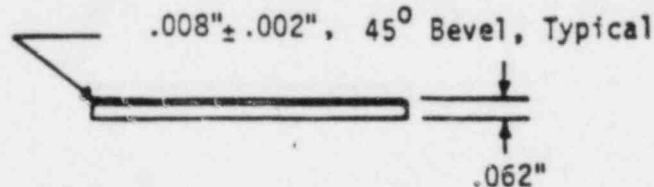
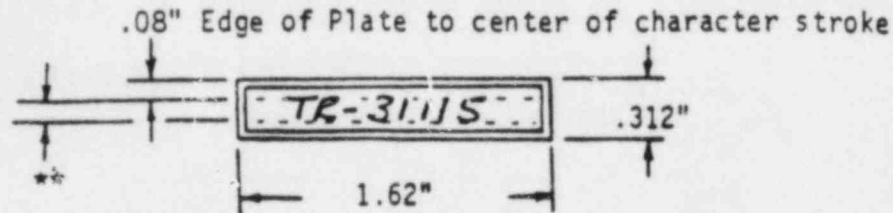
\*\*LETTER HEIGHT MEASURED  
BETWEEN CENTER LINES.



TR-31115

LEGEND LABEL DETAIL SHEET

STYLE 11  
(BLACK)



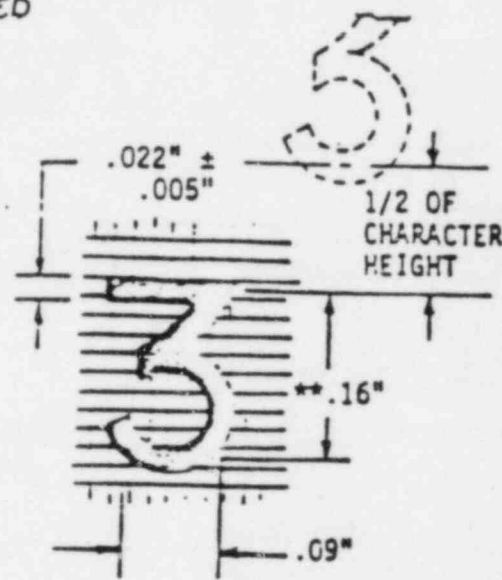
NOTES:

1. - ALL DIMENSIONS SHALL BE  $\pm .010$ " UNLESS OTHERWISE SHOWN.
2. - ALL CHARACTERS SHALL BE OF A GOTHIC STYLE CONFORMING TO THE DIMENSIONS SHOWN.
3. - NAMEPLATE MATERIAL SHALL BE ONE SIXTEENTH INCH THICK, TWO (2) PLY LAMICOID (OR EQUAL), ADHESIVE BACKED PLATE, SURFACE SHALL BE BLACK. CORE MATERIAL SHALL BE WHITE.
4. - ENGRAVE LAMICOID (OR EQUAL) 2 PLY PLATE THROUGH SURFACE PLY, INTO CENTER PLY USING A ROUNDED OR SQUARE END CUTTER. ("V" SHAPED GROOVES ARE NOT ACCEPTABLE)
5. - ALL TEXT SHALL BE CENTERED ON THE VERTICAL CENTER LINE OF THE PLATE.



\*\*LETTER HEIGHT MEASURED  
BETWEEN CENTER LINES.

1. ALL DIMENSIONS SHALL BE  $\pm .10"$  UNLESS OTHERWISE SHOWN.
2. ALL CHARACTERS SHALL BE OF A GOTHIC STYLE CONFORMING TO THE DIMENSIONS SHOWN.
3. NAMEPLATE MATERIAL SHALL BE ONE EIGHTH ( $\frac{1}{8}$ ) INCH THICK, THREE (3) PLY LAMICOID (OR EQUAL), ADHESIVE BACKED PLATE, SURFACE SHALL BE BLACK. CORE MATERIAL SHALL BE WHITE.
4. THE MAXIMUM NUMBER OF CHARACTERS PER INCH SHALL BE  $7\frac{1}{2}$ .
- SEE ATTACHED SHEET FOR TEXT TO BE ENGRAVED



\*\*LETTER HEIGHT MEASURED BETWEEN CENTER LINES.

(TYP) .312"		17.25"	
	5.54"	5.54"	
1	9	17	
2	10	18	
3	11	19	
4	12	20	
5	13	21	
6	14	22	
7	15	23	
8	16	24	

(FOR TR 31115)

1. SERV WTR H2 COOLER OUTLET
2. SERV WTR STATOR COOLER OUTLET
3. SERV WTR TURB LUBE OIL COOLER OUTLET
4. BFP A LUBE OIL COOLER OUTLET
5. BFP C LUBE OIL COOLER OUTLET
6. MAIN TURBINE LUBE OIL COOLER INLET
7. MAIN TURBINE LUBE OIL COOLER OUTLET
8. DECAY HEAT REMOVAL EXCHANGER DRAIN
9. FEEDWATER HTR 2 FLASH TANK DRAIN
10. BFP A TURBINE STEAM INLET
11. BFP C TURBINE STEAM INLET
12. MAIN TURBINE STEAM SEAL HEADER
13. HOT REHEAT STEAM
14. COLD REHEAT STEAM
15. BFP A SLEEVE BEARING (THRUST END)
16. MAIN STEAM HP TURBINE INLET
17. BFP A SLEEVE BEARING (SUCTION END)
18. BFP A THRUST BEARING
19. BFP B SLEEVE BEARING (THRUST END)
20. BFP B SLEEVE BEARING (SUCTION END)
21. BFP B THRUST BEARING
22. BFP C SLEEVE BEARING (THRUST END)
23. BFP C SLEEVE BEARING (SUCTION END)
24. BFP C THRUST BEARING

(FOR TR-31115)

ATTACHMENT 6b-8

SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS  
AS APPLICABLE TO THE  
HYDRAULIC SYSTEM CONTROL/INDICATION  
FUNCTIONAL GROUPING  
ON I-06A

FOREWORD - NUREG-0737 Supplement 1, Section 5.1b requires that a Control Room Design Review (CRDR) be conducted to identify human engineering discrepancies. Section 5.1c requires that these discrepancies be assessed and design improvements selected to correct these discrepancies.

Public Service Company (PSC) has conducted the required review of the Fort St. Vrain Control Room. Approximately eight hundred forty eight (848) discrepancies or classes of discrepancies were cited. These discrepancies were assessed to determine their potential for causing an operating error and the potential effect of any error. (Certain discrepancies are known to have caused errors). An improvement program has been selected which meets the regulatory requirements and proposes to improve the operability and functionality of the Control Room.

The regulatory requirement for the CRDR and the follow-on improvement program was directed toward the improved handling of emergencies and not specifically toward improved production. Public Service Company's improvement program is directed toward both normal operation and the handling of emergencies.

BACKGROUND - Public Service Company has initiated an integrated improvement program based on functionality rather than particular classifications of problems. This approach is first, one of determining functional groupings, followed by demarcating, hierarchical labeling, correcting indicator scaling, complying with established conventions (color coding, switch positions, etc.).

The following steps constituted the planning portion of the integrated improvement program.

- Elevation Drawings of each control panel were color coded to show applicable HEDs as either, relabeling, relocations, scaling, deletions, or equipment changeout. This scheme provides an overview of the problems documented on each control board.
- All HEDs involving Alarm Locations, and multipoint alarms were reviewed. System function and operator response were considered in grouping, deleting and adding alarms. Paste-ups of all alarm panels were completed to show proposed rearrangements.
- Functional grouping of controls and indications was approached by first preparing point interaction sketches for various systems or by direct reference to system P&Is. This effort was, in effect, an extensive operational analysis which considered the dynamic considerations of control groups and arrangements. This activity reviewed the purpose and use of each and every component on the main control boards. Interviews with operators and training personnel were



conducted to determine operator interpretations and actions.

- Controls and indications were then arranged in functionally related groups. Associated alarm locations were rechecked to verify that the more desirable locations were selected. The function relationship of adjacent indicator and control groupings were reviewed.
- Revised drawings were prepared to show the proposed arrangements. Certain of these drawings were color coded to aid in differentiating between groupings. These drawings were then utilized to determine the scope of each change package (change notice).
- Change Notice (CN) numbers were assigned to each effort identified above.

#### IMPROVEMENT PROCESS METHODOLOGY

The Improvement Process starts with the documentation and drawings produced during the improvement planning process described in the BACKGROUND presentation portion of this summary. An individual designer is assigned the responsibility of evaluating a particular board. Since this individual may not have participated in previous efforts, an educational process is initiated to acquire a thorough understanding of each system, subsystem and component represented on the assigned control board. System descriptions, Piping & Instrument diagrams, electrical drawings, operating procedures are studied to gain this thorough understanding of each system and component function. An operational analysis is conducted for each system and component on a particular control board. (This in-depth analysis is in addition to that completed for the CRDR and planning purposes.) This Operational Analysis provides additional basis for determining any changes to functional groupings.

Operating and training personnel are interviewed to solicit operational philosophies. The Operational value and function of each control and indication is addressed. Informational requirements are again discussed. (This informational requirements effort is in addition to that conducted for Emergency Operating Procedures task analysis).

All HEDs applicable to a particular control board are reviewed and the tentative fix evaluated for its corrective value within the integrated approach. HEDs written against instruments and controls recorded by the Emergency Operating Procedure task analysis "Information and Control Requirements" effort, are reviewed with particular attention to any potential safety considerations. Any previously prepared investigative information is studied. All

factors are evaluated in considering any changes to the control board.

SPECIFIC - Hydraulic System Controls/Indicator Functional Grouping - (Change Notice (CN)-1885 preparation package.)

Research - During this phase the control and indications related to the Hydraulic System were studied using the applicable system abstracts, System Operating Procedures, and system drawings. In addition, both the Technical Specifications and Final Safety Analysis Report were reviewed to determine the operational (process) control limits and safety interactive controls and systems.

Other research included discussions with operators, trainers, and engineering support personnel. This interaction with other sectors was continued throughout the research and design phases. A review of all related HEDs was performed and design problems reviewed. (See Attachment A).

Review of the HEDs and a physical study of the panel verified that there were problems in grouping, labeling, meter scaling, switch and light conventions. The original board layout is included as Attachments B, B1, & B2.

Conceptual Design - While the Hydraulic System is a support system for the secondary coolant system, space availability on I-05 control board prevented locating all related Hydraulic controls and indications in loop related arrangements at a functionally preferred location. For this reason it was deemed advantageous to provide a dedicated space adjacent to I-05. After the existing design was reviewed, preliminary redesign proposals were made using elevation drawings, modified to show proposed changes. As each proposal was studied, its operational relationships were evaluated to make certain that the arrangement provided the best man-machine interface.

This design provided for loop related grouping of controls and displays on a section of the I-06A control panel.

In this process, several iterations of a layout were evaluated. As the design became more viable and appeared to resolve most or all of the known problems, interviews were conducted to determine if all of the design and operational parameters were met. Sample copies of the Interview records are included as Attachment C. These interviews were conducted in the following manner:

- The final iteration of a proposed layout was presented to an operator.
- The operator was asked to evaluate the proposed layout. Particular attention was given to the functional grouping and the operational relationships of the controls and indications.

- Information and control needs were reviewed. The operator was asked to evaluate the proposed labeling and scaling presentations to verify that the required information was presented in a clear, concise and readily useable format.

This "table top" analysis was conducted with various operators, shift supervisors and trainers. (See Sample Interview records, Attachment C).

This verification effort resulted in operators expressing concern over labeling of PI-9105, PI-91141, PI-9106, and PI-91142 as "system emergency...", the order of pump switch arrangements, the arrangement of the digital indicators and selector switches, and the need for an operator aid legend plate listing hydraulic actuated valves. Further examination resulted in making the suggested changes. This finalized layout is included as Attachment D. A major concern was expressed concerning division of responsibility. The present division of responsibility occurs at the I-05/I-06 boundary. System 91 controls are presently located on both sides of the line. This division of responsibility is an administrative responsibility and will undoubtedly be commensurate with the recommendation that the hydraulic power system functional group be included with I-05 responsibilities.

A summary of changes for the hydraulic system control and indicator layout is presented by Attachment E.

The final step in this conceptual design phase was to determine the final text content for functional labels. Prior operator interviews and operational analysis efforts provided the basis for these determinations. See Attachment F for Functional Label legends.

The following Design Directives apply to the Hydraulic System Controls/Indicator functional grouping effort.

<u>NUMBER</u>	<u>ISSUE</u>	<u>DESCRIPTION</u>
DD-AAS-1	A	ABBREVIATION, SYMBOL, AND ACRONYM SELECTION
** DD-AIS-1	A	ANALOG INDICATOR SELECTION
** DD-CBL-1		CONTROL BOARD LAYOUT
DD-ILS-1	A	INDICATOR LIGHT SELECTION AND LOCATION
DD-LAB-1	B	PANEL AND COMPONENT LABELING
DD-SWI-1	A	SWITCH SELECTION
** IN DRAFT FORM		

The Alarm displays changes associated with the Hydraulic System are to be addressed by CN-1924A.

ATTACHMENTS  
TO  
SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS  
AS APPLICABLE TO THE  
HYDRAULIC SYSTEM CONTROL/INDICATION FUNCTIONAL GROUPING  
ON I-06A

- A List of all Hydraulic System HEDs & Copies of these HEDs
- B, B1, B2 Sections of Elevation Drawings Showing Original Configuration
- C Sample Copies of Operator Interview Records
- D, D1 Section of Elevation Drawing Showing Revised Configuration
- E Summary of Changes to Board
- F Label List

ATTACHMENT A

List of All 91 System (Hydraulic) HEDs  
&  
Copies of 91 System (Hydraulic) HEDs

## HUMAN ENGINEERING DISCREPANCIES LISTED FOR 91 SYSTEM (HYDRAULIC)

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0107	Labeling	1b	I-05	HS-91151	1	Relabel	1885	Move to I-06A. To be functionally labeled per DD-LAB-1 and DD-SWI-1. Functionally grouped per DD-CBL-1.
0107	Labeling	1b	I-05	HS-91152	1	Relabel	1885	Move to I-06A. To be functionally labeled per DD-LAB-1 and DD-SWI-1. Functionally grouped per DD-CBL-1.
0112	Labeling	1b	I-05	HS-9105-1	1	Relabel	1885	Move to I-06A. To be functionally labeled per DD-LAB-1 and DD-SWI-1. Functionally grouped per DD-CBL-1.
0116	Labeling	1b	I-05	PI-9105	1	Relabel	1885	Move to I-06A. To be functionally labeled per DD-LAB-1. Functionally grouped per DD-CBL-1.
0116	Labeling	1b	I-05	PI-9106	1	Relabel	1885	Move to I-06A. To be functionally labeled per DD-LAB-1. Functionally grouped per DD-CBL-1.
0116	Labeling	1b	I-05	PI-91141	1	Relabel	1885	Move to I-06A. To be functionally labeled per DD-LAB-1. Functionally grouped per DD-CBL-1.
0116	Labeling	1b	I-05	PI-91142	1	Relabel	1885	Move to I-06A. To be functionally labeled per DD-LAB-1. Functionally grouped per DD-CBL-1.
0118	Labeling	1b	I-05	HS-9106-1	1	Relabel	1885	Move to I-06A. To be functionally labeled per DD-LAB-1 and DD-SWI-1. Functionally grouped per DD-CBL-1.
0132	Labeling	1d	I-06A	HS-9139-1	1	Deleted	1885	To be deleted. Function not required.
0132	Labeling	1d	I-06A	HS-9140-1	1	Deleted	1885	To be deleted. Function not required.
0165	Labeling	1b	I-06A	HS-9139	1	Label	1885	To be changed to new selector switch, functionally labeled per DD-LAB-1 and DD-SWI-1 and functionally grouped per DD-CBL-1.
0165	Labeling	1b	I-06A	HS-9139-1	1	Deleted	1885	To be deleted. Function not required.
0165	Labeling	1b	I-06A	PI-9139	1	Relabeled	1885	To be changed to digital indicator, functionally labeled per DD-LAB-1 and DD-CBL-1.
0165	Labeling	1b	I-06A	PI-9139-1	1	Relabeled	1885	To be changed to digital indicator, functionally labeled per DD-LAB-1 and DD-CBL-1.
0167	Instrument	1b	I-06A	PI-9140	1	Relabeled	1885	To be changed to digital indicator, functionally labeled per DD-LAB-1 and DD-CBL-1.
0167	Instrument	1b	I-06A	PI-9140-1	1	Relabeled	1885	To be changed to digital indicator, functionally labeled per DD-LAB-1 and DD-CBL-1.
0169	Labeling	1b	I-06A	HS-9139	1	Relabeled	1885	To be changed to new selector switch, functionally labeled per DD-LAB-1 and DD-SWI-1 and functionally grouped per DD-CBL-1.



