January 26, 1993

Docket No. 52-002

MEMORANDUM FOR: Richard W. Borchardt, Section Chief
Standardization Project Directorate
Associate Directorate for Advanced Reactors
and License Renewal
Office of Nuclear Reactor Regulation

FROM: Thomas V. Wambach, Project Manager
Standardization Project Directorate
Associate Directorate for Advanced Reactors
and License Renewal
Office of Nuclear Reactor Regulation

SUBJECT: DRAFT INSPECTION, TEST ANALYSIS, AND ACCEPTANCE CRITERIA (ITAAC) FOR HUMAN FACTORS ENGINEERING

ABB-CE provided the enclosed draft proposed ITAAC for human factors engineering to obtain NRC staff feedback. Four pages of NRC staff comments are also enclosed, and these were telefaxed to ABB-CE on January 21, 1993.

Original Signed By:

Thomas V. Wambach, Project Manager
Standardization Project Directorate
Associate Directorate for Advanced Reactors
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Office of Nuclear Reactor Regulation

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UNACCEPTABLE ASPECTS OF THE ABB-CE PROPOSED HUMAN FACTORS ITAAC/DAC

1. The specific text for the design commitment described in Column 1 is to be extracted from the Certified Design Description (CDD). Any differences in text should be minimized and be intentional.

   ABB-CE's proposed ITAAC/DAC: Column 1 is not extracted from the CDD and Column 1 and the CDD are not identical.

   NRC request: Modify ITAAC such that Column 1 and the CDD are identical or provide justification for differences between the two.

2. The specific acceptance criteria for the methods described in Column 2 which if met demonstrate that the design commitment in Column 1 has been met is to be described in Column 3.

   ABB-CE's proposed ITAAC/DAC: Column 3 indicates "inspection results are available".

   NRC request: Reference the "specific acceptance criteria" in Column 3. Some suggested alternate words are as follows:

   a. The as-built MCR shall be configured as detailed in Figure 1.18.1.

   b. Availability inspection results shall satisfy verification and validation criteria.

   c. Suitability inspection results shall satisfy verification and validation criteria.

   d. Validation test results shall satisfy verification and validation criteria.

   Note: In CESSAR-DC and/or the Verification and Validation Plan and Standards, Guidelines, and Bases, ABB-CE would provide the specific criteria for Items b-d (noted above) that are generally cross-referenced in Column 3 above. Further, ABB-CE would reference up from the aforementioned documents to the subject ITAAC.

3. In the case of Design Acceptance Criteria for the control room design, the ITAAC for each phase of the design development process should be separately identified with entries in Columns 1, 2, and 3.

   ABB-CE's proposed ITAAC/DAC: The proposed ITAAC/DAC does not provide ITAAC/DAC for the following:

   a. Task Analysis

   b. Human-System Interface Design

   c. Plant and Emergency Operating Procedures

   d. Human Factors Verification and Validation

Enclosure

NRC request: Provide ITAAC/DAC for a-d above. Some suggestions for each are as follows:

a. Task Analysis

Column 1: A task analysis methodology shall be used.
An analysis of tasks shall be conducted.

Column 2: The results of the task analysis shall be inspected.

Column 3: The task analysis shall satisfy verification and validation criteria.

b. Human-System Interface (HSI) Design

Column 1: HSI design principles and criteria shall be applied in the design and evaluation of the HSI.

Column 2: The HSI design shall be inspected.

Column 3: The HSI design shall satisfy HSI design criteria.

c. Plant and Emergency Operating Procedure

Column 1: A plant and emergency operating procedure plan shall be used.

Column 2: The implementation of the plant and emergency operating procedure plan shall be inspected.

Column 3: The implementation of the plant and emergency operating procedure plan shall satisfy requirements of (a) task analysis regarding operator actions and (b) methods and criteria for development of the plant and emergency operating procedures.

d. Human Factors Verification and Validation

Column 1: A human factors verification and validation plan shall be used.

Column 2: The implementation of the human factors verification and validation plan shall be inspected.

Column 3: The implementation of the human factors verification and validation plan shall satisfy verification and validation criteria.

Comments Regarding ABB-CE's Draft Human Factors ITAAC Dated 1/7/93

1. The specific text for the design commitment described in column 1 should be extracted from the Design Description. Any differences in the text should be minimized.

