Docket File

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

January 15, 1993

Docket No. 52-002

APPLICANT: ABB-Combustion Engineering, Inc. (ABB-CE)

PROJECT: CE System 80+

SUBJECT: PUBLIC MEETING OF DECEMBER 9, 1992, TO DISCUSS THE REVIEW STATUS OF THE CE SYSTEM 80+ DESIGN WITH SENIOR MANAGEMENT

On December 9, 1992, a public meeting was held at the U.S. Nuclear Regulatory Commission (NRC), Rockville, Maryland, between senior management representatives of ABB-CE and the NRC. Enclosure 1 provides a list of attendees. Enclosure 2 is the material presented by ABB-CE.

ABB-CE opened the meeting with a review status of the System 80+ project.

The Associate Director for Inspection and Technical Assessment expressed concern that receiving inspections, tests, analyses, and acceptance criteria (ITAAC) after the draft safety evaluation report (DSER) response due date of January 21, 1993, could create a sequential review process between DSER issues response review and associated ITAAC review. Subsequently, a sequential review process could impact the review schedules for development of the System 80+ final safety evaluation report (FSER) due to potential iteration or revision of the CESSAR-DC document or System 80+ design from the ITAAC review findings. The staff also noted that closure of DSER open items for a system or CESSAR-DC chapter should be performed prior to final development and submittal of the associated system ITAAC.

ABB-CE will reevaluate their schedule for submitting ITAAC to accommodate a parallel review path with closeout packages of DSER open items, since the staff expressed significant reservation that a two-month review period of the ITAAC (March through May of 1993) would be insufficient time to appropriately evaluate System 80+ ITAAC.

ABB-CE expressed concern over staff resources to review System 80+ due to the staff's review of the lead-design (the advanced boiling water reactor [ABWR]). However, ABB-CE noted that the review process established for developing the FSER has been functioning extremely well. The recent severe accidents meeting held on December 2 and 3, 1992, at the ABB-CE facilities in Windsor, Connecticut was cited as a productive example of the review process. ABB-CE urged continued efforts to conduct similar workshop meetings for other design-related issues.

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For ITAAC related to structural design, the staff indicated that nominal wall thickness, loadings, and approved modeling and analytical methods for establishing acceptability of the as-designed/as-built configuration would be required as a minimum. ABB-CE agreed to do more for structural detail. In addition, the staff suggested that ABB-CE review the report on the structural audit performed on the ABWR design. The System 80+ design will also be audited in the future to verify acceptable application of approved methods.

ABB-CE presented the ITAAC for the System 80+ emergency feedwater (EFW) system. The staff commented, in general, that the ABB-CE approach to ITAAC appeared to be a viable and reasonable approach; however, the EFW ITAAC had not been technically evaluated by the staff.

The staff commented that the ITAAC should specify the methodology to determine as-designed and as-built structures, systems, and components (SSC) configuration adequacy. Net positive suction head (NPSH) calculations for EFW and safety inject (SI) pumps were cited by the staff as an example. The staff stated that the methodology should provide the appropriate and standard assumptions and parameters for calculating the available NPSH such as fluid temperature, line loss coefficients, debris levels, room temperatures, etc. Therefore, these standard parameters would permit two engineers to independently arrive at the same conclusion that the NPSH available exceeds the NPSH required.

In addition, the staff commented that the ITAAC should have configuration management provisions for coping with as-built deviations in SSC. The ITAAC should specify the approach and methodology for accommodating said deviations.

Also, ABB-CE should provide standardized definitions for terms such as visual inspections, walkdowns, functional tests, etc.

ABB-CE noted that the Tier 2 information included in the ITAAC was for review purposes only and is not part of the ITAAC. The staff noted that in addition to this type of review aid, the staff will need to have roadmaps that provide directions for locating key design-features and insights that have evolved from the System 80+ probabilistic risk assessment (PRA). Roadmapping should provide connections between the PRA and relevant portions of the Combustion Engineering Standard Safety Analysis Report (CESSAR-DC) chapters. Assumptions cited in the CESSAR-DC Chapter 15, "Accident Analyses," also need to be roadmapped to indicate where the assumptions are verified in the plant or system ITAAC. Roadmap information will point to where the design-feature resides in the CESSAR-DC document, then transcribed to Tier 1 information, and subsequently lifted to the appropriate system ITAAC.

Another comment provided by the staff involved the lack of specificity in the ITAAC. Acceptance criteria for the EFW system ITAAC should provide specific information on code class and piping class breaks for pressure retaining components, NDE welding, and ISI requirements. These requirements should cite the appropriate portions of the ASME code. In addition, the certified design commitment (column one of the ITAAC) should be kept more functional and column three should be expanded with the details.

ABB-CE also provided a status report in the progress achieved in the human factors engineering review of the Nuplex 80+ control room design (Enclosure 2). The staff agreed that the Nuplex 80+ design features should be Tier 2.

The next management meeting was scheduled for January 11, 1993, at the ABB-CE office in Windsor, Connecticut.