## HUMAN ENGINEERING DISCREPANCIES LISTED FOR 91 SYSTEM (HYDRAULIC)

Page 2 of 3

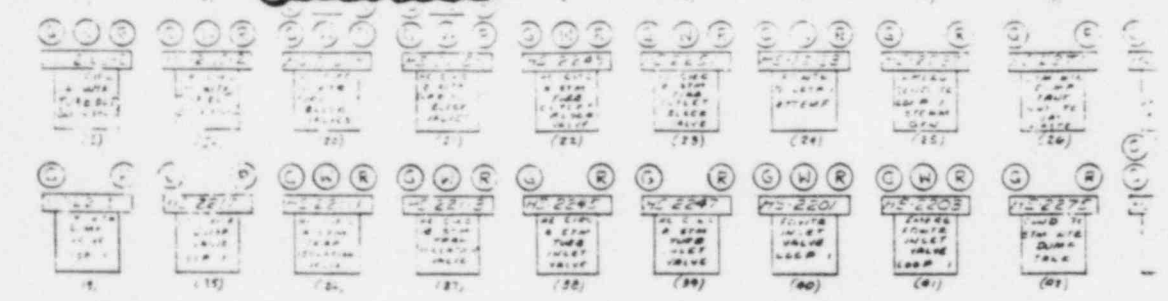
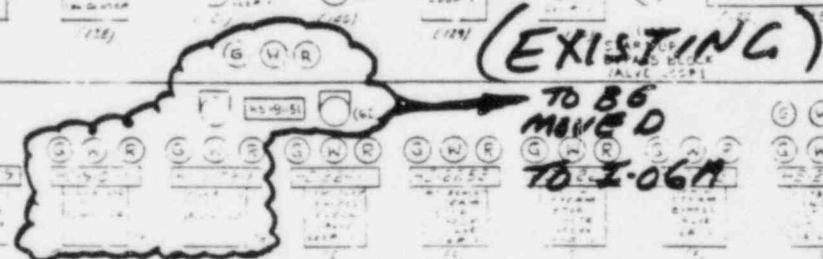
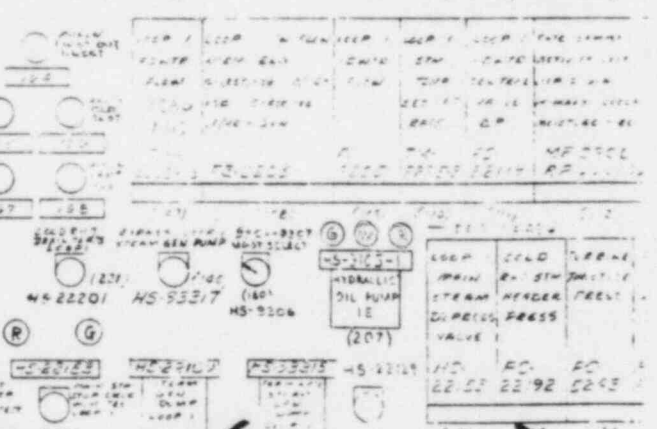
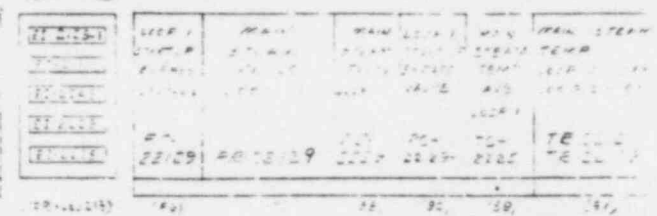
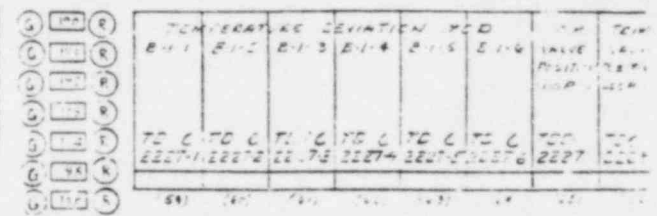
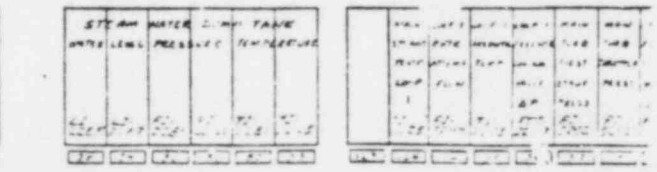
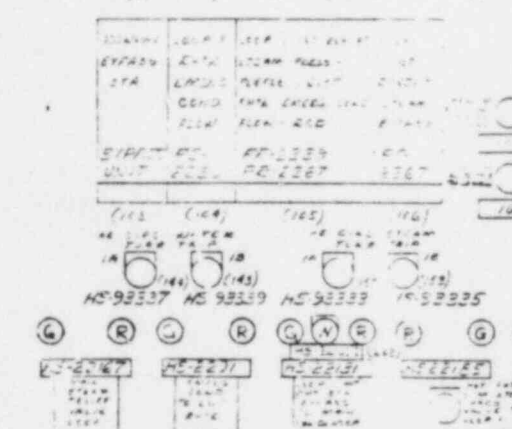
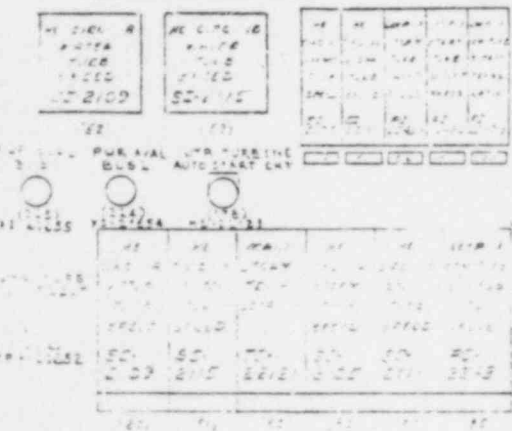
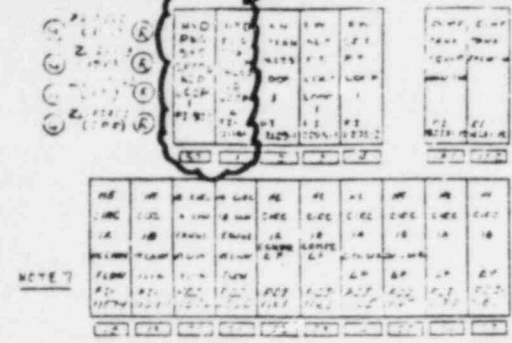
DED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0169	Labeling	1b	I-06A	HS-9139-1	1	Deleted	1885	To be deleted. Function not required.
0169	Labeling	1b	I-06A	HS-9140	1	Relabeled	1885	To be functionally labeled per DD-LAB-1 & DD-SWI-1 and functionally grouped per DD-CBL-1.
0169	Labeling	1b	I-06A	HS-9140-1	1	Deleted	1885	To be deleted. Function not required.
0383	Instrument	2d	I-05	HS-9106-1	3	Relocate	1885	Move to I-06A. To be functionally labeled per DD-LAB-1 and DD-SWI-1. Functionally grouped per DD-CBL-1.
0513	Instrument	2e	I-05	PI-9105/6	1	Relocate	1885	Move to I-06A. To be functionally labeled per DD-LAB-1. Functionally grouped per DD-CBL-1.
0513	Labeling	1b	I-05	PI-9105/6	3	Relabel	1885	Move to I-06A. To be functionally labeled per DD-LAB-1. Functionally grouped per DD-CBL-1.
0513	Instrument	2e	I-05	PI-91141/2	1	Rescale	1885	Move to I-06A. New dial card(s) to be installed per DD-AIS-1. To be functionally labeled per DD-LAB-1 and functionally grouped per DD-CBL-1.
0513	Labeling	1b	I-05	PI-91141/2	3	Relabel	1885	Move to I-06A. To be functionally labeled per DD-LAB-1. Functionally grouped per DD-CBL-1.
0560	Instrument	2e	I-05	PI-9105	2	Rescale	1885	Move to I-06A. New dial card(s) to be installed per DD-AIS-1. To be functionally labeled per DD-LAB-1 & functionally grouped per DD-CBL-1.
0560	Instrument	2e	I-05	PI-9106	2	Rescale	1885	Move to I-06A. New dial card(s) to be installed per DD-AIS-1. To be functionally labeled per DD-LAB-1 & functionally grouped per DD-CBL-1.
0569	Instrument	2e	I-05	PI-91141	2	Rescale	1885	Move to I-06A. New dial card(s) to be installed per DD-AIS-1. To be functionally labeled per DD-LAB-1 and functionally grouped per DD-CBL-1.
0569	Instrument	2e	I-05	PI-91142	2	Rescale	1885	Move to I-06A. New dial Card(s) to be installed per DD-AIS-1. To be functionally labeled per DD-LAB-1 and functionally grouped per DD-CBL-1.
0576	Instrument	2e	I-06A	PI-9139-1	2	Relabel	1885	To be changed to digital indicator. Relabel to PDI-9139-1 consistent with actual parameter.
0576	Instrument	2e	I-06A	PI-9140-1	2	Relabel	1885	To be changed to digital indicator. Relabel to PDI-9140-1 consistent with actual parameter.
0587	Instrument	2e	I-06A	PI-9139	2	Change-out	1885	To be changed to digital indicator, functionally labeled per DD-LAB-1 and grouped per DD-CBL-1.

## HUMAN ENGINEERING DISCREPANCIES LISTED FOR 91 SYSTEM (HYDRAULIC)

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INST IDENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0587	Instrument	2e	I-06A	PI-9140	2	Change-out	1885	To be changed to digital indicator, functionally labeled per DD-LAB-1 & grouped per DD-CBL-1.
0615	Instrument	2f	I-05	HS-91151	1	Change-out	1885	Move to I-06A. To be changed to SBM type switch. To be functionally labeled per DD-LAB-1 & DD-SWI-1 and functionally grouped per DD-CBL-1.
0615	Instrument	2f	I-05	HS-91152	1	Change-out	1885	Move to I-06A. To be changed to SBM type switch. To be functionally labeled per DD-LAB-1 & DD-SWI-1 and functionally grouped per DD-CBL-1.
0751	Instrument	2c	I-05	HS-9105-1	3	Relocate	1885	Move to I-06A. To be changed to SBM type per DD-LAB-1 & DD-SWI-1 and functionally grouped per DD-CBL-1.
0751	Instrument	2c	I-05	HS-9106-1	3	Relocate	1885	Move to I-06A. To be functionally labeled per DD-LAB-1 & DD-SWI-1 and functionally grouped per DD-CBL-1.
0762	Instrument	2c	I-05	HS-9101-1	3	Relocate	1885	Move to I-06A. To be functionally labeled per DD-LAB-1 & DD-SWI-1 and functionally grouped per DD-CBL-1.
0762	Instrument	2c	I-05	HS-9105-1	3	Relocate	1885	Move to I-06A. To be functionally labeled per DD-LAB-1 & DD-SWI-1 and functionally grouped per DD-CBL-1.
0762	Instrument	2c	I-06A	HS-9139	3	Change-out	1885	To be changed to new selector switch. Functionally labeled per DD-LAB-1 & DD-SWI-1 & functionally grouped per DD-CBL-1.
0762	Instrument	2c	I-06A	HS-9139-1	3	Deleted	1885	To be deleted. Function not required.
0762	Instrument	2c	I-06A	HS-9140	3	Change-out	1885	To be changed to new selector switch. Functionally labeled per DD-LAB-1 & DD-SWI-1 & functionally grouped per DD-CBL-1.
0762	Instrument	2c	I-06A	HS-9140-1	3	Deleted	1885	To be deleted. Function not required.
0762	Instrument	2c	I-06A	PI-9139	3	Change-out	1885	To be changed to digital indicator, functionally labeled per DD-LAB-1 & grouped per DD-CBL-1.
0762	Instrument	2c	I-06A	PI-9139-1	3	Change-out	1885	To be changed to digital indicator, functionally labeled per DD-LAB-1 & grouped per DD-CBL-1.
0762	Instrument	2c	I-06A	PI-9140	3	Change-out	1885	To be changed to digital indicator, functionally labeled per DD-LAB-1 and grouped per DD-CBL-1.
0762	Instrument	2c	I-06A	PI-9140-1	3	Change-out	1885	To be changed to digital indicator, functionally labeled per DD-LAB-1 and grouped per DD-CBL-1.

EXISTING  
TO BE  
MOVED  
TO I-06A

ATTACHMENT B  
Section of Elevation  
Drawing showing Original  
Configuration of I-05



NOTE: NUMBERS IN PARALLEL  
PARTIAL THESIS 'S', &  
NUMBERS ON THE F  
3-1510 HA-4 SPEC

Section of Elevation  
Drawing showing Original  
Configuration of I-05

(EXISTING)  
TO 85  
MOVED  
TO 106A  
FINISH FLOOR

5' 4 1/2" TC  
FINISH FLOOR

4'-7" TO  
FINISH FLOOR

### INSTRUMENTS WITH EYES

2' 2 1/4" TO  
FINISH FLOOR

PERECN  
GA-4096  
-CV-14147

(EXISTING)  
TO BE  
MOVED  
TO 106A

3'-0" TO  
FINISH FLOOR

52

1

10

+

1

 $2\frac{5}{8}$ 

1

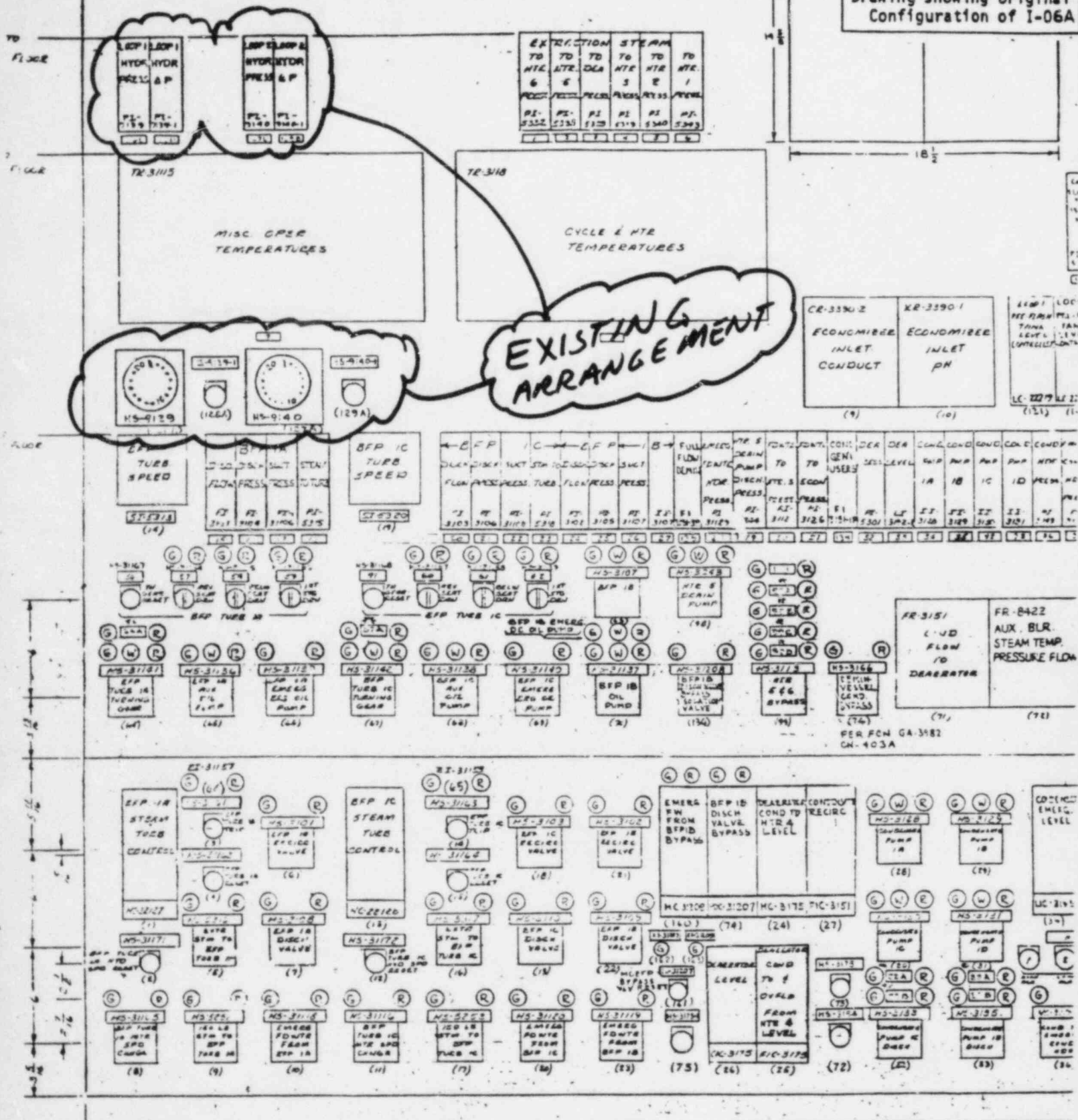
10

10

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ATTACHMENT B-2  
Section of Elevation  
Drawing showing Original  
Configuration of I-06A



\* FOR NAMEPLATE ENGRAVING, SEE ENGRAVING  
LIST FIG. 1 OR FIG. 2 ON DRASS. E-1339 OR E-1340

NOTE:  
NUMBERS IN NAMEPLATE  
PARENTHESES (2), LEFT  
NUMBERS ON THE F44  
0-15100 FA-1 SHEETS

ATTACHMENT C

Sample Copies  
of  
Operator Interviews





## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 050

## INVESTIGATIVE INFORMATIONAL RECORD

Sht 1 of 5

Investigator's Name Ron Olson			DATE 13 November 85	
Problem Description: <u>Validation of hydraulic system controls relocation and functional grouping on control board I-06A by soliciting operator and trainer opinions and observations.</u>				
ITEMS INVOLVED				
ITEM	LOC.	DESCRIPTION	E-1203	P & I NO.
System 91	I-05	Hydraulic System		
	I-06A			
Questions: <u>1. Are you familiar with the existing hydraulic system controls?</u>				
<u>2. What is your opinion of the existing controls?</u>				
<u>3. After examining the proposed layout, do you observe any difficulty:</u>				
<u>a) with the proposed location of the hydraulic system functional group as a whole?</u>				
<u>b) with the proposed location of any individual instrument or control within the functional group?</u>				
<u>4. Suppose the controls were configured as proposed. Do you think that operating will be more difficult or easier?</u>				
Provide Conclusion on separate or final sheet.				
Investigator's Signature <i>Ronald E. Olson</i>			Date <i>13 November 1985</i>	

Date: 13 November 1985

Investigative Informational Record - Answers to Questions

Respondent: John Maynard, Senior Licensed Operator

Question 1: Yes.

Question 2: "The layout bothers me the most."  
"The alarms are scattered."

Question 3a: Effect responsibility. The division line is at I-05/I-06.  
"No difficulties. I preferenced it there." (Interviewer's  
comment: The operator was referring to the proposed  
location of the hydraulic controls.)

3b: PI-9105, 9106, 91141, and PI-91142 should not be labeled  
emergency. (Interviewer's comment: Noted and changed).

Question 4: "Lot easier."  
"Good location"

Date: 14 November 1985

Investigative Informational Record - Answers to Questions

Respondent: Willard Ashmore, Trainer, (former licensed operator)

Question 1: Yes.

Question 2: Spread all over. Not organized.

Question 3a: Good location for hydraulic controls.

3b: Handswitch positions should correlate with the pump's actual field location. (Interviewer's comment: Sequence of operation and consistency of functional grouping determines handswitch position. Field location is of minimal concern.) I don't like the meter and selector switch layout. (Interviewer's comment: noted and changed)

Question 4: Grouping of hydraulic controls on I-06A shifts responsibility for the hydraulic controls. (Interviewer's comment: The I-05/I-06 dividing line is also the division line between operator responsibility. Presently the hydraulic alarms and controls are split between I-05 and I-06. The alarms are to be addressed in a separate change.) This move will define responsibility.

Date: 14 November 1985

Investigative Informational Record - Answers to Questions

Respondent: Steve Shafer, Shift Supervisor (Senior Licensed Operator)

Question 1: Yes.

Question 2: "The loop split is O.K."  
"Labeling is inadequate."  
"Selector Switch selector and alarm could be better."

Question 3a: I like the idea of putting it all together, like the location on I-06A.

3b: Approved of digital indications. Better indication for the tight range of the pressure limit. Accumulators have a narrow operating band. HS-91151 and HS-91152 change to SMB type switches is good.  
Would like a legend plate (operator aid) identifying valves being operated.

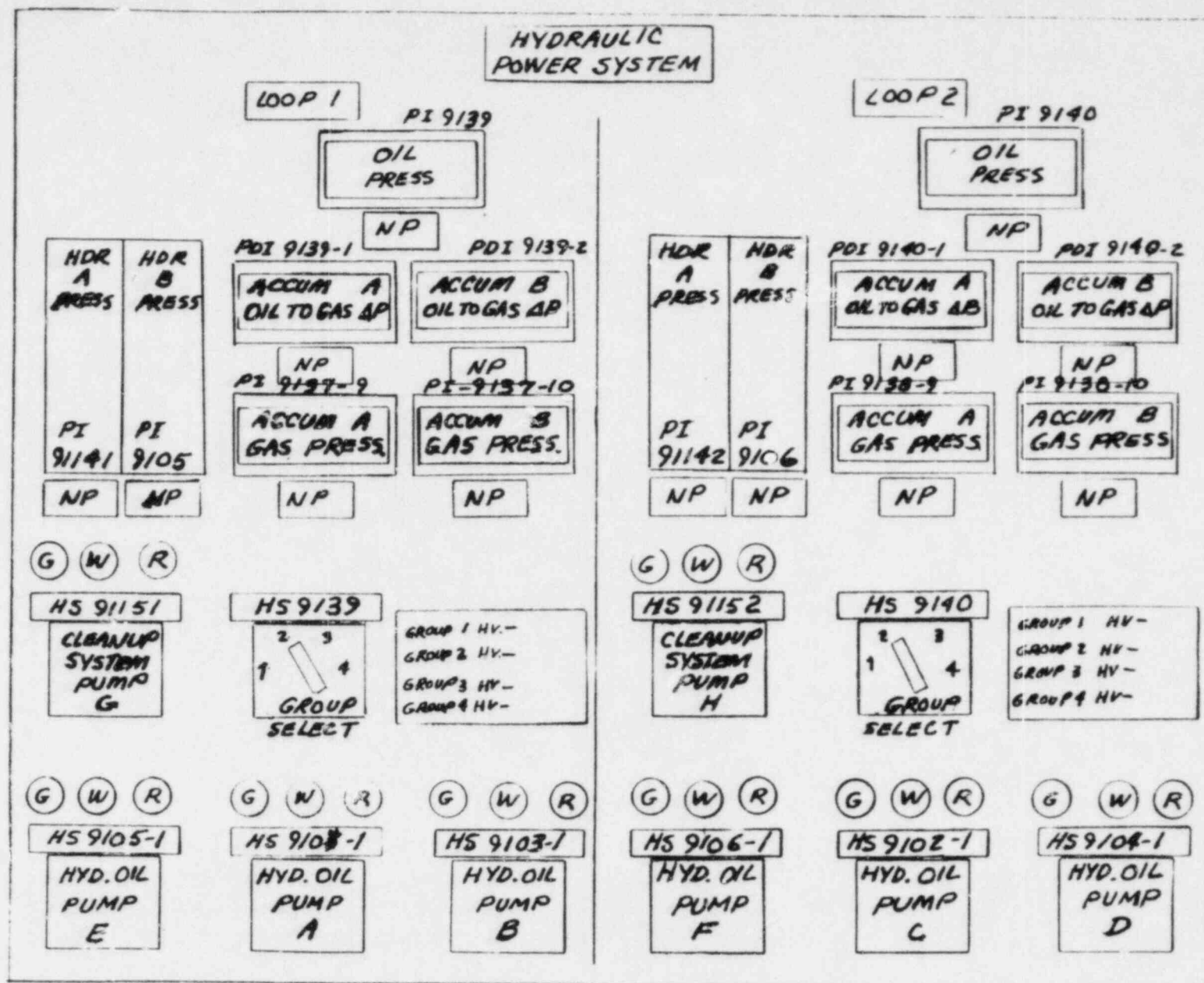
Question 4: May not make that much difference.  
Better because of the functional group.  
Improves I-05 by removing excess controls.

## CONCLUSIONS:

A review of the investigative interviews indicates a general acceptance of the proposed hydraulic system controls revision.

Several minor changes were suggested by respondents during the interviews. These were evaluated and acted on if there was merit in the suggestion. Comparing the enlarged functional group layout sketch used for the interviews with final layout shown in Attachment E, these minor changes are obvious:

- i) changed the pump switch order
- ii) centered the hydraulic oil pressure indicator
- iii) added operator aid legend plate.



