



SACRAMENTO MUNICIPAL UTILITY DISTRICT 6201 S Street, P.O. Box 15830, Sacramento CA 95852-1830, (916) 452-3211  
RJR-85-424 AN ELECTRIC SYSTEM SERVING THE HEART OF CALIFORNIA

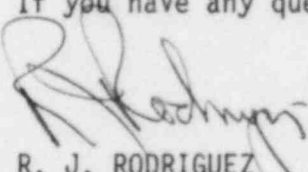
August 30, 1985

DIRECTOR OF NUCLEAR REACTOR REGULATION  
ATTENTION HUGH L THOMPSON JR DIRECTOR  
DIVISION OF LICENSING  
US NUCLEAR REGULATORY COMMISSION  
WASHINGTON DC 20555

DOCKET 50-312  
RANCHO SECO NUCLEAR GENERATING STATION UNIT NUMBER 1  
SAFETY PARAMETER DISPLAY SYSTEM (SPDS) - REQUEST FOR ADDITIONAL  
INFORMATION DATED JULY 16, 1985

In response to your letter dated July 16, 1985, we have enclosed Attachment 1 explaining the layout of our control room and the relative locations of the SPDS CRTs, SPDS controls, and the Digital Radiation Monitoring System (DRMS). Attachment 2 addresses your request for further definition of the display format, operator tasks to acquire the display system for each critical safety function and all variables for the function selected by us to meet the requirements for the SPDS.

If you have any questions, please contact Jerry Delezenski at Rancho Seco.

  
R. J. RODRIGUEZ  
ASSISTANT GENERAL MANAGER, NUCLEAR

Attachments - 2

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8509040036 850830  
PDR ADCK 05000312  
F PDR

## ATTACHMENT 1

### RANCHO SECO CONTROL ROOM LAYOUT

The Rancho Seco Control Room consists of backpanels, front consoles and miscellaneous operator aides. Miscellaneous operator aides include the operator communications and log desk, Digital Radiation Monitoring System (H1DRMS), and the Interim Data Acquisition and Display System (IDADS). The Control Room layout, Figure 1, shows the distances between the various panels and consoles. Additionally, layout drawings of H1SS for the SPDS controls (Figure 2, items 101 and 102), H2SP for the SPDS CRTs (Figure 3 items 1 and 2) have been included for your information. The control room is in the process of design review which may modify the layout of these panels.

The Rancho Seco Control Room was observed by Leo Beltrachi, NRC, and a group of contractor auditors on June 18-20, 1985. The purpose of their visit was to perform a preliminary audit of the Rancho Seco SPDS.

## ATTACHMENT 2

### I. Safety Parameter Display System

As described in the SMUD Safety Parameter Display Functional Description, B&W Drawing No., 1134042, Revision A-3, Section 2.2.15, "when a reactor trip occurs, the display shall switch to the post-trip ATOG display with history trace initialized". The SPDS CRTs thus automatically show the display format with the critical safety functions. No operator action is required to obtain this format (Figure 5). The critical safety functions and variables for each on this display are shown in Figure 6.

The SPDS provides additional displays for normal operations and inadequate core cooling. These displays enhance the operators familiarity with the SPDS. Display selection is by rocker switch with red LED indicating that the switch has been actuated (See Figure 7). Many of the critical safety functions are duplicated on the additional displays but only the post-trip display is necessary to see all of the critical safety functions addressed by the SPDS.

### II. Digital Radiation Monitoring System

The Digital Radiation Monitoring System (DRMS) presents the radiation control critical safety function to the control room operator. The variables associated with DRMS are shown in Figure 8. The operator tasks necessary to obtain these displays are explained below.

During the course of normal operations, Grid 1 (Figure 9) is displayed on the CRT. If Grid 1 is not present, the operator can obtain it by depressing the Grid 1 pushbutton on the DRMS control panel (Figure 10). The purpose of this display is to provide the operator with an overview of the status of the radiation monitor channels in selected areas. Status grid displays also serve as the mechanism through which the operator acknowledges computer-generated notification of a critical change of status for any channel in the system. When a critical change of state occurs, the RM-11 computer turns on the channel alarm annunciator and logs the event on the printer. The operator may turn off the audible alarm annunciator by pressing any of the six grid display function keys. However, the operator can display the proper grid most quickly by first examining the lower right corner of the current display to see which grid status-marker is blinking and by then pressing the associated grid display function key. Each time the operator turns off the audible alarm annunciator, his action is reported on the event log.

After summoning the appropriate grid display, the operator looks for one or more blinking channel names on the display screen. The status (color) shown for each channel identified by a blinking channel name represents a recent change of state which requires the attention of the operator. At this point, the operator uses the keypad to acknowledge the alarm by selecting the blinking channel.

