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ILLINOIS POWER COMPANY



CLINTON POWER STATION, P.O. BOX 678, CLINTON, ILLINOIS 61727

September 28, 1984

Docket No. 50-461

Director of Nuclear Reactor Regulation  
Attention: Mr. A. Schwencer, Chief  
Licensing Branch No. 2  
Division of Licensing  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Subject: Clinton Power Station Unit 1  
SER Confirmatory Issue #38  
Preliminary Design Assessment (PDA) of Control Room and  
Detailed Control Room Design Review (DCRDR)

Dear Mr. Schwencer:

This letter provides submittals of 1) the results of the PDA Human Engineering Discrepancies (HEDs) evaluation and 2) the DCRDR Program Plan.

PDA HED EVALUATION

In Letter U-0706, dated April 19, 1984, Illinois Power (IP) provided the status and schedule for resolution of PDA HEDs resulting from the Control Room Design Review (CRDR)/Audit conducted in November 1981. The evaluation of the PDA HEDs is complete, and a report of the results is submitted herewith as Attachment 1. To aid your review, this information is presented in the same format as the "Status Report on the Clinton Power Station Unit 1 Control Room Design Review" sent to G. E. Wuller (IP) from H. Bernard (NRC) in July 1982. Implementation of the resolutions correcting the HEDs will be completed in early 1985.

Features that could not be evaluated during the CRDR/Audit, Category B Items (as noted), and Category C Items will be evaluated as part of the DCRDR. The results of this evaluation, the proposed corrective actions, and the schedule for implementing the actions will be presented to the NRC in the DCRDR Summary Report.

DCRDR PROGRAM PLAN

In Letter U-0647, dated July 5, 1984, IP proposed a schedule for completing each requirement of Supplement 1 to NUREG-0737, including a revised DCRDR Program Plan submittal date of January 1, 1985. As a result of a telephone conversation with B. L. Siegel (NRC) on August 6, 1984, IP received approval to submit the program plan in September 1984.

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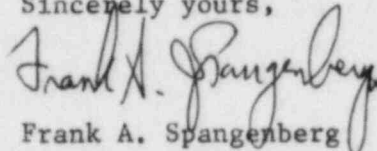
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The DCRDR Program Plan is complete, and a copy is submitted herewith as Attachment 2. The plan presents the approach that will be taken to review the control room for HEDs and the schedule allowing the final DCRDR Summary Report to be submitted by July 1, 1985.

IP will provide additional information or update progress as requested.

Sincerely yours,



Frank A. Spangenberg  
Director - Nuclear Licensing  
and Configuration  
Nuclear Station Engineering

FAS/LRR/jgh

Attachments

cc: B. L. Siegel, NRC Clinton Licensing Project Manager  
NRC Resident Office  
Regional Administrator, Region III, US NRC  
Illinois Department of Nuclear Safety

CLINTON POWER STATION  
UNIT 1  
ILLINOIS POWER COMPANY

Part A This Section contains those items which were deemed necessary to be corrected prior to issuance of an operating license. Following each item is a statement of Illinois Power Company (IP) corrective action.

A-1. CONTROL ROOM WORKSPACE

1. Access to the Remote Shutdown Panel is not currently limited. (A.1.2)\*

Corrective Action

The Remote Shutdown Panel is located in a vital security area to which access will be limited to approved personnel through the use of key cards and security doors.

2. There are no provisions for storage of procedures at the Remote Shutdown Panel. (C.1.4)

Corrective Action

Present plans are to provide adequate storage space for necessary procedures which would be accessible to the operators. This is to be done after the panel is released to Plant Staff.

\* Throughout the report the use of parentheses, such as (C.1.2), refer to the part, section, and finding number used in the HFEB Control Room Design Review/Audit report, dated December 3, 1981.

### A-3. ANNUNCIATORS

1. The audible signals to indicate cleared alarms on the annunciator system do not have a finite duration of activation. Manual operator action is required to silence the cleared alarm signal. (C.3.4)

#### Corrective Action

CPS believes it is imperative that the operator promptly reset all cleared annunciators. This is necessary to eliminate a potential source of confusion during transients. For this reason, the CPS Control Room has been designed so that positive action is required by the operator to silence the "cleared" audible signal.

The loudness of the cleared tone will be adjusted.

2. The vertical columns and horizontal rows of the annunciator panels have not been labeled with easily visible alphanumerics to facilitate visual location of each tile in a panel by its matrix coordinate designation. (C.3.5)

#### Corrective Action

Vertical columns and horizontal rows of the annunciator panels now have alphanumeric labeling.

3. Annunciator acknowledge, silence, test, and reset buttons are large, grey, and flat surfaced on some panels; and large, silver, and recessed on other panels. (A.3.10)

#### Corrective Action

The annunciator pushbutton's shape (large, square) distinguishes these controls from all other controls. Grey demarcation and label plates have been used to further distinguish annunciator pushbuttons.

4. The annunciator ACKNOWLEDGE pushbutton in the P803 annunciator control pushbutton group is not labeled to identify its function. (C.3.13)

#### Corrective Action

The annunciator ACKNOWLEDGE pushbutton has been labeled to identify its function.