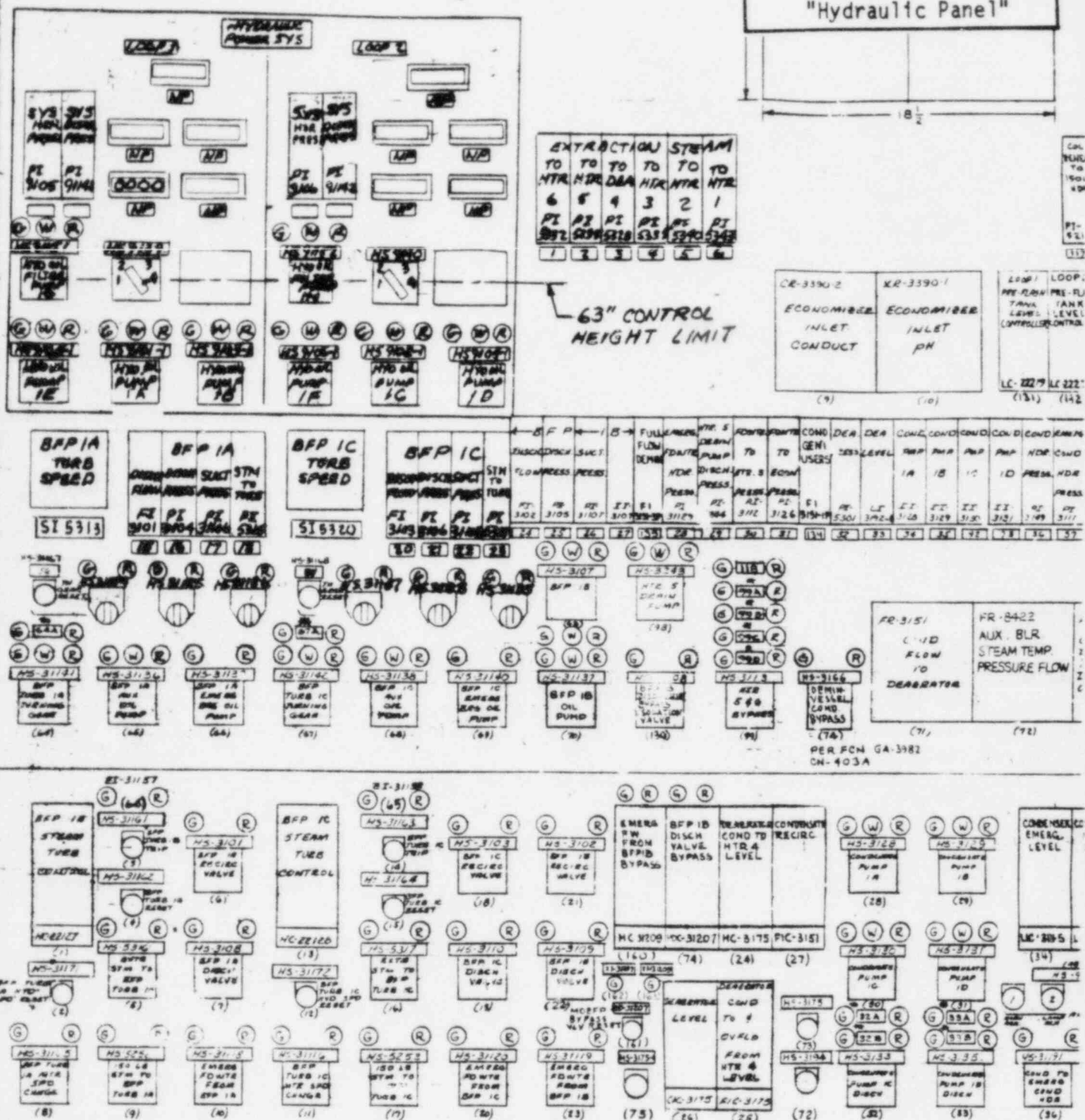
Section of Elevation  
Drawing Showing Proposed  
Configuration of  
"Hydraulic Panel"



## REDUCTION

ATTACHMENT 01

Section of I-06A  
Elevation Drawing  
Showing Location  
of Proposed  
"Hydraulic Panel"



\* FOR NAMEPLATE ENGRAVING, SEE ENGRAVING LIST FIG. 1 OR FIG. 2 ON DMSO.E-1329 OR E-1340

NOTE:  
NUMBERS IN NAMEPLATES  
IN PARENTHESES (S), REFER  
NUMBERS ON THE FOLLOWING  
0-15100 RA-1 SHEETS 1.

ATTACHMENT E  
SUMMARY OF I-06A  
PROPOSED CHANGES ASSOCIATED  
WITH THE HYDRAULIC PANEL  
GROUPING

1. Relocated:

- TR-3115 and TR-3118 relocated to I-09 by CN-1878
- HS-31184 thru HS-31189 to be moved approximately 2" down from the present locations on I-06A
- SI-5313, SI-5320, FI-3101, FI-3103, PI-31106, PI-31108, PI-3108, PI-3106, PI-5315, and PI-5318 to be moved approximately 2" down from the present locations on I-06A
- PI-5382, PI-5335, PI-5328, PI-5339, PI-5340, and PI-5343 to be relocated on I-06A
- PI-9105 and PI-9106 to be moved to I-06A
- PI-91141 and PI-91142 to be moved to I-06A
- HS-9101-1, HS-9103-1, HS-9105-1, HS-9102-1, HS-9104-1, and HS-9106-1 to be moved to I-06A

2. Removed:

- Removed and deleted the function of HS-9139-1 and HS-9140-1

3. Additions:

- PI-9137-9, -10, PI-9138-9, -10, PDI-9139-2 and PDI-9140-2 digital indicating instruments
4. HS-9139 and HS-9140 are 24 position selector switches which are to be changed to new 4 position selector switches.
  5. Changed instrument tag no. PI-9139-1 and PI-9140-1 to PDI-9139-1 and PDI-9140-1, respectively.
  6. Analog indicators PI-9139, PI-9139-1, PI-9140 and PI-9140-1 are to be changed to digital indicators.
  7. Pushbutton Switches HS-91151 and HS-91152 are to be changed to SBM type control switches.
  8. Functionally group hydraulic system controls.
  9. Rescale analog indicators.
  10. Demarcate hydraulic system panel.
  11. Relabel instruments and controls.

ATTACHMENT F

LABEL LIST  
Hydraulic Controls  
&  
Indicators

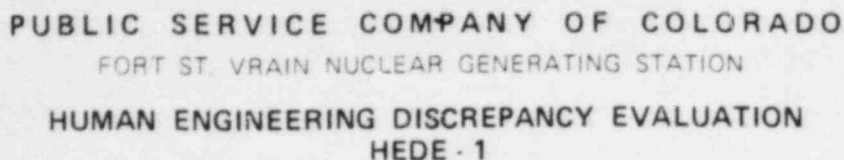
LABELING LEGEND LIST

CONTROL BOARD #	INSTRUMENT #	STYLE	FUNCTIONAL LABEL	STYLE	HED # (if applicable)
I-06A	HS 9101-1	11 BLK	HYD OIL PUMP A	5a BLK	
I-06A	HS 9102-1	11 BLK	HYD OIL PUMP C	5a BLK	
I-06A	HS 9103-1	11 BLK	HYD OIL PUMP B	5a BLK	
I-06A	HS 9104-1	11 BLK	HYD OIL PUMP D	5a BLK	
I-06A	HS 9105-1	11 BLK	HYD OIL PUMP E	5a BLK	0112
I-06A	HS 9106-1	11 BLK	HYD OIL PUMP F	5a BLK	0118
I-06A	HS 91151	11 BLK	CLEANUP SYSTEM PUMP	5a BLK	0107
I-06A	HS 91152	11 BLK	CLEANUP SYSTEM PUMP	5a BLK	0107
I-06A	PI 9105	SPECIAL	HEADER B PRESSURE	9a BLK	0116
I-06A	PI 9106	SPECIAL	HEADER B PRESSURE	9a BLK	0116
I-06A	PI 91141	SPECIAL	HEADER A PRESSURE	9a BLK	0116
I-06A	PI 91142	SPECIAL	HEADER A PRESSURE	9a BLK	0116
I-06A	PI 9139	10 BLK	HYD OIL PRESS	5a BLK	0165
I-06A	PI 9137-9	11 BLK	ACCUMULATOR A GAS PRESSURE	5c BLK	
I-06A	PI 9137-10	11 BLK	ACCUMULATOR B GAS PRESSURE	5c BLK	
I-06A	PDI 9139-1	11 BLK	ACCUMULATOR A OIL TO GAS $\Delta P$	5c BLK	0165
I-06A	PDI 9139-2	11 BLK	ACCUMULATOR B OIL TO GAS $\Delta P$	5c BLK	
I-06A	HS 9139	10 BLK	GROUP SELECT	5a BLK	0165 0169
I-06A	HS 9140	10 BLK	GROUP SELECT	5a BLK	0169

LABELING LEGEND LIST

CONTROL BOARD #	INSTRUMENT #	STYLE	FUNCTIONAL LABEL	STYLE	HED # (if applicable)
I06A	PI 9138-9	11 BLK	ACCUMULATOR A GAS PRESSURE	5c BLK	
I06A	PI 9138-10	11 BLK	ACCUMULATOR B GAS PRESSURE	5c BLK	
I06A	PDI 9140-1	11 BLK	ACCUMULATOR A OIL TO GAS $\Delta P$	5c BLK	0167
I06A	PDI 9140-2	11 BLK	ACCUMULATOR B OIL TO GAS $\Delta P$	5c BLK	
I06A	PI 9140	10 BLK	HYD OIL PRESS	5a BLK	0167
I06A			HYD PUMP SYSTEM		
I06A			LOOP 1		
I06A			LOOP 2		
I06A			LOOP 1 VALVE GROUPS		
			I. HV2253, HV2293 SV2111	SPECIAL	
			II. HV2203, HV2251 PV2243, HV2217		
			III. HV2223, HV2201 HV2241, SV2105		
			IV. PV2229, FV2205 HV2249, HV2215		
I06A			LOOP 2 VALVE GROUPS		
			I. HV2254, HS2292 SV2111	SPECIAL	
			II. HV2204, HV2252 PV2244, HV2218		
			III. HV2224, HV2202 HV2242, V2106		
			IV. PV2230, FV2206 HV2250, HV2216		





Form 344-22-4228

REVIEWER NAME

Frank Llana

DATE \_\_\_\_\_

6-20-83

A. HED TITLE Labeling and Tagging convention

8.	ITEMS INVOLVED

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) Function tag small lettering should be 3/16. Because of angle its hard to see stop start tag. also stop start are on flat panel and lights function tag and system are on vertical Board. Its hard to associate lights and function tag with handswitcher.

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION

*HS 91151 and HS 91152 <sup>Rev 11-20-85</sup> relocated to I-06A  
as part of the hydraulic power system functional grouping.  
New switch plates and legend plates. Rev 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 012HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
F. Llanas			6-21-83
A. HED TITLE <u>Labeling and Tagging convention</u> <u>Instrument, Indic Light Convention</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
* HS-22145	Hot RHT steam stop check valve Test Loop 1	I05	E-56
* HS-22183	main steam stop check valve Test Loop 1	I05	A-22
HS-91054	Hydraulic coil pump IE	I05	A-22
* HS-22182			A-23
* HS-22184			
Reference <sup>HEDA</sup> 0762 for HS-9105-1 Functional Grouping			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>Too many instrument in</u> <u>one place hard to tell which is for which should</u> <u>be labeled better. INDICATING LITES ON HS-22182 THRU HS-22185</u> <u>do not follow convention, that is red lites are on the left and green</u> <u>lites on the right. These indicating lites should be rewired and</u> <u>reversed in order.</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			
* <u>Duplicated on HED-0601</u>			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION

*HS 9105-1 move to I-06A. Include as part of hydraulic power system functional group. New labels and Switch plates Feb 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *PI 9105, PI 9106, PI 91141 and PI 91142  
move to I-06A. New functional labels of correct  
letter height per DD-LAB 41. Res 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0118HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
F. Llanas			6-21-83
A. HED TITLE <u>Labeling and Tagging Convention</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
HS-9106-1	Hydraulic oil pump IF	I05	A-23
21-2243	Hydraulic control valves	I05	B-84
21-2111			
21-2229			B-84
21-2205			B-84
21-2205	Hydraulic control valves		A-40
21-2112			
21-2230			A-40
21-2206			A-40
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>Lettering on function tags</u> <u>on instruments too small, should be 5/32 - SEE HED#0325</u> <u>E/ 0495</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION

*HS 9106-1 Move to EOGA as part of Functional Grouping to hydraulic Power system. Functional Labeling of correct height per DD-LAB-1 and DD-SWI-1  
Rec 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



CONTROL BOARDS  
(General)

CONTROL ROOM SURVEY CHECKLIST

File #

FORM 344-22-4227

CRS-9

Sheet

1 of 4

COPY

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all "J" handles equal or greater than 4" apart center to center?		Are all controls or switches equal or greater than 2" apart center to center?		REMARKS
				YES AS-19-A	NO HED#	YES AS-19B	NO HED#	
	I-01			1				
	I-01			1		1		
	I-02							
	I-02			1		1		
	I-03							
	I-03			1		1		
	I-04							
	I-04			1		1		
	I-05				1			
	I-05					1		
								see survey CRS-9 checklist sheet 4 of 4



CONTROL BOARDS  
(General)

CONTROL ROOM SURVEY CHECKLIST

COPY

File #

Sheet 2 of 4

FORM 344-22-4227

CRS- 9

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all "J" handles equal or greater than 4" apart center to center?		Are all controls or switches equal or greater than 2" apart center to center?		REMARKS
				YES AS-19-A	NO HED#	YES AS-19B	NO HED#	
	I-06 A			7				
	I-06 A			7		7		
	I-06 B			7		7		
	I-06 B			7		7		
	I-09			7		7		
	I-09			7		7		
	I-10			7		7		
	I-10			7		7		
	I-13			7		7		
	I-13			7		7		



CONTROL BOARDS  
(General)

CONTROL ROOM SURVEY CHECKLIST

copy

File #

FORM 344-22-4227

CRS- 9

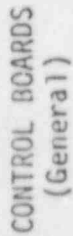
Sheet

3 of 4

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

SEQ.	PANEL	Record Instr. Numbers if No.	Dist. if No	Are all "J" handles equal or greater than 4" apart center?		Are all controls or switches equal or greater than 2" apart center to center?		REMARKS
				YES	NO	YES	NO	
				AS-19-A	HED#	AS-19B	HED#	
	I-14			7				
	I-14					7		
	I-15			7				
	I-15					7		
	I-49			7				
	I-49					7		
	I-49 B			7				
	I-49 B					7		
	I-7507A			7				
	I-7507A					7		



## CONTROL ROOM SURVEY CHECKLIST

File #

copy

FORM 344-22 4227

CAS. 9

Sheet

4 10 4

PRINCIPLE:

3.2.2.5 Controls should be located so they are reachable and accessible.

[illegible]



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0132

Form 344-22-4228

REVIEWER NAME			DATE
RON GARRETT			6/23/83
A. HED TITLE <u>HANDSWITCH LABELING</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO.
HS-11219-1	RES SH DN. TEST SW GP1	I-03	A-46
HS-11219-2	RES SH DN. TEST SW GP2	I-03	A-46
HS-9134-1	HYD. OIL SW. LOOP1	I-06 SECT.1	B-57
HS-9140-1	HYD OIL SW LOOP2	↓	B-57
HS-31184	BFPT 1A ABOVE SEAT DRAIN		
HS-31185	BFPT 1A BELOW SEAT DRAIN		
HS-31186	BFPT 1A 1ST STAGE DRAIN		
HS-31187	BFPT 1C ABOVE SEAT DRAIN		
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>ALL OF THE ABOVE HANDSWITCHES DO NOT HAVE A TAG SHOWING POSITION FOR SWITCH.</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION HS-11219-94-2 functionally label per DD-SWI-1 CH1887 10/30/85 WCH  
~~HS-9139-1 and HS-9140-1 functionally label per DD-SWI-1 CH1887 10/30/85 WCH~~

HS9139-1 AND HS9140-1 FUNCTION DELETED PRECLUDING LABELS.  
REQUIED NOTE 11/25/85 GDB

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0165

Form 344-22-4228

REVIEWER NAME			DATE
FLlanas			6-29-83
A. HED TITLE <u>Labeling and Tagging Convention</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
XR-3387-1 PDR-3380	Recorder	I06A	B-70
PI-5120	H <sub>2</sub> Press	I06A	C-89
XPI-5119	H <sub>2</sub> Purity Per cent	I06A	C-89
HS-9139 and 39-1		I06A	B-57
FI-3151-3P	Full Flow Demin FI-3153-3	I06A	F-11
PI-9139-1	LPI HYD	I06A	C-83
PI-9139	LPI HYD	I06A	C-83
FI-3151-1P	COND Gen users FI-3151-1	I06A	F-11
HS-5260-1	Lights	I06B	F-27
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>No instrument tag is shown, should have one.</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION

*HS9139, HS9139-1, PI 9139, and PI 9139-1 functional  
Labels per DD-LAB-1. Rev 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0167HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1DUPLICATE

Form 344-22-4228

REVIEWER NAME JOE KELEMEN DATE 2/24/84A. HED TITLE INSTRUMENT LABELING & TAGGING

B. ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
PI-9140	HYD. PRESS INDICATOR	I-06	C-83
PI-9140-1	"	I-06	C-83

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) FUNCTION TAGS ARE IN BLACK DYMO TAPE AND NEED TO BE REPLACED WITH LAMICOID TYPE CONTAINING MORE INFORMATION AS TO THE PARAMETER(S) BEING DISPLAYED ON THE INDICATORS.

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *PI 9140 and PI 9140-1 change to digital indicators.  
functional labels per DO-LAB-1. Rev 11-20-85*

TEAM ACTION		
TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0169

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

[illegible]



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *HS 9139 and HS 9140 change to new selector switch. Functional labeling per DD-LAB-1 and DO-SWE-1. HS 9139-1 and HS 9140-1 function deleted. Feb 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0383

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION

*HS 9106-1 Move to I-06 as part of the hydraulic power system functional groups.  
Functional labeling per DD-LAB-1 and DD-CBL-1  
Dec 11-2015*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

2 assessment  
Shirts

Form 344-22-4228

REVIEWER NAME

M. Maddox / D. Glenn

DATE \_\_\_\_\_

11/22/83

A. HED TITLE

Instrument Scaling  
Instrument locations

B.

ITEMS INVOLVED

ITEM TYPE

## NOMENCLATURE

LOCATION

INSTRUMENT  
DATA FILE NO.  
PHOTO NO.

P1-9114 **42**

$$I = 0.5$$

D-08/C-96

P1-9105/6

I-05 *W/12/83*  
I-06

D-08/ C-9

Reference HED-0477

Reference: Tact Analysis Walther 11/16 & 17/83

### C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)

(A) Scales are inconsistent

P/91142 is marked 20 to 35 with a X100 magnification

P1-9106 is marked 2000 to 3500

(B) Above listed Instruments are not functionally located with other 91 system

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *PI 9105, PI 9106, PI 91141, and PI 91142*  
*move to IOGA as part of ~~some~~ the hydraulic power*  
*system functional group. New functional*  
*labeling per DD-LAB-1. Dec 11-20-85*  
*PI 9105, PI 9106, PI 91141 and PI 91142 new dial cards per DD-AIS-1.*  
*Dec 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		





PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0560

Form 344-22-4228

REVIEWER NAME			DATE
J. KELEMEN			1/30/84
A. HED TITLE <u>INSTRUMENT SCALING</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
NI-1199 .	INDICATING METER DISPLAY	I-03	C-73
NIC-1199 .		↓	G-03
CHAMBER CURRENT		↓	G-03
NIC-1199 .		I-03	G-03
FLUX %		I-05	D-08, C-96
PI-9105 .			
PI-9106 .			
PI-22139-1			D-08, C-96
PI-22130-1 .			
LI-2285 .			D-06
LI-2287 .			
FI-22119 .			D-03, D-02
FI-22130 .			
SI-2105 .		↓	D-11, D-01
SI-2106 .		I-05	
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>METER SCALES DO NOT HAVE NINE OR LESS GRADUATION MARKS BETWEEN NUMERAL INTERVALS, VIOLATES PRINCIPLE THAT DISPLAYS SHOULD HAVE SCALE DIVISIONS WITH USUAL NUMERICAL PROGRESSIONS, (REFERENCE CRS-44-2 SURVEY)</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR _____			



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *NI-1199 replace with digital indicator. NIC-1199 rescale per DD-AIS-1 11-7-85 WCH*

*PI9105 and PI9106 move to IO6A as part of the hydraulic power system functional groups. New dial cards per DD-AIS-1 and new functional labels per DD-LAB-1 Rev V-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0569HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
J. KELEMEN			11/31/84
A. HED TITLE <u>INSTRUMENT SCALING &amp; USABILITY</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
PI-1108	WESTINGHOUSE 25A INDICATORS	I-03	
PI-1109		↓	F-21
PI-1110		I-03	
PI-91141		I-05	F-21, D-08
PI-91142			
FI-22119			C-96, D-03
FI-22120			
SI-2105			D-02, D-11
SI-2106			
SI-2111			↓
SI-2112		I-05	
FI-7320	↓	I-15	D-01, E-65
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>DISPLAYS HAVE MULTIPLIER NUMERALS ORIENTED IN A VERTICAL POSITION RATHER THAN READING FROM LEFT TO RIGHT HORIZONTALLY. (REFERENCE CRS-45 SURVEY)</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *PI-1108, 09, & 10 rescale per DD-A15-1 CN1887 11-15-85 WCH  
PI 91141 and PI 91192 move to IOLAT as part of hydraulic  
power system functional group. New functional labels  
per OO-LAB-1 and new dial cards per DD-A15-1 Dec 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0576HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
J. KELEMEN			1/31/84
A. HED TITLE <u>INSTRUMENT SCALING &amp; USEABILITY</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
PDI-21286-1.	INDICATING METER DISPLAY	I-02	C-44
PDI-21286-2.			A-79, C-43
PDI-21286-3.			C-43, C-44
PDI-21417.			C-44, A-79
PDI-21418.			A-79
PDI-21419.			D-03
PDI-21420.			D-02
PI-21243.			C-83
PI-21244.			C-83
PDI-22127.			
PDI-22128.			
PI-9139-1.			
PI-9140-1.			
FI-7320.			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>PROCESS OR ENGINEERING UNITS ON</u> <u>METER SCALES ARE NOT CONSISTENT WITH THE REQUIRED PARAMETER. DISPLAY</u> <u>SHOULD HAVE SCALES FOR WHICH UNITS OR RATE, VOLUME, ETC., ARE</u> <u>CONSISTENT, AT LEAST WITHIN SYSTEM, (PRINCIPLE)</u> <u>(REFERENCE CRS-46 SURVEY)</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *I-62 listed instruments will be revised in accordance with DD-AIS-1 per CN#1816B.*

*PI 9139-1 and PI 9140-1 change to digital indication new functional labeling per DO-LAB-1. Rev 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22 4228

REVIEWER NAME

J. KELEMEN

DATE

2/1/84A. HED TITLE INSTRUMENT SCALING + READABILITY

B. ITEMS INVOLVED

ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO PHOTO NO.
	(SEE ATTACHED INDICATOR SURVEY SHEETS.)		