The operator selects a channel from those identified on the status grid display either by using the auto-select feature or by using the keypad as follows:

1. Key in the channel number desired; the channel number is the numerical portion of the six-character channel name. (Leading zeros may be omitted when keying in the channel number.)
2. Examine the keypad entry area on the CRT display to verify the channel number.
3. Press the SEL key to select the channel or press CLEAR to clear the keypad entry and start over at Step 1.

An auto-select feature is available whenever a channel number or item number is selected. Instead of entering an integer value (channel number or item number) the SEL key on the keypad is used. Once the channel or item is auto-selected, all operations are the same as for manual selections. Auto-selection is requested by the operator pressing the SEL-key without prior input. (The keypad buffer is cleared on the CRT.)

Pressing SEL when a status grid is displayed causes the cursor to be placed around the highest priority color-coded channel. All unacknowledged (blinking) alarms are of higher priority than any acknowledged alarm. Repeated pressing the SEL key causes the cursor either to select the next highest unacknowledged alarm or to sequence through the channels displayed by priority. Using the auto-select feature is a fast and convenient method of selecting a channel when it first goes into alarm.

Pressing SEL on group displays causes the cursor to be positioned at the top of the channels in the display. Pressing SEL again causes the cursor to be positioned at the second channel. Repeatedly pressing SEL causes the cursor to be moved down one line each time until the last channel in the list is reached. Pressing SEL again causes the cursor to reposition at the first channel and start the auto-select sequence over again. Auto-select on group displays cannot be used to select channel zero unless the group is empty.

Auto-select on any display with data base items operates in much the same manner as it does on group displays. Pressing SEL positions the cursor at the first item (top of items). Pressing SEL again positions the cursor at the second item. Repeatedly pressing SEL causes the cursor to move down the list until the last item is reached. Pressing SEL again causes the cursor to be repositioned to the first item.

When the operator selects an unacknowledged channel on a status grid display, several things happen:

1. The channel name stops blinking; this shows that the operator has acknowledged the alarm.
2. The alarm acknowledgment is logged as a significant operator action.
3. The rectangle showing the channel name is outlined in white; this identifies which channel is currently selected.
4. The channel monitor control function keys and the channel display functions keys are enabled.

5. The grid status-marker for each grid display changes to show the new and most critical channel status for each grid display.

The operator may, of course, select any channel identified on a status grid, whether or not an alarm condition exists for that channel. The operation of the keypad is the same in either case.

When the operator initiates an auto-selection to select the next channel on the grid display, the channel is determined by the following criteria:

1. The channel defined with the highest unacknowledged (blinking color) status is selected.
2. If all channels are acknowledged, the next highest priority channel (to the currently selected channel) is selected. (Note that channels are ordered by priority of status. For multiple channels of the same priority, they are ordered by their position within memory tables.)
3. If neither of the above two conditions are found (this implies that the lowest priority channel is currently selected), then the channel with the highest acknowledge status is selected, restarting the auto-selection procedure at the beginning.

If the operator attempts to select a channel that is not identified on the current display, an error message appears at the bottom of the display screen. If the operator wishes to select more than one channel to acknowledge alarms, he must do so one channel at a time. Each time the operator selects an additional channel from those identified on status grid display, the white outline around the rectangle identifying the previously selected channel disappears and reappears around that for the newly selected channel. The operator may deliberately deselect any channel (to disable monitor control, for instance) by pressing the GRID display function key for the current status grid display.

#### NOTE

All unacknowledge alarms are "trapped" on the status grid display until they are acknowledged. That is, a channel may go into alarm and then return to normal, but the status grid continues to display the alarm condition (blinking) until the operator acknowledges it.

It should be noted that all inputs to the SPDS and DRMS are also input to the Interim Data Acquisition and Display System computer system. Individual points can be reviewed by the operator if there is any doubt to the validity of the information on the SPDS and DRMS. Additionally, hardwired instrumentation is available for most of the SPDS and DRMS input strings.

