MISSISSIPPI POWER & LIGHT COMPANY
Helping Build Mississippi
P. O. BOX 1640, JACKSON, MISSISSIPPI 39205

August 7, 1981

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U.S. NUCLEAR REGULATORY COMMISSION

NUCLEAR PRODUCTION DEPARTMENT

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

Attention: Mr. Harold R. Denton, Director

Dear Mr. Denton:

SUBJECT: Grand Gulf Nuclear Station
Units 1 and 2
Docket Nos. 50-416 and 50-417
File 0260/0272/L-344.0
Human Factors Engineering Review
AECM-81/291

On July 31, 1981, Mississippi Power & Light Company (MP&L) submitted a response (letter AECM-81/267) to the findings of the Human Factors Engineering Branch (HFEB) review of the Grand Gulf Nuclear Station (GGNS) Unit 1 control room.

Since then, in several informal conversations, changes have been requested to resolve several open items. Attached is the revised MP&L response to the HFEB findings. Revisions are denoted by "change bars" in the margin of the report.

Yours truly,

John D. Richardson for

L. F. Dale
Manager of Nuclear Services

SHH/JDR:lm
Attachment

cc: Mr. N. L. Stampley
Mr. G. B. Taylor
Mr. R. B. McGehee
Mr. T. B. Conner

Mr. Victor Stello, Jr., Director
Office of Inspection & Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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HUMAN FACTORS ENGINEERING

CONTROL ROOM DESIGN REVIEW FINAL REPORT

GRAND GULF NUCLEAR STATION

MISSISSIPPI POWER AND LIGHT COMPANY

CONTROL ROOM WORKSPACE

ITEM	PRIORITY	FINDING	
1	3	1.1	The total height of the wing portions of the Panel 680 console is 62 inches above the floor level. This dimension exceeds that recommended for a sit-down console. The recommended maximum heights are: Not necessary to see over console - 58 inches above floor level. Necessary to see over console - 44 inches above floor level. The right wing portion of the Panel 680 console blocks the operator's view of Panel 601. An operator standing at the central position of Panel 680 cannot see the benchboard or the lower part of the vertical board on Panel 601 over the right side of the Panel 601 benchboard, vertical board, or annunciators.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
2	3	1.2	The triangular metal panels at the left and right ends of Panel 680 unnecessarily obstruct the view past the ends of the console.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.

CONTROL ROOM WORKSPACE

ITEM	PRIORITY	FINDING	
3	3	1.3	There are several instances of unnecessary panel-mounted instruments on the main control room panels, the back panels, and the Remote Shutdown panels. The square root extractor for the RCIC FLOW CONTROL meter on Panel 601 requires no operator interaction. Two CHLORINE SAMPLE TEMPERATURE switches located on Panel 855 are maintenance switches that require no operator interaction.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
4	3[1]	1.4	There are some non-functioning, spare meters on section 1 and section 2 of Panel 807.
		RESPONSE	The non-functioning spare meters on Panel P807 will be removed from the panel or covered in some manner to prevent operator misinterpretation. This discrepancy will be corrected prior to loading fuel.
5	2	1.5	The controls and displays for the EXHAUST SYSTEMS RADIATION MONITORS and the controls for the same systems for the HVAC system are divided into four divisions that are at four separate locations. Two divisions are located on separate racks in the back panel area and two divisions are located on separate racks in the upper cable spreading room.
		RESPONSE	The four channel exhaust systems radiation monitors serve to provide isolation of ventilation systems in the event of gross radioactivity releases and do not provide actual measurements of radioactive effluents from ventilation systems. As such, the function of these monitors is to provide a go, no-go status of radioactivity in the vent system, and actual radiation measurements are not of significant importance to the operator. Annunciators have been provided on panel P601 which indicate the trip status of these radiation monitors. Based on the above, no further action is planned.

CONTROL ROOM WORKSPACE

ITEM	PRIORITY	FINDING	
6	1	1.6	The RHR JKY PUMP controls are located on widely separated panels. These controls are located on the main control room panel (Panel 601) that contain the remainder of the RHR system controls and displays, on a back panel (Panel 872), and on a panel in the upper cable spreading room (Panel 871).
		RESPONSE	The RHR jockey pumps are normally operating pumps which do not require remote monitoring. Further, abnormal RHR A(B)(C) discharge header pressure, which would be an indication of a non-running jockey pump, is annunciated on P601. The RHR B jockey pump run indication is clearly visible and easily distinguishable from in front of the P601 panel, which contains the balance of the RHR loop B controls and indications. Based on the above, it is considered that no safety problems exist and the relocation of the pump controls will be considered with the priority 3 items in the long term design review.
7	3	1.7	The desk for the second reactor operator is located behind the shift supervisor's desk and faces away from the main control console and panels. The views of Panel 680 and Panel 601 are poor from this location. The view of Panel 870 is totally blocked by the Panel 680 console.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
8	1	1.8	No telephones or other communications facilities are provided for the shift supervisor at the shift supervisor's desk.
		RESPONSE	The frequently used telephones necessary for normal plant operation will be located on or in the immediate vicinity of the Shift Supervisor's desk. Table 1 has been provided to clarify the communication system for the plant. This discrepancy will be corrected prior to loading fuel.

CONTROL ROOM WORKSPACE

ITEM	PRIORITY	FINDING	
9	1	1.9	There are small openings on the benchboard sections of the Panel 680 console that permit small parts and debris to fall into the panel interior.
		RESPONSE	This is a problem not only for panel P680 but for all the benchboards as well. Provisions will be incorporated to cover the holes to prevent debris from falling into the panels. This discrepancy will be corrected prior to loading fuel.
10	3	1.10	A large switch handle protrudes from the 480V fuse box located near the end of Panel 655 in the back panel area. The protruding handle leaves only a 16 inch wide passageway between the end of the switch and the end of Panel 655. The protruding switch handle is a hinderance to movement and a safety hazard to personnel going past it. This switch is also susceptible to inadvertant operation.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
11	2	1.11	The back portion of Panel 680 that is recessed below the front portion of the console benchboard contains controls and displays. These controls and displays are partially hidden from the view of a seated operator. The recessed portion of the benchboard may also become a convenient receptacle for extraneous items that may interfere with viewing the displays and operating the controls that are located there.
		RESPONSE	Chairs adjustable in height will be provided at panel P680 to ensure that seated operators can see the recessed portion of panel P680, while monitoring the center portion. Administrative controls will preclude using the recessed area as storage for superfluous items. This discrepancy will be corrected prior to loading fuel.

CONTROL ROOM WORKSPACE

ITEM	PRIORITY	FINDING	
12	2	1.12	No provisions are made at any of the main control room panels for an operator to lay down procedures manuals and other reference materials to be used while performing task sequences at these locations.
	RESPONSE		An adequate number of trays for holding procedure manuals or other reference materials will be provided for use at the control room panels. The tray(s) will either be of a cart type (on casters) or will be affixed to the rail on the front of each panel. This discrepancy will be corrected prior to loading fuel.
13	2	1.13	No writing surface space is provided for an operator at the Panel 680 console.
	RESPONSE		The removal and relocation of the annunciator push-buttons to another insert will be considered with the priority 3 items in the long term design review. The operator will be instructed not to place procedures, papers over controls, etc.
14	1	1.14	The top row of meters on each of the Remote Shutdown panels is located higher than the recommended maximum height of 70" for reading by a 5th percentile operator. The high location also causes parallax error when reading the upper portions of the vertical meter scales.
	RESPONSE		A major modification is being made to the upper section of the remote shutdown panels. In order to have proper environmental qualification for the devices on the remote shutdown panels, the GE 180 meters and Bailey controller are being removed and replaced with Foxboro Spec 200 instruments. This modification is part of the long term equipment qualification and will be implemented on a schedule consistent with these requirements. The new panel layout will have no top row of meters, and all meters will be located at the same height as the present second row of meters. As an interim step, stools will be provided at each remote shutdown panel for operator use. The interim step will be completed prior to loading fuel. Figure 1 shows the type of Foxboro instruments to be used.

CONTROL ROOM WORKSPACE

ITEM	PRIORITY	FINDING	
15	3	1.15	The annunciator SILENCE, RESET, and TEST response switches for the SEISMIC annunciators on Panel 856 are mounted too high. These pushbutton switches are located 83 inches above the floor and are beyond the reach of a 5th percentile operator.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
16	3	1.16	There are some controls and displays on the back panels that are mounted higher than is recommended above the floor (recommended max heights are 70" for displays and approximately 60" for controls).
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
17	3	1.17	Some controls and displays on the backpanels are mounted too close to the floor for easy operation or viewing. For example, a 3-position switch on Panel 694 is located only 33 inches above the floor (recommended minimum distance from floor = 34 inches).
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
18	1	1.18	There is no paging system phone at the Division 2 Remote Shutdown panel. When the fire door between the Division 1 and the Division 2 Remote Shutdown panels is closed, access to the paging system telephone at the Division 1 Remote Shutdown panel is blocked.
	RESPONSE		Paging systems phones, along with sound powered phone jacks, have been provided at both divisions of the remote shutdown panels. Provisions will be made for the storage of headset at each of the panels. Based on the above, no further action is planned.

CONTROL ROOM WORKSPACE

ITEM	PRIORITY	FINDING	
19	2	1.19	The handset cords of the paging system phones located at the ends of the panels in the main control room area are too short to allow an operator reasonable mobility at the control surfaces while using the phone.
		RESPONSE	The handset cords on the paging system phones will be increased in length to allow adequate mobility of the operator at the panel surfaces. This discrepancy will be corrected prior to loading fuel.
20		1.20	No provisions have been made for speech transmission and voice communications while wearing emergency breathing apparatus face masks.
		RESPONSE	Throat microphones and headsets have been pu[illegible]sed which will be used as required to provide co[illegible]ications for personnel wearing emergency breathing apparatus. These items will be stored with the emergency breathing apparatus and will be provided prior to loading fuel.
21	1	1.21	There are no provisions to store procedures at the two Remote Shutdown panels.
		RESPONSE	Provisions will be made for storing necessary procedures at the two remote shutdown panels. This discrepancy will be corrected prior to loading fuel.
22	3	1.22	There is no systematic or sequential correlation between the identification number assigned to each panel and the location of that panel in the main control room area, the back panel area, or the upper cable spreading room.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.

CONTROL ROOM WORKSPACE

ITEM	PRIORITY	FINDING	
23	1	1.23	The temporary emergency telephones are not readily distinguishable from other black telephones in the control room.
		RESPONSE	A color coding scheme for the phones will be used to distinguish the various phone systems. This discrepancy will be corrected prior to loading fuel.

WORKPLACE ENVIRONMENT

ITEM	PRIORITY	FINDING	
24	2	2.1	The ventilation in the area of the Remote Shutdown panels is very poor. This condition will be made worse if the fire door separating the two panels is closed.
		RESPONSE	At the time of the NRC design review, the permanent ventilation system for this area was not operating. When the system is operational, the ventilation in the remote shutdown area will be evaluated to ensure it complies with design criteria. The loss of ventilation which would be caused by closing the fire door is not of concern. This fire door is closed only in the event of a fire on one side of the remote shutdown room. The plant design bases do not assume a fire in the remote shutdown panel area occuring simultaneously with an event which requires control room evacuation. Therefore, at any time when operators are required to be stationed at the remote shutdown panels, the fire door will be open.
25	2	2.2	The curved-face meters located in the middle and top rows of displays on all vertical boards in the main control room area exhibit glare from the ceiling lights. Although this glare generally does not obscure the scales or pointers of the meters, it is distacting and will induce operator fatigue.
		RESPONSE	The GE curved faced meters on the vertical boards exhibit glare in the upper third or so of the meter scale. While the glare is a problem, the meter scales and pointers can be read and read from a distance. We are presently in contact with a supplier of a light filtering material which can be placed on the meter surface to eliminate the meter glare. In addition we are also investigating an alternate method of clear lacquer on the meter surface which has proved successful at other plants. This discrepancy will be corrected prior to achieving 5% power.