Sincerely,

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

Enclosures:
As stated

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See next page

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MEETING ATTENDEES

DECEMBER 9, 1992

NAME	ORGANIZATION
M. Franovich	NRR/PDST
T. Wambach	NRR/PDST
R. Pierson	NRR/PDST
R. Borchardt	NRR/PDST
D. Crutchfield	NRR/ADAR
W. Russell	NRR/ADT
T. Murley	NRR/DO
B. Boger	NRR/DRCH
A. Thadani	NRR
M. Waterman	NRR/DRCH/HICB
T. Boyce	NRR/PDST
W. Beckner	NRR/SPSB
M. Chiramal	NRR
S. B. Sun	NRR
R. Barrett	NRR
S. Ritterbusch	ABB-CE
C. Brinkman	ABB-CE
J. Longo	ABB-CE
J. Rec	ABB-CE
J. E. Robertson	ABB-CE
L. D. Gerdes	ABB-CE
H. Windsor	ABB-CE
D. Harmon	ABB-CE
R. Matzie	ABB-CE
W. Fox	Duke Eng. & Svs.
J. Burnette	Duke Eng. & Svs.
T. Oswald	Duke Eng. & Svs.
T. Crom	Duke Eng. & Svs.
M. Ceraldi	Duke Eng. & Svs.
A. Heymer	NUMARC
J. Egan	Shaw Pittman

Enclosure 1

ABB-CE - NRC MANAGEMENT MEETING
DECEMBER 9, 1992
PROPOSED AGENDA

1. OPENING REMARKS
(W. Russell and R. Matzie)

2. SCHEDULE FOR SUBMITTALS FOR DSER CLOSEOUT
(10 min) (J. Longo)

3. ITAAC

   A. INDUSTRY REVIEW OF SYSTEM 80+™ ITAAC
   (15 min) (C. Brinkman)

   B. SAMPLE COMPLETED ITAAC AND SUPPORTING TIER 2 INFORMATION
   (60 min) (H. Windsor, et al)

   C. SCHEDULE FOR SUBMITTAL OF SYSTEM 80+ ITAAC
   (15 min) (C. Brinkman)

4. SAFETY ANALYSIS ISSUES
(10 min) (J. Longo, et al)

5. REANALYSIS USING NEW SOURCE TERM
(20 min) (S. Ritterbusch)

6. HUMAN FACTORS ENGINEERING REVIEW STATUS
(30 min) (D. Harmon)

7. I&C DIVERSITY
(10 min) (NRC and D. Harmon)

8. SUMMARY

9. NEXT MEETING

Enclosure 2

DSER OPEN ITEM CLOSEOUT
PROGRESS TO DATE

9-28-92	DSER ISSUED
10-15-92	PROJECT MANAGEMENT
11-5-92	DSER OPEN ITEM CLOSEOUT KICKOFF MEETING AND BREAKOUT SESSIONS
11-6-92	HFE MEETING
11-16-92	CHAPTER 15 ANALYSES ISSUES MEETING
11-16-92	PIPING DESIGN AND LBB MEETING (2 DAYS)
11-18-92	INITIAL SUBMITTAL OF OPEN ITEM RESPONSES
11-19-92	MANAGEMENT MEETING ON HFE
11-23-92	STRUCTURAL DESIGN MEETING
11-24-92	SECOND SUBMITTAL OF OPEN ITEM RESPONSES
12-1-92	SUBMITTAL OF TWO SYSTEM ITAAC
12-2-92	SEVERE ACCIDENT MEETING (2 DAYS)
12-9-92	MANAGEMENT MEETING

SECY-91-161 SCHEDULE

1-21-93	ABB-CE DSER OPEN ITEM RESPONSES COMPLETED
5-26-93	STAFF FSER INPUTS TO PROJECT MANAGER
7-30-93	FSER TO ACRS AND COMMISSION
11-1-93	FSER ISSUED TO ABB-CE

AREAS WARRANTING MANAGEMENT AWARENESS

- SCHEDULES
- RESOURCES
- ADDITIONAL RAIs
- LEVEL OF DETAIL REQUIRED
- IMPACT OF LEAD PLANT AND INDUSTRY ISSUES

SYSTEM 80+™

NRC MANAGEMENT MEETING

December 9, 1992

ITAAC

- Example ITAAC and related information
  - Purpose for Review of Example ITAAC
  - Basis for ITAAC Preparation
- ITAAC ENTRIES including:
  - Correlation to PRA and Safety Analysis
  - "Upward Pointing" Tier 2 Information

SYSTEM 80+ ITAAC DEVELOPMENT

PURPOSE

Obtain NRC Management Concurrence with ABB-CE approach for:

- Form and Content of specific ITAAC entries
  - Using Emergency Feedwater System (EFWS) and Component Cooling Water System (CCWS) ITAAC as Examples
- PRA insights and safety analysis assumptions
  - Focus on hardware matters
- Level of detail in ITAAC and "upward pointing" Tier 2 information, as appropriate

BASIS FOR CURRENT CONTENT OF ITAAC AND RELATED INFORMATION

- Participation in NRC/Industry/Lead Plant ITAAC development activities

- Incorporation of NRC/Industry Guidance

  - NRC Review of initial pilot ITAAC submittal (4-30-92)
  - Industry Review of pilot ITAAC (7-16-92)
  - NRC Review of revised pilot ITAAC submittal (8-10-92)
  - Industry Review of 5 ITAAC (San Jose Review 9-92)

- Exclusion of programmatic and generic topics pending NRC/Industry resolution

- Preparation of supporting Tier 2 information to be supplied but not formally incorporated pending NRC/Industry Resolution

EXAMPLE ITAAC and RELATED INFORMATION

EFWS

- System overview
- PRA insights
- Safety analysis assumptions
- Selected ITAAC entries
  - Relationship to System Conceptual Diagram
  - Entries applicable to many or all system ITAAC
  - Entries having associated "upward pointing" information
  - System-specific entries where level of detail may be an issue

CCWS

- System overview
- PRA insights
- Safety analysis assumptions
- Selected CCWS ITAAC entries
  - Those for which CCWS ITAAC are different from EFWS ITAAC

EMERGENCY FEEDWATER SYSTEM

SAFETY FUNCTIONS

- Provide an independent, safety-related feedwater supply to steam generators to remove core heat and to prevent core uncovery
- Applied to:
  - loss of normal feedwater
  - steam/feedwater line break
  - LOCA-to keep SG tubes covered
- Required performance: remove heat, maintain hot standby, and cool plant with limiting failure and no offsite power