FIGURE 1  
RANCHO SECO CONTROL ROOM LAYOUT

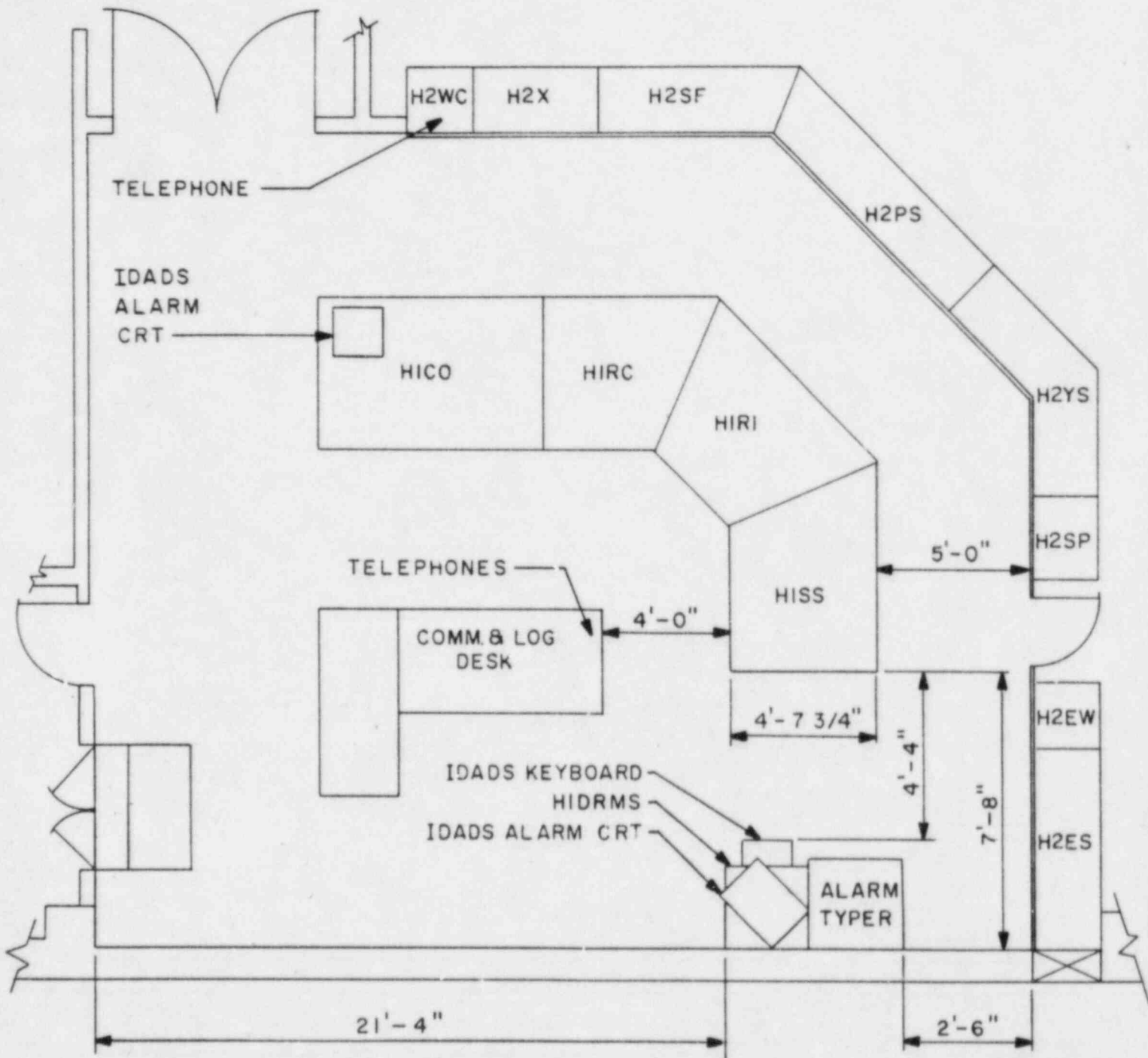
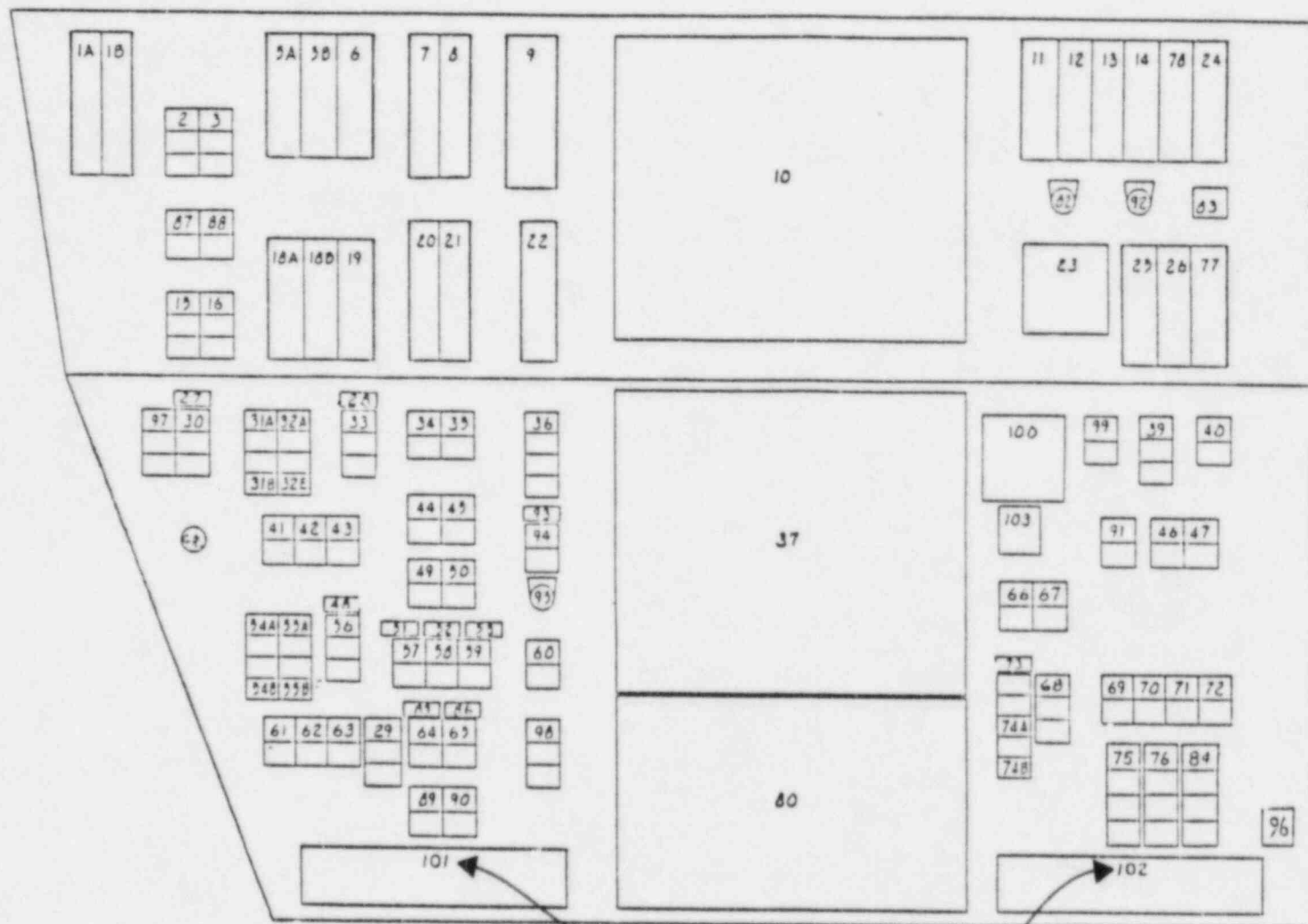