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) THE ACTUAL LETTER SIZE OF NUMERALS,  
PROCESS OR ENGINEERING UNITS ON METER SCALES ARE TOO SMALL PER <sup>THIS</sup> ~~THE~~  
PHYSICAL LOCATION (DD-LAB-1 GUIDELINES). SEE ATTACHED SURVEY SHEETS  
FOR NON-CONFORMING INDICATORS

(REFERENCE CRS-51-1A, -1B, -2A, -2B, -3A, -3B AND -3C SURVEY)

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE  
LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION \_\_\_\_\_

*See Disposition in Remarks column of attached  
Control Room Survey Checklist Sheet attached*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

### CONTROL BOARD

FORM 344-22 4237

I-05

## CONTROL ROOM SURVEY CHECKLIST

CRS - 51-2A

File #

Sheet 1 of 2

**PRINCIPLE: DISPLAY SCALES SHOULD BE READABLE FROM THE NORMAL OPERATING DISTANCE**

SEQ.	INDICATING METER DISPLAYS	RECORD INSTR. # IF ANSWER IS "NO"	NOT APPLI CABLE	IS THE LETTER SIZE FOR NUMERALS ≥ 3/16" ON ALL METERS LOCATED BETWEEN 72" AND 90" HIGH?		IS THE LETTER SIZE FOR PROCESS OR ENGINEERING UNITS ≥ 3/16" ON ALL METERS LOCATED BETWEEN 72" AND 90" HIGH?		REMARKS
				YES	NO	YES	NO	
					HED#		HED#	
	PI-9105/6					✓		<i>Functionally labeled per DO-100-1 and D-08, C-96 grouped as DO-CBL-1 Rev 11-20-88</i>
	PI-91141/42					0587		
	PI-22129-1/30-1					✓		
	FI-2205-1/-2					0587	D-08, C-96	
	FI-2206-1/-2					✓		
	ME-9306/7				✓	0587	D-08	
	RI-93250-10/51-10/52-10					0587	C-96	
	RI-2263/64				✓	0587	C-95	
	RI-93250-11/51-11/52-11					✓		
	RI-3493					0587	D-04	



CONTROL BOARD

## CONTROL ROOM SURVEY CHECKLIST

FORM 344-22 4227

I-06

CRS-51-2A

File #

Sheet

1 of 2

PRINCIPLE: DISPLAY SCALES SHOULD BE READABLE FROM THE NORMAL OPERATING DISTANCE.

SEQ.	INDICATING METER DISPLAYS	RECORD INSTR. # IF ANSWER IS "NO"	NOT APPLI CABLE	IS THE LETTER SIZE FOR NUMERALS $\geq 3/16"$ ON ALL METERS LOCATED BETWEEN 72" AND 90" HIGH?		IS THE LETTER SIZE FOR PROCESS OR ENGINEERING UNITS $\geq 3/16"$ ON ALL METERS LOCATED BETWEEN 72" AND 90" HIGH?		REMARKS
				YES	NO	YES	NO	
					HED#		HED#	
	PI-9/39/40						✓	Functionally labeled per DD-LAB-1 and signed C-83 per DD-CAT 1 for 11-20-88
							0587	
	PI-5332/35/28/39/40/43						✓	
							0587	C-82
	TI-5207/8						✓	
							0587	D-70
	TI-5216-1/-2						✓	
							0587	D-70
	LI-3217-1						✓	
							0587	C-81
	PI-5260						✓	
							0587	C-80
	INITIAL PRESSURE METER ON ENC PANEL				✓		✓	
					0587		0587	
	SPEED, 8 <sup>th</sup> STAGE PRESS., LOAD METERS ON ENC PANEL.						✓	
							0587	
	LI-4505						✓	
							0587	F-22
							✓	
	PI-4502						0587	F-22

PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0615

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS

HS-22124/30 Should be labeled as  
"Repressurization Control ~~Reset~~"  
ENABLE

I. DISPOSITION

HS-91151 and HS91152 move to IOGA report of hydraulic power system functional groups. addition permits change from push button to SBM type switch precluding color coding. New functional labels and switch plates per DD-145-1 and DSWE-1. Feb 1985

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		





## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0751

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
Assessment Committee			3/30/84
A. HED TITLE <u>Instrument - Functional Location</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
HS 9105-1	<u>Hyd Oil pump IF</u>	IOS	A22
HS 9106-1	<u>Hyd Oil pump IF</u>	IOS	A23
REF	# 0112, 0762		
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>Not functionally grouped</u>			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *HS 9105-1 and HS 9106-1 move to I-06A as part of hydraulic power system functional group. new functional labels per DD-LAB-1 and DD-SWE-1 Rev 11-2085*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0762

Form 344-22-422B

REVIEWER NAME <span style="float: right;">DATE <u>3/30/84</u></span>		
<h2 style="margin: 0;">ASSESSMENT TEAM</h2>		
A. HED TITLE <u>INSTRUMENT, FUNCTIONAL LOCATION</u>		
B. ITEMS INVOLVED		
ITEM TYPE	NOMENCLATURE	LOCATION INSTRUMENT DATA FILE NO. PHOTO NO.
<u>HS-9101-1</u>		<u>I-05</u> <u>D-78</u>
<u>HS-9105-1</u>		<u>↓</u> <u>A-22</u>
<u>HS&amp;PI-9139/40</u>		<u>I-06 SECT. 1</u> <u>B-57, C-83</u>
<u>LAL-9111-1</u>	<u>"A" HYD RESERVE OIL LEVEL 100 GAIS.</u>	<u>I-06 ALARM PAL. A</u> <u>D-54</u>
<u>LAL-9162-1</u>	<u>"B" " " " " " "</u>	<u>" " " " "</u> <u>D-54</u>
<u>LAL-9111-2</u>	<u>"A" " " " " 75 "</u>	<u>" " " D</u> <u>D-57</u>
<u>LAL-9112-2</u>	<u>"B" " " " " " "</u>	<u>" " " "</u> <u>D-57</u>
<u>HS&amp;PI-9139-1/40-1</u>		<u>" SECT. 1</u> <u>B-57, C-83</u>
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>91 SYSTEM CONTROLS, INDICATORS</u> <u>AND ALARMS ARE NOT FUNCTIONALLY GROUPED</u>		
<div style="text-align: right; margin-right: 50px;"> <u>\$0751</u>  <u>Reference HED 0112 for HS-9105-1</u>  <u>-0471</u> </div> <div style="text-align: right;"> <u>6-1</u> </div>		
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR		

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION *HS 9101-1 and HS 9105-1 move to I-06A as part of hydraulic power system functional group. HS 9139 and HS 9140 change to new type of selector switch and relocated along with PI 9139, PI 9139-1, PI 9140, and PI 9140-1 into hydraulic power system functional group. New functional labels per DD-LAB 1. ~~HS 9140-1 and HS 9139-1~~ function deleted. Per 11-20-85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

ATTACHMENT 6b-9

SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS  
AS APPLICABLE TO  
CONTROL ROOM FURNISHINGS & ARRANGEMENT

FOREWORD - NUREG-0737 Supplement 1, Section 5.1b requires that a Control Room Design Review (CRDR) be conducted to identify human engineering discrepancies. Section 5.1c requires that these discrepancies be assessed and design improvements selected to correct these discrepancies.

Public Service Company (PSC) has conducted the required review of the Fort St. Vrain Control Room. Approximately eight hundred forty eight (848) discrepancies or classes of discrepancies were cited. These discrepancies were assessed to determine their potential for causing an operating error and the potential effect of any error. (Certain discrepancies are known to have caused errors). An improvement program has been selected which meets the regulatory requirements and proposes to improve the operability and functionality of the Control Room.

The regulatory requirement for the CRDR and the follow-on improvement program was directed toward the improved handling of emergencies and not specifically toward improved production. Public Service Company's improvement program is directed toward both normal operation and the handling of emergencies.

BACKGROUND - There were nine (9) Human Engineering discrepancies initiated against the control room proper. Of these nine total, five (5) cited lighting or lighting related problems which will be addressed by a separate activity (CN-1898). One cites nomograms and placards which will also be addressed by a separate activity. The three remaining HEDs relate to housekeeping, noise, and one potential safety concern. This potential safety concern will be addressed by the I-06B and I-09 control board arrangement changes. The two HEDs to be addressed by this change are Housekeeping and Noise. Public Service Company has initiated an integrated improvement program based on functionality rather than particular classifications of problems. While there are methods to effectively address the housekeeping and noise problems separately, the concept of addressing these problem areas in an overall control room furnishings and arrangement package appeared to offer improved operations, by reducing operator fatigue through an improved operating environment.

Revised drawings were prepared to show the proposed arrangements. Certain of these drawings were color coded to aid in evaluating proposed arrangements. Finalized drawings are being utilized to determine the scope of each change package (change notice).

Change Notice (CN-1899) number is assigned to the Control Room Furnishings and Arrangement Changes.

#### IMPROVEMENT PROCESS METHODOLOGY

The Control Room Environment Improvement Process started with the selection of an outside design consultant with experience in designing control room furnishings and recommending arrangements. This designer was assigned the responsibility of evaluating the control room environment in general and specifically addressing the applicable HEDs. Operating practices were studied to gain an understanding of the plant control duties, traffic, and other control room responsibilities.



Operating and training personnel were interviewed to solicit operational philosophies. The operational value and function of each item of furniture was addressed. Procedure and reference requirements were reviewed.

All HEDs applicable to the control board room proper were reviewed and tentative fixes proposed. All known factors were evaluated in considering any changes to the control room.

SPECIFIC - Control Room Furnishings and Arrangement Synopsis -  
(Change Notice (CN)-1899 preparation package.)

HED-0551 cited Alarm Audible Levels. This HED suggests the background noise within the control room has created a necessity to increase the sound levels of audible alarms; however, even now the db level difference between alarms and background noise is below minimum standards. The chillers and reciprocating pumps located above the control room are the major cause of the background noise.

The vibration isolators (sound mounts) for this equipment were inspected and found to be in satisfactory condition.

While isolation of ducts and piping from the building structure may reduce the noise level, sound absorption within the control room appears to be the more viable solution. Sound absorption treatment in the control room itself involves the floor, walls, and ceiling. A floor carpet has been explored which meets the required fire retardant properties (ASTM-E84, 25 or less) for nuclear power plant control rooms. The product is referred to us as Bigelow Grograin III. The carpet can be purchased in carpet tiles which will make replacement in high wear areas convenient and less costly. In addition to its obvious sound absorbing properties, the introduction of carpet will create a means for color coding the vital areas in the control room, reduce operator leg fatigue, and add a professional orderliness to the room as needed and indicated in HED-0645.

For sound absorption on the walls, a composite of fiberglass semi-rigid 700 Series Insulation by Owens-Corning, with a plastic extrusion frame covered in FR701 Panel Fabric by Guilford, Ind., meets the fire retardant requirements. The acoustical properties are NRC (Noise Reduction Coefficient): .90 and NIC (Noise Isolation Class): 21. Custom panels will be fabricated to deal with the irregular items required on the walls of the control room. Again, HED-0645 would be addressed by using this composite.

The ceiling treatment is being approached by the installation of an acoustical ceiling tile of about an NRC range of .70-.80. This necessitates installation of Halon discharge at the drop ceiling level, the ceiling tiles would serve many functions beyond sound absorption, including light reflectance which is being addressed by separate activity.



Housekeeping HED-0656 cites the general arrangement and storage problems which exist along with indicating a general need for a professional, uncluttered appearance within the control room.

In addition to the professional appearance aided by floor, wall, and ceiling modifications discussed so far, the intent is to use a consistent style in cabinetry and furniture. All items for this purpose are being selected for ease of maintenance and longevity or durability.

Where possible, a bumper rail is to be installed along the walls and around cabinets as physical protection. All paint to be used on workstations and painted surfaces is specified as a catalytic paint which is extremely scratch resistant.

Personal storage is being provided for all assigned control room personnel by the installation of lockers in the adjacent room east of the Main Control Room.

In addition, lateral files, large and small parts storage cabinets, hard hat, lunch pail, and coat racks are provided for by the new furniture arrangement. These additions are intended to reduce clutter and create a more professional environment. A lunch counter is to be added and the kitchen reorganized.

Besides housekeeping concerns, HED-0656 cites disorganization within the control room. Further investigation identified and clarified this generalization. The specific problems can be summarized as poor document storage and workstation locations, sightline obstructions, and excessive non-control room personnel traffic.

The new design and arrangement of the workstation allows for viewing the control boards while seated and concurrently operating any of the CRTs without having the operator turn his back on the control boards. Operator-to-Operator visual contact will be possible standing or sitting from any point within the main controls area.

Dedicated space for P&IDs, and operating/emergency procedures will be provided with designated lay down space.

The third position operator workstation is situated on a raised floor near the southeast control room entrance. This raised area provides a clearance point for non-control room personnel, and provides visual advantage to the third operating position.

A new log desk/station is designed to further reduce congestion.

See Attachment C for the proposed control room arrangement.

ATTACHMENTS  
TO  
SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS AS APPLICABLE TO  
CONTROL ROOM FURNISHINGS & ARRANGEMENT

- A List of all associated HEDs and copies of HEDs
- B Existing Control Room arrangement
- C Proposed Control Room arrangement
- D Summary of proposed changes (Control Room Furnishings and Arrangement)
- E Sample copies of Sound Survey sheets

ATTACHMENT A  
List of All Control Room HEDs  
&  
Copies of Control Room HEDs

# HUMAN ENGINEERING DISCREPANCIES LISTED FOR THE CONTROL ROOM

Page 1 of 1

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTIFICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0551	Alarms	8h	N/A		3	Addition	1899	Provide sound absorption treatment for floors, walls and ceiling. Reevaluate alarm levels after treatment complete.
						Referred	None	Referred to Operations for maintenance activity.
0645	Control Room Misc	7e			2	Change-out	1899	Provide improved furnishings/arrangement, personal storage and sound absorption.
0799	Control Room Misc	7f	I-09		None	Relocate	1897	Provide synscope/voltmeter indications on I-06B & I-09.

NOTE: HED-0799 not included as part of this Design Package. \*



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 551HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME <u>D. Glenn</u>			DATE <u>1/11/84</u>
A. HED TITLE <u>ALARM Audible Levels</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO
② I-70	ALARM HORN	CR	N/A
③ Shift Supervisor	Alarm Panel	S.S. off	N/A
Noise Survey - CRS-14			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) ① Alarm levels averaged 6.1 db above background - Audita Survey criteria cites a 10 db difference as minimum (Operators report some variation in alarm horn levels depending on usage) Alarms were audible and distinguishable. ② Horn reported inoperable			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			
① all procedures requesting operator action, however a measured difference of 6.1 db between background levels & alarm levels was detectable and noted by operators on duty as sufficient			
② Shift Supervisor may not be made aware of CR problem.			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION \_\_\_\_\_

1. Sound absorption treatment to be provided in control room by CN-1899, with the intent of reducing background noise levels. Alarm tone levels to be re-evaluated following noise absorption efforts.
2. Shift Supervisor alarm panel hardware inoperability referred to Operations for maintenance action by GSAR. -767

*JJH 11/26/85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



Summary of  
Sound Level Survey  
Conducted for the FSV - CRDR

A sound level survey was conducted on 11 January, 1984 between the hours of 0900 and 1100 AM. Reactor Power was 68% (secondary heat balance). Alarm activity was minimal. Paging and conversational activities were normal. It was noted that the Alarm Horn level was reduced slightly, a common and randomly occurring situation.

Background sound pressure levels for A, B, and C weighted readings were recorded for specific locations (both operator and non-operating positions) on Form 344-24-4238, "Control Room Plan View".

I-70 Annunciator system audible alarm levels were recorded for operator positions. These alarm levels were not taken for "B" weighted values.

Summary -

Average Background - SPL, "A" weighted	=	62.9 db
Average level with Alarm - SPL, "A" weighted	=	69.0 db
Average Background - SPL, "B" weighted	=	68.4 db
Average Background - SPL, "C" weighted	=	73.5 db
Average level with Alarm - SPL, "C" weighted	=	75.8 db
Average level with Scram Horn at operators desks, "C" weighted	=	83 db
Average Page level above Background, "A" weighted	=	2 to 10 db
Average Conversational level above Background, "A" weighted	=	2 to 6 db
Shift Supervisor SPL, "A" weighted	=	64 db
Shift Supervisor SPL, "B" weighted	=	72 db
Shift Supervisor SPL, "C" weighted	=	76 db

Documentation -

- Survey sheets CRS-13 & 14
- 3 Control Room Plan Views, each marked for A, B, or C weighted Sound pressure levels
- HED #0551

## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0645

## HUMAN ENGINEERING DISCREPANCY EVALUATION

HEDE - 1

Form 344-22-4228

REVIEWER NAME

D. Glenn

DATE \_\_\_\_\_

2-25-84

A. HED TITLE

Housekeeping

8.

ITEMS INVOLVED

ITEM TYPE

## NOMENCLATURE

LOCATION

INSTRUMENT  
DATA FILE NO.  
PHOTO NO.

Housekeeping - Procedure Storage & Accessibility  
- Personal storage - etc

See HED 481 for furniture  
blocking RLC 4/

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)

C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) *An inspection of the Control Room on 2-22-84 & 2-29-84 reflect Housekeeping - Storage - and arrangement problems see sheet 23 of this HED. Generally, available storage is not utilized effectively.*

D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR

all-

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

I. DISPOSITION

*Provide improved control room furnishings, arrangement,  
sound absorption and storage per CB-1894 11/25/85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		

## Housekeeping, - Storage, & Arrangement

- 1 - Floor has an accumulation of dirt along cabinet and desk bases. Grime and debris is evident under operator consoles and between file cabinets and etc.
- 2 - Storage facilities are randomly located, appear to be poorly organized and generally are not dedicated to specific purposes.
- 3 - Obsolete, discarded, and non-operational equipment is stored in the control room. Desk along east wall (@ end of I-06A) has a Fox 2 terminal on surface with a line printer on top of the Fox 2 terminal. Desk drawers are packed with electronics recorder doors and other misc items.
- 4 - Parts storage cabinets are poorly organized, disorderedly, and contain other non-replacement parts items. One cabinet appears to be bulk storage for janitorial supplies. The same cabinet contains a large assortment of Brody markers.
- 5 - Procedure storage is random. An E.P. Binder was laying on top of the procedure rack while a Denver phone book, Hand broom and dust pan occupies a shelf. Shelves are not dedicated or marked.
- 6 - Two cases of paper towels are placed between the 3rd operator's desk and the start-up console.
- 7 - A Stereo system, assorted newspapers and

other misc items are on top of the start-up console.