FEATURES

- 2 separate mechanical trains
- 4 EFW pumps (2 diverse pump drivers per division, only 1 pump of 4 needed)
- 2 redundant EFW storage tanks
- flow-limiting venturis on feedwater delivery lines

ACTUATION

- automatic by ESFAS (EFAS)
- automatic by APS (AFAS)
- manual from control room

EFWS ITAAC/PRA Insights

PRA-based SYSTEM 80+ design enhancements

- two independent EFWS divisions
- diverse EFW pump drivers:

  a turbine driven and a motor driven pump in each division

EFWS ITAAC/Safety Analysis Insights

Analysis Basis

- Minimum flow rate to a steam generator requiring emergency feedwater is 500 gallons per minute with steam generator pressure at 1200 psia.
- Maximum flow rate to a steam generator requiring emergency feedwater is 800 gpm at runout conditions.
- Emergency feedwater storage tank capacity at least 350,000 gallons each.
- A single failure in the EFWS will not prevent the system from performing as stated above.

Conceptual Diagram

Purpose of Conceptual Diagram

- Depict general system configuration
- Present information that minimizes ITAAC verbiage (e.g. Control Room indications)

Content

- General system configuration and principal components
- Control Room instrumentation indications and alarms for the functional flowpaths
- Actuation and termination signals
- ASME Code Class boundaries
- Relevant connections to other components and systems

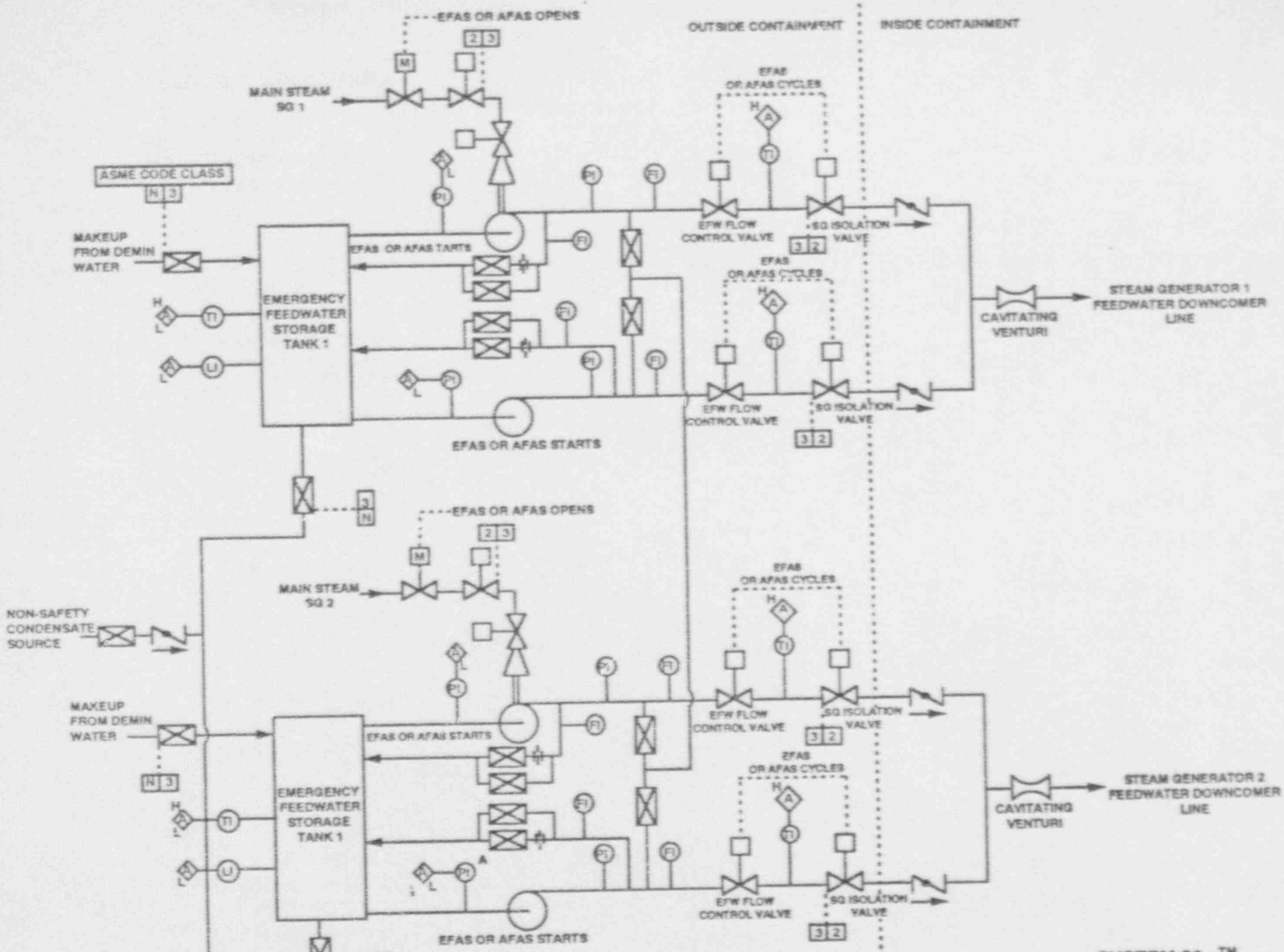


FIGURE 1.10.4-1
EMERGENCY FEEDWATER SYSTEM

SYSTEM 80+™

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a) A basic configuration for the EFWS is shown in Figure 1.10.4-1.	1.a) Visual inspections of the as-built system configuration will be performed.	1.a) The as-built configuration of the EFWS is in accordance with Figure 1.10.4-1 for the components and equipment shown.
b) Figure 1.10.4-1 depicts the ASME code classifications for the pressure retaining components.	b) Inspections of the construction records and the as-built installation will be performed.	b) The Certified Design Commitment is met.