FIGURE 2

HISS

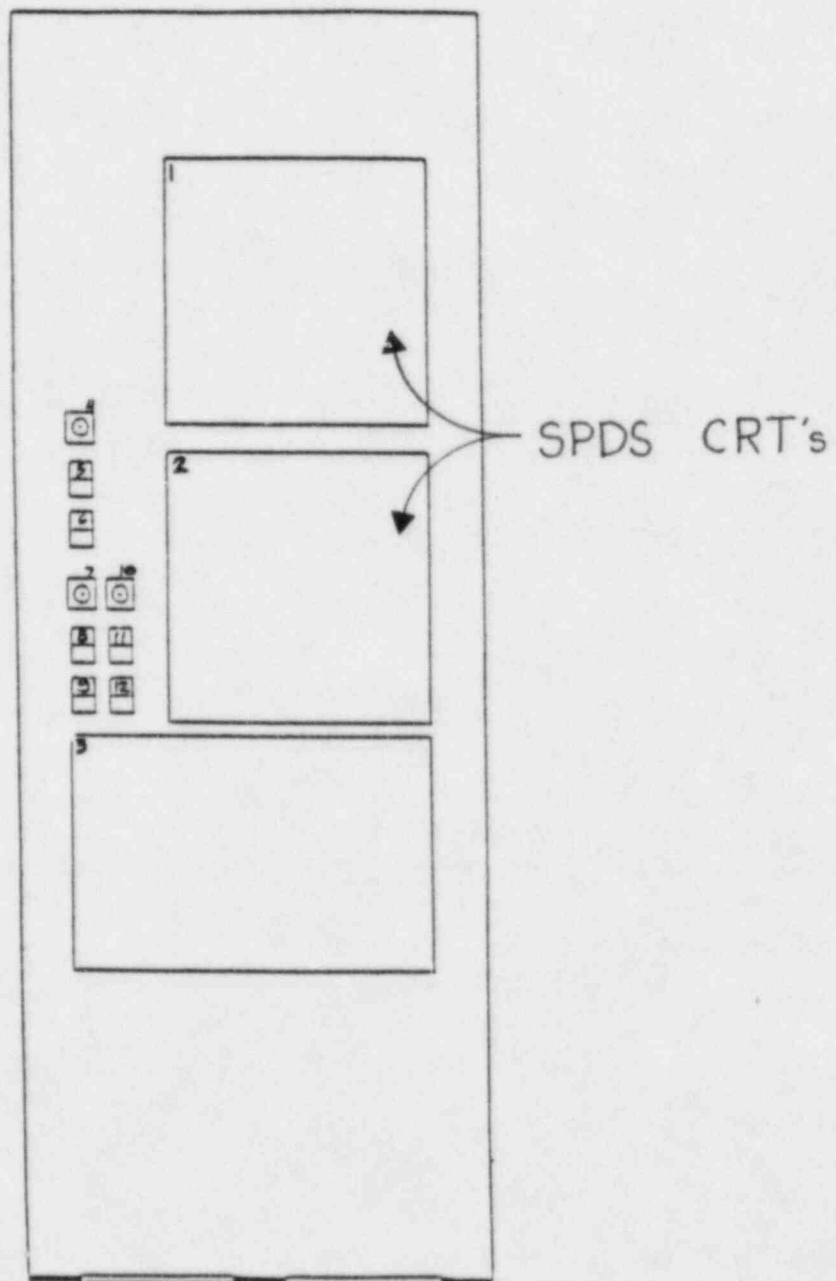


SPDS Control Panels

HISS

FIGURE 3

H2SP

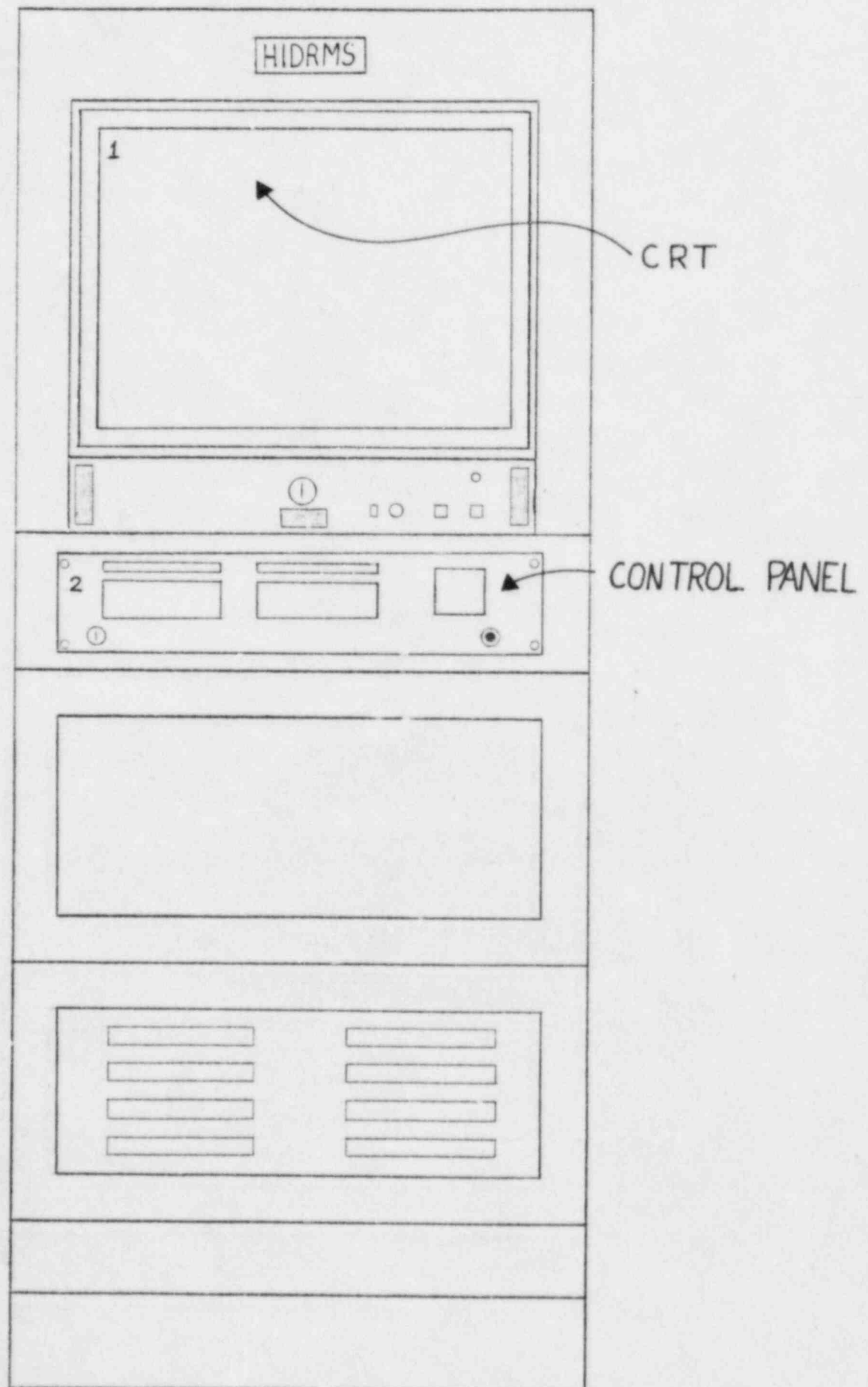


H2SP



FIGURE 4

H1DRMS



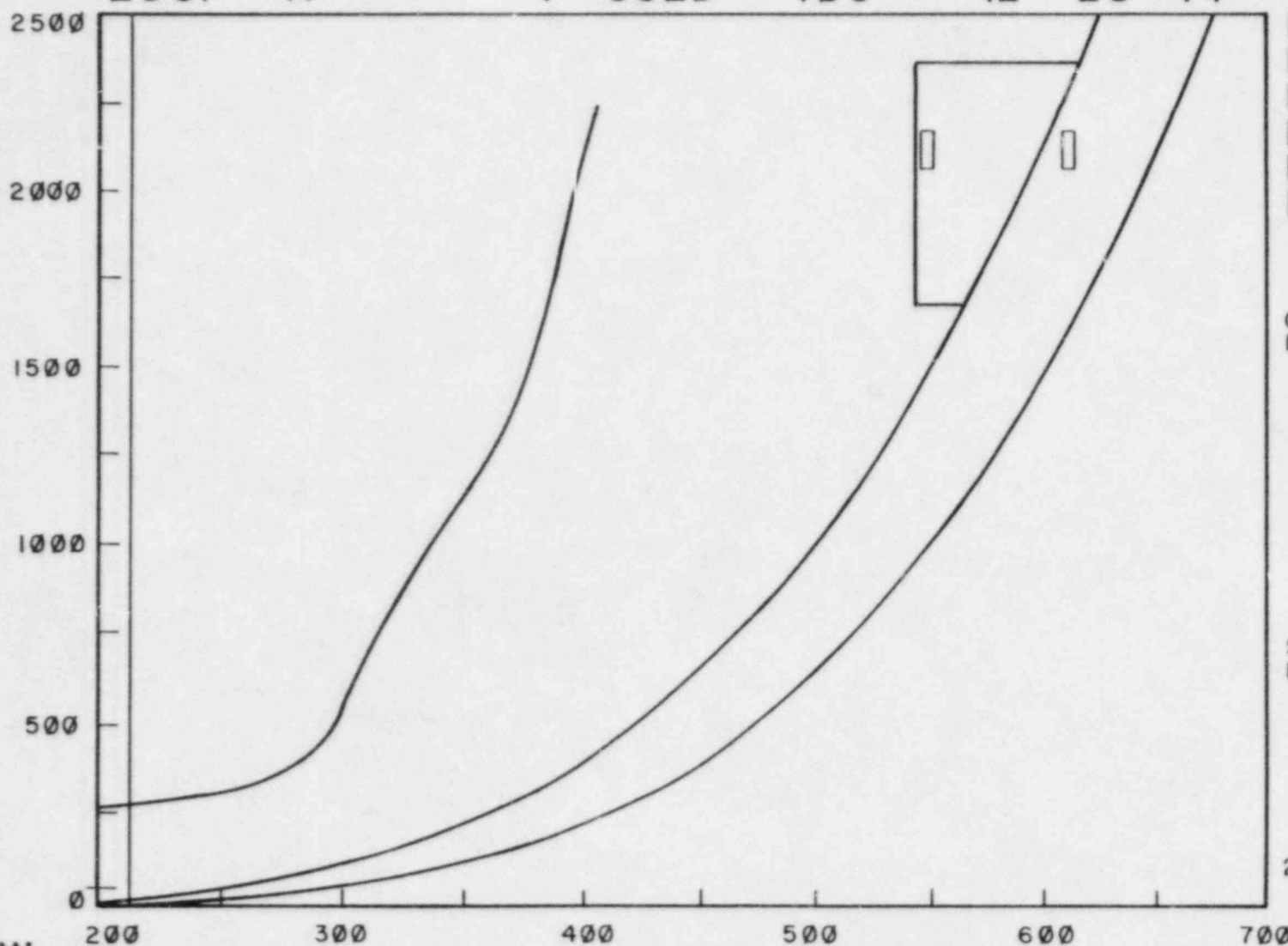
%PWR.  
0

PRES = 46  
LOOP A

T - HOT = 134  
T - COLD = 106

10 / 12 / 84  
12 : 28 : 44

P  
R  
E  
S  
S  
U  
R  
E  
  
P  
S  
I  
G



DHRS  
REACTIV  
CONT RAD  
CONT PRES  
CONT ISO  
PZR VLV

OP  
LVL  
100  
0  
64  
%

SU  
LVL  
250  
0  
249  
IN

FIGURE 5  
POST TRIP DISPLAY

%FLOW  
0

106  
134

TEMP F

Figure 6

Safety Parameter Display System  
Post-Trip Display