A-3. ANNUNCIATORS (Continued)

5. The annunciator panel on P801 for the B system is missing the "Trouble VD System Local 1PL55J". (A.3.11)

Corrective Action

Engineering evaluation of this concern has revealed that only one annunciator alarm is necessary. The local panel services both A and B systems. Another alarm could prove confusing to the operator.

6. In section 21 on P601, "CST Water Level Low" is a misnomer; it should be RCIC tank. (A.3.12)

Corrective Action

Annunciator tile is now labeled "RCIC Storage Tank Level Low".

#### A-4. CONTROLS

1. The use of the RHR B Shutdown Cooling Suction Valve 1E11-F006B was not apparent to operators. Remote Shutdown Panel. (A.4.1)

##### Corrective Action

The use of this valve is to allow the isolation of the RHR B HX from shutdown cooling if the Control Room must be evacuated. The labeling of this valve has been improved to enhance operator action. It reads "RHR B Shutdown Cooling Suction Valve E12-F006B".

2. There is little use of knob-coding on the Remote Shutdown Panel. (A.4.2)

##### Corrective Action

Throttle valve controls on the Remote Shutdown Panel (and in the Main Control Room) have been distinguished from "fixed position" controls by using the abbreviation "THROT" on their label.

3. There is not distinctive shape or color coding of controls for throttleable valves. (A.4.3)

##### Corrective Action

Throttle valve controls on the Remote Shutdown Panel (and in the Main Control Room) have been distinguished from "fixed position" controls by using the abbreviation "THROT" on their label.

4. Some pushbuttons light up when depressed. However, not all of these have lamp test capability. (A.4.4)

##### Corrective Action

All lamps with testing capabilities shall be tested periodically. Most backlit pushbuttons are lit with two bulbs and when lit, shall be checked periodically for both bulbs operable. Other indicating lights will have indirect functional checks (i.e., if breaker is energized, at least one light will be lit, otherwise the operator will investigate). If in doubt, the operators can change the bulbs to verify operability. All the above items will be administratively controlled.

A-4. CONTROLS (Continued)

5. An administrative control should be employed for key lock controls on P801 and other panels including storage of keys. (A.4.5)

Corrective Action

CPS Procedure 1432.01, Operations Department Key Control, outlines the administrative controls for all keys including keys for key lock controls.

6. On P601 insert 16, the "Norm" j-handle position on the HPCS WATER LEG PUMP is ambiguous. (A.4.6)

Corrective Action

New labels have been installed without the "Norm" position indicated.

7. On P601 insert 17, the "Neutral" j-handle position is ambiguous. (A.4.7)

Corrective Action

New labels have been installed without the "Neutral" position indicated.

8. Several of the Bailey controllers in the Control Room appear to have the Manual and Automatic control positions reversed. There is an inconsistency from control to control.

Examples:

- a) RECIRC Loop A Flow Control on P680-04
- b) RECIRC Loop A Master Control on P680-04
- c) RECIRC Loop A Flux Control on P680-04
- d) RECIRC Loop B Flow Control on P680-04

(C.4.7)

Corrective Action

All the Bailey controllers follow the same convention. Foxboro controllers, which are also used in the Control Room, have the manual and automatic positions reversed in relation to the Bailey controllers. This deviation from the convention is countered by labeling and color coding. The manual and automatic positions of both types of controllers are consistently color coded and clearly labeled to identify their function. This should be adequate to enhance operator action.

A-4. CONTROLS (Continued)

9. The Manual and Automatic positions on several Bailey controllers on P680-03 are inconsistently color coded.

Examples:

- a) RECIRC LOOP A FLOW CONTROL
- b) RECIRC LOOP A MASTER CONTROL
- c) RECIRC LOOP A FLUX CONTROL
- d) RECIRC LOOP B FLOW CONTROL

(C.4.9)

Corrective Action

All the Bailey controllers follow the same convention. The Foxboro controllers used in the Control Room have had the pushbutton lens changed so that manual and automatic have the same color convention as the Bailey controllers.

10. Labels on backlit indicator lights in the Control Room are easily removeable and are interchangeable. The labels do not have location identifier codes or keys to prevent interchanging the labels or to identify the correct location of each label.

Example:

UNIT 1 DMPR MTR on P801-66

(C.4.10)

Corrective Action

A set of panel front elevation drawings will be available for use in the Control Room. These drawings can be used to confirm proper pushbutton conventions.



## A-5. DISPLAYS

1. The informational transilluminated displays on the upper right of each section on P801 are missing some tiles. (A.5.1)

### Corrective Action

The missing tiles on P801 have been installed.

2. On P870 insert 52, the 6900 V Bus 1B Voltage scale is limited to 5250. (A.5.2)

### Corrective Action

A new meter has been installed with a scale range of 0-9000 volts.

3. The meter for DGB Output Watts for diesel generator output on P601 is scaled to 27.5 Kilowatts. (A.5.6)

### Corrective Action

A new meter has been installed with scale range of 0-5800 Kilowatts. Generator rated power is approximately 3900 KW.

4. The DGLA & 1B OUTPUT WATTS meter on P877 has a scale reading from 0 to 27.50 with increments at 4.58, 9.17, 13.75, 18.33, and 22.92. (A.5.7)

### Corrective Action

A new meter with scale range of 0-5800 Kilowatts has been installed with readily interpretable major and minor division markings.