ITAAC 1.a verifies the EFWS configuration based on PRA insights.

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
2. ASME Code portions of the EFWS retain their integrity under internal pressures that will be experienced during service.	2. A pressure test will be conducted on those portions of the EFWS required to be pressure tested by the ASME Code.	2. The results of the pressure test of ASME Code portions of the EFWS conform with the requirements in the ASME Code Section III.

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. Water is supplied to each EFW pump at a pressure greater than the net positive suction head (NPSH) required.	3. Test to measure EFW pump NPSH will be performed. An analysis to determine NPSH available to each EFW pump will be prepared based on test data, as-built data and vendor pump records.	3. The calculated available NPSH exceeds pump NPSH required by the vendor for the pump.

Tier 2 information
EFWS Pump NPSH

The EFW NPSH is measured with the EFW pump suction taken from the EFWST with two pumps running in the EFW division and EFWST pressure at atmospheric pressure. The analysis will be based on the following:

- Elevation of EFW pump suction line penetrations in the EFWST and EFW pump locations and elevations.
- EFWST minimum water level
- Design basis EFW temperature
- Pressure losses for EFW pump inlet piping and components
- Both EFW pumps operating in a division.

The NPSH will be adjusted by analysis to the maximum allowable EFWST temperature.

EMERGENCY FEEDWATER SYSTEM

Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a) An Emergency Feedwater Actuation signal (EFAS) actuates the EFWS components. An Alternate Feedwater Actuation Signal (AFAS) actuates the EFWS components.	4.a) Testing will be performed by generating a simulated EFAS for its corresponding steam generator. The test will be repeated using a simulated AFAS.	4.a) The motor-driven and turbine-driven pumps start, and the steam generator isolation and flow control valves open, in the division receiving the simulated EFAS. The same components actuate in response to a simulated AFAS.
b) SG water level signals cycle the SG isolation and flow control valves.	b) Functional tests of each division will be performed by simulating high and low SG water level signals.	b) A simulated high SG water level signal closes the SG isolation valves and flow control valves in its associated division. A simulated low SG water level signal opens the SG isolation valves and flow control valves in its associated division.

Tier 2 information

EFWS Actuation Confirmation of EFWS actuation on an EFAS or an AFAS will be conducted with the EFWS in the normal standby lineup. The test may be conducted by sequentially testing individual component actuation when the EFAS or AFAS output relays are energized (i.e., the signal and/or power leads to the other components may be lifted.) Each component will be tested using both an AFAS and an EFAS. The test to confirm cycling of valves on EFAS or AFAS signals and resets will be performed by first introducing a signal that energizes the Engineered Safety Features - Component Control System (ESF-CCS) output relays and then introducing a signal that deenergizes the ESF-CCS output relays. This process places the ESF-CCS logic in its reset state for the next actuation signal and in its actuated state for the next reset signal.

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.a) Each EFWS pump delivers at least 500 gallons per minute to the steam generator(s) against a steam generator feedwater nozzle pressure of 1217 psia.	5.a) EFWS functional tests of each EFWS pump will be performed to determine as-built system flow vs. steam generator pressure. Analyses will be performed to convert the test results to the conditions of the Certified Design Commitment.	5.a) The Certified Design Commitment is met.
b) Maximum flow to each SG is 800 gpm with both pumps in the division running, against a steam generator pressure of 0 psig.	b) EFWS functional tests will be performed with both pumps in a division running. Analyses will be used to convert the test results to the conditions of the Certified Design Commitment.	b) The Certified Design Commitment is met.

ITAAC 5.a and 5.b support a safety analysis basis.

Tier 2 Information

EFWS Flow System minimum flow will be determined by operating one EFWS pump at a time. Each pump will be tested with flow aligned to the steam generator and the plant at hot standby conditions (SG pressure approximately 1100 psia). The flow results will be converted by analysis to an expected flow at 1217 psia SG feedwater nozzle pressure, using calculated system resistance.

The test to determine system maximum flow will be conducted by operating both EFW pumps in a division with flow aligned to the steam generator supplied by that division. Analysis will convert flow results to an expected flow at 0 psig SG feedwater nozzle pressure using calculated system resistance.

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. Each emergency feedwater storage tank has an internal volume of at least 350,000 gallons above the EFW pump suction line penetrations.	6. Inspection of construction records for the EFWSTs will be performed and the internal volume of each tank available for emergency feedwater will be calculated.	6. Each EFWST internal volume is at least 350,000 gallons above the EFW pump suction line penetrations.

ITAAC 6 supports a safety analysis basis.

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7. EFWS instrumentation indications and alarms shown on Figure 1.10.4-1 are available in the Control Room. Controls are available in the control room to start and stop the EFW pumps, and open and close the EFW pump steam turbine supply valves, steam generator isolation valves, and flow control valves.	7. Inspection of the control room for the availability of instrumentation indications and alarms identified in the Certified Design Commitment will be performed. Tests will be performed using the EFW controls in the Control Room.	7. The instrumentation indications and alarms shown on Figure 1.10.4-1 are available in the Control Room. EFW controls operate as specified in the Certified Design Commitment.

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8. Safety-related EFWS components described in the Design Description for each division of the EFWS are powered from their respective Class 1E busses with the exception of containment isolation valves and associated containment isolation valve instrumentation and controls. (Power for containment isolation valves and their associated instrumentation and controls is addressed in Section 1.6.6.)	8. A test of the power availability to the components described in the Design Description for the EFWS will be conducted with power supplied from the permanently installed electrical power buses.	8. The Certified Design Commitment is met.

ITAAC 8 supports a safety analysis basis (Single Failure).