- 8 - An auxiliary kitchen facility is located behind I-09 with misc spices & seasoning setting on adjacent cabinet
  - 9 - Area behind I-09 is congested. Guards are installed on switches to prevent (or minimize) inadvertent operation.
  - 10 - Two file cabinets contain ~~both~~ operational records, personal belongings and misc reading materials
  - 11 - Bulletin board is poorly organized and maintained. Operational info is interspersed with misc news and safety items.
  - 12 - Clothing and Hat Storage is random.
  - 13 - Operator desks are cluttered. Furniture arrangement reduces operator space and restricts walkways
- Summary - There does not appear to be dedicated storage for either operational materials or personal belongings. Housekeeping in general is poor. Available space is poorly utilized and maintained.
14. Additional CRT added on an enlarged cabinet at south end of last operator console further restricting operator area & walk-way.

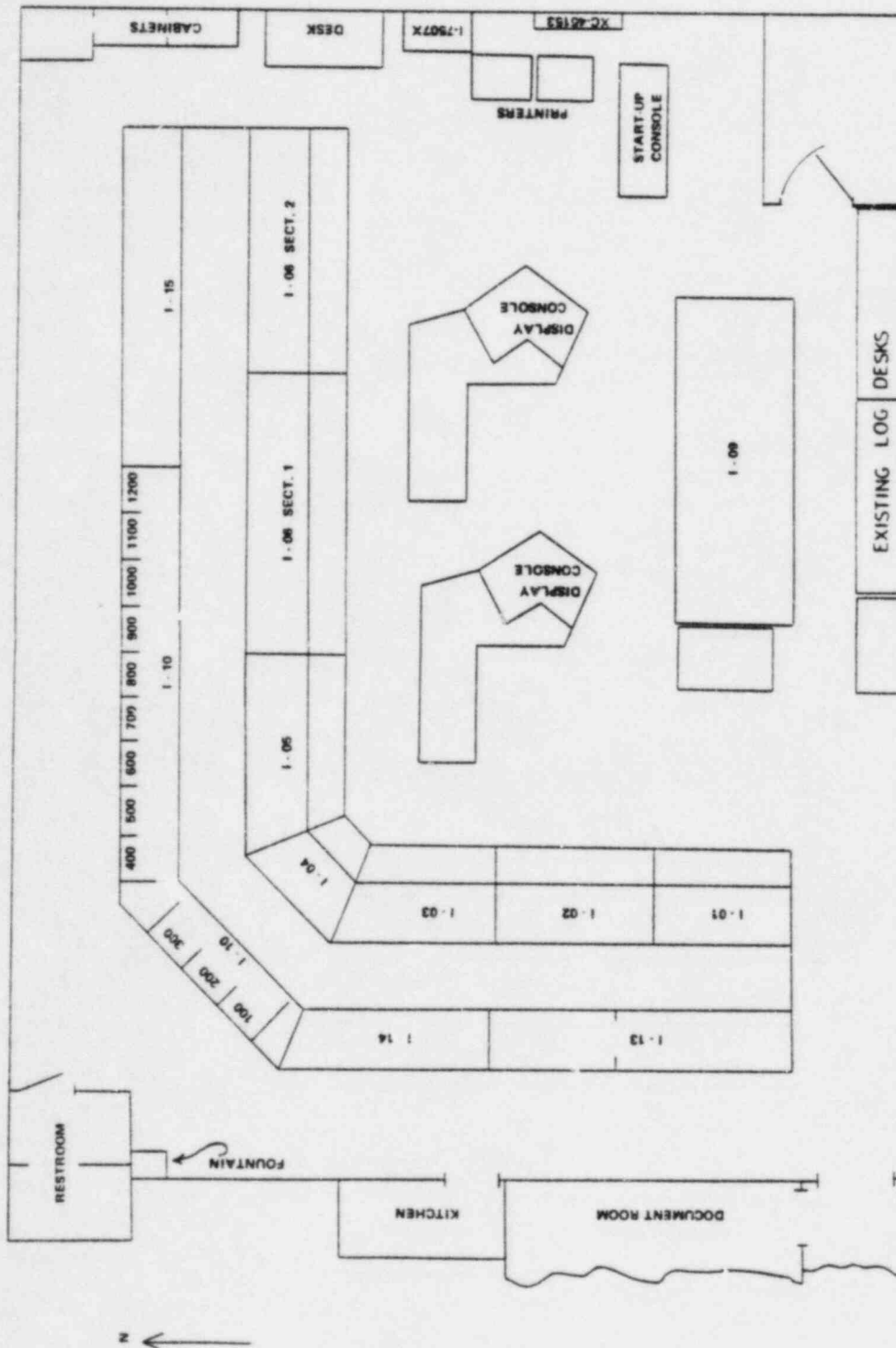


ATTACHMENT B

EXISTING CONTROL ROOM ARRANGEMENT



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST VRAIN NUCLEAR GENERATING STATION  
CONTROL ROOM PLAN VIEW

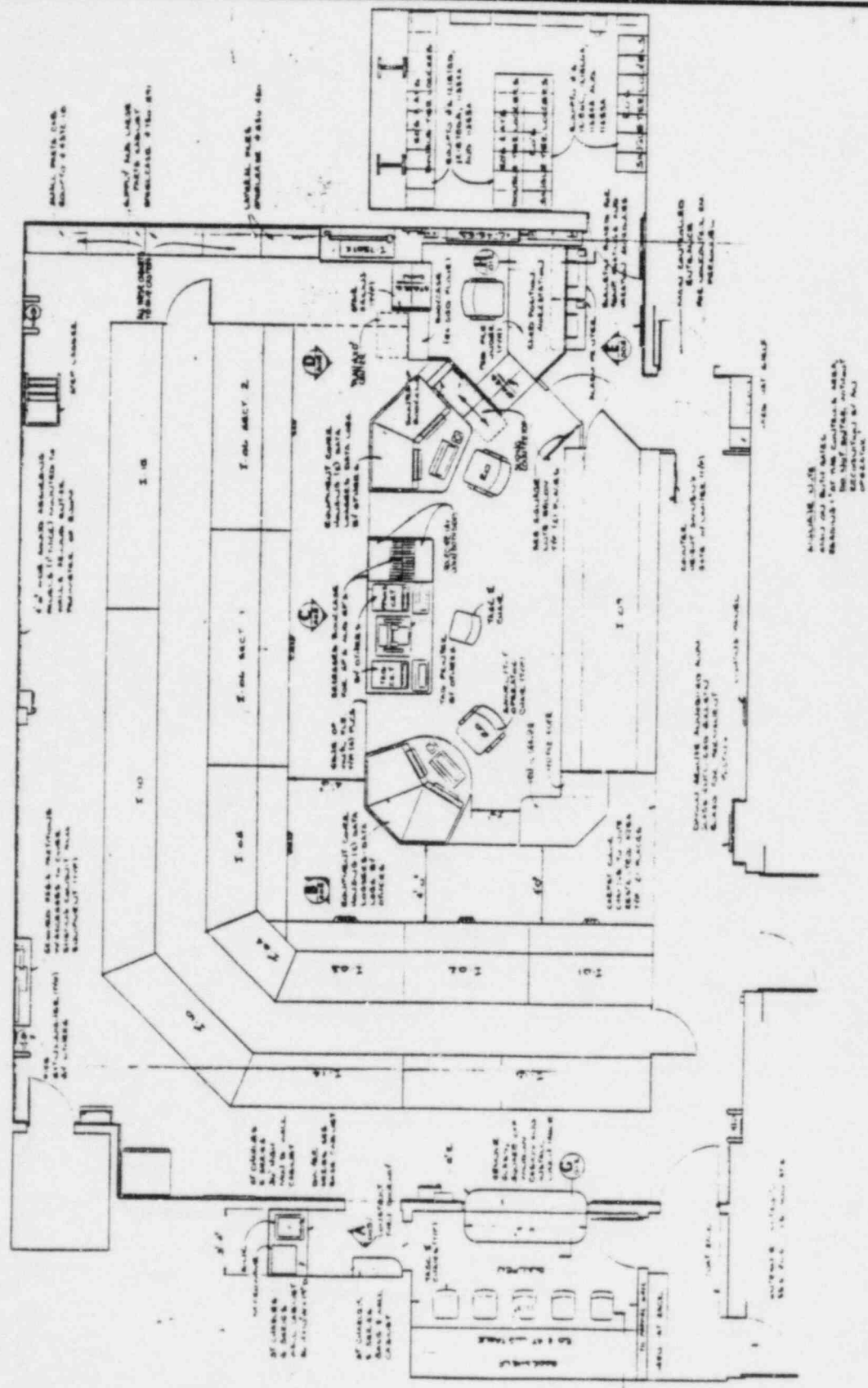


MAP NO. \_\_\_\_\_  
REFERENCE \_\_\_\_\_

0 6'  
SCALE

ATTACHMENT C

PROPOSED CONTROL ROOM ARRANGEMENT

[illegible]

## ATTACHMENT D

### SUMMARY OF PROPOSED CHANGES CONTROL ROOM FURNISHINGS AND ARRANGEMENT

#### 1. Relocates:

Start-up console to be redesigned for portability and storage outside the control room when not in use.

Log desks to be located in the adjacent document room to the west of the main control room.

#### 2. Additions:

- Newly designed workstations
- Raised floor area
- Small parts storage
- Large parts storage
- Lateral files
- Locker Room with personal storage for Control Room personnel
- Sound absorbing wall treatments
- Color coordinated carpeting
- Human engineered chairs
- Color coordinated accessory furnishings
- Lunch counter
- Access control gates
- New non-control room assigned personnel entrance

#### 3. Rearrangements

- Workstation location
- Alarm printer location
- Kitchen
- Documents Room/Bull pen

P&ID, SP, & OP locations and laydown space

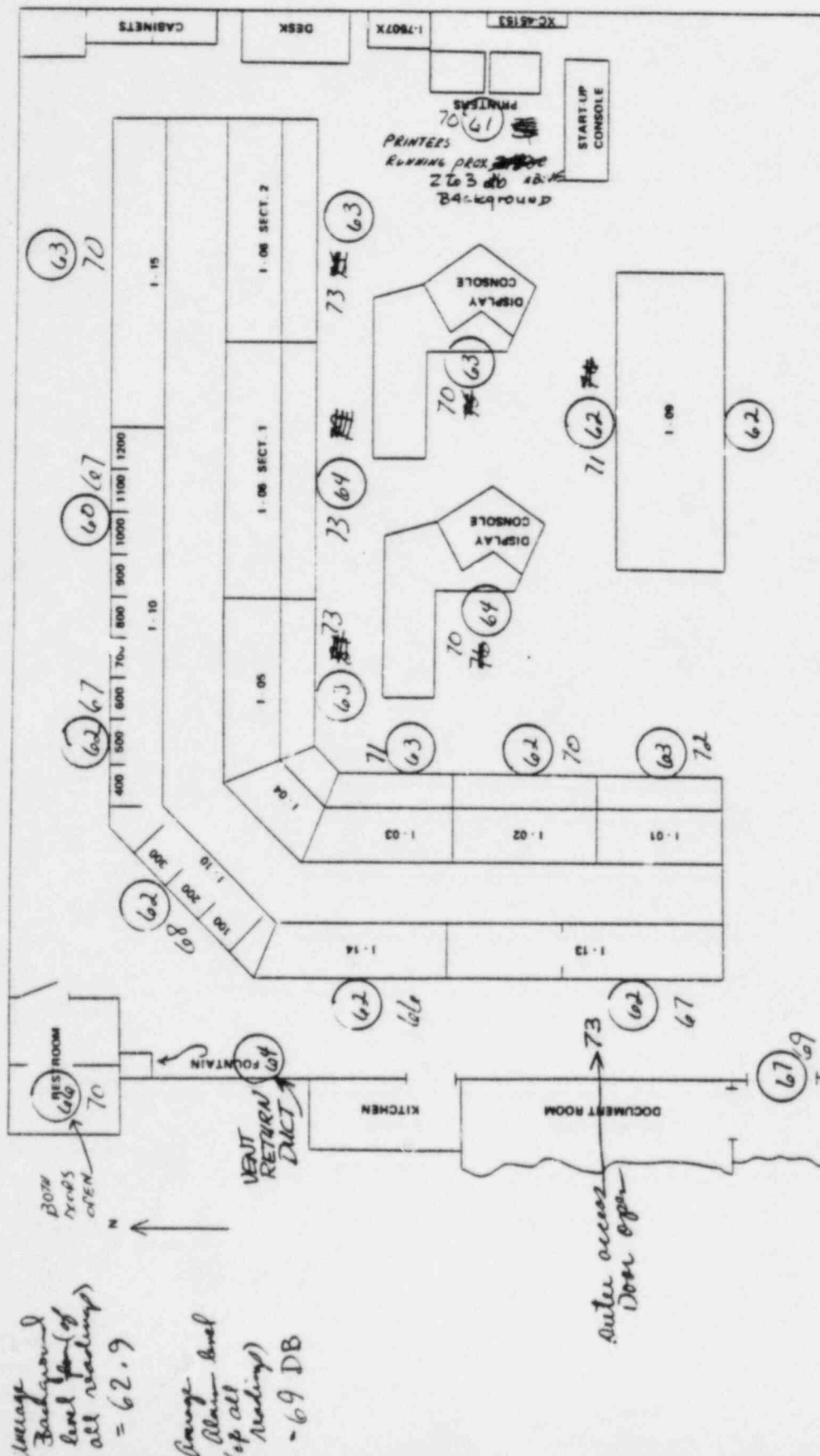
ATTACHMENT E

SAMPLE  
SOUND LEVEL  
SURVEY SHEETS

**SOUND SURVEY**  
11 JAN, 1984  
"A" WEIGHTED VALUES  
ALL READINGS IN DB

NOTE: PLANT PWR  
68% SET.

PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST VRAIN NUCLEAR GENERATING STATION  
CONTROL ROOM PLAN VIEW



NOTES: Average Page level 2-10 db on "A" WEIGHTED SCALE depending on individual paying  
② Average Conversational Reading 2-6 db above Background.

BLACK - BACKGROUND  
RED - ALARM

MAP NO. **I**  
REFERENCE *Sound Survey*

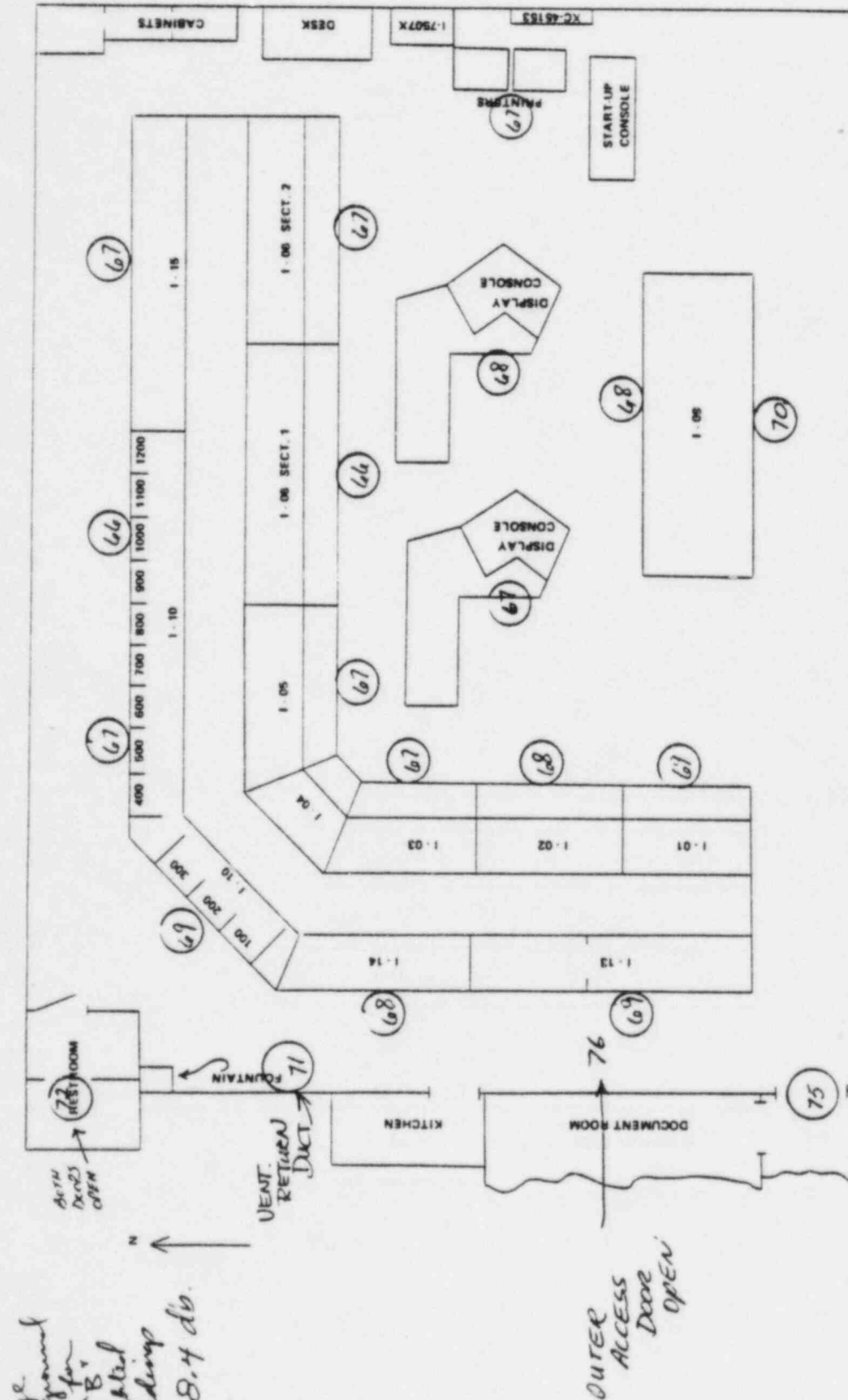
0 6' SCALE

*Recorded 11/Jan-84*



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
CONTROL ROOM PLAN VIEW

SOUND SURVEY  
11 JAN 1984  
"B" WEIGHTED VALUES  
ALL READINGS IN DB



Average Background  
Level for  
all "B"  
Weighted  
Readings  
= 68.4 db.

BLACK - BACKGROUND  
RED - ALARM LEVELS NOT TAKEN FOR "B" weighting

MAP NO. 2  
REFERENCE SOUND SURVEY

SCALE

Recorded 11 Jan 1984

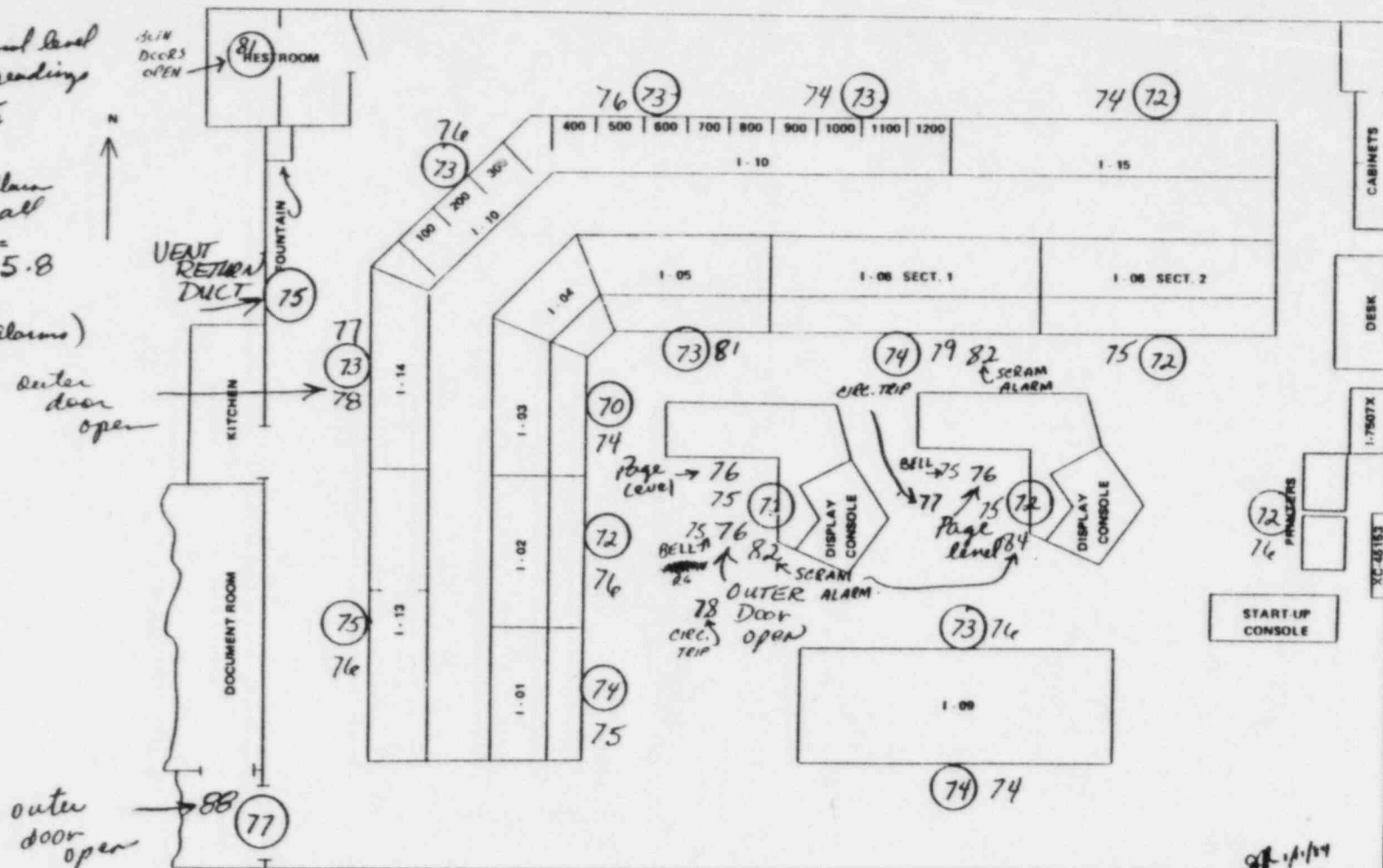


PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
CONTROL ROOM PLAN VIEW

SOUND SURVEY - 11 JAN 84  
"C" WEIGHTED VALUES  
ALL READINGS IN DB

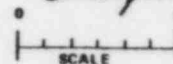
Average  
Background level  
of all "C" readings  
= 73.5

Average Alarm  
level of all  
readings =  
75.8  
(excludes  
Special Alarms)



BLACK - BACKGROUND  
RED - ALARM

NOTE: ① Page Level average of 4 DB above Background  
Range 1 to 6 depending on individual  
paging)  
② Average Conversational Level 2-3 DB above  
Background.