5. The OS AIR TEMP RAD MON DIV 2 RAD LVL Meter on P800 has a scale reading .01 at the bottom with zero above it and increments of 10 to 100 above the zero. This also applies to DIV 1. (A.5.8)

### Corrective Action

Meter scale has been changed to a log scale with a range of .1-10,000 mr/hr.

6. Suppression pool level meter on C61-P001 has a scale ranging from -24 inches to +6 inches. This scale is not consistent with similar Control Room indication, and reference point is unclear. (A.5.9)

### Corrective Action

Scale has been changed to have a range from -45" to +55". The "0" on the scale represents a plant elevation of 731'5". The final disposition of this instrumentation will be presented in the DCRDR Summary Report.

A-5. DISPLAYS (Continued)

7. On the Reactor Water Level Recorder on P678, the scales appear incorrect for Wide Range values. (A.5.10)

Corrective Action

The scales on this recorder have been changed. The red pen will monitor UPSET RANGE with a 0-180 inch scale, and the blue pen will monitor NARROW RANGE with a 0-60 inch scale. The recorder and pens have been labeled appropriately.

8. The scale for JET PUMP FLOW on the JET PUMP FLOW/CORE PLATE DP Recorder on P678 is not high enough for the operating parameters. (A.5.11)

Corrective Action

Recorder scale of 0-100 mlbs/hr is correct. Normal operating flow rate is 84.5 mlbs/hr.

9. There are several meters that display mid-scale indications if the meter fails or becomes inoperative.

Examples:

- a) Battery Current meters on P877-15 fail to the +200 amp indication.
- b) The 4571 VARS meters on P870-15, P601-14X, and P601-15Y fail to a zero indication at mid-scale.

Corrective Action

Meter fail points on meters that fail at mid-scale points will be marked in red with the letters "FAIL POINT".

10. The small meters on the Bailey controllers on P870-54M are not labeled to identify what parameter is being indicated or the units of the parameter being displayed. (C.5.6)

Corrective Action

These meters have been labeled to identify both the parameter and its associated units.

11. On P601 insert 18, the Suppression Pool Level chart recorder is scaled in inches (0-80) while the procedures reference SP level in feet. (A.5.12)

Corrective Action

Illinois Power's Engineering Department is currently reviewing Suppression Pool Level instrumentation in the Control Room to assure appropriate scales and reference points will be consistent. The final disposition of this instrumentation will be presented in the DCRDR Summary Report.

A-5. DISPLAYS (Continued)

12. The scale on the COND BSTR PUMP DISCH HDR PRESSURE on P870 has a range reading from 0 to 200 (Insert #57), which is an inadequate range for operation. (A.5.13)

Corrective Action

The scale has been changed to 0-800 psig, rated operating pressure is approximately 490 psi.

13. Steam Flow/Feedwater Flow scales on P678 show a range that is too small for the actual operating values. (A.5.14)

Corrective Action

The scale range on the Steam Flow/Feedwater Flow recorder is 0-20 mlbs/hr, rated operating flow rate is 12.4 mlbs/hr. New chart paper has been installed to match this range.

14. The CCW PUMPS 1A, 1B, 1C Current meters on P801 should not show negative values. (A.5.15)

Corrective Action

The scales have been changed to eliminate the negative values.

15. Readability of instrumentation on P678 from the P680 position is difficult without the assistance of banding (i.e., at 120" letter height would have to be .48" to be read; no labels or scale numbers are larger than .25"). (A.5.16)

Corrective Action

Illinois Power's Operations and Engineering Departments have reviewed this situation and have identified appropriate instrumentation throughout the Control Room to be banded, the zones to be banded, and the appropriate color of the bands. Banding has been added in accordance with this evaluation.

16. MAIN STOP VALVE POSITION GROUP MILLIAMP METERS on P678 have a scale from 20 to 0 to 20. Positive and negative indications are not shown. (A.5.17)

Corrective Action

Positive and negative indication has been added.

A-5. DISPLAYS (Continued)

17. Some strip chart recorders do not have chart paper installed.  
(C.5.9)

Corrective Action

Strip chart recorders have appropriate paper installed. To aid the operator in replacing recorder paper, the type of paper has been marked on the recorder door.

18. The scales on some strip chart recorders do not match the scales on the recorder chart paper.  
Example:  
The ECC SPEED & CONT VLV POSITION recorder on P870-59L has two scales on the recorder, and the chart paper installed on the recorder has three scales.  
(C.5.10)

Corrective Action

The appropriate paper with scales to match the recorder scales has been installed in all recorders.

19. The PMS TREND recorders 1 & 2 on P680-10E and the NEUTRON MONITORING SYSTEM strip chart recorders on P678 have multiple scales which are not aligned with each other or with the chart paper. (C.5.11)

Corrective Action

Appropriate paper with the scales aligned has been installed in the recorders.

20. A vertical series of 8 pairs of red and green indicator lights on the Remote Shutdown Panel alternate colors left-right down the two columns. In this arrangement, color and position do not provide any type of redundant information and do not conform to the Close/Green/Left - Open/Red/Right convention used in the Control Room. (C.5.15)

Corrective Action

The lights have been changed to conform with the Close/Green/Left and Open/Red/Right color convention.

21. One indicator needle on the steam control valve on the turbine control panel, P680, is very small and difficult to see.  
(A.5.18)

Corrective Action

Meter needle will be adjusted if possible; if not, it will be replaced with a larger one.