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9. Outside containment, the two mechanical divisions of the EFWS are physically separated except for the cross-connect lines between EFWSTs and between divisional EFW pump discharge lines.	9. Visual Inspections of EFWS divisional mechanical separations will be performed.	9. Outside of containment, a divisional wall separates the two EFWS mechanical divisions.

ITAAC 9 verifies the design based on PRA insights and a safety analysis basis (Single Failure).

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10. The flow recirculation line from each EFW pump discharge back to its associated EFWST provides required EFW pump minimum flow and permits testing each EFW pump at full flow.	10. Tests of each EFW pump in the minimum flow and full flow test modes will be conducted with flow directed to the EFWST through the pump's recirculation lines.	10. Minimum recirculation flow meets or exceeds the pump vendor's required flow. Full flow from each pump (at least 500 gpm) is returned to the EFWSTs.

COMPONENT COOLING WATER SYSTEM

Safety Functions

- Removes heat generated from plant's safety and non-safety components during:
  - Normal Operations
  - Shutdown
  - Refueling
  - Design Basis Accidents

Features

- Two separate CCW Divisions - Each division has the heat dissipation capacity to achieve and maintain safe cold shutdown.
- Two CCW pumps and heat exchangers per division
- One CCW surge tank per division

Actuation

- Normally operating
- Automatic isolation provisions
  - Redundant valves are provided on the supply and return lines to cooling loops composed of non-ASME Code Component Cooling Water piping. These valves close upon receipt of an SIAS.
  - A Low-low CCW surge tank level signal terminates cooling water flow to cooling loops composed of non-ASME code piping.

CCWS ITAAC/PRA Insights

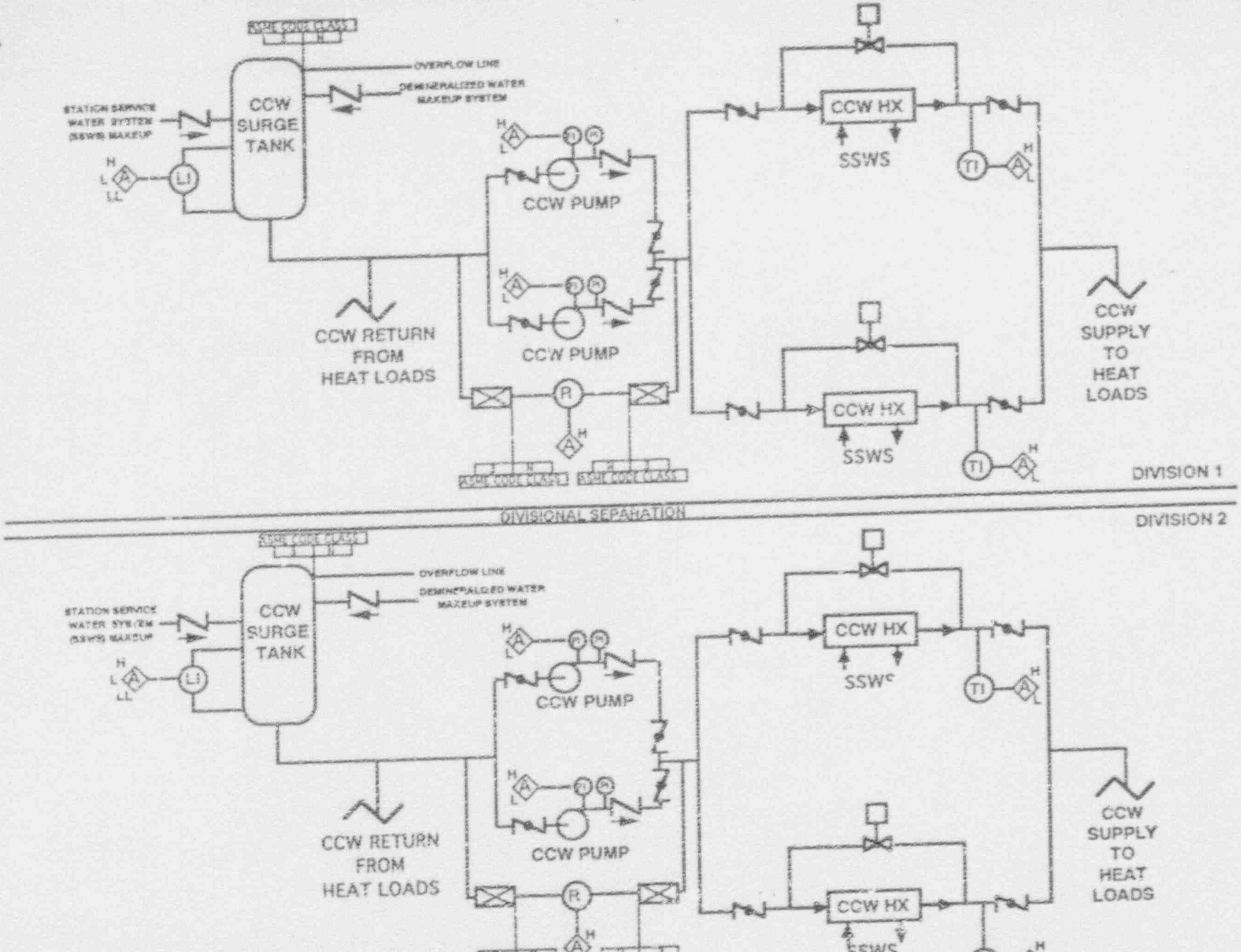
PRA-based SYS 80+ design enhancements

- two independent divisions
- two redundant pumps per division
- capability of isolating non-safety related loads when required

CCWS ITAAC/Safety Analysis Insights

Analysis Basis

- Minimum flow rate to a containment spray heat exchanger is 8000 gallons per minute
- A single failure in the CCWS will not prevent the system from performing as stated above.