WORKPLACE ENVIRONMENT

ITEM	PRIORITY	FINDING	
26	1	2.3	The SSW SYSTEM B FLOW meter on the Division 2 Remote Shutdown panel exhibits glare from the ceiling lights.
	RESPONSE		As part of the remote shutdown panel modification discussed in the response to Finding 1.14, the GE 180 meters are being replaced with Foxboro N-257H meters. Once the modification is made then the glare on the meters will be re-evaluated and corrected as necessary. As an interim step, the glare on the SSW SYSTEM B FLOW meter will be corrected prior to loading fuel.
27	2	2.4	The CRT displays on Panel 680 exhibit extreme glare from the ceiling lights. This problem is especially noticeable from the position of a seated operator because of the upward tilt orientation of the CRTS.
	RESPONSE		The design of the plant is such that the CRT displays are an aid to the operators and are not required for plant operation or safe shutdown. While the glare is a problem and does seem to reduce readability in the area of the glare it can still be read and read from a distance. No problems seem to exist for a standing operator. We are presently in contact with a supplier of a light filtering material which can be fastened to the CRT screen to eliminate the meter glare. In addition, different light bulbs are being considered that will possibly reduce the glaring effect. This discrepancy will be corrected prior to achieving 5% power.
28	3	2.5	Some labels on the back panels are shadowed by their associated displays. While these labels are generally still readable, the shadowing will contribute to operator fatigue
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.

WORKSPACE ENVIRONMENT

ITEM	PRIORITY	FINDING	
29	3	2.6	The curved-face meters on the vertical boards of the main control room panels have luminance ratios (LRs) that are too high. The portions of the meters that exhibited glare had LRs of approximately 11:1, while the portions without glare had LRs of approximately 5:1 (recommended max LR = 3:1)
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
30	3	2.7	The reflectances off of the displays on the main control room panles are below the recommended 80%-100% range, with the exception of a section of Panel 870 (measured reflectance = 95%). The reflectances measured at the other panels ranged from 3% to 72%.
		RESPONSE	Priority ratings of 3 discrepancies will be evaluated and proposed action reported as part of the long term design review.
31	1	2.8	The emergency lighting system provides inadequate levels of illumination to the areas in front of main control room Panels 870, 601, and 864 (recommended min illumination level = 10 footcandles). The measured levels ranged from 0.2 footcandles in front of Panel 601 to 9.1 footcandles in front of Panel 870.
		RESPONSE	All control room lighting is supplied from an inverter supplied bus or the emergency diesel generators. Upon loss of offsite power the inverter supplied lights supply emergency lighting in the control room. After 12 seconds, all the lighting in the control room is re-energized from the emergency diesel generators. At the time of the evaluation, only the inverter supplied lights were measured. As all lighting is restored after 12 seconds, no further action is planned.

WORKSPACE ENVIRONMENT

ITEM	PRIORITY	FINDING	
32	1	2.9	There is no emergency lighting provided in the back panel area, other than battery-powered lights indicating the exits. The exit lights do not provide sufficient illumination to allow the operator to read displays or labels at the back panels.
		RESPONSE	The center fixture in each row of lights in the back panel area will be reconnected to the inverter busses to provide emergency lighting for the back panel. This discrepancy will be corrected prior to loading fuel.
33	1	2.10	There is no convenient supply of spare bulbs for the indicator lights on the Remote Shutdown panels. The closest supply of spare bulbs is in the control room which is three levels above the Remote Shutdown area. Since there is no lamp test capability for the indicators on these panels, the operator cannot easily determine the actual status of the indication.
		RESPONSE	Provision will be made to store spare indicator light bulbs in the vicinity of the Remote Shutdown panels. This discrepancy will be corrected prior to loading fuel.

ANNUNCIATORS

ITEM	PRIORITY	FINDING	
34	1	3.1	There is no annunciator to indicate NSSSS DIV 2 TRIP UNIT OOFILE/PWRLOSS as there is for DIV 1 on Panel 601.
	RESPONSE		The present label is incorrect and will be revised to include all NSSSS divisional trip units. This discrepancy will be corrected prior to loading fuel.
35	1	3.2	The annunciator tile for RADWASTE BUILDING EXHAUST FILTER A DIFF PRESS HIGH is missing on Panel 854.
	RESPONSE		A new annunciator tile will be provided as part of the re-labeling effort for panel P854. This discrepancy will be corrected prior to loading fuel.
36	1	3.3	On Panel 601 and Panel 680, the REACTOR LEVEL LOW annunciators are illuminated for different low water levels within the reactor. However, the specific level associated with each annunciator alarm is not indicated by the annunciator legend.
	RESPONSE		The annunciator tiles dealing with REACTOR LEVEL LOW will be revised as indicated in Figure 2 to reflect specific levels. This discrepancy will be corrected prior to loading fuel.

ANNUNCIATORS

ITEM	PRIORITY	FINDING	
37	1	3.4	Annunciator windows that have multiple inputs or channels do not have the capability for reflash if the first alarm has not cleared.
	RESPONSE		The annunciator system will be modified to include the capability for certain annunciator windows that have multiple inputs to reflash if the first alarm has not cleared and a second alarm occurs. The annunciators were selected for reflash based on: (1) criticality to plant safety, (2) necessity for reflash, and (3) the availability of other indication. Those annunciators for which reflash modules will be provided will be denoted by a black square in the lower right-hand corner of the annunciator tile. While equipment has been ordered and engineering is proceeding, it is doubtful that this item can be accomplished prior to loading fuel. This discrepancy will be corrected prior to startup following first refueling outage.
38	1	3.5	There is no first-out alarm panel. Alarms are stored in the process computer for printout in the order of occurrence.
	RESPONSE		Both the BOP & NSS computers provide a sequence of events capability which includes all points which would normally be included in a first-out system. This is provided to the operator via hard copy from the computer printers. Thus the operator will be provided with a hard copy printout of parameters or trips which cause the reactor to scram. A sample of the BOP sequence of events printout is provided in Table 5. Based on the above, no further action is planned.

ANNUNCIATORS

ITEM	PRIORITY	FINDING	
39	1	3.6	The annunciator response procedures have not been properly coded to the panel identification and matrix location systems.
		RESPONSE	The Alarm Response Instructions (ARIs) will be coded to be consistent with the panel identification and matrix systems. This discrepancy will be corrected prior to loading fuel.
40	3	3.7	Annunciator tiles are not consistently grouped according to priority. Although functional grouping on most panels is generally good, the grouping according to priority is not consistent. The practice of locating the red (trip) tiles on the top row of the annunciator panel is not followed on all panels.
		RESPONSE	Prior rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
41	1	3.8	The FEEDWATER annunciator tiles on Panel 680 are white. These tiles should be amber to conventionally identify second level of consequence alarms.
		RESPONSE	These annunciators will be re-colored in accordance with the new annunciator re-priorization scheme, which will include four colors: red, amber, white, and blue. This discrepancy will be corrected prior to loading fuel.

ANNUNCIATORS

ITEM	PRIORITY	FINDING	
42	1	3.9	Some annunciators are not located above their associated controls and displays. Two examples of this are the MSR annunciators on Panel 680 and the ADS-B annunciators on Panel 601. The MSR annunciator tiles are on section 8A, while the related controls and displays are on sections 9C and 10C. The ADS-B annunciator tiles are on section 18A, while the related controls are on section 19C. The ADS annuciators are grouped in an unconventional B-left/ A-right arrangement while the associated ADS controls and displays are grouped in a conventional A-left/ B-right arrangement.
	RESPONSE		The annunciators associated with the turbine-generator and its' auxiliaries are located on inserts 8A, 9A, and 10A of panel P680, while the associated controls are located on inserts 9C and 10C. Due to the large number of annunciators it was not possible to locate each and every annunciator tile above its' associated control. Instead functional grouping of the major component annunciators was considered of prime importance. MSR annunciators consist of only minor annunciators (i.e., drain levels, etc.) which were functionally grouped in the closest available space. If the MSR annunciators were relocated to insert 10A, then other annunciators would have to be moved and the functional grouping would be lost. Based on the above the MSR annunciators will be re-evaluated with the priority 3 items in the long term design review. It is recognized that the annunciator window arrangements on insert 18A and 19A of panel P601 are less than optimal, however, we believe no safety problem exist. The ADS annunciators usually refer to a specific action that has taken place in the ADS logic (i.e., ADS LOGIC B SEAL IN ADS B LO WTR LVL CONF,etc) instead of an abnormal plant condition. Hence the annunciators are more for reference purposes than specific actions. A survey of the ADS Alarm Response Instructions (ARIs) confirmed the fact that the majority of the ADS B ARIs are exactly the same as the ADS A ARIs. Based on the above we believe no safety problem exists in the arrangement of the ADS annunciator, however, in response to the NRC concerns the ADS annunciators will be relocated to be consistent with the left-to-right convention. The rearrangment of annunciators above controls for insert 18A and 19A will be re-evaluated as a priority 3 item in the long term design review.

ANNUNCIATORS

ITEM	PRIORITY	FINDING	
43	1	3.10	The CRD ISOLATION VALVE annunciator tile is not located with the other CRD annunciators on Panel 601.
		RESPONSE	The CRD ISOLATION VALVE annunciator tile on panel P601, insert 22A, will be relocated from window B-1 to window B-3 to place it with the other CRD annunciators. This discrepancy will be corrected prior to loading fuel.
44	3	3.11	The bulbs for the small annunciators on Panel 680 are difficult to remove and replace. The small bulbs are hard to grip and are easily dropped.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
45	1	3.12	The annunciator tile label 480V LCC 13BD3 on Panel 807 should read 11BD3.
		RESPONSE	The annunciator tile is incorrect and will be revised to read 11BD3. This discrepancy will be corrected prior to loading fuel.

ANNUNCIATORS

ITEM	PRIORITY	FINDING	
46	1	3.13	The annunciator alarms have no visual or audio signal which indicates a cleared alarm. Presently, a tile for a cleared alarm will remain illuminated until the RESET response control is pressed. This will erroneously indicate to the operator that the alarm conditions still exists.
		RESPONSE	The annunciator system is being modified to function with the sequence of operation shown on Table 2. The flash rate of the "ringback" logic will be such that it is easily distinguishable from that corresponding to an alarm. A fourth pushbutton will be located at the annunciator controls on the panels in the main operating area. The audible ringback consists of a bell that is easily distinguishable from the computer alarm, evacuation alarm, and fire alarms. This discrepancy will be corrected prior to loading fuel.
47	3	3.14	The annunciators on Panel 855, which are not tilted forward, exhibit significant glare when unlit.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design reivew.

CONTROLS

ITEMS	PRIORITY	FINDING	
48	1	4.1	The REACTOR FEED PUMP TURBINE TRIP A and B pushbuttons on Panel 680 are not readily distinguishable from other nearby pushbuttons and are not guarded to prevent inadvertent actuation.
		RESPONSE	The Reactor Feed Pump Turbine Trip pushbuttons will be changed to red pushbuttons to make them more distinguishable. Shrouds will be added around the pushbuttons to prevent inadvertant actuation. This discrepancy will be corrected prior to loading fuel.
49	1	4.2	The RCIC MANUAL ISOLATION pushbutton on Panel 601 is not readily distinguishable from the adjacent RCIC RESET and RCIC MANUAL INITIATE pushbuttons. The RCIC MANUAL ISOLATION pushbutton is not guarded to prevent inadvertent actuation.
		RESPONSE	The RCIC manual isolation pushbutton will be changed to a red pushbutton to make it distinguishable from the adjacent RCIC Reset pushbutton. A shroud will be added to the pushbutton to prevent inadvertant actuation. This discrepancy will be corrected prior to loading fuel.
50	3	4.3	The pairs of rectangular pushbuttons used on Panel 680 do not have sufficient physical separation or tactile differentiation between the two buttons to prevent inadvertent or incorrect actuation. The pushbuttons of each pair generally have opposite functions (e.g. Close/Open, Start/Stop), but an operator could easily make an error if not looking at the button while actuating it.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.