Critical Safety Function	Variables	Presentation Method
Reactivity Control	Source Range NI A&B Reactor Trip Status CRG 2-7 position	Alert
Reactor Core Cooling & heat removal from	T-hot A&B T-cold A&B RCS Press A&B WR RCS Press A&B NR RCS Press A&B LR T-incore (Avg. of 5 highest)*	Graphic & Alphanumeric
	OTSG Op Range Level OTSG SU Range Level	Bar Chart & Alphanumeric
	Decay Heat Flow A&B DHRS Suction Valves [2] LPI Injection Valves [2]	Alert
	OTSG Pressure	Graphic #
RCS Integrity	T-hot A&B T-cold A&B RCS Press A&B WR RCS Press A&B NR RCS Press A&B LR	Graphic & Alphanumeric
	OTSG Op Range Level OTSG SU Range Level	Bar Chart & Alphanumeric
Containment Integrity	Containment Pressure NR	Alert
	Containment Radiation 1&2	Alert
	Containment Isolation Valve Status (33) SFAS Channel 1A & 1B Trip Status	Alert
Radioactivity Control	Containment Radiation 1 & 2 (See also H1DRMS)	Alert

## NOTES

- \* T-incore versus RCS pressure requires the operator to actuate the Incore Temp pushbutton on the SPDS control panel (Figure 7) on H1SS (Item 101 or 102 see Figure 2).
- # OTSG Pressure is used in an algorithm to calculate and display the OTSG T-sat Line (Purple vertical line).