MAP NO. 3  
REFERENCE Sound Survey

Recorded 11 Jan 84

ATTACHMENT 6b-10

SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS  
AS APPLICABLE TO  
CONTROL ROOM LIGHTING

FOREWORD - NUREG-0737 Supplement 1, Section 5.1b requires that a Control Room Design Review (CRDR) be conducted to identify human engineering discrepancies. Section 5.1c requires that these discrepancies be assessed and design improvements selected to correct these discrepancies.

Public Service Company (PSC) has conducted the required review of the Fort St. Vrain Control Room. Approximately eight hundred forty eight (848) discrepancies or classes of discrepancies were cited. These discrepancies were assessed to determine their potential for causing an operating error and the potential effect of any error. (Certain discrepancies are known to have caused errors). An improvement program has been selected which meets the regulatory requirements and proposes to improve the operability and functionality of the Control Room.

The regulatory requirement for the CRDR and the follow-on improvement program was directed toward the improved handling of emergencies and not specifically toward improved production. Public Service Company's improvement program is directed toward both normal operation and the handling of emergencies.

BACKGROUND - Three HEDs were generated as a result of lighting level surveys. (See example included as Attachment A).

Normal Lighting Levels - HED 0480 cited light levels below 50 f.c. (48 f.c. measured) near I-9310 and I-9315 panels. The reason for this below minimum level was defective bulbs. These bulbs were subsequently replaced.

Emergency Lighting Levels - HED 0482 and 0486. All control room locations have insufficient (0-4 f.c.) illumination which results in some difficulty identifying controls, or obtaining required readings. This reduced light level also reduces color discrimination.

The present emergency system consists of 12-100W incandescent fixtures located above the luminous ceiling louvre. This system creates a different visual environment during an emergency situation primarily due to light level and light color (2800 K approximately).

The existing illumination deficiencies can be summarized as glare/fatigue during normal conditions and color/pattern problems during emergency conditions. These problems are not generated by the same lighting system. The lighting survey done on 10/17/85 identified clearly the deficiencies in the "emergency" mode lighting system. Most of the measurements were in the range of 0-4 f.c. with great number of locations with "0" or unreadable meter level.

The Illuminating Engineering Society of North America significantly revised the recommended illuminance levels in 1981. The new procedure recognized that previous systems did not produce good lighting with high visual clarity. The new levels suggest a range, 20-50 foot candles horizontal for power plant control rooms. This is

expressed as Lighting Category "D". Unfortunately, meeting this criteria even on the high range, (50 f.c.) does not insure a "glare-free" (on the instrument faces) installation. Glare is an undesirable reflection which challenges visual acuity. Any direct downlight source will generate "glare" on shiny instrument faces and dials.

HED 0485 cites Glare on Indicators. The overwhelming majority of vertical indicators have glare, requiring the operators to shift relative positions to eliminate glare at different scale values.

The existing lighting system consists of exposed fluorescent fixtures above a white louvre ceiling 12" above the top of control consoles. The lamps are arranged in single lamp reflector strips (225-4' units) located above the louvre. The glare is a direct reflection of the lamp image on the louvre blades.

The lighting survey executed on 10/18/83 graphically indicated light meter positions on the vertical plan of the board, which complied with the quoted illumination level of 50 f.c. (in both horizontal and vertical planes).

#### IMPROVEMENT PROCESS METHODOLOGY

The lighting Improvement Process started with the selection of an outside design consultant to address the control room furnishings and arrangement improvement as well as the lighting problems. This designer was assigned the responsibility of determining and evaluating the improvement options. Since this individual did not participate in previous efforts, a site visit was initiated to acquire a thorough understanding of the control room arrangement and existing lighting systems.

Operating and training personnel were interviewed to solicit operational philosophies. The Operating environment was studied and the environmental considerations for each control room task were evaluated. Informational and reference material requirements were again reviewed.

All HEDs applicable to the control room proper were reviewed and the tentative fix evaluated for its corrective value within the integrated approach.

#### SPECIFIC - Control Room Lighting Change Synopsis - (Change Notice (CN)-1898 preparation package.)

The selected design uses 68-4'-34 Watts-Ultralume 300 lamps and 8-13W recessed fluorescent fixtures over the work stations for normal lighting generating a connected load of 2416 Watts. This is an important reduction in connected load which will also affect the comfort level of the space since less heat will be radiated.

Presently  $\frac{1}{3}$  of the normal lighting in the control room is fed from an essential lighting cabinet with a connected load of 3775 watts. All the proposed normal lighting will be fed from this essential lighting cabinet with a reduction of about 1300 watts.

This proposed design was selected to produce comfortable, glare-free, high color rendering illumination, both during normal and emergency conditions.

This proposed lighting system was designed to reduce reflected glare from instruments by reflecting the light from the ceiling, allowing this surface to become a large area luminous radiator. Also, since the emergency source is located along side of the normal source, light patterns and room orientation will be the same as during normal lighting operation.

The lamp color family was selected for its known high color rendering index and high visual clarity and because its color temperature enhances the feeling of quiet and calm with lower fatigue.

The designed emergency system generates  $\frac{1}{2}$  of normal light level from the same location and in the same direction with the same lamp color. This will maintain all normal visual orientations, brightness ratios, and modeling while only reducing the relative level to  $\frac{1}{3}$  of normal. The selected design uses 34-4'-34 watts-ultralume 300 lamps and 8-13W recessed fluorescent fixtures over the work stations for emergency lighting. The system also takes into consideration the limited amount of emergency energy available and maintains the connected load (1,260 Watts) close to the present system load of 1200 Watts. The ballasts are operable from the U.P.S. system and are of the instant-start type.



ATTACHMENTS  
TO  
SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS AS APPLICABLE TO CONTROL ROOM LIGHTING

- A List of all associated HEDs and copies of HEDs
- B Sample Lighting Survey Sheets
- C Existing Lighting Plan Detail
- D Proposed Lighting Elevation Detail
- E Proposed Lighting Plan View

ATTACHMENT A  
List of Control Room Lighting HEDs  
&  
Copies of Control Room Lighting HEDs

HUMAN ENGINEERING DISCREPANCIES LISTED FOR CONTROL ROOM LIGHTING

Page 1 of 1

HED NO.	PROBLEM CLASSIFICATION		LOCATION IDENTI- FICATION	INSTRUMENT NUMBER	CATEGORY	DISPOSITION		REMARKS
	GROUP	CODE (SEE FIGURE 1)				RESOLUTION	CHANGE NOTICE	
0480	Control Room Misc	7a	CR		3	Replacement	None	Bulb replacement referred as a
0481	Control Room Misc	7a	CR		3	Label	1898	Maintenance activity.
0482	Control Room Misc	7a	CR		2	Referred	1898	Lighting cabinet access provided mid 1985
0485	Instrument	7b	All	Indicators	1	Min. Glare	1898	Cabinet & Breaker labeling to be per
0486	Control Room Misc	7c			2	Change-out	1898	CN-1898.
								Increase emergency light levels. Defec-
								tive bulb replacement referred by
								GSAR-0761.
								Change to indirect lighting.
								Provide increased emergency light level.



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0480

Form 344-22-4228

REVIEWER NAME <u>D. Glenn</u>			DATE <u>10-14-83</u>
A. HED TITLE <u>Control Room Lighting</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
① -	Regular Lighting	C.R.	
②	Emergency Lighting	CR	
② Reference Emergency Lighting Survey Conducted 10/14/83 DGB			
① Reference Normal Lighting Survey Conducted 10/14/83 DGB			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)			
① Improper lighting levels at I-10 700, 800, and 900 BAYS due to lamp failure			
② Bulbs out at 3 locations resulting in lighting levels below <del>surrounding</del> areas.			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			
All			

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

*Eye Fatigue and recognition errors*

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

*Replace Bulbs and establish periodic checks for bulb failures*

I. DISPOSITION \_\_\_\_\_

*Bulb replacement is a maintenance activity.  
This particular problem was referred to plant operation  
by ESAR 261 dated 5/13/82 RPL 11/25/82  
11/25/85*

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Reactor Operator		



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0481

2 assessment  
Sheets

Form 344-22-4228

REVIEWER NAME		D. Glerna		DATE	10-14-83
A. HED TITLE <u>Lighting Cabinet Access and Markings</u>					
B. ITEMS INVOLVED					
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.		
L.C.	<u>Regular</u> Lighting Cab # 4	C.R. South wall			
L.C.	Ess. Lighting Cab # 18	Turb Mtn Floor			
See also HED - 0645					
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)					
① Furniture blocking access to R.L.C # 4 and Breakers in R.L.C # 4 not <sup>fully</sup> identified					
② Breakers in R.L.C # 18 not identified					
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR					
Routine & Emergency Operations					



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

① Lack of access to L.C.#4 may result in operations under reduced normal lighting - (Emergency light come on with loss of power)

①② Lack of markings could result in <sup>failure to</sup> quickly restoring lighting after breaker trips or <sup>possible</sup> disruption of power to ~~some~~ lighting circuits when attempting to de-energize other ~~circuit~~

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

① - Operation of wrong control - Misinterpretation of data or scale reading

①② Operating wrong breaker could result in <sup>partial</sup> disruption of lighting during a critical operation.

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

ensure access to L.C.#4

I. DISPOSITION \_\_\_\_\_

Furnishings blocking L.C.#4 in Control Room were removed during mid 1985. Labeling to be included in lighting change CN-1898 *WLB 4/26/85*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

*Failure to recognize critical situations - Unable to identify controls or obtain required readings.*

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

*Unable to perform critical functions*

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

*Increase lighting levels to Minimums*

I. DISPOSITION \_\_\_\_\_

*Redesign lighting system - Install indirect lighting. Provide emergency fixtures in some location as normal lighting. Level to be at approx 1/3 normal levels. accomplished by CN-1898 JHT-11/25/82*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator



## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0485

33 sheets  
attached

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Form 344-22-4228

REVIEWER NAME		D. GLENN		DATE	10-18-83
A. HED TITLE <u>Slare on Indicators</u>					
B. ITEMS INVOLVED					
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA. FILE NO. PHOTO NO.		
Indicators	See attached listing		B 45		
			B 52		
			B 24		
			B 48		
			B 49, B 50		
			B 51, B 53		
			B 54, B 56		
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED) <u>Slare is a problem on indicators listed.</u> <u>Operator is required to shift <sup>realign</sup> positions to eliminate</u> <u>glare at different scale values</u>					
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR <u>all procedures involved</u>					

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

*Mis-reading  
fatigue*

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

*improper action resulting from mis reading*

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

*Change light arrangement - add diffusion*

I. DISPOSITION \_\_\_\_\_

*Calare to be minimized by the installation  
of indirect lighting system per CN-1898 ~~11/25/85~~*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator





## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

Log Number 0486

## HUMAN ENGINEERING DISCREPANCY EVALUATION

HEDE - 1

Form 344-22-4228

REVIEWER NAME			DATE
D. GLENN			10-18-83
A. HED TITLE <u>Color discriminability</u>			
B. ITEMS INVOLVED			
ITEM TYPE	NOMENCLATURE	LOCATION	INSTRUMENT DATA FILE NO. PHOTO NO.
	Color discrimination under Emergency lighting	Control Room	N/A
See attached Sheet.			
C. PROBLEM DESCRIPTIONS (GUIDELINES VIOLATED)			
Decreased Color discrimination under emergency lighting conditions in Control room.			
General loss of definition and recognition of all control details under poor Emerg. lighting			
D. LIST THE PROCEDURES OR OPERATIONS THAT USE THE LISTED ITEMS IN A MANNER TO INDUCE THE OPERATOR ERROR			
All procedures required during loss of outside Electrical Power & turbine trip prior to establishing Emerg diesel power.			



E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

- Failure to identify color ring meaning once <sup>code is</sup> initiated
- Mis-reading data from recorders
- 92 System mimic lines on I-06B are on aid to power restoration and if not discriminable may lead to actuation of wrong breaker

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

*Increase light levels.*

I. DISPOSITION \_\_\_\_\_

*Provide indirect lighting and increase level per  
CN-1898 R/H 11/24/85*

TEAM ACTION

TEAM MEMBER SIGNATURE

CONCURRENCE OR  
NON-CONCURRENCE

DATE

Team Manager

CRDR Coordinator

Human Factors Spec.

Senior Reactor Operator

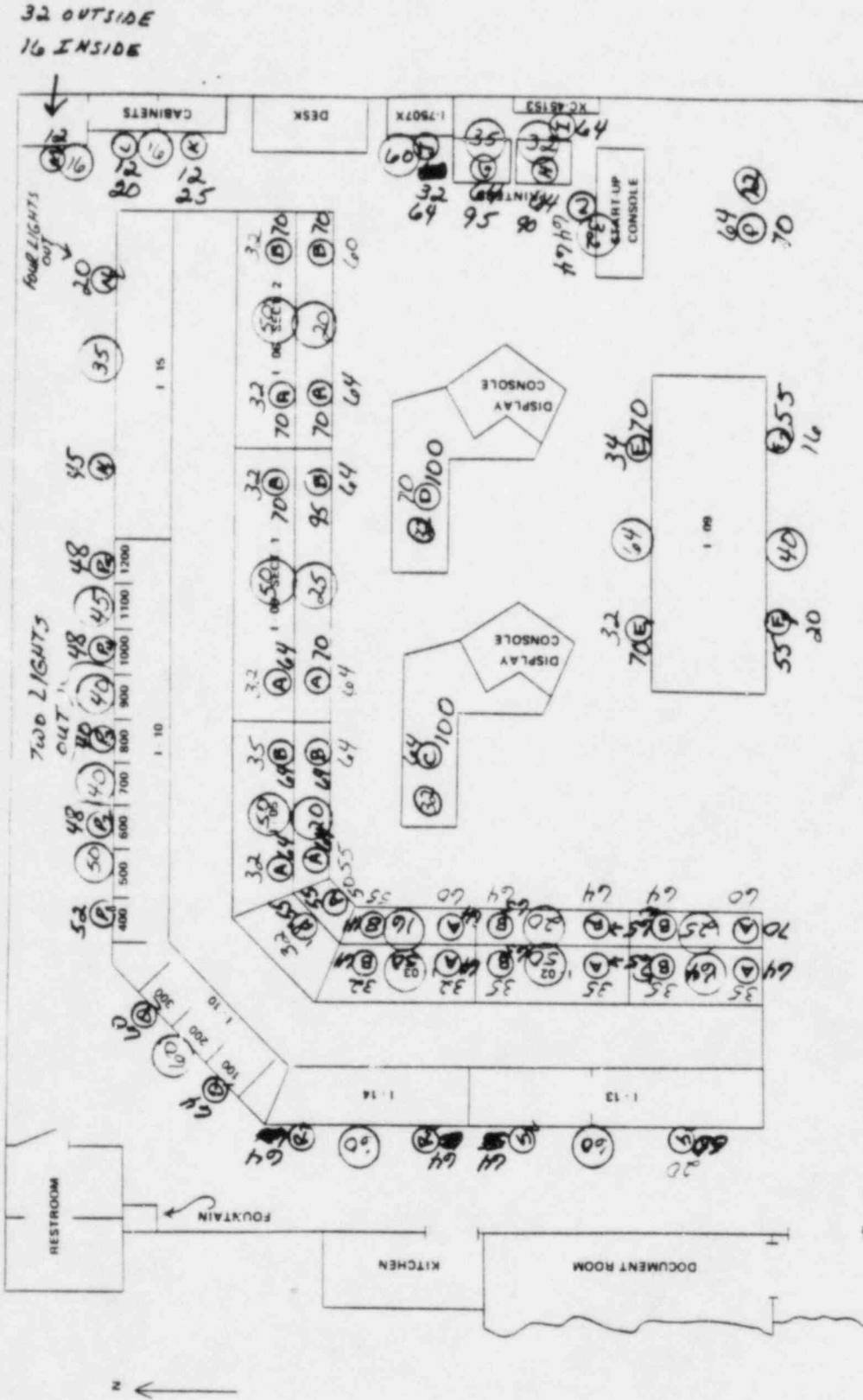
ATTACHMENT B

SAMPLE  
LIGHTING SURVEY  
SHEETS

PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
CONTROL ROOM PLAN VIEW



NORMAL LIGHTING



Lumidisk  
Lumisphere  
Lumisphere  
BLACK - ILLUMINATION (on viewing plane @ surface) direct light  
RED - REFLECTED (illumination) (on viewing plane @ surface)  
GREEN - ILLUMINATION (integrated) (on viewing plane @ surface)

All Readings in Foot Candles

MAP NO. 1A

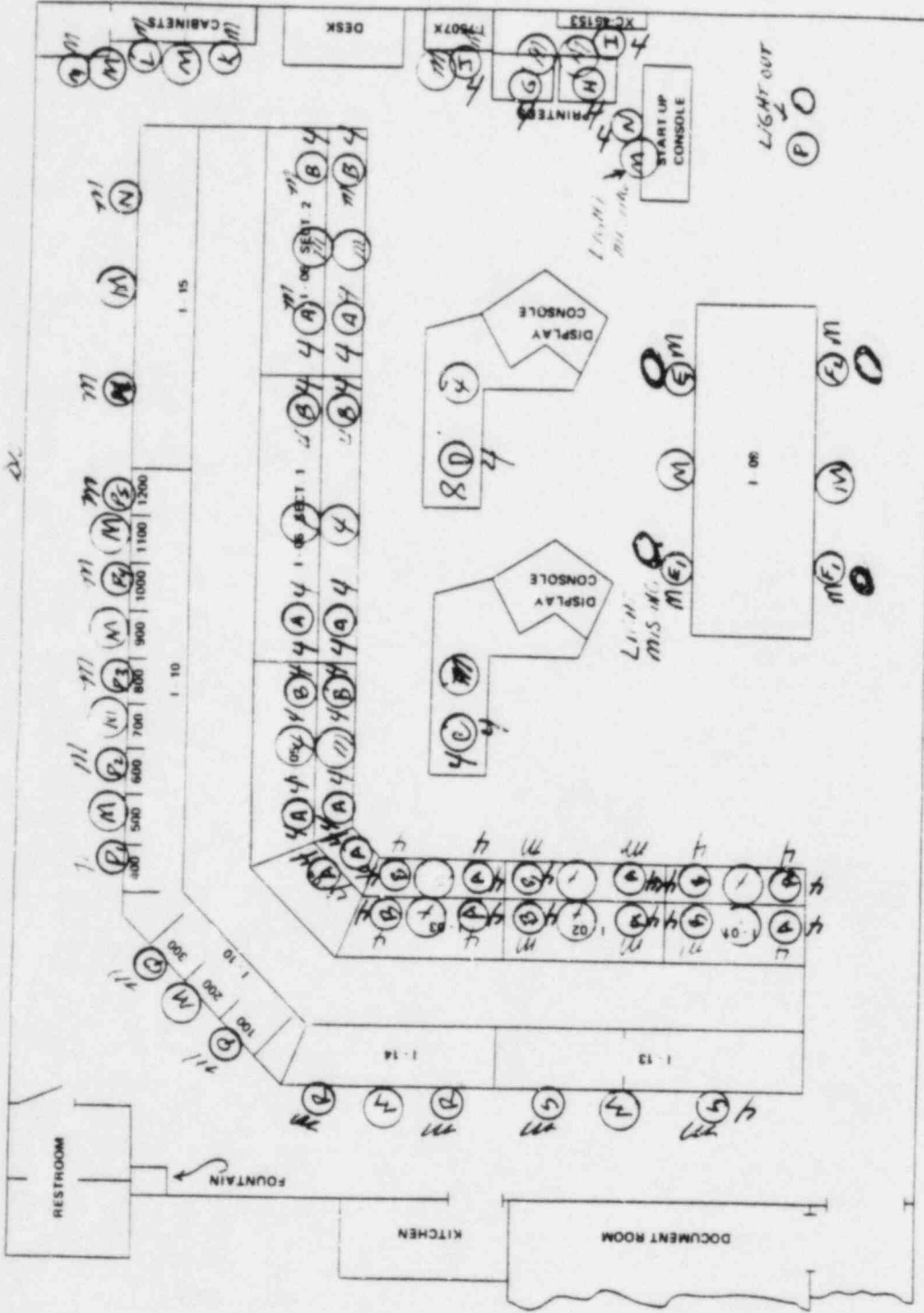
REFERENCE LIGHTING SURVEY

Completed 11/14/83



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION  
CONTROL ROOM PLAN VIEW