CONTROLS

ITEM	PRIORITY	FINDING	
51	2	4.4	The four pushbutton IRM RANGE SELECTOR switches on Panel 680 are 3/4 inch square and are separated by 1/4 inch with no barriers between the switches. These switches can be inadvertently or incorrectly actuated.
		RESPONSE	The IRM RANGE SELECTOR switches on panel P680 is composed of 'UP' and "DOWN' pushbuttons for each of the 8 IRM channels along with various indicators and status lights. The inadvertert or incorrect actuation of a pushbutton would cause: (1) no consequences, (2) rod block, or (3) half scram. All of the conditions are in the fail safe conditions and this has no affect on plant safety, but rather plant availability. Based on the above, this item will be considered with the priority 3 items in the long term design review.
52	1	4.5	The INFLUENCE LIMIT control temporarily installed on top of the Panel 680 console is mounted too high and is too near the console edge where it is vulnerable to inadvertent actuation.
		RESPONSE	The INFLUENCE LIMIT switch was temporarily installed for pre-op testing and turbine roll. The permanent switch will be a flush mounted status light, similar to the other status lights on the panel. Since it is only a status light and has no control functions, it is not subject to inadverent operation. The permanent light will be installed prior to loading fuel.
53	3	4.6	Unprotected J-handle switches protrude 2 1/2 inches from the vertical back panels. These handles are vulnerable to inadvertent activation.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed action reported as part of the long term design review.

CONTROLS

ITEM	PRIORITY	FINDING	
54	1	4.7	The IRM, APRM, and SRM BYPASS switches for NEUTRON MONITOR BYPASS DIVISION 1 in the left center depressed section of Panel 680 do not lock into the activated position. It is possible to accidentally deactivate these switches while reaching past them for the RPS A, RPS B, and OOSVC switches.
		RESPONSE	Although the inadverent deactivation of the bypass switches would be in the fail safe condition, the RPS A and B OOSVC switches will be relocated on insert 5B. The switches will be relocated to a higher position to prevent inadverent deactivation by the bypass switches, while reaching for the RPS OOSVC switches. This discrepancy will be corrected prior to loading fuel.
55	1	4.8	DELETE
56	1	4.9	Rotary switches on Panel 870 are grouped in large, evenly spaced, rectangular arrays with only labels to identify the function of each control. The largest of these rectangular arrays is a 6X5 matrix of switches. This arrangement impedes rapid and correct selection of a specific control within a group.
		RESPONSE	The above discrepancy conerns inserts 3C and 9C of panel P870, which contains automatic isolation valves for the plant. While the inserts do consist of large matrixes of rotary switches, they have been functionally grouped according to the areas for which they isolate (e.g. Auxiliary Building, Containment and Drywell). It is believed that this type of demarcation is better than individual system demarcation for the purpose these valves serve. Each matrix consists of many systems, some consisting of one switch while others consist of many. The individual demarcation and/or larger group labels for each system within the main demarcation, while functionally relating controls, will only add unnecessary clutter to the inserts and make matters worse. The valves automatically isolate the associated building on an isolation signal and normally require no operator interface. During accident conditions in which an Auxiliary Building isolation, etc., has occurred, the insert should have basically a green board concept and during normal operation the insert should have a red

CONTROLS

ITEM	PRIORITY	FINDING
56	1	4.9

RESPONSE (con't) board concept. Other matrixes on the panel were re-evaluated to determine the best methods for demarcation. It is believed that the present demarcation system best suits the functions served by each set of switches. Based on the above, no further action is planned.

CONTROLS

ITEM	PRIORITY	FINDING	
57	1	4.10	The white color of the FR 1ST F043A JOG OPEN backlit legend pushbutton switch in the XOVER PIPE LS DR VLV group on Panel 680 does not conform to the OPEN=Red indicator light color convention used in the control room.
		RESPONSE	The backlit pushbutton for the FR 1ST F043A JOG OPEN has an incorrect white lens which will be replaced with a red lens. This discrepancy will be corrected prior to loading fuel.
58	3[1]	4.11	The MANUAL SCRAM pushbuttons on Panel 680 have inconsistent color-coding: Three are pink and one is red.
		RESPONSE	The MANUAL SCRAM pushbuttons on panel P680 will be changed to provide a consistent red color coding. This discrepancy will be corrected prior to loading fuel.
59	1	4.12	There is excessive use of keyswitches. Use of large numbers of keyswitches that are operated by identical keys provides little protection from unauthorized operation of the controls.
		RESPONSE	This is considered an administrative problem not related to safe plant operation. To solve this administrative problem a detailed review will be made and certain switches will be replaced. Based on the above, this item will be included with the priority 3 in the long term design review.

CONTROLS

ITEM	PRIORITY	FINDING	
60	1	4.13	The LOWER (speed decrease) pair of MANUAL SPEED CHANGE pushbuttons for each REACTOR FEED PUMP TURBINE on Panel 880 are in an unconventional left to right arrangement. The pair arrangement is: FAST = left (gray) / SLOW = right (black). The associated RAISE (speed increase) pair of pushbuttons are in the preferred arrangement: SLOW = left (gray) / FAST = right (black).
		RESPONSE	The LOWER and RAISE pushbuttons on the MANUAL SPEED CHANGER for each RFPT must be considered together as a group. The FAST pushbutton on the LOWER control is located to the left since this will cause a more rapid decrease in turbine speed. Thus the two pairs of buttons together follow a logical left-to-right sequence: fast decrease, slow decrease, slow increase, fast increase. Rearranging the buttons on the LOWER control would destroy this logical sequence and lead to operator confusion. The color of the pushbutton are, however, not consistent and will be corrected so that the two SLOW buttons are gray and the two FAST buttons are black. The color change will be made prior to loading fuel.
61	3	4.14	The CGCS DIVISION 1 MANUAL INITIATON RESET switch on Panel 870 has unconventional NORMAL/RESET positions compared to similar controls at other locations.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.

CONTROLS

ITEM	PRIORITY	FINDING	
62	1	4.15	The DIESEL GENERATOR MANUAL GOVERNOR, MANUAL VOLTAGE SET, and AUTO VOLTAGE SET control switches on Panel 864 which are used for manual control of the diesel generators are not readily distinguishable from adjacent circuit breaker switches. A mistake in switch selection could result in an unintentional trip of an emergency power circuit breaker.
		RESPONSE	The above set of control switches (i.e., DIESEL GENERATOR MANUAL GOVERNOR, MANUAL VOLTAGE SET, and AUTO VOLTAGE SET) are located adjacent to and intermixed with breaker controls on panel P864; however, they are not associated with the mimic as are the breaker controls. The breaker controls also have associated indicator lights to indicate breaker positions, whereas the generator controls do not. In addition to the above, however, demarcation lines along with different handles or colored rings will be used to further distinguish the generator controls. This discrepancy will be corrected prior to loading fuel.
63	3	4.16	The yellow color of the EXECUTE keys on the CRT control keyboards for the computer generated CRT displays on Panel 680 violates the color-code convention of using yellow to denote a potentially hazardous condition.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
64	3	4.17	The position indication mark on the rotating ARM/DISARM color of some pushbuttons switches is not visible from a location in front of the pushbutton. The operator must lean over and look for the red pointer stripe on the back of the collar to determine the ARM/DISARM status of the pushbutton. An example of this is the HYDRAULIC POWER UNIT SHUTDOWN control on Panel 680.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.

CONTROLS

ITEM	PRIORITY	FINDING	
65	2	4.18	The small diameter pushbutton on the Bailey flow controllers that are mounted flush with the instrument surface or recessed below the instrument surface are difficult to depress.
	RESPONSE		A survey of the Bailey controllers with the recessed pushbuttons was made by the operating staff. It was determined that no difficulty exists in depressing the pushbuttons the required amount for actuation. The pushbuttons, according to Bailey, were designed recessed to prevent inadvertent actuation while reaching for the CLOSE/OPEN pushbuttons. In addition, Bailey was contacted regarding this problem. It was stated by representatives of Bailey that no other utility, nor the NRC, had contacted them previously to identify this problem. It is considered that until and unless operating experience proves the Bailey design to be inadequate, nothing warrants modification of the controllers. Based on the above, no further action is planned.
66	2	4.19	The surfaces of some backlit legend pushbuttons are uncomfortably hot to touch when they must be held in the depressed position for more than a few seconds.
	RESPONSE		Further evaluation of the backlit pushbuttons indicated that when continuously depressed for approximately 30 seconds, the surface heat generated only very miled discomfort for some operators and no discomfort for others. In no case was the surface heat such that the operator could not keep the button depressed, Based on the above, it is felt that this item has no impact of safety and as such will be reviewed with the priority 3 items in the long term design review.
67	3^1	4.20	The white engraved letter in used on the black and gray Cutler-Hammer paired pushbuttons on Panel 680 gives poor contrast between the legend and the dark background. Accumulation of dirt in the white engraved letters has further reduced the contrast and readability of these identification labels.
	RESPONSE		The white engraved lettering used on a black or gray Cutler-Hammer paired pushbutton is a standard GE design for open, closed or jog marking. The concern that dirty white engraving may result in poor contrast and readability can be resolved by periodic cleaning of these pushbuttons. Based on the above, this action will close this finding.

CONTROLS

ITEM	PRIORITY	FINDING	
68	1	4.21	The operator cannot readily distinguish between backlit legend pushbuttons and backlit legend indicator lights that are grouped together in the same matrices on Panel 680.
	RESPONSE		Provision will be incorporated to readily distinguish the pushbuttons from the status lights as indicated by figure 2. This discrepancy will be corrected prior to loading fuel.
69	3^1	4.22	The handles of some three-position J-handle switches on Panel 601 obscure the view of the neutral (center) position label.
	RESPONSE		In cases where the J-handle of Electroswitch switches obscures center position label, the labels will be corrected to eliminate this situation. This discrepancy will be corrected prior to loading fuel.
70	3	4.23	No consistent key teeth orientation convention (e.g., key teeth up or key teeth down) is used for keyswitches.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
71	3^1	4.24	The RECOMBINER SELECT controls on Panel 870 unnecessarily use ten-position rotary switches. Only three of the ten switch positions are used and the remaining seven positions are labeled as unused.
	RESPONSE		The RECOMBINER SELECT control selects one of three thermocouples to be displayed on an associated temperature meter. The placement of the selector switch in an unused position would result in no safety implication. A mechanical stop will be added to the switch, however to prevent the switch from being placed in an unused position. This discrepancy will be corrected prior to loading fuel.

CONTROLS

ITEM	PRIORITY	FINDING	
72	1	4.25	The switch positions of some rotary switches are not labeled (e.g., ESF LOGIC DIV 2 switches on Panel 872, STARTUP RANGE PROCESS RADIATION MONITOR switches N11F005A and B on Panel 870).
		RESPONSE	The switch labels for N11F005A,B on panel P870 have labels which include the correct switch position. Labels denoting switch positions for the rotary controls on panel P872 will be added prior to loading fuel.
73	1	4.26	The AUXILIARY BOILER MAXIMUM LOAD controls on Panel 854 do not have control knobs installed and are not labeled to indicate the increase/decrease direction of control rotation.
		RESPONSE	Control knobs will be installed on the auxiliary boiler load controls and labels will be added which indicate the increase/decrease direction of control rotation. This discrepancy will be corrected prior to loading fuel.
74	2	4.27	It is fatiguing to the operator to hold some spring-loaded rotary switches in the actuated position for the time required to perform their control function because of the high spring resistance (e.g., LPCS TEST RETURN TO SUPPRESSION POOL switch on Panel 601).
		RESPONSE	Switch caps with a larger handle will be permanently attached to those control switches with throttle capability. Using these larger switch caps will reduce the force required by the operator and thus reduce operator fatigue. This discrepancy will be corrected prior to loading fuel.

CONTROLS

ITEM	PRIORITY	FINDING	
75	1	4.28	DELETE
76	3	4.29	The IRM, APRM, and SRM BYPASS four position selector levers have unconventional alphabetical sequences of switch positions (e.g., clockwise position sequences AECG, BFDH, AEC, and BFD).
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.

DISPLAYS

ITEM	PRIORITY	FINDING	
77	1	5.1	The meaning of the two white indicator lights that are associated with the AUX BOILER STANDBY/RUN switch is not clear.
	RESPONSE		The two white indicator lights for the auxiliary boilers are used to indicate that the associated circulating water pump and heater is in a standby condition. Adequate labeling will be added to the panel to denote the purpose of the lights. This discrepancy will be correct prior to loading fuel.
78	1	5.2	The 480V breaker displays on Panel 807, section 2B and section 3A read in volts instead of amps.
	RESPONSE		The label corresponding to the meters in question is incorrect. A label has since been provided to correct the discrepancy. Based on the above, no further action is planned.
79	3	5.3	The DROOP indicators on the TURBINE GENERATOR section of Panel 680 are not used by the operators.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
80	1	5.4	The scale for the PUMP B PRESSURE, on Panel 680, reads 0-3.5 psi. The correct range is 0-1200 psi.
	RESPONSE		The correct range scale (0-1200 psi) for the PUMP B PRESSURE, on Panel 680, has since been installed. Based on the above, no further action is planned.