NOTES:

A. A REMOVABLE SPOOL PIECE IS LOCATED ON EACH STATION SERVICE WATER SYSTEM MAKEUP LINE TO EACH CCW SURGE TANK.

FIGURE 1.9.2.2-1
COMPONENT COOLING WATER SYSTEM

SYSTEM 80+™

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A general configuration for the Component Cooling Water System is shown in Figure 1.9.2.2-1.	1. Visual inspections of the as-built CCWS configuration will be conducted.	1. The as-built configuration of the Component Cooling Water System is in accordance with Figure 1.9.2.2-1 for the components and equipment shown.

ITAAC 1 verified the CCWS configuration based on PRA insights.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
2. Outside of containment, the two CCWS divisions are physically separated.	2. Visual inspections of the as-built system configuration will be conducted.	2. Outside of containment, a divisional wall separates the two CCWS divisions.

ITAAC 2 verifies the CCWS configuration based on PRA insights.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.a) The CCWS has the capacity to dissipate the heat loads of connected condensers, coolers, and heat exchangers during operation, shutdown, refueling, and design basis accident conditions.	3.a) Test will be performed and analysis prepared to determine heat dissipation capacity based on as-built CCWS serviced com-ponents and measured flow rates. The analysis is based upon the following: - CCWS flow to cooled components for each plant mode. - SSWS flow to each component cooling water heat exchanger. - Maximum design basis station service water inlet temperature. - Vendor heat exchanger data.	3.a) The heat dissipation capacity of the CCWS exceeds the heat gener-ation capacity of the connected condensers, coolers, and heat ex-changers during operation, shut-down, refueling and design basis accident conditions.
b) Each division has heat dissipation capacity to achieve and maintain cold shutdown.	b) Test will be performed and analysis prepared for each division for heat dissipation capacity to achieve and maintain cold shutdown.	b) The heat dissipation capacity of each CCWS division exceeds the heat loads generated for achievement and maintenance of cold shutdown.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. (Continued)		
c) The CCWS provides at least 8000 gpm to each containment spray heat exchanger.	c) Test will be performed to confirm CCWS flow rate to the containment spray heat exchangers.	c) The CDC is met.

ITAAC 3.c supports a safety analysis basis.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. Figure 1.9.2.2-1 depicts the ASME code classifications for the pressure retaining components.	4. Inspections of the construction records and the as-built installation will be performed.	4. The Certified Design Commitment is met.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. The ASME portions of the Component Cooling Water System retain their integrity under internal pressures experienced during service.	5. A hydrostatic test will be conducted on those portions of the Component Cooling Water System required to be hydrostatically tested by the ASME code.	5. The results of the hydrostatic test of the ASME portions of the Component Cooling Water System conform with the requirements in the ASME Code, Section III.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. Component cooling water is supplied to each CCWS pump at a pressure greater than the net positive suction head (NPSH) required.	6. Test to measure CCWS pump NPSH will be performed. An analysis for NPSH will be prepared based upon test data, as-built data and vendor pump records.	6. The calculated available NPSH exceeds pump NPSH required by the vendor for the pump.

Tier 2 Information
CCWS Pump NPSH

The analysis will be based on the following:

- Component cooling water surge tank and component cooling water pump locations and elevations.
- Component cooling water surge tank water level at minimum value.
- Design basis component cooling water temperature.
- Pressure losses for pump inlet piping and components.
- Both CCW pumps operating in a division.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7.a) Redundant valves are provided on the supply and return lines to cooling loops composed of non-ASME code component cooling water piping.	7.a) Inspection of the as-built configuration will be performed.	7.a) The Certified Design Committment is met.
7.b) Redundant valves on the supply and return lines to cooling loops composed of non-ASME code component cooling water piping close upon receipt of a Safety Injection Actuation Signal (SIAS).	7.b) A test will be performed using a simulated SIAS signal.	7.b) The valves close upon receipt of a simulated SIAS.
c) The valves on the supply and return lines to cooling loops composed of non-ASME code component cooling water piping fail to closed positions.	c) A test will be performed using a simulated or actual loss of motive power to the valves.	c) Valves close on loss of motive power.

ITAAC 7.a and 7.b verifies the design based on PRA insights.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.a) The containment isolation valves in the CCWS piping to the reactor coolant pumps do not close upon receipt of a Containment Isolation Actuation Signal (CIAS) or a Safety Injection Actuation Signal (SIAS).	8.a) Tests will be performed using simulated CIAS and SIAS signals.	8.a) Containment isolation valves to the RCP do not close in response to a CIAS or a SIAS.
b) These containment isolation valves can be operated to opened and closed positions with controls in the Control Room.	b) Tests closure capabilities will be conducted for the containment isolation valves.	b) The Certified Design Commitment is met.

ITAAC 8.a and 8.b verifies the design based on PRA insights.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9. Instrument indications and alarms depicted in Figure 1.9.2.2-1 are available in the Control Room.	9. Inspections of Control Room instrument indications and alarms will be performed.	9.a) The Certified Design Commitment is met.

SYSTEM 80+™

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10.a) Controls are available in the Control Room as specified below: 1) Component cooling water flow to each shutdown cooling heat exchanger can be initiated and terminated. 2) Component cooling water flow to each containment spray heat exchanger can be terminated. 3) Component cooling water flow to each spent fuel pool heat exchanger can be initiated and terminated.	10. Tests of initiation and termination, both automatically and manually, of component cooling water flow will be performed. SIAS and CSAS signals will be simulated. A component cooling water surge tank low-low level signal will be simulated.	10. CCWS controls operate in accordance with the Certified Design Commitment.