FIGURE 7  
SPDS CONTROL PANEL

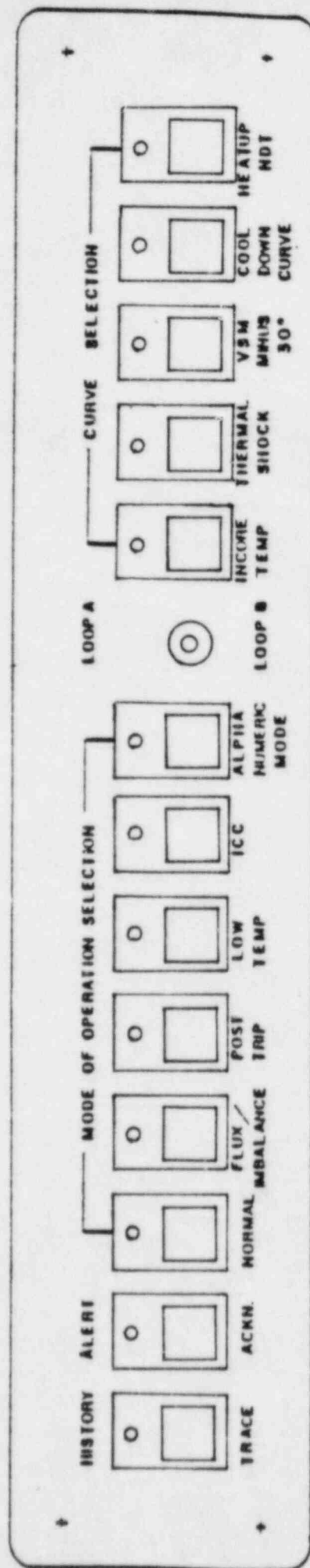


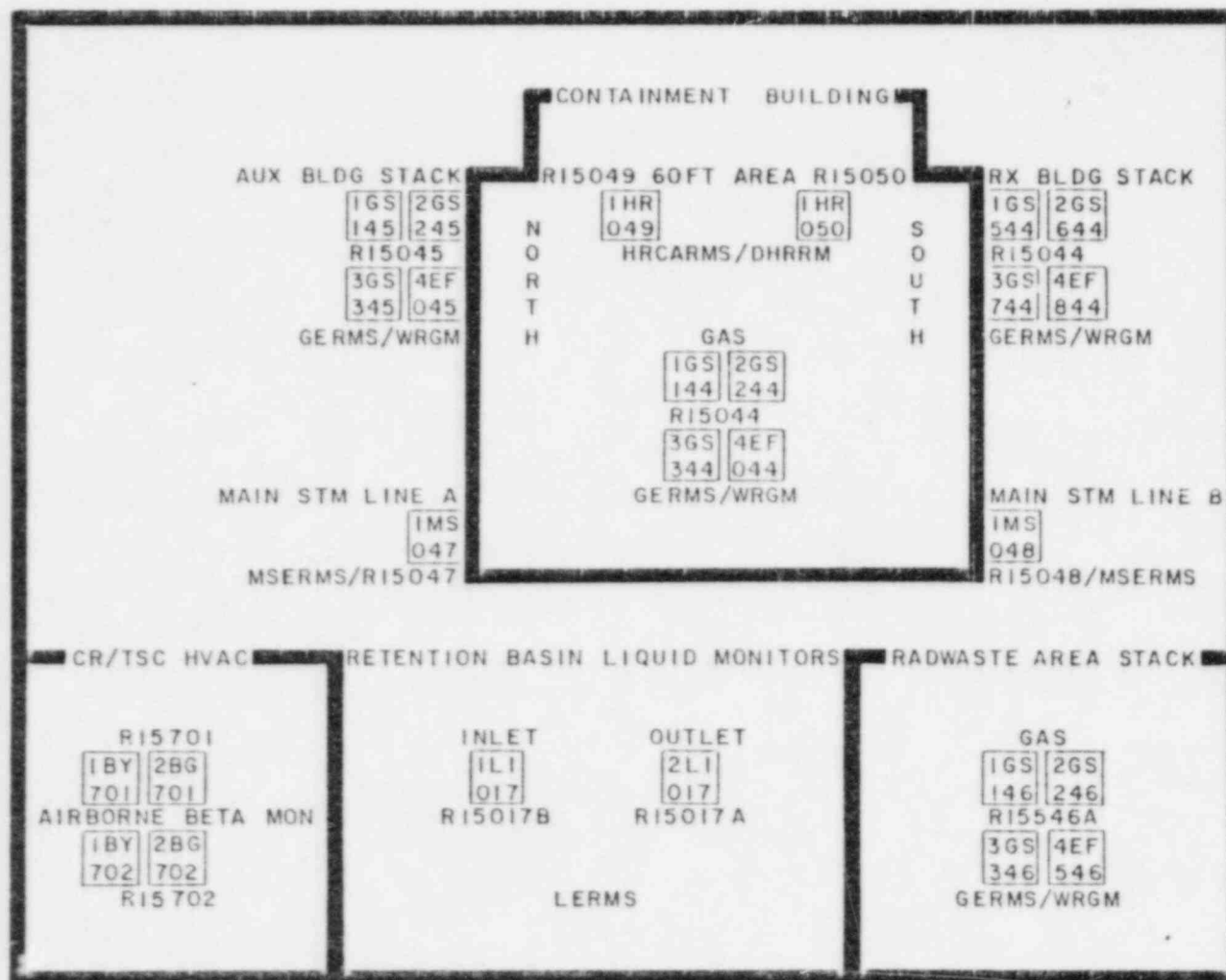
Figure 8

## Digital Radiation Monitoring System

Variables	Channels	Monitor Type
Auxiliary Building Stack	R15045	WRGM/GERMS
Reactor Building Stack	R15044	WRGM/GERMS
Reactor Building 60 ft	R15049 R15050	HRCARMS/DHRRM HRCARMS/DHRRM
Main Steam Line A	R15047	MSERMS
Main Steam Line B	R15048	MSERMS
Radwaste Area Stack	R15056	WRGM/GERMS
Retention Basin Liquid Monitors	R15017A R15017B	LERMS LERMS
CR/TSC HVAC	R15701 R15702	Airborne Beta Monitor Airborne Beta Monitor

Monitor Type Legend

WRGM	-	Wide Range Gas Monitor
GERMS	-	Gaseous Effluent Radiation Monitoring System
HRCARMS	-	High Range Containment Area Radiation Monitoring System
DHRRM	-	Digital High Range Radiation Monitor
MSERMS	-	Main Steam Effluent Radiation Monitoring System