A-5. DISPLAYS (Continued)

22. Tolerance zones are not indicated on most meters in the Control Room. (A.5.20)

Corrective Action

IP's Operations and Engineering Departments have reviewed this situation and have identified appropriate instrumentation throughout the Control Room to be banded, the zones to be banded, and the appropriate color of the bands. Banding has been added in accordance with this evaluation.

23. There should be some way to positively diagnose a failed indicating light. Currently, there is no lamp test capability to do so. (A.5.21)

Corrective Action

All lamps with testing capabilities shall be tested periodically. Indicating lights will have indirect functional checks, (i.e., if breaker is energized at least one indicator light will be lit, otherwise the operator will investigate). If in doubt, the operators can change bulbs to verify operability. All the above steps will be administratively controlled.

24. Recorders are not always clearly marked with type of paper required. They should also provide appropriate chart paper. (A.5.22)

Corrective Action

Chart paper manufacturer and catalog number will be installed inside recorder doors.

25. The red zone marking on the GEN HYDROGEN PURITY meter on P870-55M obscures the minor division marks on the meter scale. (C.5.16)

Corrective Action

An Engineering evaluation was performed and has revealed that the system is not operated in the red zone, and therefore, should not be detrimental to any operator action. The red zone is an indication of danger from low hydrogen purity.

A-5. DISPLAYS (Continued)

26. The backlit indicators on P680-06 cannot readily be distinguished from backlit pushbuttons. The backlit pushbuttons and indicators are intermixed in the same matrix arrays. (C.5.17)

Corrective Action

New labels with black borders have been installed for the backlit pushbuttons to distinguish them from the indicators.

27. Some of the yellow alarm indicator lights on the Remote Shutdown Panel do not conform to color code convention.  
Examples:

- a) RCIC TURBINE TRIP indicator light
- b) RCIC TURBINE OIL TEMP HIGH indicator light
- c) RCIC TURBINE BEARING OIL LOW PRESS indicator light

(C.5.18)

Corrective Action

As a result of IP's engineering evaluation, the yellow indicator lights should be acceptable and agree with NUREG-0700, paragraph 6.5.1.6(c) and GE Design Spec Data Sheet (MCB) 22A4200AC paragraph 4.1.2.3. Amber lights are used to indicate "hazard, caution, or attention required" and "cautionary information".

28. The REACTOR FUEL ZONE LEVEL recorder on P601-20 is not installed, and its space on the panel is not labeled. (C.5.19)

Corrective Action

Reactor fuel zone level recorder has been installed and labeled.

## A-6. LABELS AND LOCATION AIDS

1. Computer controls for OUTPUT SOURCE ON P680 panel are mislabeled. AUTO/MANUAL should be SELECT 1/SELECT 2 and MODE should be AUTO/MANUAL.

### Corrective Action

Computer controls on P680 have been changed as described in this finding.

2. Review of a new label list for Remote Shutdown found significant improvements. (A.6.2)

### Corrective Action

Permanent labels have been procured and installed.

3. The chart recorder for REACTOR WATER CLEANUP SYSTEM RWCU/RECIRC CONDUCTIVITY on P678 has a label reading "R - Red" and "R - Blue".

### Corrective Action

Corrections have been made to label so that it reads "B - Blue".

4. COMBINED INTERMEDIATE VLV POSITION meters on P678 are not labeled. (A.6.4)

### Corrective Action

Labels have been installed for all Combined Intermediate VLV position meters.

5. GEN MEGAWATTS Meter on P678 is not labeled. (A.6.5)

### Corrective Action

GEN MEGAWATTS meter is in the "Turbine Section" of P678 and is labeled "Load".

6. The meters on the RCIC Section on P601 are not labeled. (A.6.6)

### Corrective Action

Meters have been labeled.

## A-6. LABELS AND LOCATION AIDS

7. The switches on Westronics DW RTRN AIR/AREA TEMP Meter on P800 are not labeled. The same is true for the ECCS Pump RMS Temp Meter. (A.6.7)

### Corrective Action

The switches on the meters have been labeled.

8. The discharge pressure meters on P601 insert 21 are unlabeled. (A.6.8)

### Corrective Action

Meters have been labeled.

9. Tags are too large and tend to obscure adjacent indications. (A.6.9)

### Corrective Action

Smaller tags which don't obscure adjacent indications are now being used.

10. The IRM insert and withdraw pushbuttons on P680 are not labeled (Insert 06). (A.6.10)

### Corrective Action

Pushbuttons have been labeled.

11. RHR A Head Spray Flow on P601 is labeled incorrectly. (A.6.11)

### Corrective Action

Label has been corrected to read RHR B HEAD SPRAY FLOW.

12. Test buttons for the Scram Discharge Volume Drain Valves on P680 are not labeled so (Insert 06). (A.6.12)

### Corrective Action

Test buttons are now labeled "SCRAM DISCHARGE VOL DRAIN VALVE TEST SWITCH".

13. The Reactor Protection System Bypass keylock switches on P680 are mislabeled. (A.6.14)

### Corrective Action

These switches have been labeled "RECIRC PUMP TRIP BYPASS".