DISPLAYS

ITEM	PRIORITY	FINDING	
81	1	5.5	The scales for CNDS BOOSTER PUMP FLOW, CNDS PUMP FLOW, and HTR DRN PUMP FLOW on Panel 680 are not monitored.
	RESPONSE		The correct meter scales for the CNDS BOOSTER PUMP FLOW, HTR DRN PUMP FLOW is incorrect and will be corrected prior to loading fuel. The meter scale for the CNDS PUMP FLOW has since been corrected and no further action is planned.
82	1	5.6	The CIRCULATING WATER BLOWDOWN VALVE Bailey controllers on Panel 870 have different scale indications for the same function (e.g., F513B uses a +/- null scale while F513A uses a % scale).
	RESPONSE		The circulating water blowdown controller for valve N71-F513A will be modified to include the correct bias setting drum with +/- null scale, to be consistent with the controller for valve N71-F513B. This discrepancy will be corrected prior to loading fuel.
83	1	5.7	The LOAD GRAD and STEAM FLOW DEMAND meters on Panel 680 have no scale indications.
	RESPONSE		A temporary meter was installed in place of the LOAD GRAD meter for the NRC visit so that light measures of the panel could be made. The correct meter has since been installed. The STEAM FLOW DEMAND meter has a scale which reads from 0 to 130, however, has no indication of units. Unit indication will be added to the meter scale prior to loading fuel.
84	2	5.8	The TVR MAN/AUTO meters on Panel 680 read in percent full scale rather than in amps for exciter output current and in volts for generator voltage.
	RESPONSE		The instrument scales (0-100%) for the TVR MAN/AUTO meters are consistent with the requirements of the turbine-generator vendor. The instruments provide indication of the voltage regulator position reference (analagous to a voltage regulator input reference potentiometer). Hence, an output reading in percent is compatable with the function being monitored. The labeling will be changed to reflect generator output and exciter output without making reference to current and volts. This discrepancy will be corrected prior to loading fuel.

DISPLAYS

ITEM	PRIORITY	FINDING	
85	2	5.9	The units on the LVL scales for the LEAK WATER meters on Panel 680 are inconsistent with the parameters being measured.
		RESPONSE	The LEAK WATER LVL meter (N43-R609) located on panel P680 has a 0-15 PSIG scale. The scale installed is correct per the design documents supplied by the turbine/generator vendor. The signal being supplied to the (N43-R609) meter is from a pressure transducer installed in the leakage water pipe, upstream of the leakage water pumps. The discrepancy between the parameter being measured and the designed monitoring fuction will be corrected by providing a scale or changing the label. This discrepancy will be corrected prior to loading fuel.
86	1	5.10	The FUEL OIL TANK LEVEL meters for the A and B systems on Panel 864 and the HPCS AUX DG13 LEVEL meters on Panel 870 have scales that use pressure units (e.g., inches of water) rather than level units.
		RESPONSE	The scales for the FUEL OIL TANK LEVEL and the HPCS AUX DG13 LEVEL meters on panel P864 and P870 will be corrected to indicate level units. This discrepancy will be corrected prior to loading fuel.
87	1	5.11	The CNDSR VAC SHELL PRESSURE meters on Panel 680 indicate that they are measuring "ABS PRESS" without assigning the appropriate units.
		RESPONSE	The scales on the CNDSR VAC SHELL PRESS meters on panel P680 will be corrected to indicate the appropriate pressure units: PSIA. This discrepancy will be corrected prior to loading fuel.

DISPLAYS

ITEM	PRIORITY	FINDING	
88	1	5.12	The RHR HXA and HXB Bailey controllers on Panel 601 have no unit disignations on the scales.
	RESPONSE		The RHR HXA and B level controllers are graduated in percent and are so designated. Percent is the proper designation of the units on these controllers. Units on the RHR HXA and B steam pressure controllers are not and have no need to be designated. The HX steam pressure indicators, which monitor the parameter affected by the controllers, do have designated units and are located directly adjacent to the controllers. Procedurally, the operator adjusts the controller until a specified value on the indicators is achieved. No specific value on the controller thumbwheel is required, but rather the thumbwheel graduations are for reference only. Based on the above, no further action is planned.
89	1	5.13	The REACTOR VESSEL LEVEL display scale on the Division 1 Remote Shutdown panel ranges from -150 to +60. The values (other than -150) that are less than zero are not labeled with the negative ("-") designation symbol.
	RESPONSE		The scale on the REACTOR VESSEL LEVEL meter will be modified to include the negative ("-") designation symbol so that it is clearly understood which values are less than zero and which are not. This discrepancy will be corrected prior to loading fuel.
90	3	5.14	The OFF GAS PRE-HEATER INLET meters and the RECOMBINER INLET meter on Panel 845 each use three colored pointers (red, green, and black) with no explanation of the pointer color-coding.
	RESPONSE		The blue, black, and red pointers discussed in this finding are the standard used on the GE 195 meter relay. The blue pointer (left hand half-arrow) represents the low alarm setpoint. The red pointer (right hand half-arrow) represents the high alarm setpoint. The black pointer is the meter needle which indicates the value of the process variable. A label will be centrally located on panel P845 explaining this color convention. This discrepancy will be corrected prior to loading fuel.

ITEM	PRIORITY	FINDING	
91	31	5.15	The display for a Bailey meter on the Remote Shutdown panel for % OPEN does not have the percent symbol included on the scale.
	RESPONSE		As part of the remote shutdown panel modification discussed under Finding 1.14, the Bailey controller will be replaced with a Foxboro model N-250HM controller shown in Figure 1. The scales on the Foxboro controller will be modified, as necessary to add appropriate units.
92	2	5.16	Many of the meters on Panel 680 are too small to be read from a distance (e.g., RX WATER LEVEL, RX PRESSURE, FEEDWATER FLOW, and STEAM FLOW).
	RESPONSE		A survey was made of the small GE 185 meters in the control room to determine which ones require reading from a distance. The survey included: (1) other control room indication present (e.g., annunciators, etc.), (2) criticality to plant safety, (3) does the meter have to be read from a distance, and (4) the use of tolerance zones. The survey determined that only the RX WATER LEVEL, RX PRESSURE, FEEDWATER FLOW, and STEAM FLOW meters were critical. Based on the above, these meters will be replaced with larger Bailey Signaflex meters similiar to the one shown in Figure 3 prior to loading fuel. This figure is provided only for reference and does not reflect true conditions. The parameter legends will be placed on labels similiar to that used elsewhere in the control room and will not be displayed on the meter scales. Table 6 list the meters to be replaced along with corresponding scales.
93	1	5.17	Many of the meters on the Remote Shutdown panels have dirty or damaged face plates that obscure the meter scales.
	RESPONSE		As part of the remote shutdown panel modification discussed under Finding 1.14, all the meters on the remote shutdown panel are being replaced with Foxboro Model N-257H meters. However, as an interim step the face plates on the present meters will be replaced. This discrepancy will be corrected prior to loading fuel.
94	3	5.18	The flow meters on the Remote Shutdown panels use a small type face in order to show a range from 0-15,000 GPM. The lettering used on these meters is about half the size of the type face used on all the other meters.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.

DISPLAYS

ITEM	PRIORITY	FINDING	
95	3	5.19	The circuit breaker and valve position indicator lights do not follow the convention of red = unsafe, green = safe, and amber = hazard (potentially unsafe).
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
96	1	5.20	The displays on the main control room panels, the back panels, and the Remote Shutdown panels do not have normal operating ranges indicated.
	RESPONSE		Abnormal operating ranges (caution zones) will be denoted on the control room, backpanel, and remote shutdown meters/recorders prior to loading fuel. The caution zones will be denoted by yellow out of tolerance ranges on the meter/recorder scales. Those meters for which tolerance zones will not be included are: (1) trip units, (2) multi-input meters/recorders, (3) meters which are manually set by the operator in a controlling loop, (4) meters which change zones depending on mode of operation, (5) meters for which operating experience must be gained, and (6) volt meters. Based on our evaluation, the above types of indicators do not require caution zones. As an interim step, the operating zones maybe included on the face bezel. Permanent installation will be made prior to startup after the first refueling outage.
97	1	5.21	The closely spaced indicator lights on Panel 680 are inductively coupled so that bulbs which should be off sometimes glow when an adjacent bulb is on. The status light on Panel 601 exhibit the same problem.
	RESPONSE		This discrepancy is presently under investigation to determine an adequate solution. This discrepancy will be correct prior to loading fuel.
98	1	5.22	Control indicator lights, some legend lights, and some legend pushbuttons are not equipped with a lamp test capability or with dual filament bulbs to facilitate detection of burned-out bulbs.
	RESPONSE		The NRC draft guidelines requires lamp test capability, dual bulbs, or filament redundancy when incandescent bulbs are used. The main panels (e.g., P601, P680, P870 and P807) use neon or dual bulbs in all but a very few extreme cases. In these cases dual filament bulbs have been ordered and will be installed prior to loading fuel. The shared panels (e.g., P855, P854, P856), the remote shutdown panel and the backpanels have incandescant bulbs that provide no redundant

DISPLAYS

ITEM	PRIORITY	FINDING	
98	1	5.22 (con't)	indication. For these panels, we are pursuing the use of dual filament or neon bulbs. As an interim step, however, a survey of the panels will be conducted daily to ensure no abnormalities exists (included as a minimum will be the checking of the two bulb indication for pumps and valves.)

DISPLAYS

ITEM	PRIORITY	FINDING	
99	1	5.23	Some pushbutton controls use indicator lights that have a clear outer bulb with an inner gas discharge element that emits a pale blue glow when the light is turned on. It is difficult to readily determine whether these lights are on or off. In addition, these indicator lights conventionally should be white instead of blue.
	RESPONSE		We are presently investigating possible replacements for the white neon lights. This discrepancy will be corrected prior to loading fuel.
100	1	5.24	The CONTAINMENT DRYWELL PRESSURE and TEMPERATURE recorders on Panel 870 have only two pens. These recorders require three pens to record the variables of interest.
	RESPONSE		The CONTAINMENT/DRYWELL PRESSURE and TEMPERATURE recorders presently installed on panel P870 will be replaced with three-pen recorders. This discrepancy will be corrected prior to loading fuel.
101	1	5.25	On most strip chart recorders in the control room, the paper scales are in units of percent (0-100%) rather than in the units and ranges used on the installed recorder scales.
	RESPONSE		Chart paper marked with the proper units and ranges will be provided for the strip chart recorders in the control room. This discrepancy will be corrected prior to loading fuel.