ITAAC 10.a)3) verifies the design based on PRA insights.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10.b) Automated initiation or termination of component cooling flow is as specified below: 1) Component cooling water flow to cooling loops composed of non-ASME code piping is terminated automatically upon the receipt of a component cooling water surge tank low-low level signal. 2) Component cooling water flow to each containment spray heat exchanger is initiated automatically upon receipt of a Containment Spray Actuation Signal (CSAS). 3) Component cooling water flow to each spent fuel pool heat exchanger is terminated automatically by a Safety Injection Actuation Signal (SIAS).		

ITAAC 10.b)1) and 10.b)3) verifies the design based on PRA insights.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
11. Safety related CCWS components described in the Design Description for each division of the CCWS are powered from their respective divisional Class 1E busses with the exception of containment isolation valves and associated containment isolation valve instrumentation and controls. (Power for containment isolation valves and their associated instrumentation and controls is addressed in Section 1.6.6.)	11. A test of power availability to the CCWS components described in the Design Description will be conducted with power supplied from the permanently installed electric power busses.	11. Safety related CCWS components described in the Design Description for the Component Cooling Water System receive electrical power in accordance with the Certified Design Commitment.

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I&C DIVERSITY

AND

HUMAN FACTORS ENGINEERING REVIEW STATUS

ABB-CE - NRC MANAGEMENT MEETING
DECEMBER 9, 1992

NRC HUMAN FACTORS PROGRAM REVIEW MODEL ELEMENTS

1. HFE PROGRAM MANAGEMENT
2. OPERATING EXPERIENCE REVIEW
3. FUNCTION ANALYSIS
4. FUNCTION ALLOCATION
5. TASK ANALYSIS
6. HUMAN SYSTEM INTERFACE DESIGN
7. PROCEDURE DEVELOPMENT
8. HF VERIFICATION AND VALIDATION

ABB-CE / NRC AGREEMENTS ON HFE PROGRAM REVIEW ELEMENTS 1 - 4

(FROM AUG 20, SEPT 10-11, & SEPT 28 MTG.S)

THE FOLLOWING DESIGN PROCESS ELEMENTS CAN BE CLOSED-OUT PRIOR TO CERTIFICATION:

- o HUMAN FACTORS PROGRAM PLAN (1)
- o OPERATING EXPERIENCE REVIEW (2)
- o SYSTEM FUNCTIONAL ANALYSIS (3)
- o ALLOCATION OF FUNCTION (4)

AS CLOSED ITEMS, THESE HFE ELEMENTS WILL BE OUTSIDE THE SCOPE OF ITAAC, WHICH WILL THUS NOT PLACE REQUIREMENTS ON ELEMENTS 1-4, PER SE. (FSER WOULD IDENTIFY THESE ELEMENTS AS COMPLETE.)

ABB-CE / NRC AGREEMENTS ON
HFE PROGRAM REVIEW ELEMENTS 5 - 8

(FROM AUG 20, SEPT 10-11, & SEPT 28 MTG.S)

THE FO'LOWING DESIGN PROCESS METHODOLOGIES WILL BE

A) EVALUATED, WHERE APPROPRIATE, IN TERMS OF THE RCS PANEL DESIGN;
B) APPROVED PRIOR TO CERTIFICATION;
C) APPLIED FOLLOWING CERTIFICATION (VIA ITAAC/DAC):

- o TASK ANALYSIS (5)
- o HUMAN-SYSTEM INTERFACE DESIGN (6)
- o PROCEDURE DEVELOPMENT (7)
- o VERIFICATION & VALIDATION (8)

CLOSURE OF THESE ELEMENTS WILL BE ACHIEVED BY PERFORMING THE TESTS AND MEETING THE CRITERIA SPECIFIED IN THE ITAAC/DAC.

ABB-CE REQUEST FOR APPROVAL OF NUPLEX 80+ DESIGN FEATURES

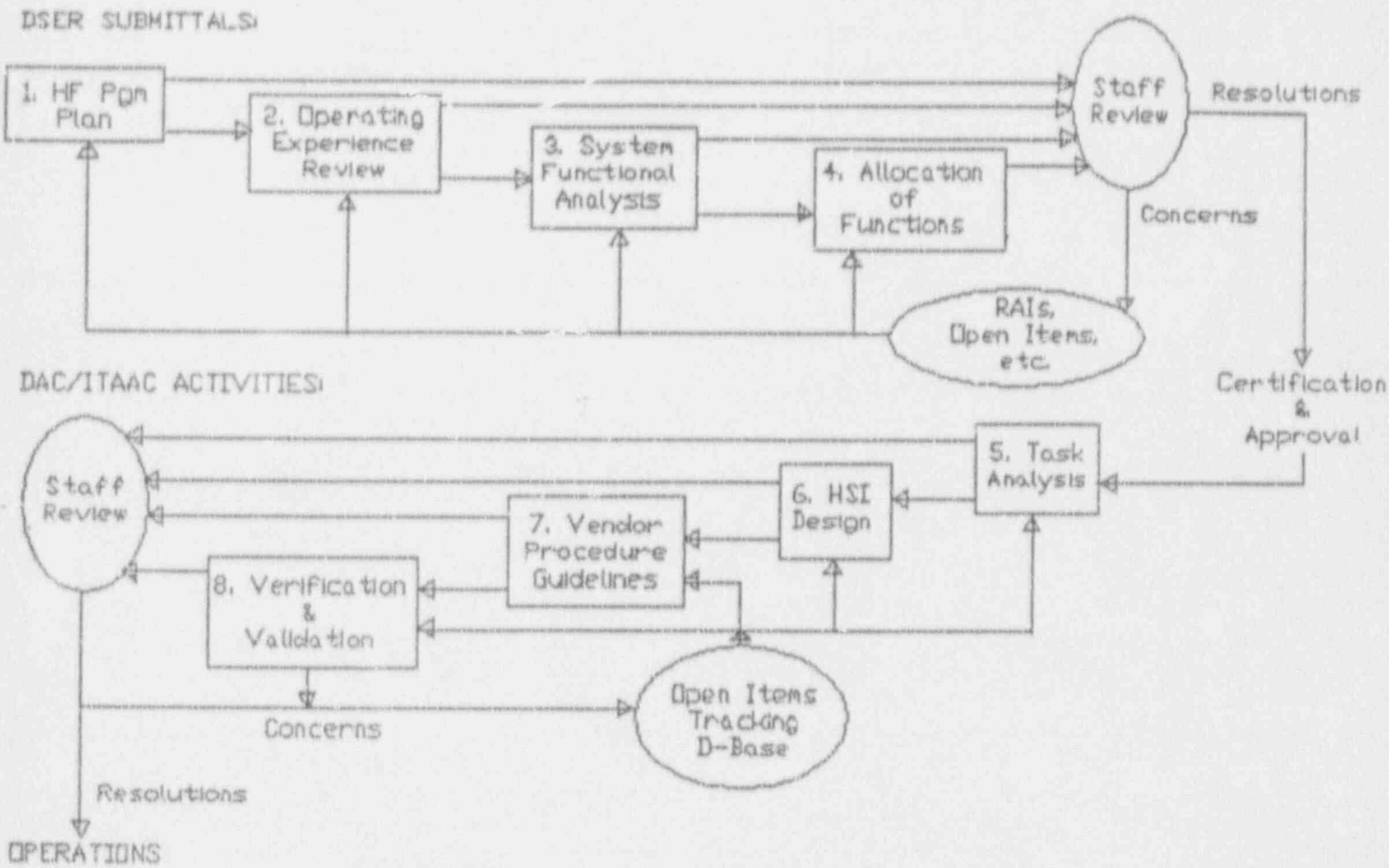
(ALWR-92-203, APR 9; ALWR-92-422, SEPT 18)