A-6. LABELS AND LOCATION AIDS (Continued)

14. Reactor water level on P678 is a two-channel recorder but is only labeled for one channel. (A.6.15)

Corrective Action

Both channels have been labeled. (See response to A-5.7)

15. On P870 insert 54, the indicator lights for MS LEAD LO PT DRN VLVS are unlabeled. (A.6.16)

Corrective Action

Indicator lights have been labeled.

16. On P870 insert 55, several switches are unlabeled. (A.6.17)

Corrective Action

Labels have been added.

17. On P870 insert 56, one switch is unlabeled. (A.6.18)

Corrective Action

Switch has been labeled.

18. On P870 insert 59, a button on the bottom right is unlabeled. (A.6.19)

Corrective Action

Button has been labeled.

19. On P601 insert 19, the indicator lights for safety relief valve solenoid "B" activation are unlabeled. (A.6.20)

Corrective Action

Indicator lights have been labeled.

20. On P601 insert 21, a bank of meters on the left is unlabeled. (A.6.21)

Corrective Action

Meters have been labeled.

A-6. LABELS AND LOCATION AIDS (Continued)

21. Labels on P801 are not used to functionally group controls and displays. (A.6.22)

Corrective Action

Meters and labels have been functionally grouped and hierarchical labeling and demarcation have been used to distinguish the groups.

22. There is no hierarchical labeling scheme to aid operators in identification of systems and subsystems. (A.6.23)

Corrective Action

Hierarchical labeling has been incorporated in the panel layouts to aid operators.

23. Controls and components of similar or common function on P870 are not visually distinguishable by hierarchical labeling. (A.6.24)

Corrective Action

Hierarchical labeling has been incorporated to aid the operator in determining related components.

24. Functional groups are not indicated on each panel. (A.6.25)

Corrective Action

Functional groups have been indicated by using hierarchical labeling and/or demarcation lines where appropriate.

25. Labels on the MAIN STOP VLV POSITION/COMBINED INTERMEDIATE VLV POSITION SECTION on P678 are placed above the displays. (A.6.26)

Corrective Action

New labels have been placed below the meters.

26. Labels are placed below the trip buttons on P680. (A.6.27)

Corrective Action

Labels have been placed above the trip buttons.

A-6. LABELS AND LOCATION AIDS (Controlled)

27. Labels placed below recorders on C61-P001 are sometimes eclipsed by the recorder itself. (A.6.28)

Corrective Action

Panel C61-P001 is the Remote Shutdown Panel. This panel has no recorders installed. Labels on recorders in the Control Room have been changed so that the labels are placed on the recorder door and are not obstructed by the recorder.

28. Division indication on all labels is too small to be seen without close scrutiny. (A.6.30)

Corrective Action

Illinois Power's Operations and Engineering Departments have evaluated this situation and determined the division indication on labels can easily be read from the position which the operator must be in order to operate the valve. The division indicators are located consistently in the same position to ensure fast operator identification and avoid confusion.

29. Division numbers on labels for C61-P001 are very small and difficult to read. (A.6.31)

Corrective Action

In order to remain consistent, the division indicators on the Remote Shutdown Panel are the same size as those in the Control Room. Demarcation will be added in order to show the divisional separation between sections.

30. Labels are written inconsistently for the SGTS UPSM & ONSM HEPA FILT for the A and B sections on P801. (A.6.32)

Corrective Action

Labels have been changed to be consistent.

31. The test switch for CGCS TEST on P800 is labeled "TEST" for division 1 and "INOP" for division 2. (A.6.33)

Corrective Action

In order to maintain consistency, the division 2 CGCS label was changed so the "INOP" position is now "TEST".

A-6. LABELS AND LOCATION AIDS (Continued)

32. Some abbreviations used on labels on C61-P001 are inconsistent. For example, shutdown service is abbreviated SX and SSW on remote shutdown and Control Room panels. (A.6.34)

Corrective Action

Labels have been changed so that the labels on C61-P001 are consistent with those in the Control Room.

33. MS TO SJAE 1A INLT VLV 1CA01AA in Aux and Extraction Steam Section on P870 is not labeled as to direction of operation. (A.6.35)

Corrective Action

"Close" and "Open" designations have been added.

34. Labels on C61-P001 are black on yellow and white on blue. (A.6.36)

Corrective Action

New labels which are silver letters on black background have been installed to be consistent with Control Room labeling.

35. Mimics on P601 are incomplete. (A.6.39)

Corrective Action

Mimics on P601 have been completed.

36. Labels on the Remote Shutdown Panels are black on yellow and other colors. Labels are also temporary. (A.6.37)

Corrective Action

All labels on the Remote Shutdown Panel and in the Control Room now have silver letters on a black background and are .032" thick aluminum plates with long life adhesive backing.

37. Front width on labels varies significantly from label to label on C61-P001. Some are very thick and cannot be read easily. (A.6.38)

Corrective Action

All labels on the Remote Shutdown Panel and in the Control Room now have silver letters on a black background and are .032" thick aluminum plates with long life adhesive backing.

A-6. LABELS AND LOCATION AIDS (Continued)

38. Mimics on several CRT displays lack origin or termination points. (C.6.14)

Corrective Action

Due to the construction and testing status of the Control Room and computer system, the CRT's will be evaluated as part of the DCRDR with results of this review included in the DCRDR Summary Report.