AUDITORY SIGNAL SYSTEMS

ITEM	PRIORITY	FINDING	
102	1	6.1	The annunciator audio signals do not adequately localize the incoming alarm by the use of signals of different frequencies or patterns.
		RESPONSE	In order to provide auditory localization to the panels, alarm horn frequencies will be established as described in Table 3. This discrepancy will be corrected prior to loading fuel.
103	1	6.2	The operator cannot identify the location of alarms originating at some panels by the direction of the audio signal. The annunciator alarm signals for Panel 854, Panel 855, Panel 856, and Panel 862 are emitted from Panel 807. The annunciator alarm signals for Panel 601, Panel 864, and Panel 680 come from a single horn located above Panel 601.
		RESPONSE	In order to provide auditory localization, additional alarm horns will be added such that each panel or subgroup of panels will have individual alarms. The alarm locations are given in Table 4. This discrepancy will be corrected prior to loading fuel.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
104	3[1]	7.1	Panel 870 and Panel 601 have some alpha-numeric panel section designation labels missing.
	RESPONSE		These labels are presently included on the drawings and will be provided prior to loading fuel.
105	3[1]	7.2	Some annunciator panels do not have an identification label located above each panel.
	RESPONSE		These labels are presently included on the drawings and will be provided prior to loading fuel.
106	3[1]	7.3	Some groups of controls do not have hierarchical system labeling to aid the operator in differentiation between the many functional groups of controls. The functional group of FEEDWATER controls and displays on Panel 680 and the TURBINE TEST group of equipment on Panel 870 do not have hierarchical system labels. The HX SYSTEM mimic on Panel 870 has no hierarchical system label or any other identification label.
	RESPONSE		These labels are presently included on the drawings and will be provided prior to loading fuel.
107	1	7.4	The individual safety device test buttons in the TURBINE TEST group of equipment on Panel 870 are unlabeled.
	RESPONSE		The Automatic Turbine Tester (ATT) module located on panel P870 along with the ATT pushbutton on P680 is used to automatically test the functions of the turbine protective devices, main stop and control valves, low pressure stop and control valves, and the bypass stop and control valves. As part of the ATT system, the safety devices subgroup control along with the other pushbuttons on the ATT modules is used to test the protective trip devices of the turbine. The safety device subgroup controls consist of three pushbuttons (RESET, OFF/ON, and TEST) along with various indicator lights. While physical size and location prevents the placement of a label to indicate pushbutton control on the ATT module itself, a picture depicting the safety device subgroup controls and associated push-buttons will be added to the side of the ATT modules. This item will be added prior to loading fuel.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
108	1	7.5	Each Remote Shutdown panel has two groups of controls that are unlabeled. There are a total of five unlabeled controls on each panel.
	RESPONSE		These labels will be provided as part of the new relabeling for the remote shutdown panel. This discrepancy will be corrected prior to loading fuel.
109	1	7.6	There are two groups of red and green indicator lights on Panel 855 that are not labeled.
	RESPONSE		These labels will be provided as part of the new relabeling effort for panel P855. This discrepancy will be corrected prior to loading fuel.
110	1	7.7	The bank of PLANT SERVICE WATER/RADIAL WELLS legend pushbutton controls on Panel 854 are not engraved or labeled.
	RESPONSE		These labels will be provided as part of the relabeling effort for panel P854. This discrepancy will be corrected prior to loading fuel.
111	1	7.8	The sound-powered telephone jacks at the end of Panel 807 are unlabeled.
	RESPONSE		Any special-use or dedicated sound powered phone jacks at the end of panel P807 and elsewhere will be so denoted prior to loading fuel. It is not considered that common use plant wide channel need special labeling other than channel designation.
112	3	7.9	The alpha-numeric panel section designation labels do not run in sequential numerical order from left to right on Panel 601.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
113	1	7.10	The labels for several Unit 1 and Unit 2 indicator light and control/indicator light groups on Panel 862 are located with the incorrect group. The differentiated groups of equipment for each unit presently contain both Unit 1 and Unit 2 labels.
		RESPONSE	This item will be corrected as part of the new relabeling effort for panel P862. Demarcation lines will be provided as necessary to functional group controls. In addition, white letters on a black background will be used to denote Unit 2 items while black letters on a white background will be used to denote Unit 1 items. This discrepancy will be corrected prior to loading fuel.
114	3^1	7.11	The hierarchical system label for the OTBD PROC SMPL functional group is larger than the standard system label size. In addition, this label is located below the functional group it identifies, rather than above, as is the control room convention. This may lead to operator confusion about what the label actually identifies.
		RESPONSE	The OTBD PROC SMPL VLVs hierarchical label conforms to the labeling drawing for labels of this type and is consistent with other labels used on the panel. In order to avoid confusion with the RECIRC LOOP A/B hierarchical label used on the same insert, the demarcation lines will be revised to include the label within its boundary. This discrepancy will be corrected prior to loading fuel.
115	3^1	7.12	The panel identification labels on the back panels are inconsistently located. Some labels are located below their associated control/display groups, while some are located above.
		RESPONSE	The labels on the back panels will be reviewed and corrected in accordance with the relabeling effort for the backpanels. The relabeling of the back panels will be handled as a priority 3 item and will be included in the long term design review.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
116	3	7.13	The labels on the Bailey panel-mounted instruments (e.g. AUX BOILER A AMPS) on Panel 854 are too low to be read. From a standing position in front of this panel, the labels are totally obscured by their associated instruments.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
117	3	7.14	The labels for four controls on Panel 680, section 3B are located below the associated units, rather than above. These labels are totally obscured by the associated controls when viewed from a standing position at the panel edge.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
118	3	7.15	The label for the H2 RECOMB A TC SEL rotary control on Panel 870 is below the control rather than above it, as is the control room convention. There is inadequate separation between this label and the correctly positioned label for an adjacent control.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
119	3[1]	7.16	The annunciator matrix identification labels on Panel 680 are made of temporary labeling material and are not uniformly positioned.
	RESPONSE		The annuncaitor matrix labels for Panel P680 will be replaced with plastic labels similar to labels used elsewhere in the Control Room. The labels will be uniformly positioned to the center left or uniformly positioned to center right. This discrepancy will be corrected prior to loading fuel.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
120	3[1]	7.17	The labels for the meters on Panel 694 do not include parameter identification of the information that is being displayed.
	RESPONSE		The meters in question are included as part of the Rosemount trip units and are normally used for maintenance purposes. While the operator may use them to verify a channel trip, etc., they are infrequently used. The labeling for these items will be included as part of the back panel relabeling discussed under Finding 7.12 as a priority 3 item.
121	3[1]	7.18	The labels on two trend recorders on Panel 855 indicate that these recorders monitor two parameters, when actually each monitors only one (flow).
	RESPONSE		New labels will be provided as part of the relabeling effort for panel P855. This discrepancy will be corrected prior to loading fuel.
122	3[1]	7.19	The hierarchical labels for the groups of RCIC TURB and RCIC PUMP meters do not clearly apply to all of the three meters in each group. The hierarchical label for the RCIC TURB group is too closely incorporated into the individual label for the DISCH DR meter.
	RESPONSE		New labeling will be provided so that it is readily apparent to the operator which meters are applicable to the turbine and which to the pump. This discrepancy will be corrected prior to loading fuel.
123	1	7.20	The labels for three recorders on Panel 855 are incorrect. The FRESH AIR UNIT A DIFF PRESS label should read FRESH AIR UNIT B DIFF PRESS. The REFRIGERANT CPRSR A label should read FRESH AIR UNIT A DIFF PRESS. The AIR CONDITIONER UNIT A IN DAMPER should read AIR CONDITIONER UNIT B IN DAMPER.
	RESPONSE		New labels will be provided as part of the new relabeling effort for panel P855. This discrepancy will be corrected prior to loading fuel.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
124	1	7.21	The labels for two meters on Panel 807 are incorrect. The label that reads 480V BREAKER should read VOLTS. The label that reads 480V BUS should read SPARE.
		RESPONSE	The labeling in question deals with the old labels. New labels have since been added to correct the problem. Based on the above, no further action is planned.
125	3[1]	7.22	The label that reads RECIRC PUMP for the pump symbol in the RCIC mimic on Panel 601 is incorrect. The pump indicated by this symbol is an RCIC pump.
		RESPONSE	The labeling in question deals with the old labels. New labels have since been added to correct the problem. Based on the above, no further action is planned.
126	3[1]	7.23	The labeling used in the control room does not use consistent abbreviation, terminology, or syntax. This is especially a problem when the labels for associated controls and displays are not consistent.
		RESPONSE	This item is concerned with the old labeling on the panels. New labels are being added as part of the relabeling effort for the control room. New labels consistent in abbreviations, terminology and syntax will be added to the main control room panels prior to loading fuel. The backpanels will be relabeled as a priority 3 item.
127	3[1]	7.24	The Bailey meter and square root extractor on the Division 1 Remote Shutdown panel have labels that are a different color and type face from the other labels on the panel.
		RESPONSE	New labels will be coded as part of the relabeling effort for the remote shutdown panel. This discrepancy will be corrected prior to loading fuel.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
128	3[1]	7.25	Two terminations on the electrical distribution mimic on Panel 807 are inconsistently labeled. One termination label reads 500 KV SYSTEM, while the other reads SERV XFMR No. 21. The drawings indicate that the terminations should have been labeled 500 KV SYSTEM at both locations. Two additional labels should have been located adjacent to the terminations that read SERV XMFR NO. 11 and SERV XRMR NO. 21.
	RESPONSE		The new labels/mimics were not installed at the time of the NRC visit. The new labeling drawings include the required labels which will be installed prior to loading fuel.
129	1	7.26	The abbreviations used on the new labels installed in the main area of the control room do not agree with the abbreviations used in the operating procedures
	RESPONSE		The operating procedures will be reviewed and any necessary revisions thereto will be made to effect consistency between abbreviations used on the new labels and those used in the procedures. This discrepancy will be corrected prior to loading fuel.
130	3[1]	7.27	A Fischer controller on Panel 680 uses unconventional and inconsistent symbols to indicate "manual" and "automatic" operations.
	RESPONSE		The Fisher controllers on panel P680 use international symbols to indicate manual and automatic operation. Once an operator receives initial indoctrination in their meaning, he should have no further difficulty identifying the purpose of the backlit pushbuttons. Based on the above, this item will be included with the priority 3 items in the long term design review.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
131	3[1]	7.28	The divisional identification labels on Panel 855 use Roman numerals (I,II). Arabic numerals are conventionally used in the control room.
	RESPONSE		New labels consistent with labels used elsewhere in the control room will be provided as part of the relabeling effort for panel P855. This discrepancy will be corrected prior to loading fuel.
132	3[1]	7.29	The labels used to identify individual components on Panel 870 are inconsistently engraved. There is wide variation in the engraved depth of the letters, in the stroke width, and in the spacing between the letters.
	RESPONSE		A survey will be made of all new labeling in the control room to ensure that the labels conform to requirements. New labels will then be provided as necessary. This discrepancy will be corrected prior to loading fuel.
133	3[1]	7.30	The identification labels for the meters in the D21 RADIATION MONITOR MODULE on Panel 844 are located to the side of each row instead being associated with each meter. Each individual meter has an aluminum label that is used only for maintenance identification.
	RESPONSE		The labels provided with the radiation monitor meters conform to the left-right/top to bottom configuration required by the guidelines. The present location of the labels should cause no safety problems, but will be relocated to provide consistency with other labeling used in the control room. This item will be included with the priority 3 items in the long term design review.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
134	3[1]	7.31	The maintenance labels for the meters in the D21 RADIATION MONITOR MODULE on Panel 844 have unpainted lettering tnat is of low contrast with the shiny aluminum surface.
	RESPONSE		The aluminum labels on the radiation modules are shipping tags and are for the purpose of tracking the meters during storage, etc. They provide no information that is required for the operator and will be replaced with the labels under Finding 7.31. This item will be included with the priority 3 items in the long term design review.
135	3[1]	7.32	The hierarchical label for the TURB GEN AUX system uses a different size lettering and a different type face than is used for the other system labels on Panel 680.
	RESPONSE		The hierarchical label for the TURB GEN AUX system will be replaced to be consistent with other supplied labels. This discrepancy will be corrected prior to loading fuel.
136	1	7.33	The valve controls on the Remote Shutdown panels have temporary tape labels that give the associated valve numbers.
	RESPONSE		The new labeling for the remote shutdown panel will include valve numbers along with concise descriptive messages, thus eliminating the need for the temporary labels. This discrepancy will be corrected prior to loading fuel.
137	1	7.34	The temporary maintenance tags on the TRIP UNIT CARD FILE on Panel 855 obscure the switches below this unit.
	RESPONSE		The temporary shipping tags on the trip units on panel P855 will be removed prior to loading fuel.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
138	1	7.35	The temporary labels used in the control room do not always conform to good human factors engineering principles concerning color, contrast, and letter size.
	RESPONSE		A large number of the temporary labels in the control room are used to identify items turned over to MP&L Startup for testing. These provide no useful information to the operator and will be removed by Startup once testing is complete. Other temporary labeling in the control room is used to clarify or correct the existing labels. Once the new labeling is installed and correct the temporary labels will be removed.
139	1	7.36	The tags that are planned for the tag-out system are large (3"x6"). These tags will be large enough to obscure the label associated with the tagged unit and will also be capable of obscuring the labels and indicators of adjacent units.
	RESPONSE		Very seldom will there exist the necessity to put one of the 3"x6" tags on a switch or component in the control room. Rather, the 3"x6" tag will be placed on a breaker, etc., outside the control room and a small reference tag will be placed on the associated control switch in the control room. If the situation ever exist such that a 3"x6" tag must be placed on the control boards, it will be affixed so as to clearly designate the tagged component without obscuring adjacent labels or indicators. The tagging procedure will be revised to clearly indicate the above.
140	1	7.37	The related controls and displays on Panel 854, Panel 856, and Panel 862 are not sufficiently identified as functional groups. No use of demarcation is made on these panels.
	RESPONSE		Demarcation lines will be provided on the concerned panels to functional group related controls and displays. This discrepancy will be corrected prior to loading fuel.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
141	3[1]	7.38	The tape used for the mimic lines in the main control room area is easily peeled or rubbed off. The RHR A mimic lines on Panel 601 are especially easy to remove.
	RESPONSE		The mimic tape used on the main control room panel will be replaced with raised plastic of the same material being used as the new labels. This discrepancy will be corrected prior to loading fuel.
142	3[1]	7.39	There are several cases of mimic discontinuity. Some mimic lines end with no termination labels. For example, the mimic lines going to and from HX B in the CCW mimic on Panel 870 do not have adequate labeling to indicate the beginning and termination points.
	RESPONSE		During the NRC visit the complete new labeling system had not yet been finished. These labels are presently included on the new drawings and will be provided to indicate all beginning and termination points. This discrepancy will be corrected prior to loading fuel.
143	3[1]	7.40	There are several different methods used to indicate mimic line intersection. These methods do not always clearly indicate what occurs at the intersection (e.g. overlap, joining, no intersection, etc.).
	RESPONSE		All mimics will include joining for the intersection of lines, with not joining being the indication of overlap. This discrepancy will be corrected prior to loading fuel.
144	3[1]	7.41	The mimic colors used on the Remote Shutdown panels are not consistently applied. Blue is used for both water and low pressure steam. Green is also used for water.
	RESPONSE		The mimic for the remote shutdown panel will be redesigned to be consistent with the main control panels. Color coding of all mimics will provide for consistently applied colors. This discrepancy will be corrected prior to loading fuel.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
145	1	7.42	All the mimics on the Remote Shutdown Panels have some errors and inconsistencies: . Some lines are incorrectly color-coded. . Some equipment labels are included in the mimic for equipment that is no longer included in the system design. . Some terminations are not labeled. . Some mimic lines are missing.
	RESPONSE		The mimics will be redesigned to include color coding and panel layout consistent with the main control room boards. Equipment labels not depicted will be removed to reflect as built plant status. This discrepancy will be corrected prior to loading fuel.
146	3[1]	7.43	The ADS/SRV system mimic on Panel 601 contains a conceptually misleading depiction of the flow path from the safety relief valves to the suppression pool. The mimic indicates flow from only one SRV to the suppression pool. This is an incorrect representation, since all SRVs discharge to the suppression pool.
	RESPONSE		The representation of all SRVs to the suppression pool is impractical due to space limitation, hence one typical SRV was shown. The depiction mimic will be removed, however, to avoid operator misinterpretation. This discrepancy will be corrected prior to loading fuel.
147	3[1]	7.44	Some of the tape used on the mimics in the main control area has outlined, clear arrows to indicate flow while some has filled-in, dark arrows. The clear arrows are of low contrast to the rest of the tape and cannot be seen easily.
	RESPONSE		The tape will be replaced as described under Finding 7.38 and will include engraved flow arrows which are consistent and readily apparent to the operators. This discrepancy will be corrected prior to loading fuel.