2. Tier 2 supporting information, p. 5:

   To the extent applicable, the Tier 2 information should be incorporated into a future Amendment to CESSAR-CD including

   "There are no PRA insights affecting the MCR design."

   All of the a-j documents. Note that the Tier 2 information on page 5 should not appear in the ITAAC Table 1.18.1. Instead, this information should be a part of CESSAR-DC with references "up" to the applicable ITAAC.

3. The applicant's response (see letter dated December 18, 1992, LD-92-120) to Open Item 20.2-29 regarding human factors related Issue HF1.3.4a, "MMI - Control Stations," indicated the following:

   "All System 80+ local control stations are designed in accordance with the criteria in the System 80+ Human Factors Engineering Stadards, Guidelines and Bases. This assures that accepted human system interface design principles are incorporated into local control station designs. Inaddition, local control stations required to perform the System 80+ Emergency Procedure Guidelines (EPGs) are designed using task analysis and human factors verification and validation."

   In light of the above statement and commitment, the staff requests that the following statement be added to the Design Decription for Control Panels: "Each control panel both inside and outside the control room (i.e., local control stations) are designed to meet human factors design criteria." Further, a future Amendment to CESSAR-DC should reference "up" to the applicable ITAAC.

4. The attachments (pp. 1-9) providing Nuplex 80+ Standard Features should not be a part of the human factors ITAAC. By definition, this is Tier 2 information. Therefore, this detailed information should be a part of CESSAR-DC or non-proprietary design description documents (referenced in CESSAR-DC) that will eventually become a part of the Design Control Document. Note that CESSAR-DC shoul reference "up" to the applicable ITAAC.

5. The human factors ITAAC/DAC should cover each phase of the design development process remaining for Nuplex 80+ including

   a. Task Analysis

   b. Human-System Interface Design

   c. Plant and Emergency Operating Procedure Development

   d. Human Factors Verification and Validation

   It is unclear to the staff that the above aspects of the design process have bee adequately and completely covered in the proposed human factors ITAAC.

6. Is Figure 1.18.1 intended to be a part of the proposed ITAAC? It was not included in the materials reviewed.

7. Clarify whether standard design features are proposed for panels both inside and outside of the control room.

8. What is currently proposed for column 3 does not appear to be adequate criteria.

PRELIMINARY

ABB Combustion Engineering

Section 1.18.1: MAIN CONTROL ROOM 1/6/93

Design Description

The Main Control Room (MCR) provides the workspace, annunciators, displays, and controls necessary to 1) operate the plant and 2) maintain plant safety.

The MCR provides workspace and facilities for continuous occupancy and use by up to 8 staff members, including up to 6 operating staff within the controlling workspace.

In the event that the MCR becomes uninhabitable, control is transferred to the Remote Shutdown Panel via transfer switches located in the MCR.

The general MCR configuration is shown in Figure 1.18.1. The controlling workspace of the MCR is bounded by the Master Control Console (MCC), the Auxiliary Console, the Safety Console, and the Control Room Supervisor Console. Outside the controlling workspace, but within the control room emergency zone, the MCR provides operations and administration offices, and document storage facilities.

The MCR consoles provide annunciators and displays of system status and process parameters. Prioritized alarms, post-accident monitoring instrumentation, and safety parameter display system functions are provided. In addition, a large screen Integrated Process Status Overview (IPSO) display provides top-level SPDS information. The IPSO is visible from the controlling workspace, and from the adjoining offices.

The MCR consoles provide with plant component controls.

MCR console annunciators, displays and controls are implemented using Video Display Unit (VDU) devices and backlit component control switches on each control console panel. The following Human-System Interface (HSI) features utilize consistent operating conventions at Nuplex 80+ control panels:

DPS Display Hierarchy
DIAS Alarm Tile Displays
DIAS Dedicated Parameter Displays
DIAS Multiple Parameter Displays
CCS Process Controller Displays
CCS Switch Configurations

MCR panels are organized according to the following plant operating functions:

Reactor Control System (M1)
Charging & Volume Control System (M2)
Plant Monitoring & Control (M3)
Feedwater & Condensate Systems (M4)
Turbine Control (M5)
Heating, Ventilation, & Air Conditioning (A1)
Cooling Water Systems (A2)
Engineered Safety Features (A3)
Safety Monitoring (A4)
Fire Protection (A5)
Secondary Cycle (A6)
Switchyard (A7)
Electrical Distribution (A8)

Each panel provides spatially dedicated indications and controls. In addition, each panel provides a VDU terminal. MCR panels are configured so that diverse, Class 1E and non-class 1E instrumentation are available. Panel organization into major consoles is shown in Figure 1.18.1.