39. There is a temporary mimic on the Remote Shutdown Panel. (C.6.16)

Corrective Action

A permanent mimic similar to that used in the Control Room has been installed on the Remote Shutdown Panel.

40. Mimic line color coding is usually consistent within systems. In the steam/water systems:

Red - Steam

Green - Service (lake) water

Yellow - Condensed steam

Blue - Purified water

Orange - Extraction steam

Brown - Condensate piping

White - Gland sealing steam

Grey - Noncondensable gas vent to suppression pool from RHR heat exchanger

(A.6.42)

Corrective Action

A standard list of mimic colors has been developed and has been used in the design of Control Room mimics.

41. Some flow indications arrows on the mimic P680 are "cut off" and, therefore, not clear in their indication. (A.6.43)

Corrective Action

The mimic on P680 has been revised. Flow indicators have been added to aid operators.

42. Some flow direction indications are not present on mimic lines and some mimics are not complete on P801. (A.6.44)

Corrective Action

The mimic on P801 has been revised. Flow indicators have been added to aid operators.

A-6. LABELS AND LOCATION AIDS (Continued)

43. On P800 insert 62 has no flow direction indications on the mimic. (A.6.45)

Corrective Action

Flow indicators have been added.

44. Demarcation lines are not used to enclose related displays on P801. (A.6.46)

Corrective Action

Demarcation lines and hierarchical labeling have been incorporated to functionally group controls and displays where appropriate without adding confusion.

45. Backpanel 803 has a Switchyard Buses mimic which shows Unit 2 buses. However, Unit 2 does not yet exist. (C.6.17)

Corrective Action

The mimic which shows Unit 2 buses has been removed.

## A-7. PROCESS COMPUTERS

1. Character labels have worn off of some keys on the PMS keyboards on P680-10E. (C.7.2)

### Corrective Action

Keys with worn labels will be replaced after construction of Control Room is complete.

2. A complete set of computer system operating procedures was not available in the Control Room and could not be evaluated. (C.7.4)

### Corrective Action

Reference material on the operation of the computer system will be available to the operator in the Control Room.

3. The CRT-2 display for the RWCS SYS on P680 has poor contrast between the characters and background. (C.7.5)

### Corrective Action

The contrast adjustment is accessible and will be adjusted if necessary upon installation and evaluation of permanent lighting in the Control Room. Evaluation will be performed as part of DCRDR.

4. There is no printer in the Control Room capable of printing trend data or plant status data. (C.7.10)

### Corrective Action

Trend data and plant status data are provided by the PMS system's alarm processing software. As alarms occur, they can be displayed on any of the PMS CRT's (i.e., Control Room, Computer Room, TSC, EOF) and will be printed on a dedicated printer in the computer room directly adjacent to the main control area.

5. Dirt has accumulated on keys of keyboard for PMS on P680, making them difficult to read. (B.7.1)

### Corrective Action

Keys will be cleaned and/or replaced after Control Room construction is complete.

## A-8. PANEL LAYOUT

1. Area Radiation Monitor and Process Radiation Monitor displays on P680 have not yet been installed. (A.8.1)

### Corrective Action

The ARM and PRM displays have been installed on P678.

2. The Sump Discharge System is included on the section with the Control Rod Drive Hydraulics on P601. (A.8.3)

### Corrective Action

Grey demarcation and hierarchical labeling have been incorporated to distinguish these two systems.

3. On P800 insert 63, several systems are placed on the panel. (A.8.4)

### Corrective Action

Hierarchical labeling and grey demarcation have been incorporated to distinguish the different systems on the panel.

4. Meters in the top left bank on P801 are not separated according to function. There are nine meters in this bank, which makes it more difficult to identify a given indicator. (A.8.6)

### Corrective Action

Meters have been functionally grouped. Hierarchical labeling has been added to aid in distinguishing the meter groups.

5. The Cont Bldg Exh Air Temp is grouped with six other unrelated meters on P800. (A.8.7)

### Corrective Action

Meters have been functionally grouped. Hierarchical labels have been added to aid in distinguishing the meters.

6. The Condenser A CW Inlet Temp meter on P800 is not associated with other temperature readings. (A.8.8)

### Corrective Action

The meters have been changed so that the condenser A CW Inlet Temp meter is now adjacent to the condenser A CW Outlet Temp meter.



A-8. PANEL LAYOUT (Continued)

7. The panel layout of functionally related meters and controls on P870-56 is poorly grouped, making association between controls and displays difficult. (C.8.1)

Corrective Action

Meters have been functionally grouped and hierarchical labeling has been added to improve meter/control associations.

8. The most frequently used STEAM SEAL HDR PRESSURE and SSE SHELL LEVEL meters on P870-56 are buried within a ring of meters instead of being placed in distinctive positions that facilitate operator reference to them. (C.8.2)

Corrective Action

The STM SEAL HDR PRESSURE and SSE SHELL LEVEL meters have been relocated on the end of the bank. Hierarchical labeling is also used to further facilitate operator actions.

9. In the lower bank of meters on P601 the Diesel Generator C panel, the three left most BUS VOLTAGE meters have no relation to the other meters. (A.8.10)

Corrective Action

The three bus voltage meters have been distinguished from the unrelated meters through the use of hierarchical labeling.