LABELS AND LOCATION AIDS

ITEM	PRIORITY	FINDING	
148	3^1	7.45	The mimic tape containing the outlined, clear arrows is very reflective and exhibits significant glare. This glare makes the clear arrows very difficult to follow.
	RESPONSE		The mimic tape will be replaced as discussed under Finding 7.44. This discrepancy will be corrected prior to loading fuel.
149	3^1	7.46	There is not enough contrast between the light blue mimic tape and the white mimic tape used on a Panel 601 mimic. These different colored mimic lines are positioned near each other in the mimic and may be misinterpreted to be the same color.
	RESPONSE		The mimic tape will be replaced and discussed under Finding 7.38 and will incorporate contrast between colors. This discrepancy will be corrected prior to loading fuel.

PROCESS COMPUTER

ITEM	PRIORITY	FINDING	
150	3	8.1	Some keywords for access to the computer exceed the recommended maximum of seven characters.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
151	3	8.2	Many pages of the computer display do not contain a title or other type of functional designation.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
152	3	8.3	They keyboards on the Panel 680 console do not have the capacity for correcting an error in a single keystroke. The entire corrected input must be entered.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
153	3	8.4	The alphanetic keyboards on the Panel 680 console do not have a standard QWERTY arrangement of keys.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
154	3[1]	8.5	The numeric keypad for the Safety Parameter Display System is non-standard and does not conform with other keypads in the control room.
	RESPONSE		The Safety Parameter Display System is still in the design phase and will not be operational until October of 1982. This concern will be considered prior to placing the system into full operation. Based on the above, this discrepancy will be re-evaluated as a priority 3 item in the long term design review.

PROCESS COMPUTER

ITEM	PRIORITY	FINDING	
155	3	8.6	The keys on the keyboards of Panel 680 require excessive operator effort due to their high actuation resistance.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
156	3	8.7	There is a long delay (10-15 sec) in the response of the computer to certain input commands. There is no message to acknowledge to the operator that the command is being processed.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
157	3	8.8	There is noticeable flicker on the CRT mimics when certain colors are used (e.g., light blue and green).
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
158	2	8.9	The alarm displays on the CRTs are very difficult to read. The displays exhibit poor character legibility and low contrast between the red characters and the black background.
	RESPONSE		The character legibility and contrast problems are characteristic of the video monitors and the number of alarms being handled by the system. With respect to the monitor, we intend to perform periodic maintenance to keep the display quality at its best. The major problem with the display at present is the large number of non-functioning points which are not deleted from the data base. This results in an excessively active alarm queue resulting in excessive alarm message movement. The situation will improve considerably by the time of fuel load. Based on the above, this discrepancy will be re-evaluated as a priority 3 item in the long term design review.

PROCESS COMPUTER

ITEM	PRIORITY	FINDING	
159	3	8.10	The CRT brightness and focus controls are not available to the operator. Adjustment of these controls requires the assistance of a maintenance electrician.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
160	2	8.11	The CRT prompt and advisory messages at the bottom of the screen are not visible to seated operators.
	RESPONSE		The prompt and advisory message portion of the CRT referred to above is the portion of the CRT reserved for the interactive frame and does not serve any monitoring display function. Any time that this portion of the screen is used, the operator is using the key board at that screen; in this position/mode, the interactive frame is visible to the operator. The only part that may not be visible in this mode is the yellow error message. To correct this, the CRTs have been slid forward and/or the bezel surrounding the screen has been shaved. Based on the above, no further action is planned.
161	2	8.12	The value bar graph display option on the CRT screen shows all bar graphs with a scale in 0-100% rather than in the engineering units of the parameter that is being displayed.
	RESPONSE		The CRT value bar displays include engineering units along with the numeric display of the monitored parameter. The display is intended to provide relative indication of the parameter value. To change the system to incorporate engineering units without degrading the flexibility of the formating and possibly affecting the response of the system would require a major change to the display system. Value bar graphs deemed to be a major importance can and are being hard-coded into the system as operator guides. These bar graphs are being scaled in engineering units. Based on the above, no further action is planned.

PROCESS COMPUTER

ITEM	PRIORITY	FINDING	
162	3	8.13	Many data display formats made available by the process computer require several pages of display. However, there is no indication of how many pages are in each data display until the last page is reached.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
163	2	8.14	DELETED
164	2	8.15	The CRT display color-codes are not always consistent with colors used elsewhere in control room. There are also some color-coding inconsistencies between different CRT displays.
	RESPONSE		The CRT display color codes are consistent with colors used elsewhere in the control room wherever possible. Minor discrepancies occur because only eight colors are available on the CRTs and two of these eight colors (magenta & dark blue) are not used due to contrast and readibility problems. In all but one case, the only discrepancies that occur are that the operator guides do not distinguish between such things as low and high pressure water or different voltages. This is insignificant since the majority of the time this variance of the same parameter is not displayed simultaneously on the same guide. In all cases, every effort has been made to clearly distinguish the difference by labeling or some other descriptive identification. The one operator guide where convention was not followed (EHC), different colors were used to distinguish between the different subsystems. This will help make this one particular guide more useful to the operator. Any color-coding inconsistencies found between different CRT displays will be corrected prior to loading fuel.
165	2	8.16	The Terminet printers have a speed of 50 lines/minute. The recommended speed is 300 lines/minute.
	RESPONSE		The Terminet 1200's will be changed out with faster printers with speeds of 300 lines/minute. This discrepancy will be corrected prior to loading fuel.

PANEL LAYOUT

ITEM	PRIORITY	FINDING	
166	2	9.1	Some controls and indicators for the HPCS DIESEL GENERATOR are located on Panel 870, while the rest of the HPCS system is located on Panel 601.
		RESPONSE	The following controls and indicators located on Panel P870 inserts 5B and C are associated with the HPCS Diesel Generator: (1) 3 control switches for the SSW DIV 3 system (2) 1 control switch for the HPCS Rm Fan Coil Unit (3) 3 control switches for the HPCS Diesel Generator Outside Air Fan (4) 3 indicators and associated status lights for the SSW DIV 3 system (5) 2 indicators and associated status lights for the Diesel Generator Fuel Oil System (6) Various annunciators Of the above items, 1,2 and 4, along with various annunciators, are associated with the SSW system which is located on panel P870 and is consistly located for all three diesel generator systems. The remaining items are associated with the HPCS Diesel Generator Fuel Oil System. The relocation of the controls to panel P601 inserts 16B and C, while providing a central location for controls, would only add unnecessary clutter to the P601 insert. The controls are automatically activated on the start of the HPCS Diesel Generator and would only have to be infrequently monitored by the operator. Annunciators are present to alert the operators to abnormal conditions. Based on the above, this discrepancy will be re-evaluated as a priority 3 item in the long term design review.
167	3	9.2	The SERVICE WSTE WTR PRESS meters on Panel 854 for Unit 1 and Unit 2 are not installed with the same orientation as the Unit 1 and Unit 2 sections of the control room. The annunciators associated with these meters are in the same orientation as the control room.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.

ITEM	PRIORITY	FINDING	
168	2	9.3	While increasing or decreasing power using the RECIRC MASTER CONTROLLER on section 3D of Panel 680, the operator must simultaneously watch the IRM and APRM recorders on section 5B and section 7B.
		RESPONSE	Changes in power using the RECIRC MASTER CONTROLLER will normally be a slow, controlled "bump-and-wait" type evolution. An operator can adequately monitor the IRM and APRM recorders while performing this controlled evolution. The RECIRC MASTER CONTROLLER is located on insert 3D of panel P680 while the IRM/APRM recorders are located on inserts 5B and 7B of the same panel. The distance to the IRM/APRM recorders on insert 5B is approximately 53" from the recirc controller. The general layout of panel P680 is provided in Figure 4. Additionally, video guides will be developed when the computer interface is complete, which will include APRM indication. These video guides, when displayed on insert 4B of panel P680, will provide additional power monitors in close proximity to the recirc control station. The computer interface is expected to be operational prior to commerical operation.
169	2	9.4	The CRD HDR WTR meters are located on Panel 601, while the other CRD controls and displays are located on Panel 680. The information provided by these meters is needed during operation of the control rod drive system.
		RESPONSE	The CRD HDR WTR meters located on panel P601 are presently monitored by the computer system and as such can be displayed on insert 4 and 8 of panel P680. Should the operator need this information on panel P680 during rod movement, the information can be displayed on one of the following: 1) CRTs, 2) digital display, and/or 3) trend recorders. Based on the above, no further action is planned.
170	2	9.5	The RHR-B FLOW TO HD SPR keyswitch and the RHR-B TO HD SPR FLOW recorder are located in the RHR-A area of Panel 601. These should be located in the RHR-B area of Panel 601.
		RESPONSE	The RHR FLOW TO HD SPR switch and flow indicator will be relocated from the RHR-A area of panel P601 to the RHR-B area. This discrepancy will be corrected prior to loading fuel.