LERMS	-	Liquid Effluent Radiation Monitoring System

FIGURE 9  
DRMS GRID 1 DISPLAY

GRIDS BB

BB

TO SELECT CHANNEL: 1) KEY IN CHANNEL NUMBER 2) PRESS SET KEYPAD [ ]

IM5048 CHECK SOURCE ENERGIZED

PRINTER OFF-LINE RM-11 #1

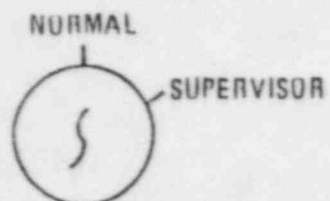


# SYSTEM SPECIAL FUNCTIONS

SYS ACK	PRINTER OFF-LINE	STOP LOG	PRINT CRT
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GRID 1	GRID 2	GRID 3	GROUP MENU
GRID 4	GRID 5	GRID 6	LOG MENU
CLEAR SCREEN	ALARM HISTORY		

## SYSTEM DISPLAYS



# CHANNEL MONITOR CONTROL

FLOW	FILT	PURGE	C/S
------	------	-------	-----

TREND 10 MIN	TREND HOURLY	TREND DAILY	
MON ITEMS	CHAN ITEMS	STATUS	

## CHANNEL DISPLAYS

SEL	7	8	9
ENTER	4	5	6
CLEAR	1	2	3
LIT	-	0	+

# LAMP TEST

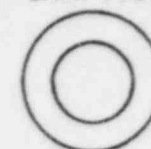


FIGURE 10  
HIDRMS CONTROL PANEL