10. In the RHR sections on P601, the Containment Spray Delay Timer Reset switches are identical to the Containment Spray Manual Initiation switches and they are close in proximity. (A.8.11)

Corrective Action

The color of the Containment Spray Delay Timer Reset switches has been changed from red to black in order to distinguish them from the Containment Spray Manual Initiation.

11. The PWR SOURCE, PLANT SVC WTR, and CST sections of P601-16 are not separated by any type of functional or system demarcation. (C.8.3)

Corrective Action

The three systems on P601-16 now use different color mimic and hierarchical labels to aid in distinguishing them from each other.

A-8. PANEL LAYOUT (Continued)

12. The annunciators controls on several panels are located close to other system controls and surrounded by system mimics. There is no demarcation or color coding to set the annunciator controls apart from the plant system controls and mimics located in close proximity.

Example:

Annunciator controls on P870-51  
(C.8.4)

Corrective Action

Grey demarcation has been added to distinguish the annunciator pushbuttons from other controls on the panel.

13. There is a lack of demarcation to separate two systems on P800-62P whose mimics are run together. Both system mimics have the same color flow paths. (C.8.5)

Corrective Action

Hierarchical labeling and a demarcation line have been added to distinguish the two systems.

14. The "A" System Valve control is located in an out of place position in the "B" System part of the RHR System mimic on P601-17 and is not included in the "A" System mimic. (C.8.6)

Corrective Action

The "RHR B SUPP TO RX HEAD SPRAY VALVE" on P601-17C was mislabeled as RHR "A". This has been corrected.

15. A string of nine environmental parameter meters on P801-66T is too long. Functionally related displays within the meter string are not grouped together. No demarcation is used to visually break up the long string into readily identifiable sections. (C.8.7)

Corrective Action

Functionally related displays have been grouped together and hierarchical labels added in three areas to distinguish their functions.

A-8. PANEL LAYOUT (Continued)

16. There is a lack of consistent left-right order of related adjacent watt and current meters in meter strings on P601-16. Examples:  
a) NORMAL SOURCE watt and current meters  
b) RESERVE SOURCE watt and current meters  
(C.8.8)

Corrective Action

Meters have been rearranged to read consistently (watt, current) from left to right.

17. The labels for the CGCS CMPR 1A and 1B meters on P800 indicate that the B meter is on the left and the A meter is on the right, contrary to convention in the Control Room. Presently, it appears that these meters are criss-crossed with their controls below. (A.8.12)

Corrective Action

The meters have been changed so the A meter is on the left and the B meter is on the right so they are no longer criss-crossed.

18. Either the mimic labels for the 480V XFMRs J and R on P870-53 are reversed or their associated displays are reversed.  
(C.8.9)

Corrective Action

The displays associated with the 480V XFMRs J and R have been exchanged.

19. The display layout of 480 V BUS VOLTAGE meters in the second row of meters on the vertical panel on P870-52 is inconsistent with the layout of similar meters in the third row of meters on the panel. (C.8.10)

Corrective Action

The meter displays have been changed so that the meters are consistently arranged.

20. The control/display relationship layout of the DISCHARGE TEMP displays on P801-67 is reversed with respect to the control/display relationship on P801-66. Layout on both these panels should be the same. (C.8.11)

Corrective Action

The control/display relationship of the DISCHARGE TEMP displays on P801-67 and P801-66 is now consistent with each other.

A-8. PANEL LAYOUT (Continued)

21. The AUX & EXTRACTION STEAM panel on P870-56A has a general lack of demarcation. (C.8.12)

Corrective Action

Demarcation and hierarchical labeling have been added to group related controls together.

22. On P800 inserts 63 and 64, there are meter strings containing more than five meters. (C.8.13)

Corrective Action

Meter strings have been arranged by functionally grouping related meters and adding hierarchical labeling.

23. One group of 8 and one group of 7 meters on P601 are clustered together. (A.8.14)

Corrective Action

The group of 8 meters has been divided into 3 subgroups and the group of 7 meters has been divided into 2 subgroups. The subgroups have been distinguished by hierarchical labels.

24. There is a group of eight meters on C61-P001 grouped together. (A.8.15)

Corrective Action

This will be reviewed as part of our Detailed Control Room Design Review.

25. One group of 7 and two groups of 9 meters on P800 are clustered together. (A.8.16)

Corrective Action

The meters have been functionally grouped and distinguished by using hierarchical labeling.

26. There are two groups of 9 meters each and two groups of 6 meters each on P801. (A.8.17)

Corrective Action

Meters have been functionally grouped and distinguished using hierarchical labeling.

A-8. PANEL LAYOUT (Continued)

27. There are two groups of 9 and two groups of 6 meters located together on P870. (A.8.18)

Corrective Action

Meters have been functionally grouped and distinguished using hierarchical labeling.

28. Meters are grouped in sets of 6 or more on P870, which may make it difficult to locate a desired reading. For example, in the Aux and Extraction Steam section, there is a bank of 9 meters. (A.8.19)

Corrective Action

Meters have been functionally grouped and distinguished using hierarchical labeling.

29. Mirror imaging is used inconsistently in the Aux Power Emergency section on P870. Displays are arranged inconsistently between the A and B buses. (A.8.21)

Corrective Action

The following arrangements of meters have been established to comply with the changes recommended for the Aux Power Section and to afford consistency between the A and B buses.