PANEL LAYOUT

ITEM	PRIORITY	FINDING	
171	3	9.6	Three groups of related controls on Panel 870 are arranged in non-sequential numerical order. These groups are: . the DRYWELL COOLING FAN switches, . the DRYWELL COOLING WATER switches, and . the DRYWELL COOLING DAMPER switches.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
172	3	9.7	The AUX BLDG FUEL HANDLING VENT recorder channel selector rotary switches on Panel 600 are arranged in non-sequential alphabetical order. The left-hand switch positions are labeled MON A and MON D. The right-hand switch positions are labeled MON B and MON C.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
173	2	9.8	DELETE
174	3[1]	9.9	The high density placement of HVAC controls and indicators on Panel 842 makes it difficult to identify an related groups.
	RESPONSE		The high density placement of the controls does not provide for rapid operator recognition, however, a safety hazard does not exist. Demarcation lines along with more concise labeling will be included along with the priority 3 items in the long term design review.

PANEL LAYOUT

ITEM	PRIORITY	FINDING	
175	1	9.10	DELETE
176	3	9.11	The FUEL POOL COOLING pump and valve controls on Panel 642 are grouped with leak detection equipment with which they are not functionally associated.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
177	3	9.12	The entire 500 KV switchyard mimic on Panel 807, while agreeing with the line drawing of the switchyard, is reversed from the layout of the Unit 1 and Unit 2 areas of the control room. Two terminations on the 500 KV switchyard mimic are reversed in layout from the corresponding termination on the electrical distribution mimic on the same panel (SVCE XFMR 21 and 11 on the switchyard mimic and SVCE XFMR 11 and 21 on the electrical distribution mimic).
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
178	3	9.13	The layout of associated controls and meters on Panel 807 is poor. Some arrays of horizontally oriented controls are related to arrays of vertically oriented meters. Some controls are in different sequential numerical order than their related meters. There are several groups of horizontally oriented controls that are related to meters that are in a mixed horizontal and vertical layout. Some pairs of meters that must be read simultaneously are located in separated meter strings.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed action reported as part of the long term design review.

PANEL LAYOUT

ITEM	PRIORITY	FINDING	
179	3	9.14	The layout of Panel 854 is generally overcrowded and poor. Functionally related controls for the AUX BOILER A and B are separated by shared controls for the DEAERATOR. Other groups of related shared controls are intermixed with unrelated controls.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
180	3	9.15	There is one string of seven meters and one string of eight meters in the HPCS system on Panel 870. The RCIC TURBINE and RCIC PUMP meters on Panel 601 are grouped together in a string seven meters long. The recommended maximum number of meters in a string is five.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
181	3	9.16	The displays for LOOP A and LOOP B on Panel 680, section 2D are layed out in a partially mirror-imaged arrangement.
		RESPONSE	Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.

CONTROL-DISPLAY INTEGRATION

ITEM	PRIORITY	FINDING	
182	3	10.1	Groups of related controls and displays are separated by unrelated controls/displays. For example, related SERVICE AIR controls and displays on Panel 854 are separated by a group of unrelated backlit pushbuttons. In addition, the controls and displays for the PLANT SERVICE WATER/RADIAL WELLS on this panel are separated by the SERVICE AIR PRESSURE display.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
183	3	10.2	Some controls and system status displays on Panel 604 are unnecessarily grouped close together. The NSSSS INBOARD controls and system status displays and the STANDBY LIQUID CONTROL system controls and status displays are in a single group with large areas of blank panel immediately adjacent.
	RESPONSE		Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.
184	2	10.3	The range selector switches for the pens and displays of two pen strip chart recorders on Panel 680 and Panel 870 have inconsistent left/right relationships. The left switch selects the range of the right display (front pen) and the right switch selects the range of the left display (rear pen).
	RESPONSE		On the IRM/APRM recorders on panel P680, the input signals to the red and blue pens will be reversed so that the selector switches and pens will be reversed so that the selector switches and pens will have consistent left/right relationships. The labels for the selector switches will be corrected to reflect this relationship. This modification will also result in a proper left/right relationship between the recorder pens and the IRM range selector switches. On the hydrogen analyzer recorders on panel P870 there are no selector switches, however, the labels for the range indicating lights above the records will be modified to include the pen color associated with each pair of lights. This discrepancy will be corrected prior to loading fuel.

CONTROL-DISPLAY INTEGRATION

ITEM	PRIORITY	FINDING	
185	1	10.4	Some Bailey flow controllers have display response that is reversed from the associated control action. When the right-hand pushbutton (OPEN) is depressed, the display pointer moves to the left (0%). When the left-hand pushbutton (CLOSE) is depressed, the display pointer moves to the right.
			RESPONSE: The Bailey controllers in the control room will be evaluated to determine which controllers have final control element (i.e. valve) response that is reversed from control action. On panel P680, where "split" controllers are used, the control stations will be set up so that movement of the display pointer to the right corresponds to increasing control action (i.e. valve opening) and will be caused by pushing the right-hand pushbutton (OPEN). On other panels, where "unitized" controllers are used, this modification cannot be easily made. For those controllers a label will be added to the output meter which indicates that leftward movement of the pointer corresponds to valve opening and vice-versa. This discrepancy will be corrected prior to loading fuel.
186	3	10.5	Pressure indicator displays are needed in addition to indicator light displays to monitor and verify the operation of the MSIVs. Pressure indicator displays are not included with the indicator light displays on the MSIV relay panels, Panel 654 and Panel 655.
			RESPONSE: Priority rating 3 discrepancies will be evaluated and proposed actions reported as part of the long term design review.

CONTROL-DISPLAY INTEGRATION

ITEM	PRIORITY	FINDING	
187	2	10.6	The REACTOR WATER LEVEL SIGNAL FAILURE indicator light on Panel 680 is not located near the related REACTOR WATER LEVEL SIGNAL selector switches. Instead it is located in the RFPT-A group of controls and indicator lights.
		RESPONSE	The REACTOR WATER LEVEL SIGNAL FAILURE indicator light and the REACTOR WATER LEVEL A/B SELECTOR switch, while being functionally related, have no control-display interaction. The indicator light, which is also annunciated on panel P680, is used to indicate a channel disagree between two of the three channels of the reactor water level control and is located further upstream in the circuity. The selector switch is used to select which channel A or B is connected to the feedwater control circuity. Based on the above, it is considered that the present arrangement is adequate and hence no further action is planned.

TABLE 1

COMMUNICATIONS SYSTEM

1. Public Address System (PA) - The PA system is located throughout the site for intraplant voice communication. Electrical power for the PA system is provided from the 120 VAC uninteruptible power. The PA system consists of handset stations and loudspeaker assemblies. It is comprised of two independent communication channels, a page channel and a party channel. The party channel has the capability to support 4 independent communication links. An integral part of the PA system is the evacuation alarm system, it is activated from the main control room.

   A separate PA system, independent of the main plant PA system, is provided for a direct line of communication between the control room and the refueling areas of the containment and auxiliary building.

   A third independent PA system is provided for communication between the Remote Shutdown panel and the control room.

2. Sound-Powered Telephone System - is used to supplement the (PA) system and also to provide fixed emergency communication capability. The system consists of a six channel sound-powered telephone system which is comprised of a permanently interconnected series of telephone jacks for sound-powered telephone sets.

   A separate sound-powered system, independent of the main sound-powered system, is provided for a direct line of communication between the control room and the refueling areas of the containment and auxiliary building.

   A third independent sound-powered system is provided for communication between the Remote Shutdown panel and the control room. The system is comprised of (2) channels.

   No AC or DC power is required for the operability of the system.

3. A Two-Way Radio System - is provided for mobile intraplant communication, it consists of portable two-way radios, an antenna network and repeater stations which are located throughout the plant. A total of (6) repeater stations are installed at GGNS, 4 of these are delegated to plant operations and the remaining (2) are utilized for an independent security two-way radio system.

   The antenna network presently installed at GGNS allows certain areas to be blacked out for two way radio communication. Those identified thus far are the Drywell and Containment at all elevations and the 93' elevation of the Auxiliary building.

4. Commercial Telephone - the system is provided by South Central Bell, it provides service by direct dialing to locations outside the plant, both local and long distance, and also between extensions. This is a commercial dial telephone system, with extensions installed at a limited number of locations throughout the plant in addition to the control room. An independent line, unlisted number, is provided for emergency plant-to-offsite communications. An onsite power supply is provided for the telephone system.

TABLE 1

COMMUNICATIONS SYSTEM

5. Power System Communications (microwave) - Communications with offsite locations in the power system is accomplished via a carrier current link. This network connects GGNS with the Middle South System Control Center, the Mississippi Power & Light Company General Offices, and the Mississippi Power & Light Dispatcher. Used during normal plant operation.

6. Two-Way Radio - An emergency control room to offiste communication system is provided via a two-way radio.

TABLE 2

SEQUENCE OF OPERATION

'RINGBACK ALARM SEQUENCE'

Sustained Alarm

Condition*	Field Contact	Window	Audibles	Audible Ringback**
Normal	Normal State	Off	Off	Off
Alarm	Alarm State	Fast Flash	On	Off
Silence	Alarm State	Fast Flash	Off	Off
Acknowledge	Alarm State	Steady On	Off	Off
Return to normal	Normal State	Slow Flash	Off	On
Reset	Normal State	Off	Off	Off

Momentary Alarm

Conditions*	Field Contact	Window	Audibles	Audible Ringback**
Normal	Normal State	Off	Off	Off
Alarm	Alarm State	Fast Flash	On	Off
Return to normal	Normal State	Fast Flash	On	Off
Silence	Normal State	Fast Flash	Off	Off
Acknowledge	Normal State	Slow Flash	Off	On
Reset	Normal State	Off	Off	Off

Test***

Condition	Field Contact	Window	Audibles	Audible Ringback**
Test	As Is	On	On	Off

* Operation of the pushbutton must take place in the following sequence: Silence, Acknowledge, Reset. Any other inadvertent sequence will not change the state of the annunciator.

** Ringback is an audible signal when an abnormal condition clears. An alarm audible shall take precedence over a ringback audible under all conditions.

*** Test button shall be so arranged that no change of state takes place due to actuation of the test button. Any abnormal conditions existing prior to operation of test button shall be displayed after the test if the condition is still abnormal.

Note: The above sequence of operation is for the main control room panels only (P870, P601, P807, P862, P854, P855). The back panels and the panels in the upper cable spreading room should have the same sequence of operation except that the acknowledge pushbutton should also silence the alarm audible (no silence pushbutton required on back panels).

TABLE 3

AUDITORY LOCALIZATION

AUDIBLE ALARM

Panel	Center Freq	Bandwidth
H13-P845	250 Hz	200-300 Hz
H13-P842	450 Hz	400-500 Hz
H13-P862	1000 Hz	950-1050 Hx
H13-P680	1500 Hz	1450-1550 Hz
H13-P870	2000 Hz	1950-2050 Hz
H13-P601	2500 Hz	2450-2550 Hz
H13-P807	3000 Hz	2950-3050 Hz
H13-P808	250 Hz	200-300 Hz
H13-P811	450 Hz	400-500 Hz

AUDIBLE RINGBACK

Panel	Center Freq	Bandwidth
H13-P680	1500 Hz	1450-1550 Hz
H13-P845	250 Hz	200-300 Hz
H13-P811	450 Hz	400-500 Hz

TABLE 4

ALARM LOCATIONS

AUDIBLE ALARM

Horn	Panels Assocated	Location
1	P680	P680
2	P601/P864	P601
3	P870	P870
4	P807	P807
5	P854/P855/P862	P862
6	P845*	P845
7	P842*	P842
8	P808**	P808
9	P811**	P811

AUDIBLE RINGBACK

Horn	Panels Associated	Location
1	P864/P680/P601/P807/P870 P855/P854/P842	P680
2	P845*/P842*	P845
3	P808*/P811*	P811

* Backpanels (main control room)
** Backpanels (upper cable spreading room)

Note: P856 - SEISMIC INSTRUMENT CABINET has its own associated annunciator system and horns.