PRELIMINARY

ABB Combustion Engineering

Inspection, Test, Analyses, and Acceptance Criteria

Table 1.18.1 defines the inspections, tests, analyses, and acceptance criteria that will be applied to the MCR.

Table 1.18.1: MAIN CONTROL ROOM ITAAC (page 1 of 3)

Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.The basic configuration for the (MCR) facility is shown in Figure 1.18.1.	Configuration inspections of the as-built MCR will be performed.	The as-built MCR inspection results are available.
2. The MCR provides annunciators, displays and controls specified in the Vendor Procedure Guidelines(VPGs).	Availability inspection of the as-built MCR will be performed.	Availability inspection results are available.
3. The MCR provides workspace for continuous occupancy by up to 8 staff members.	Suitability inspection of the as-built MCR will be performed.	Suitability inspection results are available.
4. The MCR permits execution of the MCR tasks specified in the VPGs.	Validation tests using a full-scale, dynamic simulation (mockup) of the certified MCR will be performed.	The Validation test results are available.

TIER 2 SUPPORTING INFORMATION

1. There are no PRA insights affecting the MCR design.

2. The following documents are the bases for the MCR design:
   a. HUMAN FACTORS STANDARDS GUIDELINES AND BASES (NPX80-IC-DR791-02)(DRAFT)

   b. NUPLEX 80+ DESIGN BASES (NPX80-IC-DB-790-01)

   c. SYSTEM DESCRIPTION FOR CONTROL COMPLEX INFORMATION SYSTEM (NPX80-IC-SD791-01)

   d. SYSTEM DESCRIPTION FOR CRITICAL FUNCTION AND SUCCESS PATH MONITORING (NPX80-IC-SD790-02)

   e. FUNCTIONAL TASK ANALYSIS METHODOLOGY (CESSAR-DC SECTION 18.5)

   f. OPERATING EXPERIENCE REVIEW FOR SYSTEM 80+ MMI DESIGN (NPX80-IC-RR790-01)

   g. HUMAN FACTORS PROGRAM PLAN FOR THE SYSTEM 80+ STANDARD PLANT DESIGN (NPX80_IC-DP790-01)

   h. HUMAN FACTORS ENGINEERING VERIFICATION AND VALIDATION PLAN FOR NUPLEX 80+ (NPX80-IC-VP790-03)

   i. NUPLEX 80+ VERIFICATION ANALYSIS REPORT (NPX80-TE790-01)

   j. NUPLEX 80+ FUNCTION ANALYSIS AND ALLOCATION REPORT

3. The MCR design features are provided in the Attachment.

PRELIMINARY

PRELIMINARY

ABB Combustion Engineering

Section 1.18.2: REMOTE SHUTDOWN ROOM 1/6/93

Design Description

The Remote Shutdown Room (RSR) provides the workspace, annunciators, displays, and controls that are necessary to achieve and maintain hot shutdown of the plant from a location outside the Main Control Room (MCR).The RSR provides workspace and facilities for continuous occupancy by up to 3 staff members.

The workspace of the RSR contains the Remote Shutdown Panel (RSP). The RSP provides annunciators and displays of system status and process parameters. Prioritized alarms, post-accident monitoring instrumentation, and safety parameter display system functions are provided. The RSP also provides plant component controls.

Annunciators, displays and controls on the RSP are implemented using Video Display Unit (VDU) devices and backlit component control switches. The following Human-System Interface (HSI) features utilize consistent operating conventions at Nuplex 80+ control panels:

DPS Display Hierarchy
DIAS Alarm Tile Displays
DIAS Dedicated Parameter Displays
DIAS Multiple Parameter Displays
CCS Process Controller Displays
CCS Switch Configurations

The RSP is configured so that diverse, Class 1E and non-class 1E instrumentation are available. Annunciators, displays and controls at the RSP are physically separated and electrically isolated from those in the MCR.