BESIDES REVIEWING THE HFE PROCESS ELEMENTS, TEST (I.E., VERIFY) THE SUITABILITY OF THE MAIN CONTROL ROOM (MCR) TIER 1 DESIGN FEATURES:

- o MCR CONFIGURATION
- o IPSO
- o STANDARD (I.E., GENERIC) CONTROL PANEL FEATURES (EXEMPLIFIED IN RCS PANEL DESIGN & MOCKUP):
  - DPS DISPLAY HIERARCHY
  - DIAS ALARM TILE DISPLAY
  - DIAS DEDICATED PARAMETER DISPLAY
  - DIAS MULTIPLE PARAMETER DISPLAY
  - CCS PROCESS CONTROLLER DISPLAY
  - CCS PUSHBUTTON SWITCH CONFIGURATION

THESE STANDARD FEATURES WILL BE DETAILED IN THE DESIGN CONTROL DOCUMENT.

RESOLUTION OF CONCERNS VIA DESIGN PROCESS ITERATION



RECENT ABB-CE - NRC HUMAN FACTORS INTERACTION

DATE	MEETING/RESULTS
11/19	MEETING WITH NRC HF STAFF/BNL*
	- VERBAL COMMENTS ON: HUMAN FACTORS PROGRAM PLAN (HFPP) OPERATING EXPERIENCE REVIEW (OER) REPORT
	- CLOSURE OF NUPLEX 80+ SPDS APPROACH TO NUREG-0737, SUPPLEMENT 1
11/19	MEETING WITH NRC MANAGEMENT
	- EPG INVENTORY COMMITMENT BY ABB-CE
	- RE-ESTABLISHED GOAL TO CLOSE HFE PROGRAM REVIEW MODEL ELEMENTS 1-4 PRIOR TO CERTIFICATION
	- RE-ESTABLISHED GOAL TO APPROVE NUPLEX 80+ DESIGN FEATU
12/4	CONFERENCE CALL WITH NRC HF STAFF/BNL.
	- RESOLUTION OF COMMENTS ON: HFPP OER REPORT

* BNL - BROOKHAVEN NATIONAL LABORATORY

STATUS OF SUBMITTALS FOR HF ELEMENTS 1-4

ELEMENT	SUBMITTAL	STATUS
1	Draft Revised HFPP	Submitted 11/5/92
	Staff/BNL Comments	Received 11/19 & 11/29/92
	Final Revision	Expected 12/11/92
2	Draft OER Report	Submitted 11/5/92
	Staff/BNL Comments	Received 11/19 & 11/29/92
	Final Revision	Completed
2	Draft Nuplex 80+ Information Systems Description Bases Document	Expected Completion 12/11/92
	Final Submittal	Pending Comments
3/4	Draft Function Analysis and Functions Allocation Report	Expected 12/9/92
	Final Submittal	Pending Comments

STATUS OF SUBMITTALS FOR HF ELEMENTS 5-8

ELEMENT	SUBMITTAL	STATUS
5	Task Analysis Methodology Revision	Draft 1/4/93 Submittal 1/21/93
6	Responses to HSI Open Items in DSER	Draft 12/15/92 Submittal 1/21/93
7	Operational Support Information Program	Submittal 1/21/93
	Revised Emergency Procedure Guidelines	Submittal 1/21/93
8	HF Verification and Validation Man	Draft 1/4/93 Submittal 1/21/93

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POST JANUARY HUMAN FACTORS EFFORTS

ACTIVITY/SUBMITTAL	TENTATIVE DATE
Human Factors ITAAC	2/93
Nuplex 80+ DCRDR Audit by NRC	3/93
EPG Inventory of Alarms, Indications and Controls	3-4/93

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I&C DIVERSITY - STATUS

- Progress has been made at identifying technical options for manual actuation of ESF functions and dedicated display of key parameters via means not subject to a common mode failure.

- The common mode failure analysis has been reviewed, a meeting to resolve open issues is scheduled for January 6, 1993.