TABLE 5: SOE EXAMPLE

MISSISSIPPI POWER AND LIGHT COMPANY
GRAND GULF NUCLEAR UNIT ONE
---------SEQUENCE OF EVENTS LOG---------
7/23/81 08:40:15

THE FIRST EVENT OCCURRED AT 7/23/81 08:34:55.000 *** RECALL ***

TIME AFTER FIRST EVENT	POINT ID	SERVICE DESCRIPTION	POINT STATUS	QTY	MESSAGE TYPE
0.000 SECS	N43K229	PW TANK LEVEL	TRIPPED		TRIP
1.661 SECS	N43K230	GEN TERM BOX LEVEL	TRIPPED		TRIP
13.115 SECS	N43K238	PW TEMPERATURE	HIGH		TRIP
15.040 SECS	N43K239	WTR COMN HEAD VIB	TRIPPED		TRIP
15.091 SECS	N41K201	ROTOR GROUND TRIP	TRIPPED		TRIP
15.524 SECS	N71AC01A	CIRC WTR PMP A MOTOR PROT	TROUBLE		TRIP
15.577 SECS	N71AC01B	CIRC WTR PMP B MOTOR PROT	TROUBLE		TRIP
15.314 SECS	N71AC01B	CIRC WTR PMP B MOTOR PROT	TROUBLE		TRIP
18.474 SECS	N71N041A	CMP A LUBE WTR FLOW	LOW		TRIP
15.665 SECS	N71N041B	CMP B LUBE WTR FLOW	LOW		TRIP
1.753 SECS	R15S702	SERV XFMR 11 BU LO RLY	OPERATE		TRIP
15.659 SECS	R15S725	SERV XFMR 11 PRI DIFF RELAY	OPERATE		TRIP
15.307 SECS	R15S725	SERV XFMR 11 PRI DIFF RELAY	OPERATE		TRIP
1.103 SECS	R15S726	SERV XFMR 11 OVERCURRENT RLY	OPERATE		TRIP
15.213 SECS	R15S726	SERV XFMR 11 BU DIFF RELAY	OPERATE		TRIP
15.382 SECS	R15S726	SERV XFMR 11 BU DIFF RELAY	OPERATE		TRIP

TABLE 6

METERS BEING REPLACED WITH

BAILEY SIGNAFLEX METERS

Meter #	Description	Scale
C34-PI-R605	RX PRESS WIDE RANGE	0-12(x100) PSIG
B21-LI-R604	RX WTR LVL WIDE RANGE	-150/0/+60 IN
C34-LI-R606A, B, C	RX WTR LVL NARROW RANGE A/B/C	0-60 IN
C34-FI-R604 A, B	FW FLO A/B	0-10($x10^6$)LBS/HR
C34-FI-R603A, B, C, D	STM FLO A/B/C/D	0-5($x10^6$)LBS/HR

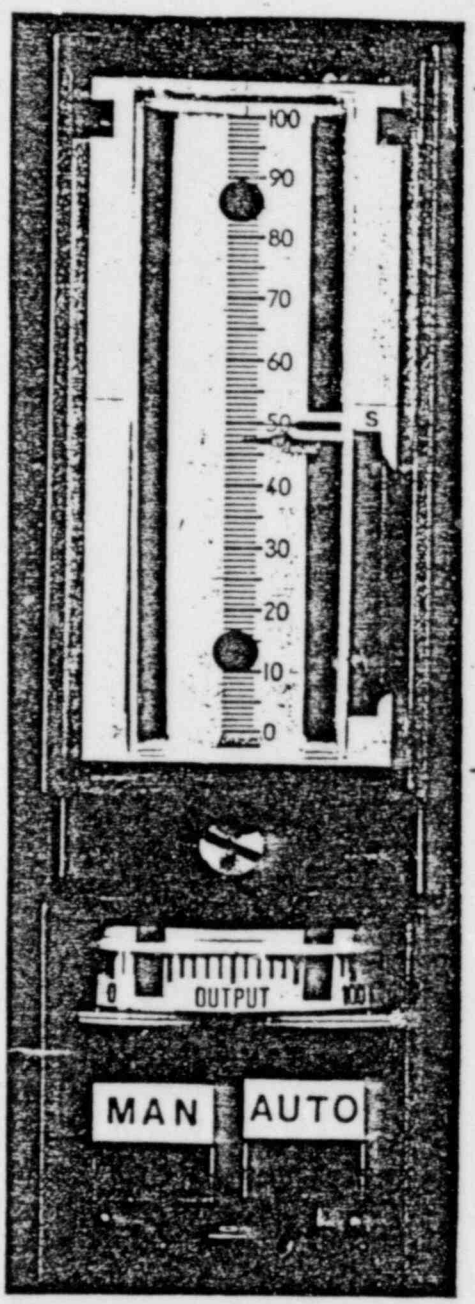
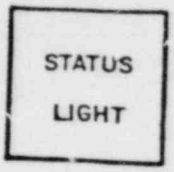
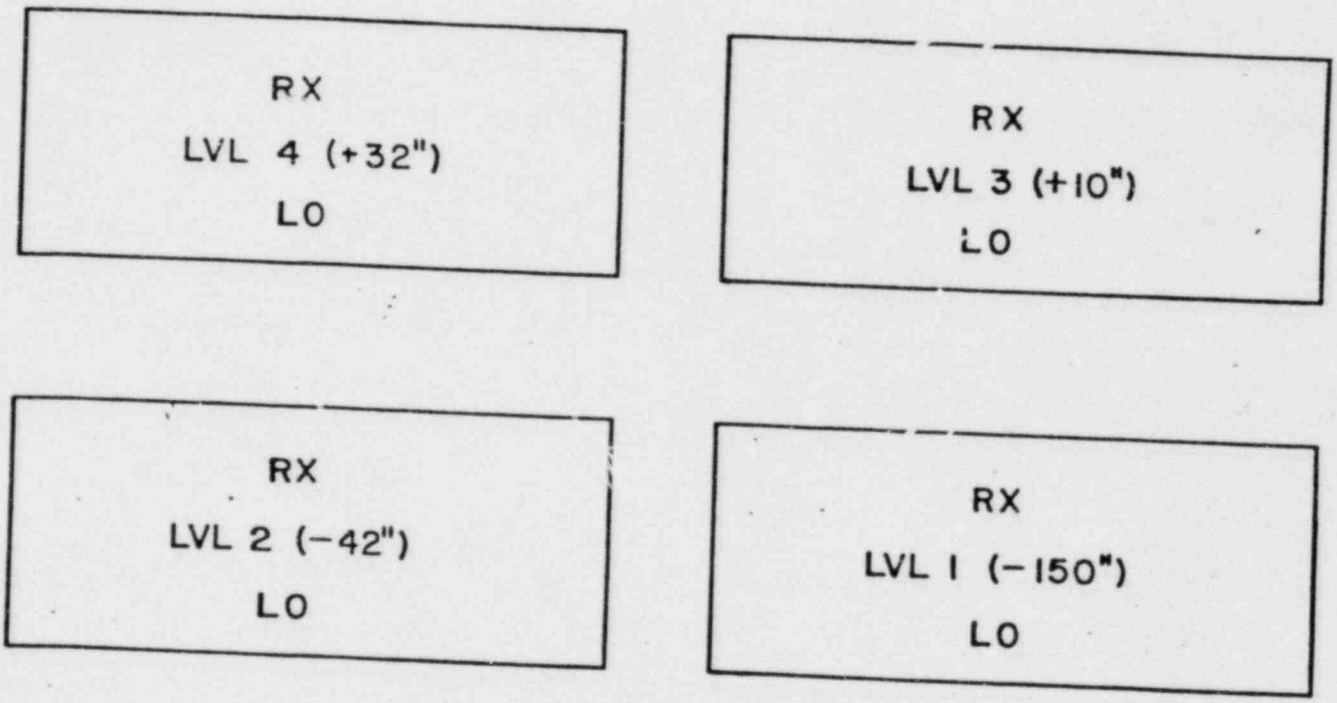


FIGURE 1 FOXBORO
NUCLEAR 250 STATION

(FULL SCALE)



LABELS TO DISTINGUISH STATUS LIGHTS AND PUSHBUTTONS



LABELS TO DISTINGUISH DIFFERENT REACTOR WATER LEVELS
(NOT TO SCALE)

FIGURE 2: STATUS LIGHTS, PUSHBUTTONS AND REACTOR WATER LEVEL ANNUNCIATORS

FIGURE 3 BAILEY
EDGEWISE INDICATOR
TYPE ES
(FULL SCALE)

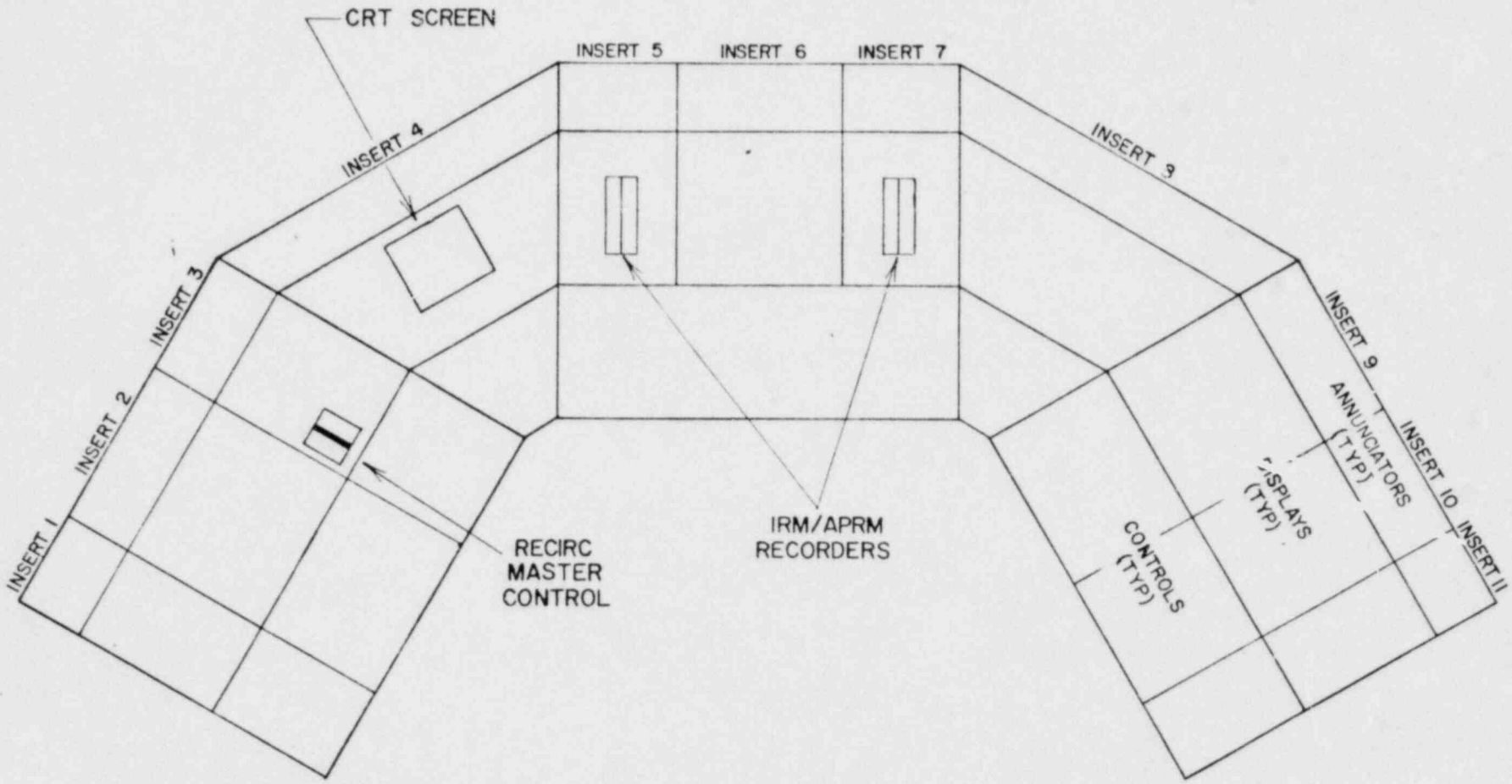


FIGURE 4 P680 LAYOUT
(GENERAL)