PRELIMINARY

ABB Combustion Engineering

Inspection, Test, Analyses, and Acceptance Criteria

Table 1.18.2 defines the inspections, tests, analyses, and acceptance criteria that will be applied to the RSR.

Table 1.18.2: REMOTE SHUTDOWN ROOM ITAAC (page 1 of 1)

Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The RSR provides annunciators,displays and controls specified in the Vendor Procedure Guidelines.	Availability inspection of the as-built RSR will be performed.	RSR Availability inspection results are available.
2. The RSR provides workspace and facilities for continuous occupancy and use by up to 3 staff members.	Suitability inspection of the as-built RSR will be performed.	RSR Suitability inspection results are available.
3. The RSR permits execution of the RSR tasks specified in the VPGs.	Validation tests using full-scale, dynamic simulation (mockup) of the certified RSR will be performed.	The Validation test results are available.

Table 1.18.1: ~~MAIN~~ REMOTE SHUTDOWN CONTROL ROOM ITAAC (PAGE 2 OF 2)

Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria

TIER 2 SUPPORTING INFORMATION

1. There are no PRA insights affecting the RSR design.
2. See Table 1.18.1 Tier 2 information for documents which are the bases for the RSR design.
3. The RSR design features are provided in the Attachment.

PRELIMINARY

ABB Combustion Engineering

Section 1.18.3: CONTROL PANELS 1/6/93

Design Description

Control Panels provide the annunciators, displays and controls necessary to 1) operate the plant and 2) maintain plant safety.

Control Panels provide annunciators and displays of system status and process parameters. Prioritized alarms, post-accident monitoring instrumentation, and safety parameter display system functions are provided. Plant component controls are provided.

Control Panels provide both spatially dedicated annunciators, displays and controls, and a selectable display of information for any plant function. Control Panel indications and controls are implemented using Video Display Unit (VDU) devices and backlit component control switches. The following Human-System Interface (HSI) features utilize consistent operating conventions at Nuplex 80+ Control Panels:

DPS Display Hierarchy
DIAS Alarm Tile Displays
DIAS Dedicated Parameter Displays
DIAS Multiple Parameter Displays
CCS Process Controller Displays
CCS Switch Configurations

Each Control Panel is designed for specific tasks as specified by Vendor Procedure Guidelines.

PRELIMINARY

ABB Combustion Engineering

Inspection, Test, Analyses, and Acceptance Criteria

Table 1.18.3 defines the inspections, tests, analyses, and acceptance criteria that will be applied to each Control Panel.

Table 1.18.3: CONTROL PANEL ITAAC (page 1 of 1)

Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.The Control Panels provide annunciators, displays, and controls specified in Vendor Procedure Guidelines.	Availability inspection of the as-built Control Panels will be performed.	The Availability inspection results are available
2.The Control Panel meets human factors design criteria.	Suitability inspection of the as-built Control Panels will be performed.	The Suitability inspection results are available.

Table 1.18.1: ~~MAIN~~ CONTROL ~~ROOM~~ PANEL ITAAC (PAGE 2 OF 2)

Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
TIER 2 SUPPORTING INFORMATION		
1. There are no PRA insights affecting the Control Panel design.		
2. See Table 1.18.1 Tier 2 information for documents which are the bases for the control panel design.		
3. The Control Panel design features are provided in the attachment.		

PRELIMINARY

PRELIMINARY

NUPLEX 80+ STANDARD FEATURES (Tier 2) 1/6/93

The following applications are standardized Human-System Interface (HSI) features that utilize consistent operating conventions at Nuplex 80+ control panels:

DPS Display Hierarchy
DIAS Alarm Tile Displays
DIAS Dedicated Parameter Displays
DIAS Multiple Parameter Displays
CCS Process Controller Displays
CCS Switch Configurations

PRELIMINARY

ABB Combustion Engineering

STANDARD FEATURE: DPS Display Hierarchy (10/19/92)

The DPS Display Hierarchy is a standard Human-System Interface (HSI) feature of the Nuplex 80+ Data Processing System (DPS). The DPS Display Hierarchy submitted for final design approval is described in CESSAR-DC (Chapter 18). The major characteristics of the DPS Display Hierarchy are as follows:

1. The DPS Display Hierarchy is an integrated presentation of Nuplex 80+ process information.

2. The DPS Display Hierarchy provides selectable annunciators and displays of system status and process parameters.

3. Touch-screen VDU devices are utilized.

4. On each display page in the DPS Display Hierarchy, a spatially dedicated message area and main menu are provided.

5. The DPS Display Hierarchy permits selectable access to any of its display pages from any DPS terminal.

6. The DPS Display Hierarchy permits acknowledgment of Nuplex 80+ annunciators.

7. The DPS Display Hierarchy automatically provides specific alarm condition messages at the time of alarm acknowledgment.

8. The DPS Display Hierarchy is configured to conform to the System 80+ Human Factors Standards, Guidelines, & Bases.

9. The DPS Display Hierarchy indications are read at the panel.

10. The DPS VDU devices are located on the vertical panel sections.

11. The DPS Display Hierarchy is diverse and independent of the Discrete Indication and Alarm System (DIAS).

PRELIMINARY

ABB Combustion Engineering

STANDARD FEATURE: DIAS Alarm Tile Display (1/6/93)

The DIAS Alarm Tile Display is a standard Human-System Interface (HSI) feature of the Nuplex 80+ Discrete Indication and Alarm System (DIAS). The DIAS Alarm Tile Display submitted for final design approval is described in CESSAR-DC (Chapter 18). The major characteristics of the DIAS Alarm Tile Displays are as follows:

1. Software-generated alarm tiles present groups of functionally-related alarm status messages.

2. Touch-screen VDU devices are utilized.

3. On each DIAS Alarm Tile Display device, the status of alarm tiles is presented on a single alarm tile display page; for each tile, an associated alarm list page is available to present the status of the individual alarm conditions.

4. Unacknowledged alarms on a single tile are acknowledged through the display as a group.

5. Alarm condition messages are automatically provided upon alarm tile acknowledgment.

6. Alarm tiles are assigned to control panels by corresponding plant systems.

7. Alarm tile display devices are located on the vertical panel sections.

8. Alarm tiles on the alarm tile display page are spatially dedicated.

9. DIAS Alarm Tile Displays are configured to conform to the System 80+ Human Factors Standards, Guidelines, & Bases.

10. Tile details are read at its panel; tile status is visible across the controlling workspace.

11. Alarm tiles are established for process parameters that provide direct indication of:

    a. Critical Safety Functions
    b. Critical Power Production Functions
    c. Success Path performance
    d. Success Path availability
    e. Damage to major equipment
    f. Personnel hazard

PRELIMINARY

12. Alarms are presented in one of four states: new, existing, cleared, reset.

13. The highest priority of a new or cleared alarm state with the highest priority existing alarm state is provided within a single tile.

14. A tile "stop/resume flash" feature is provided for Priority 2 and 3 alarms.

15. A momentary tone provides an initial audible alert of the transition of one or more alarms to new or cleared states for priority 1 or 2 alarms.

16. A momentary reminder tone provides a recurring audible alert if Priority 1 or 2 alarms remain unacknowledged.

17. Alarm tones emit from the console where the alarming display is located.

PRELIMINARY

ABB Combustion Engineering

STANDARD FEATURE: DIAS Dedicated Parameter Display (1/6/93)

The DIAS Dedicated Parameter Display is a standard Human-System Interface (HSI) feature of the Nuplex 80+ Discrete Indication and Alarm System (DIAS). The DIAS Dedicated Parameter Display submitted for final design approval is described in [CESSAR-DC (Chapter 18). The major characteristics of the DIAS Dedicated Parameter Displays are as follows:

1. DIAS Dedicated Parameter Displays are software-generated display representations of process parameters. Each dedicated parameter display presents a single value based on redundant sensor data.

2. DIAS Dedicated Parameter Displays present validated information based on redundant sensor data. Validation failures are indicated on the displays.