A bus from left to right:

4160V BUS 1A Voltage  
480 BUS, G, I, K & O Voltage  
Battery IE Current  
DC MCCIE Voltage

B bus left to right:

DC MCCIF Voltage  
Battery IF Current  
480 V BUS, H, J, I, & K  
4160 V BUS 1B Voltage

A-8. PANEL LAYOUT (Continued)

30. In addition to the above, the upper bank of meters in the Aux Power Emergency Section on P870 is not fully mirror-imaged and should be changed to comply with the changes in the Aux Power Section. (A.8.22)

Corrective Action

In order to afford consistency both between and within panels, the meter for  
UAT 1B FDR to 4160 V BUS 1B WATTS was swapped with  
UAT 1B FDR to 4160 V BUS 1B CURRENT meter.  
and the meter for  
BUS 1RT4 FDR to 4160 V BUS 1B WATTS was swapped with  
BUS 1RT4 FDR to 4160 V BUS 1B CURRENT.

Meters are now mirror imaged.

31. Mirror imaging is used in the Auxiliary Power section on P870 but its application is not consistent. (A.8.23)

Corrective Action

In order to assure consistency of arrangements and to avoid operator confusion,  
the UAT 1B FDR to 6900 V BUS 1B WATTS meter was swapped with  
UAT 1B FDR to 6900 V BUS 1B CURRENT meter, and  
the BUS 1RT6 FDR to 6900 V BUS 1B WATTS meter was swapped with  
BUS 1RT6 FDR to 6900 V BUS 1B CURRENT.

Meters are now mirror imaged.

32. Two arrays of backlit indicators on P801-66T and 67U that have the identical functions do not have corresponding indicators in the same locations in both arrays. (C.8.15)

Corrective Action

The backlit indicators have been changed so that corresponding indicators on both panels are in the same location.

A-9. CONTROL/DISPLAY INTEGRATION

1. Meters on P601 are not optimally lined up with controls on the Diesel Generator C panel. (A.9.1)

Corrective Action

The middle bank of meters has been rearranged (from left to right) as listed below to better correspond to their associated controls.

DIESEL GEN  
VARS

DIESEL GEN  
WATTS

DIESEL GEN  
AMPS

HPCS  
MOTOR AMPS

Part B This section contains items which IP had committed to perform an evaluation of in order to resolve them prior to licensing. Following each item is a statement of Illinois Power Company (IP) corrective action. Some items, as indicated, will be further evaluated as part of the Detailed Control Room Design Review (DCRDR). The results of the evaluation, proposed corrective action, and schedule for implementing the actions will be submitted as part of the DCRDR Summary Report not later than 120 days prior to issuance of an operating license.

#### B-1. CONTROL ROOM WORKSPACE

1. Passageways between P800, P801 and P870, P877 respectively are 26" wide; passageways between P680 and P601, P870 respectively are 27" wide. (A.1.1)\*

##### Corrective Action

The Control Room is a vital security area where key card access will be used. A CPS procedure will allow the Assistant Shift Supervisor and Control Room Operators control over who and when someone is allowed in the operating area, thus restricting the traffic flow between panels. Therefore, current passageways are acceptable.

2. There is inadequate separation between the front surface of the Remote Shutdown Panel and the backpanel surface of the adjacent electrical panel. The distance between the opposing surfaces is approximately 32 inches. This is an inadequate amount of work space for easy operation of the Remote Shutdown Panel by one or more operators. The minimum recommended separation distance between a single row equipment panel and a wall or other opposing surface is 50 inches. (C.1.1)

##### Corrective Action

The Remote Shutdown Panel has been rotated 180 degrees and there now exists a 48" distance between opposing surfaces. This separation distance has been considered acceptable by the NRC's Human Factors Engineering Branch.

\*Throughout the report the use of parentheses, such as (C.1.2), refer to the part, section, and finding number used in the HFEB Control Room Design Review/Audit report, dated December 3, 1981.



B-1. CONTROL ROOM WORKSPACE (Continued)

3. The J-handle Transfer Switches on the Remote Shutdown Panel are mounted too low. They are located between approximately 20" and 33" above the floor. This low control height makes them inconvenient to operate. (C.1.2)

Corrective Action

The transfer switches on Remote Shutdown Panel (RSP) are used only to transfer control functions from the Main Control Room to the RSP. Therefore, they are actuated once and left in this position while operations are performed at this panel. Due to this infrequent use, they are positioned relatively low and out of the way to allow the frequently used controls and displays to be optically positioned on this panel.

4. The shiny surface of control pushbuttons and CR2 40 switches results in glare (9.5:2.6 against panel background). (A.1.6)

Corrective Action

This will be reevaluated as part of the Detailed Control Room Design Review (DCRDR) after completion of lighting installation.

5. The keyboard for the PMS System on P680 has significant glare which obscures the legends. (A.1.7)

Corrective Action

This will be reevaluated as part of the DCRDR following installation of permanent lighting.

6. The minimum reading distance for meters should be seven feet. The glare problem makes this difficult. (A.1.8)

Corrective Action

This will be reevaluated as part of the DCRDR after permanent lighting and "egg-crate" diffusers are installed.

7. Significant glare is occurring on all meters in the Control Room. (A.1.9)

Corrective Action

This will be reevaluated as part of the DCRDR after permanent lighting and "egg-crate" diffusers are installed.