EMERGENCY LIGHTING



NOTE: - Readings shown as 4 or Minimal were not resolvable on meter scale.  
- Reading shown as 4 are minimal resolvable

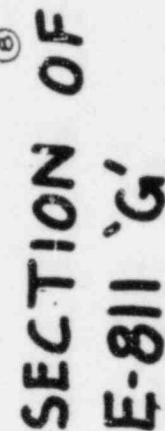
Luminaire  
Luminaire  
Luminaire  
Luminaire

BLACK - ILLUMINATION (on viewing plane @ surface of panel) (direct light)  
RED - LUMINATION (on viewing plane from operators position)  
Green - Illumination (integrated) (on viewing plane @ surface of panel)

ALL READINGS IN FOOT CANDLES

0 6  
SCALE

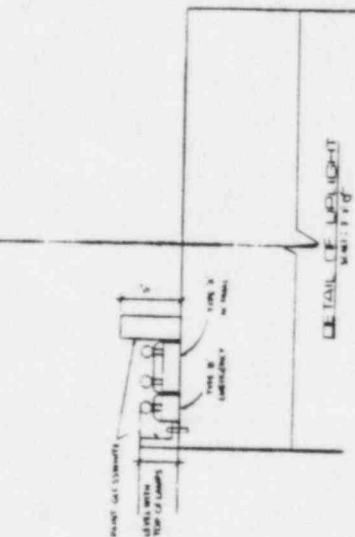
MAP NO. 1B  
REFERENCE LIGHTING SURVEY  
"EMERGENCY"



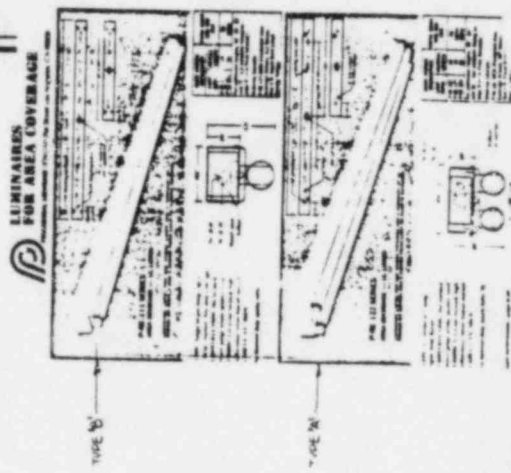
CONTROL ROOM  
CL 4029'-0"



SECTION THROUGH CONTROL FILM

[illegible]

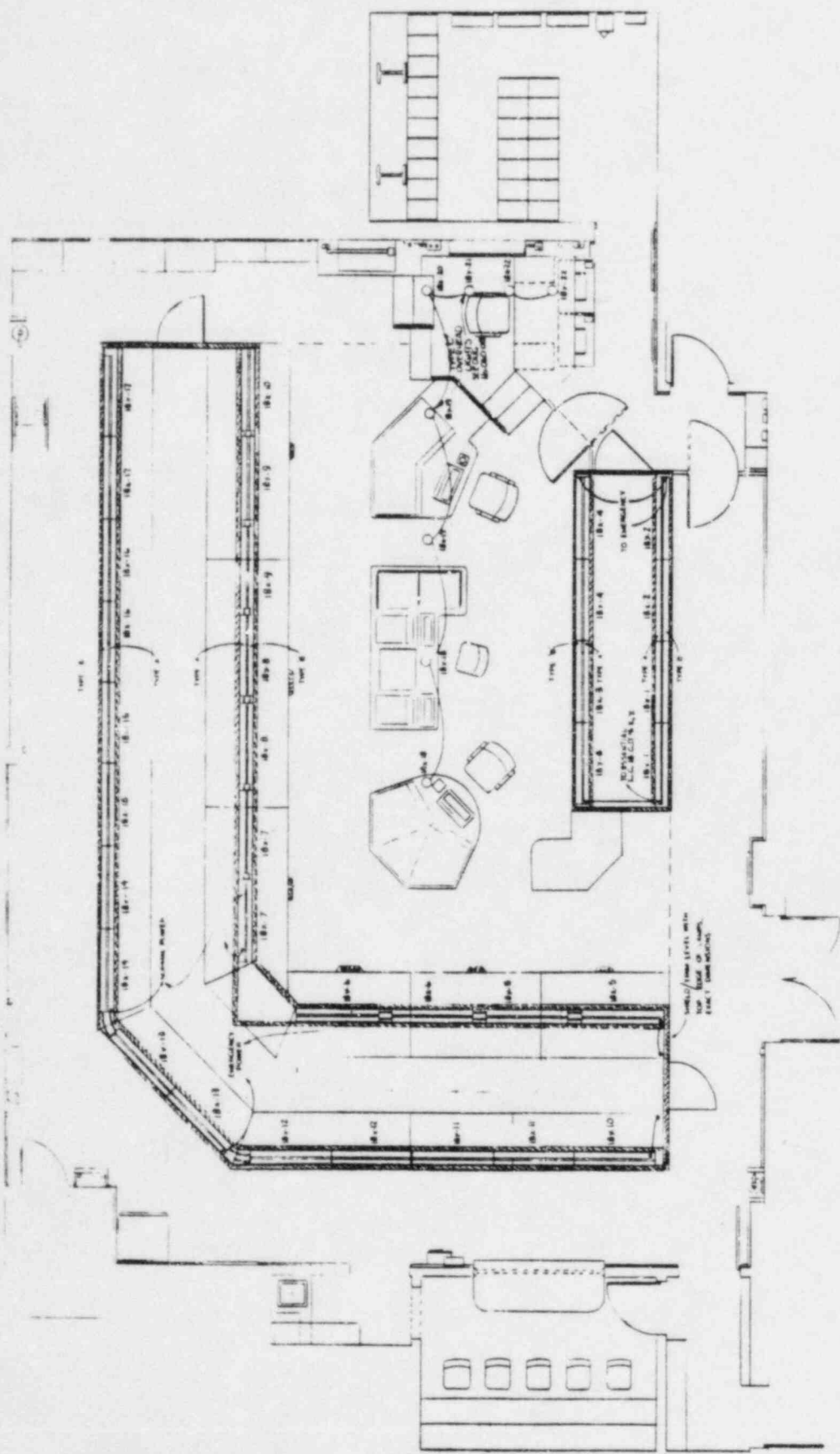
High frequency  
electronic  
lockdown...

[illegible]





NAME	WILSON, WALTER
DATE	07-07-68
TIME	11:00 AM
PLACE	CHICAGO



FLOOR PLAN - LIGHTING  
Scale:  $\frac{1}{8"} = 1'-0"$

ATTACHMENT 6b-11

SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS  
AS APPLICABLE TO  
OPERATOR AIDS

FOREWORD - NUREG-0737 Supplement 1, Section 5.1b requires that a Control Room Design Review (CRDR) be conducted to identify human engineering discrepancies. Section 5.1c requires that these discrepancies be assessed and design improvements selected to correct these discrepancies.

Public Service Company (PSC) has conducted the required review of the Fort St. Vrain Control Room. Approximately eight hundred forty eight (848) discrepancies or classes of discrepancies were cited. These discrepancies were assessed to determine their potential for causing an operating error and the potential effect of any error. (Certain discrepancies are known to have caused errors). An improvement program has been selected which meets the regulatory requirements and proposes to improve the operability and functionality of the Control Room.

The regulatory requirement for the CRDR and the follow-on improvement program was directed toward the improved handling of emergencies and not specifically toward improved production. Public Service Company's improvement program is directed toward both normal operation and the handling of emergencies.

BACKGROUND - As cited in Fort St. Vrain HED-0643, the nomograms and instructional aids located on control boards do not follow a given standard or convention. These nomograms and instructional aids present information required by the operator in determining certain setpoints or other appropriate action. The format of these aids varies depending on the source. Many are copies of charts, tables and etc., copied directly from vendors' manuals. Others are hand drawn and through successive copying are not clearly legible. The increment and scaling factors do not always correlate with the information source display. While there has existed a recording or logging effort for these operator aids, the controls for posting were implemented during 1985. This control medium is entitled "Control of Operator Aids" and is included with this summary as Attachment B.

#### IMPROVEMENT PROCESS METHODOLOGY

The first step in approaching the fix for this HED has already been taken. This step involves administrative control over the content, placement, and creation of the nomogram and instructional aids. The control as described in the document SMAP-9A establishes a procedure for approval. During the approval period the nomograms and instructional aids will be reviewed and changed as necessary to reflect a similarity of scale and information corresponding to the instrumentation each refers to on the control board. SMAP-9A also refers to the creation of the aids on a suitable medium.

The next step in the fix, therefore, will require a design directive based on human factor principles which will dictate the quality, size, readability, and placement of the aids in order to arrive at a choice of mediums.

These standards support the principles and guidelines set forth in NUREG-0700, 6.6 "Labeled and Location Aids". In order to create a unity of design directives, the guidelines for instructional aids will refer to appropriate standards already issued by Fort St. Vrain for the creation of control board labeling and graphic enhancement. These documents are DD-LAB-1, "Control Room Panels and Component Labeling" and DD-AAS-1, design directive for "Abbreviation, Symbol and Acronym Selection". These documents already encompass the human factors principles of NUREG-0700.

SPECIFIC - Operator Aids (Change Notice (CN)-1900 preparation package). The first step in preparing CN-1900 will be to determine which of the existing aids are actually required on the control boards and which may be placed in procedures or otherwise made available.

The second step will consist of determining the required content, and in the case of scaled values, determine the resolution required. The required charts, nomograms, and instructional aids will then be prepared in accordance with the design directive to be prepared for this purpose. See Attachment C for an outline of this proposed design directive.

ATTACHMENTS  
TO  
SUMMARY OF THE  
CONTROL ROOM IMPROVEMENT  
DESIGN PROCESS AS APPLICABLE TO OPERATOR AIDS

- A A copy of HED-0643 with supporting attachments
- B A copy of SMAP-9, "Control of Operator Aids"
- C An Outline of the proposed design directive content to standardize control room nomograms and instructional aids

ATTACHMENT A

HED-0643





## PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

HUMAN ENGINEERING DISCREPANCY EVALUATION  
HEDE - 1

Log Number 0643

with  
Attachment 1 & 2

Form 344-22-4228

[illegible]

E. SPECIFIC OPERATOR ERROR(S) THAT COULD RESULT FROM HED \_\_\_\_\_

F. LIST THE CONSEQUENCES OF OPERATOR ERROR \_\_\_\_\_

G. CLASSIFICATION \_\_\_\_\_

H. CORRECTIVE ACTION OPTIONS \_\_\_\_\_

*Devise appropriate guidance & standards  
for posting format, size, content & location*

I. DISPOSITION \_\_\_\_\_

TEAM ACTION

TEAM MEMBER SIGNATURE	CONCURRENCE OR NON-CONCURRENCE	DATE
Team Manager		
CRDR Coordinator		
Human Factors Spec.		
Senior Factor Operator		

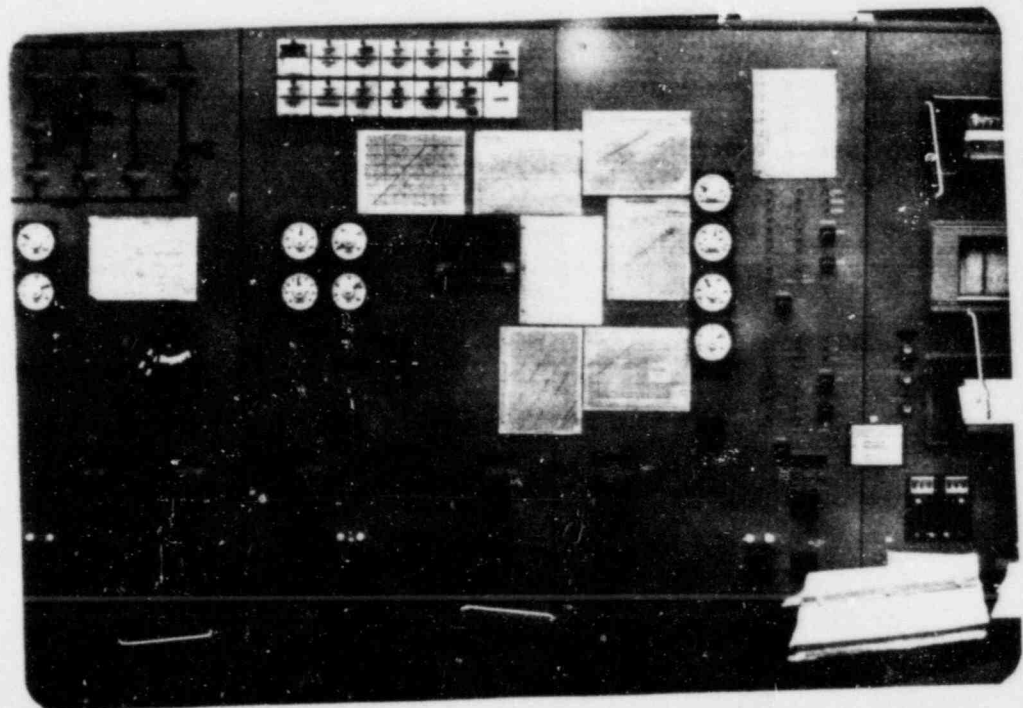
## Attachment to HED # 0643

A survey of Nomograms, charts, & instructional aids on 2-22-84 reflects the following

- 1- Nomographs & charts do not follow any particular convention in format or style.
- 2- Similar graphs are posted for the same parameter without clear direction as to the application of each ex: #5 & 6 for AR-9303 & # 2 & 69 for Penetration Interspace flow rates.
- 3- Two (2) each charts items posted each with a number "7" identification.
- 4- Items are posted remote to the point of use
- 5- Results information and Portions of RPs are posted on Control boards. ex RP 446 posted above & between bay 100-200-300.
- 6- Misc memos, notes, & communications clutter boards. Ex: Bin 501, 801, 1101  
Memo Schmidt - McBride posted left of Bay 1200 & Right of Bay 400
- 7- I-09 serves as a bulletin board - Misc charts & Graphs posted with out regard to point of use or purpose.

- 8 - Chart #7 "Rx Power vs CPM" for SR-5.2.11W doesn't follow population stereotypes for location of dependant & independent variables. This results in "out-of-limit" area being below the curve.
9. Chart # 70 is located on I-14. Chart 70 is used only when I-70 equipment is Out of Service.
10. Lettering too small on many charts & graphs. Charts are not legible. examples Chart # 83 & 65
11. Item # 41, OPOP Page 25, Fig III D1 has no functional description (typical)

I-09



CONTROL ROOM BOARDS  
INDEX OF ITEMS POSTED

*Attachment 2*  
*HED-0643*  
*Sheet 1 of 4*

1. Operation of:
  - a. HS-7210
  - b. HS-7204-1
  - c. HS-7204-2
2. Penetration Interspace Pressure Vs. ACFM = to Tech Spec Limit - 16.7 #/hr.
3. System 25 numbers and locations (two sheets)
4. Wind Chill Index
5. Calibration Curve for AR-9303 (0-50)
6. Calibration Curve for AR-9303 (0-500)
7. Change Notice - Speed/Wobble System
8. Computer Processing Configuration
9. RR-93254 - Area Monitors
10. RWP's (lights #1-6)
11. RWP's (lights #1-6) (duplicate of #10)
- 12.
13. RR 93255 Point Index
14. RR 93256 Point Index
15. FI-7320 (Flow in CFM = Flow in  $\text{cm}^3/\text{sec}$ )
16. HS-21267 (point, TC#, Circ.)
17. HS-21268 (point, TC#, Circ.)
18. Thermo Electric Patch
19. Cord #'s 31 through 60 (TC's 21266 and 21268)
20. Cord #'s 1 through 30 (TC's 21265 and 21267)
21. Vacuum Jackets, Normal and Prior to  $\text{LN}_2$  Fill
22. A-3, A-4 Well Vacuums
23. E-3, E-4 Well Vacuums
24. A-5, A-6 Well Vacuums

Attachment 2  
HED - 0643  
Sht 2 of 4

25. \*If Well Vacuums Exceed 500 Microns
26. Flow Transmitter and Size for Channels 1 through 36 (System 46)
27. Flow Scanner Reading Vs. Flow in GPM on 1 1/2" and 2" FT's
28. LCO 4.2.15D, Daily Average Outlet Water Temperature
- 29.
30. Individual Circulator Low Range Flow
31. Instructions if System is not at Rated Density
32. Figure III.D.1, OPOP III
- 33.
34. Circulator Speed in RPM Vs. Feedwater Flow in #/hr.
35. Circulator Inlet Temperature (°F) Vs. PCRV Pressure (PSIA)
36. Minimum Emergency Accumulator Pressure Vs. Reactor Pressure
37. Circulator Speed Vs. Feedwater Flow (Figure 8)
38. Nomograph for Dewpoints 8 PPM<sub>v</sub> as a Function of P
39. Estimated Capability Curves
40. Electric Malfunction Alarms
- 40A. System 32 Bypass Flashtank Drain System Diagram
41. OPOP III, Figure III.D-1 Power/Flow
42. Flux Controller out of Auto and Alarmed
43. Individual Rod Group Worths
- 43A. Sat. Stm. Tem. vs. Pressure ..
44. System 73 Instrument #'s, Elevation, Location, and Group
45. Procedure for Problems with Data Logger Operation
46. Data Logger Points Used Frequently
- 47.
48. Chart Index (beginning with chart #PR-1185)
49. Chart Index (beginning with chart #CW P<sub>h</sub>)



Attachment 2  
HED - 0643  
Sht 3 of 4

- 50.
- 51.
52. Feedwater Flow vs. Circulator Speed.
53. RR Recorder 93540 Pen Index
54. RR Recorder 93539 Pen Index
55. RR Recorder 93538 Pen Index
56. RR Recorder 93537 Pen Index
- 57.
- 58.
- 59.
- 60.
- 61.
- 62.
63. Weekly Test of Fire and Radiological Alarm
64. Emergencies and Drills
65. Use this Chart for Var. Locating on the Main Generator
66. Allowable Temperature Difference
67. Gaseous Release Stability Curves
68. Standby Generator Load Starting Sequence
69. LCO 4.2.9 Penetration Leak Rate
70. RERP ATTACHMENT II Conversion Graph
71. Dose Assessment Information
72. TR-92105 Gen & Trans. Temps.
73. Power to Flow
74. PROCEDURE -- HLT-1 (RWP) and HLT-2 (SCRAM)
75. Fixed PPS Setpoints for FSV
76. A, B, C, D, E, F, PPS Logic

Attachment 2  
HED -0643  
Sht 4 of 4

- 77.
78. WEST POND STAFF GAUGE vs INVENTORY
79. EAST PON STAFF GAUGE vs INVENTORY
80. Plant Trouble Report
- 81.
82. Switching Five Point Monitor to Turbine Deck
83. Turbine Drains by Group
84. One Line Diagram I-09
85. Depressurize H<sub>2</sub>O Indication
86. Dewpoint Conversion to PPM
87. Access Bay Roof Stack Indication
88. Diesel Storage Ft.-Inch./GAL.
89. Steam Water Drains High Temp Alarm
90. Plant Electrical System
91. Overall Plant Control System
92. Reheat Attemperation Vs. Feedwater Flow

Check <sup>Sali</sup>~~only~~ curve.