3. DIAS Dedicated Parameter Displays present spatially dedicated information.

4. A DIAS Dedicated Parameter Display permits continuous display the individual data points.

5. DIAS Dedicated Parameter Displays incorporate automatic range change features.

6. Touch-screen VDU devices are utilized.

7. DIAS Dedicated Parameter Displays are assigned to control panels by corresponding plant systems.

8. DIAS Dedicated Parameter Display devices are located on the vertical control panel sections.

9. DIAS Dedicated Parameter Displays are configured to conform to the System 80+ Human Factors Standards, Guidelines, & Bases.

10. DIAS Dedicated Parameter Display values are read from across the Main Control Console; the Display details are read at the panel.

11. DIAS Dedicated Parameter Displays are provided for the following :

    a. Critical Safety Functions
    b. Success Path performance
    c: PAMI indication
    d: Reg. Guide 1.97

PRELIMINARY

12. DIAS Dedicated Parameter Displays are diverse and independent of the DPS display system.

PRELIMINARY

ABB Combustion Engineering

STANDARD FEATURE: DIAS Multiple Parameter Display (1/6/93)

The DIAS Multiple Parameter Display is a standard Human-System Interface (HSI) feature of the Nuplex 80+ Discrete Indication and Alarm System (DIAS). The DIAS Multiple Parameter Display submitted for final design approval is described in [CESSAR-DC (Chapter 18)]. The major characteristics of the DIAS Multiple Parameter Displays are as follows:

1. DIAS Multiple Parameter Displays are software-generated display representations of process parameters.

2. DIAS Multiple Parameter Displays present validated information based on redundant sensor data. Validation failures are indicated on the displays.

3. DIAS Multiple Parameter Displays are digital and analog representations of process parameters.

4. A DIAS Multiple Parameter Display permits continuous display of its individual data points.

5. Touch-screen VDU devices are utilized.

6. Multiple parameters are assigned to control panels and combined into common DIAS Multiple Parameter Display devices based on plant systems relationships.

7. DIAS Multiple Parameter Display devices are located on the vertical control panel sections.

8. DIAS Multiple Parameter Displays are configured to conform to the System 80+ Human Factors Standards, Guidelines, & Bases.

8. DIAS Multiple Parameter Display values are read at the panel.

9. DIAS Multiple Parameter Displays are diverse and independent of the DPS display system.

PRELIMINARY

ABB Combustion Engineering

STANDARD FEATURE: CCS Process Controller Display (1/6/93)

The CCS Process Controller Display is a standard Human-System Interface (HSI) feature of the Nuplex 80+ Component Control Systems (CCSs). The CCS Process Controller Display submitted for final design approval is described in CESSAR-DC (Chapter 18). The major characteristics of the CCS Process Controller Displays are as follows:

1. CCS Process Controller Displays are software-generated representations of process control devices and their controlled variables.

2. Touch-screen VDU devices are utilized.

3. CCS Process Controller Display devices are located on the control panel benchboard sections.

4. CCS Process Controller Displays conform to the System 80+ Human Factors Standards, Guidelines, & Bases.

5. CCS Process Controller Displays are read at the panel.

6. Controls are assigned to control panels based on plant systems, and are combined into Process Controller Display devices based on shared functional relationships.

7. CCS Process Controller Display is divided into static and dynamic sections for master loop and subloop control and monitoring.

8. CCS Process Controller Displays permits selection of operating modes, loop control signal, and loop setpoints.

9. CCS Process Controller is a man-machine interface device only. All control loop electronics are located outside the main control room.

PRELIMINARY

ABB Combustion Engineering

STANDARD FEATURE: CCS Switch Configuration (1/6/93)

The CCS Switch Configurations are a standard Human-System Interface (HSI) feature of the Nuplex 80+ Component Control Systems (CCSs). The CCS Switch Configurations submitted for final design approval is described in CESSAR-DC (Chapter 18). The major characteristics of the CCS Switch Configurations are as follows:

1. CCS Switch Configurations utilize physical pushbuttons with backlit legend status indicators.

2. CCS Switch Configurations permit on-line replacement and bumpless transfer.

3. CCS Switch Configurations are assigned to control panels based on plant systems, and combined into multiple component units based on functional relationships.

4. CCS Switch Configuration devices are located on the control panel benchboard sections.

5. CCS Switch Configurations conform to the System 80+ Human Factors Standards, Guidelines, & Bases.

6. CCS Switch Configuration details are read at the panel.

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