FORT ST. VRAIN  
CONTROL ROOM DESIGN REVIEW

HED CATEGORIZATION  
RECORD

HED # 0643

LIKELIHOOD THAT HED WILL CAUSE ERROR						
CAT. 4		CAT. 1 OR 3		CAT. 1 OR 2		
DEFINITELY NOT	VERY UNLIKELY	PROBABLY NOT	MAYBE	PROBABLY	VERY LIKELY	DEFINITELY

*Handwritten: 5/3/84*

RESULT OF ERROR (IF UNCORRECTED)						
CAT. 3		CAT. 1 OR 2				
NO EFFECT	REQUIRES ADDITIONAL STEPS	REDUCTION IN OPER. PERFORMANCE	LOSS OF COMPONENT FUNCTION	LOSS OF SYSTEM FUNCTION	EXTENDED LOSS OF SYSTEM FUNCTION	EXTENDED LOSS OF PLANT FUNCTION

*Handwritten: 5 HC*

EFFECT ON MAINTENANCE AND/OR RESTORATION OF A CSF						
CAT. 2			CAT. 1			
NO EFFECT	POTENTIAL REDUCTION TO SAFETY MARGIN	REDUCED SAFETY MARGIN	LOSS OF SAFETY MARGIN	LOSS OF CSF	EXTENDED LOSS OF CSF	PREVENT RESTORATION

*Handwritten: 5 HC*

REMARKS \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TEAM ACTION				
CATEGORIZATION	1	2	3	4
NOTE: DISSENTING TEAM MEMBER(S) OPINION NOTED ABOVE				
TEAM MEMBER	TEAM MEMBER SIGNATURE		CONCURRENCE	DATE
Team Manager	(T)	<i>W. Meloy</i>	<input checked="" type="radio"/> YES <input type="radio"/> NO	5/3/84
CRDR Coordinator	(C)	<i>[Signature]</i>	<input checked="" type="radio"/> YES <input type="radio"/> NO	5/3/84
Human Factors Spec.	(H)	<i>[Signature]</i>	<input checked="" type="radio"/> YES <input type="radio"/> NO	5/3/84
Senior Reactor Operator	(S)	<i>[Signature]</i>	<input checked="" type="radio"/> YES <input type="radio"/> NO	5/3/84
Engineering Technician	(E)	<i>[Signature]</i>	<input checked="" type="radio"/> YES <input type="radio"/> NO	5/3/84

ATTACHMENT B

COPY OF SMAP-9  
"CONTROL OF OPERATOR AIDS"



PUBLIC SERVICE COMPANY OF COLORADO  
FORT ST. VRAIN NUCLEAR GENERATING STATION

SMAP-9  
Issue 1  
Page 1 of 5

TITLE: CONTROL OF OPERATOR AIDS

ISSUANCE  
AUTHORIZED  
BY

*Fuller by [signature]*

PORC  
REVIEW

*523 MAY 17 1985*

EFFECTIVE  
DATE

*JJ Borst*

*5-24-85*

1.0 PURPOSE

- 1.1 This procedure describes the authorization, documentation, and review required to ensure operator aids are current, complete, and necessary.

2.0 APPLICABILITY

- 2.1 Information utilized in the operation of plant systems must be properly controlled. The use of informal, unauthorized, or out-of-date instructions, notes, graphs, drawings, and other documents in the plant can detract from and potentially affect proper operation or maintenance.

3.0 GENERAL REQUIREMENTS

- 3.1 The Superintendent of Operations is responsible for the administration of this procedure.
- 3.2 Supervisors or Superintendents are responsible for authorizing those graphs, tables, and curves originating within their departments that are to be used as operator aids.
- 3.3 The Results Technician is responsible for (1) the posting and removal of Operator Aids, (2) maintaining an Operator Aid log, (3) periodically reviewing the need for existing Operator Aids in the Operator Aid log, (4) ensuring that drawings that are approved and posted as Operator Aids reflect actual plant configuration, and (5) maintain P&I location index. Sketches that are not part of the drawing control system will be controlled per section 4.2.1.

#### 4.0 PROCEDURE

##### 4.1 DEFINITIONS

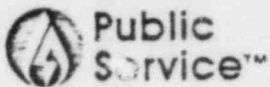
- 4.1.1 Operator - Broadly defined as anyone authorized to operate equipment. In addition to Operations Department personnel, this definition could include Chemistry, Radiochemistry, and Betterment personnel.
- 4.1.2 Operator Aids - Information including sketches, notes, graphs, instructions, drawings, and other documents used to assist operators in performing assigned duties.
- 4.1.3 Permanent Information - Information that appears on a medium not suitable to change and determined by the Superintendent of Operations to be applicable indefinitely. An example would be an instruction engraved on a permanent label. Information posted in this format is not considered to be an operator aid in this procedure.
- 4.1.4 Operator Aid Log Book - A notebook containing all operator aids such as curves, graphs, tables, and other information usually addressing areas that include equipment characteristics (e.g., pump and tank volume curves, reactivity effects, conversion tables, system drawings, and chemistry-related information). These operator aids are normally generated by the Nuclear Betterment Department, Technical Services, or the Chemistry Department for use by operators in the operation of the plant.

##### 4.2 INSTRUCTIONS

###### 4.2.1 Operator Aid Log

- a) All operator aids, such as tables, graphs, curves, and other information for use by operators in plant operations, shall be in a professional format on a suitable medium. Each operator aid shall contain the originator's signature and be approved by the originator's department head and the Superintendent of Operations. (Attach. SMAP-9A is a Sample Operator Aid.) Additionally, operator aids containing safety-related information that is not in a previously approved procedure must be reviewed and approved by the Plant Operations Review Committee.





- b) The Shift Supervisor will approve each proposed Operator Aid and contact the Results Technician. The Results Technician will be responsible for having the Operator Aid signed by the originator, the head of the originating department, and the Superintendent of Operations. The Operator Aid will be listed on the Operator Aid log index and the sequential serial number from the log will be placed on the operator aid.
- c) The operator aid log book will be maintained by the Results Technician. The log will include a copy of each posted operator aid.
  - 1) The Operator Aid Log Index Sheet should include the following information:
    - a) Sequential serial number - The number should indicate the year and the next consecutive number of the operator aid to be issued. For example, 84-27 would indicate the 27th operator aid issued for the year -1984. The next consecutive number would be 84-28 and so on.
    - b) Date and if required posted - The date the shift supervisor authorizes the operator aid to be posted.
    - c) Location - Area where the operator aid is to be posted. This location should be specific enough to be easily found by referencing the operator aid log. "Auxiliary Building," for example, is not specific; "Unit 1 Waste Monitoring Panel," however, is more complete.
    - d) Description - The operator aid.
    - e) Shift Supervisor approval initials - The Shift Supervisor shall initial the index indicating his authorization to post the operator aid.



#### 4.3 GENERAL INSTRUCTIONS

- 4.3.1 Operator aids shall not be posted in a manner that will obscure controls, indications, or indicating lights. They shall be firmly attached and suitably protected from the environment.
- 4.3.2 Anyone finding an unauthorized operator aid shall notify the Shift Supervisor or Results Technician. The Shift Supervisor will either authorize the operator aid in accordance with this procedure, or have it removed.
- 4.3.3 Personnel shall not independently label plant components or systems in the plant. Requests for labeling of components or systems shall be directed to the Superintendent of Operations.
- 4.3.4 The Shift Supervisor shall be notified by the requestor/department originating the operator aid when the need for the operator aid no longer exists.
- 4.3.5 Operator aids shall not be utilized in the place of safety tags used for the protection of personnel and equipment.
- 4.3.6 Operator aids shall not be utilized in place of CAUTION tags.
- 4.3.7 Operator aids shall not be utilized to bypass the normal plant procedure review and approval process.

#### 4.4 REVIEW OF OPERATOR AIDS

- 4.4.1 The Superintendent of Operations shall initiate the review of the Operator Aid Log Index per the quarterly Review of Operations. The Results Technician will be notified and will review for correctness and need of each posted Operator Aid. The reviewer shall indicate the review by writing below the last index entry "Reviewed by (name) on (date)."
- 4.4.2 The Superintendent of Operations shall review the Operator Aid Log Index for correctness and need in conjunction with the above Results Technicians review. He shall indicate his review on the index in the manner stated in section 4.4.1.



4.4.3 At the end of each quarterly review, the Results Technician shall submit to the Superintendent of Operations the results.

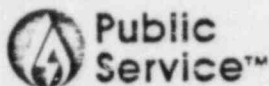
4.4.4 The Shift Supervisor shall submit a list of those operator aids that he recommends be made permanent. For instance a procedure change may be required or a fabricated label may be produced.

5.0 REFERENCES

None.

6.0 ATTACHMENTS

SMAP-9A, Sample Control Operator Aid



FORT ST. VRAIN NUCLEAR GENERATING STATION  
PUBLIC SERVICE COMPANY OF COLORADO

Attach. SMAP-9A  
Issue 1  
Page 1 of 1

RR-93254  
Area Monitors

# 85-09

RR-93254 Channel	Channel and Radiation Transmitter #	Location	Elevation	Alarm Setpoint mrem/hr
1	RT93250-1	Refueling Machine Control Rm.	4881	2.5 MR/HR
2	RT93252-1	East Wall	4881	2.5 MR/HR
3	RT93250-14	Refueling Floor/East Wall	4881	2.5 R/HR
4	RT93250-2	East Walkway	4849	2.5 MR/HR
5	RT93250-3	Hot Service Facility Platform	4849	10.0 MR/HR
6	RT93251-3	Hot Service Blower Suction	4849	100 MR/HR
7	RT93251-6	Grade Floor North Truck Bay	4791	2.5 MR/HR
8	RT93252-4	Instrument Room-Analytical Instrument Board	4829	2.5 MR/HR
9	RT93250-5	Control Room	4829	1.0 MR/HR
10				
11	RT93250-4	Outside HSF Door	4839	2.5 MR/HR
12	RT93251-5	Valve Operating Station West	4781	2.5 MR/HR
13	RT93252-6	Near South Stairwell	4791	2.5 MR/HR
14	RT93251-7	Valve Operating Station West	4781	2.5 MR/HR
15	RT93252-7	Valve Operating Station East	4781	2.5 MR/HR
16	RT93250-8	North East Walkway	4771	2.5 MR/HR
17	RT93251-8	Radiochemical Lab	4771	2.5 MR/HR
18	RT93251-9	North Stairwell	4740	2.5 MR/HR
19	RT93250-13	Near Condensate Demineralizers	4791	2.5 MR/HR
20	*Spare			
21	*Spare			
22	RT93252-2	South Stairwell	4864	2.5 MR/HR
23	RT93251-4	General Office Area	4811	1.0 MR/HR
24	*7325-2	Turbine Building	4921	10.0 MR/HR

Prepared By \_\_\_\_\_ Date \_\_\_\_\_  
Approved By \_\_\_\_\_ Date \_\_\_\_\_  
Department Head \_\_\_\_\_ Date \_\_\_\_\_  
Superintendent of Operations \_\_\_\_\_ Date \_\_\_\_\_

## ATTACHMENT C

### OUTLINE OF THE PROPOSED DESIGN DIRECTIVE TO STANDARDIZE CONTROL ROOM NOMOGRAMS AND INSTRUCTIONAL AIDS

#### I. Format Size

1. Establish maximum size of Operator Aid by determining final placement on control board and minimum content.
2. Final placement should be within one to two feet of point of use.

#### II. Character and Index Line Sizes

##### 1. For Non-Safety Related Operator Aids

- a. Headlines - 2.5mm high for upper case letters  
(10 point size on Kroy type machine)
- b. Body Copy - .05mm high for upper case letters  
(average typewriter size)
- c. Major Index Lines or Major Line Art  
.89mm thick (#3 point size for Leroy)
- d. Minor Index Lines or Minor Line Art  
.33mm thick (#0 point size for Leroy)

##### 2. For Safety Related Operator Aids

- a. Headlines - 3.5mm high for upper case letters  
(12 point size on Kroytype)
- b. Body Copy - 2.5mm high for upper case letters  
(10 point size on Kroytype)
- c. Index Lines and Line Art - following instructions  
on II. 1. d&c

\*Based on Helvetica Medium type viewed at 28 inches

#### III. Medium

1. Operator aids shall be pasted-up on 201 Cresent board, black letters on a white background.
2. Crop lines shall be indicated for size of final piece.
3. Final paste-ups shall be approved as per SMAP, issue 1, dated 5-24-85.
4. Paste-up shall be reproduced.

#### IV. Final Placement

Attachment of Operator Aid to control board shall be done using Scotch Brand 3-M double stick tape #Y4439325 around borders.

SUPPLEMENTS  
TO  
ATTACHMENT 9



ATTACHMENT 9  
HEDs Having  
Final Dispositions Different From The  
Proposed Disposition Shown in Attachment B  
Of The Summary Report

HED	PROBLEM CLASSIFICATION	ORIGINAL DISPOSITION	FINAL DISPOSITION	REMARKS
0168	Labeling	Change-out	Relabel	Model change-out, relocate to I-09 & relabel.
0384	Instrument	None/Relocate	Relocate	All listed recorders to be relocated to I-09 and relabeled.
0504	Instrument	Relocate	Change-out	Model change-out, function to be replaced by a CRT display. Recorder function to be relocated I-09.
0517	Labeling	Label Relabel	Relabel Relocate	Terminology change only. Recorder function to be relocated to I-09 & relabeled.
0630	Instrument	Rescale	None/Change-out	Model change-out, function to be replaced by a digital display. Recorder function to be relocated to I-09.
0652	Instrument	Evaluated (Note 8)	Replace None	Replace chart paper. Combined on single recorder by CW-1378.
0653	Instrument	Evaluated	Rescale None Change-out  Rescale  Change-out  Add pointer Change-out  Change-out	PR-1108 move to I-09 and rescale NR-1133-2 reevaluated -no discrepancy. Replace with digital by CN-1891 and move recorder function to I-09. Rescale CR-3390-2, XR-3390-1 and move to I-09.  GR-5154, TR-92105 - change-out, move to I-09, relabel and rescale. TR-4637/38 - Add pointer to fixed scale. FR-2222 - Change-out, move to I-09, relabel and rescale.  Combine on single recorder, relabel and rescale. (See listing for HED-0652)
0654	Instrument	Evaluated (Note 8) (Note 19)	Relocate	NR-1199's function replaced with a digital indicator (mass flow). Recorders removed to I-09 to be used for historical information only.
0655	Instrument	Evaluated (Note 8) (Note 19)	Rescale Change-out  None Change-out	TR-2256 - Move to I-09 and rescale. GR-5154 - Change-out, move to I-09, relabel and rescale. TR-4637/8 - reevaluated - no discrepancy. PDR-73448 (Typ) - combine on single recorder, rescale and relabel.

ATTACHMENT 9  
HEDs Having  
Final Dispositions Different From The  
Proposed Disposition Shown in Attachment B  
Of The Summary Report

HED	PROBLEM CLASSIFICATION	ORIGINAL DISPOSITION	FINAL DISPOSITION	REMARKS
0656	Instrument	Evaluated	Rescale	All recorders except GR-5154/IR-5156/IR-2321 model change-out, move to I-09 and rescale. GR-5154/IR-5156 move to I-09 and rescale. IR-2321 - Relocate local and rescale.
0657	Instrument	Evaluated (Note 8) (Note 19)	Label	IR-2255/2227 - Relocate to I-09 and functionally label.
			Relabel	GR-5154/IR-5156/IR-92105 - Model change-out, move to I-09 and relabel.
			Label None	Combine to single recorder. IR-2321 - Relocate locally.
0658	Instrument	Evaluated (Note 8) (Note 19)	Change-out	IR-2227/55, IR-3118, IR-3115, IR-2222 IR-2232 - See HED resolution.
0659	Instrument	Rescale	Change-out	IR-2232 - model change-out, relocate to I-09 and relabel. GR-5154/IR-5156
0661	Instrument	Change-out	None	See HED Resolution.
0662	Instrument	Change-out	None	See HED Resolution.
0746	Instrument	Relocate	None	IR-2321 - Relocate locally. (remove from control room)
0786	Instrument	Relocate	None	IR-2321 - Relocate locally. (remove from control room)

ATTACHMENT 9  
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HED	PROBLEM CLASSIFICATION	ORIGINAL DISPOSITION	FINAL DISPOSITION	REMARKS
0022	Labeling	Relabel	Delete	Instrument no longer required
0031	Labeling	Relabel	Delete	HS-1220, HS-1221, HS-1224, HS-1225, HS-1226 no longer required - system function revised
0033	Labeling	Label	Delete	XI-22147 & XI-22148 no longer required
0034	Labeling	Relabel	Delete	XI-1247, XI-1248 & XI-1249 no longer required
0042	Labeling	Relabel	Delete	No longer required
0096	Labeling	Label	Label Delete	Provide functional label. Switches not required. Replaced the function with a steam generator graphics display.
0280	Labeling	Change-out	Reevaluated	No action required. Switch positions do not correspond to DD-SWI-1 requirements, however, sequence is preferred for unique function.
0496	Instrument	None	Relocate Change-out	NR-1199/FR-11262/XR-11262 relocated to I-09, all functions not required on I-03. XR-11262 function to be provided on I-03 by digital indicator
0506	Labeling	Relabel	Delete	TDI-22147, TDI-22148, TI-22147, TI-22148, XI-22148, XI-11142, XI-11143, XI-11144 no longer required
0538	Instrument	Rescale	Change-out	Function replaced with a graphics situational display
0559	Instrument	Relabel	Change-out	Replace with digital indicator & selector switch
0560	Instruments	Relabel Relabel	Change-out Rescale	NI-1199 to be changed to a digital indicator. NIC-1199 to be rescaled.
0564	Instruments	Rescale	Change-out	Replace with bar graph indicators.
0571	Instruments	Rescale	Change-out	NI-1131-1 & NI-1132-1 to be replaced with bar graph indicators.
0591	Instrument	Change-out	Delete	No longer required.

ATTACHMENT 9  
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HED	PROBLEM CLASSIFICATION	ORIGINAL DISPOSITION	FINAL DISPOSITION	REMARKS
0607	Instrument	Change-out	Delete	HS-1257 no longer required.
0629	Instrument	Rescale	Relocate	Relocated to I-09 & Rescaled. Function replaced on I-03 by a graphics display.
0661	Instrument	Change-out	Relocate Relocate Change-out/Relocate	FR-11262 Function to I-09 NR-1199 Function to I-09 Relocate XR-11262 to I-0-9 and provide function on I-03 with a digital indicator.
0736	Instrument	Change-out	Reevaluated	No action required - see HED Disposition
0742	Instrument	Change-out	Reevaluated	Circuit redesigned
0745	Labeling	Relabel	Delete	EI-1257, EI-1258, & HS-1257 no longer required
0832	Instrument	Relocate	Change-out	Multiple meter groupings addressed specifically for each function. See HED disposition.

ATTACHMENT 9  
HEDs Having  
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HED	PROBLEM CLASSIFICATION	ORIGINAL DISPOSITION	FINAL DISPOSITION	REMARKS
0132	Labeling	Label	Delete	HS-9139-1/9140-1 to be deleted. Function not required.
0165	Labeling	Change-out	Relabel	PI-9139/9139-1 to be changed to digital indicator, functionally labeled per DD-LAB-1 and functionally grouped per DD-CBL-1.
0165	Labeling	Change-out	Delete	HS-9139-1 to be deleted. Function not required.
0167	Instrument	Change-out	Relabel	PI-9140/9140-1 to be changed to digital indicator, functionally labeled per DD-LAB-1 and functionally grouped per DD-CBL-1.
0169	Labeling	Change-out	Relabel	HS-9239/9140 - to be functionally labeled per DD-LAB-1 & DD-SWI-1 and functionally grouped per DD-CBL-1.
0169	Labeling	Change-out	Delete	HS-9139-1/9140-1 - to be deleted.
0513	Labeling	Relocate	Relabel	PI-9105/6 - move to I-06A to be functionally labeled per DD-LAB-1. Functionally grouped per DD-CBL-1.
0513	Labeling	Relocate	Relabel & Rescale	PI-91141/2 - move to I-06A. New dial cards to be installed per DD-AIS-1. To be functionally labeled per DD-LAB-1 and functionally grouped per DD-CBL-1.
0560	Instrument	Change-out	Rescale	PI-9105/06 - Move to I-06A. New dial cards to be installed per DD-AIS-1. To be functionally labeled per DD-LAB-1 and functionally grouped per DD-CBL-1.
0576	Instrument	Change-out	Relabel	PI-9139-1/9140-1 - to be changed to digital indicators. Relabel to PDI-9139-1/9140-1 consistent with actual parameter.
0587	Instrument	Rescale	Change-out	PI-9139/9140 - to be changed to digital
0587	Instrument	Relabel	Relocate	indicator, functionally labeled per DD-LAB-1 & grouped per DD-CBL-1.

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HED	PROBLEM CLASSIFICATION	ORIGINAL DISPOSITION	FINAL DISPOSITION	REMARKS
0762	Instrument	Change-out	Relocate	Move HS-9101-1/9105-1 to 1-05A. To be functionally labeled per DD-LAB-1 & DD-SW1-1 and functionally grouped per DD-CBL-1.
0762	Instrument	Change-out	Delete	HS-9139-1 & HS-9140-1 to be deleted. Function not required.



ATTACHMENT 9  
HEDs Having  
Final Dispositions Different From The  
Proposed Disposition Shown In Attachment 8  
Of The Summary Report

ITD	PROBLEM CLASSIFICATION	ORIGINAL DISPOSITION	FINAL DISPOSITION	REMARKS
0486	Control Room Misc	Relabel	Change-out	Provide increased emergency light levels.
0551	Alarms	None	Addition	Provide sound absorption treatment of floors, walls, and ceilings. Reevaluate alarm levels after treatment completion.
0645	Control Room Misc	Evaluated	Change-out	Provide improved furnishings, personal storage, and sound absorption.