Docket File

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

June 3, 1992

Docket No. 52-002

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

PROJECT: CE System 80+

SUBJECT: SUMMARY OF MANAGEMENT MEETING REGARDING HUMAN FACTORS ENGINEERING FOR THE CONTROL ROOM - NUPLEX 80+ (APRIL 24, 1992)

A meeting was held between management representatives of the Nuclear Regulatory Commission (NRC) and ABB-CE on April 24, 1992, regarding the status and direction of the NRC human factors engineering review of NUPLEX 80+, the control room for CE System 80+. A list of attendees at the meeting is provided in Enclosure 1. The presentations of NRC and ABB-CE are provided in Enclosures 2 and 3, respectively.

ABB-CE was asked whether a delay in the schedule for issuance of the draft safety evaluation report (DSER) was needed for ABB-CE to provide additional information. ABB-CE stated that all submittals for incorporation in the DSER would be provided by May 8, 1992, and therefore, no delay was requested.

ABB-CE requested that the process used to-date be reviewed for the acceptability of the product to-date and that the process to be certified would be for future panels. NRC stated that NRC will certify the design process and product. NRC will make a determination with ABB-CE as to what will be in Tier 1 and what will be in Tier 2. In general, the process will be in Tier 1 and the product in Tier 2. The process to be certified will be what is necessary to develop an additional product. In this regard, ABB-CE committed to comment on the process described in the Brookhaven National Laboratory report for design acceptance criteria and inspections, tests, analyses, and acceptance criteria.

ABB-CE indicated that standard features should be certified and not hardware. NRC asked for a clear definition of what constituted standard features. ABB-CE stated that this would be documented in a letter to NRC.

A discussion of the status of review of the reactor coolant system panel ensued. It was determined that the reviewers and ABB-CE technical staff must identify what information is already available to the staff and what additional information is needed. The option of performing a detailed control room design review (DCRDR) at Windsor, Connecticut, was discussed. It was agreed that this could not be done quickly enough to support the DSER, but should be scheduled later.

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The next meeting was tentatively scheduled for May 8, 1992. A document identifying the information still needed must be available for that meeting. (Subsequently, this meeting was postponed until May 19, 1992.)

Original Signed By:

Thomas V. Wambach, Project Manager
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Enclosures:
As stated

cc w/enclosures:
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OFC:	LA:PDST:ADAR	PM:PDST:ADAR	SC:PDST:ADAR
NAME:	PShea:tz	TWambach	JNWilson
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The next meeting was tentatively scheduled for May 8, 1992. A document identifying the information still needed must be available for that meeting. (Subsequently, this meeting was postponed until May 19, 1992.)

Thomas V. Wambach

Thomas V. Wambach, Project Manager
Standardization Project Directorate
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Enclosure 1

List of Attendees

April 24, 1992

NAME	ORGANIZATION
Thomas Wambach	NRR/ADAR/PDST
Thomas Hiltz	NRR/ADAR/PDST
Richard Eckenrode	NRR/DLPQ/LHFB
Donna Smith	NRR/DLPQ/LHFB
Cecil Thomas	NRR/DLPQ
William Travers	NRR/ADAR
Jared Wermiel	NRR/DLPQ/LBHFB
Bob Pierson	NRR/ADAR/PDST
Jack Roe	NRR/DLPQ
Jim Bongarra	NRR/DLPQ/LHFB
D. M. Crutchfield	NRR/ADAR
Peter Lang	DOE
Dan Giessing	DOE
Daryl Harmon	ABB-CE
Charlie Brinkman	ABB-CE
Regis Matzie	ABB-CE
Bob Fuld	ABB-CE Human Factors

NRC - CE MANAGEMENT MEETING

April 24, 1992

Subject: CESSAR - DC Chapter 18 DSER

Enclosure 2

OBJECTIVES OF NRC CESSAR - DC CHAPTER 18 HUMAN FACTORS REVIEW

1. Issue DSER on schedule (based on CE submittals received no later than May 8, 1992)

2. Staff reviews consistent with requirements of 10 CFR 52 and 10 CFR 50.34(f)(2)

3. Issue a DSER with the minimum number of open items possible

Requirements of 10 CFR Part 52

Applicant must provide information necessary and sufficient for final safety conclusion.

Applicant to include necessary inspections, tests, analyses, and acceptance criteria (ITAAC) for verification of design.

Control Room Requirements of 10 CFR 50.34(f)(2)

A control room design that reflects state-of-the-art human factor principles prior to committing design to fabrication

SPDS to display a minimum set of parameters defining the safety status of the plant

Automatic indication of the bypassed and operable status of safety systems

Staff Required Information Necessary for a Human Factors Safety Conclusion Under 10 CFR 52

- Documentation That Supports the Human Factors Design Process for the Control Room
  (Certified Under Tier 1)

- Design Acceptance Criteria

  - Part of ITAAC

  - Verify Implementation of DAC

Above Required Because:

1. Control room design will not be completed prior to certification.
2. Sufficient detail and completed design for human engineering will not be available.

CE Requested Staff Review (April 9, 1992)

- NRC to Approve Design Process and Product for:

  - RCS Panel
  - IPSO
  - Control Room Configuration

Information Necessary to Accomplish Above Approval:

- Sufficiently detailed description of design and design analyses, i.e. level of detail comparable to that of a DCRDR for RCS, IPSO, and control room configuration

- Staff audit of the panels and documentation

ABB-CE EXPECTATIONS FOR THE CESSAR-DC CHAPTER 18 DSER

1. THE DESIGN PROCESS FOR THE RCS PANEL, CONTROL ROOM CONFIGURATION AND INTEGRATED PROCESS STATUS OVERVIEW (IPSO) IS ACCEPTABLE.

   - MAN-MACHINE INTERFACE DESIGN FEATURES DEVELOPMENT
   - FUNCTIONAL TASK ANALYSIS METHODOLOGY
   - RCS PANEL DESIGN PROCESS
   - VERIFICATION ANALYSIS PROCESS
   - CONTROL ROOM CONFIGURATION DESIGN PROCESS

ABB-CE EXPECTATIONS FOR THE CESSAR-DC CHAPTER 18 DSER

2. THE NUPLEX 80+ MAIN CONTROL ROOM CONFIGURATION IS ACCEPTABLE.

- PANEL FOOTPRINT
- LOCATION OF IPSO
- LOCATION OF OFFICES

ABB-CE EXPECTATIONS FOR THE CESSAR-DC CHAPTER 18 DSER

3. THE DESIGN OF THE INTEGRATED PROCESS STATUS OVERVIEW IS ACCEPTABLE.

   - FUNCTIONAL DESIGN

   - CONTINUOUS CRITICAL FUNCTION STATUS DISPLAY

ABB-CE EXPECTATIONS FOR THE CESSAR-DC CHAPTER 18 DSER

4A. THE DESIGN PRODUCT FOR THE RCS PANEL IS ACCEPTABLE.

- RCS ALARM TILES
- RCS DISCRETE INDICATORS
- RCS CRT PAGES
- RCS PROCESS AND COMPONENT CONTROLS
- RCS PANEL LAYOUT

4B. THE MMI FEATURES USED FOR THE RCS ARE ACCEPTABLE FOR USE IN EQUIVALENT APPLICATIONS FOR ALL REMAINING PANELS. EXAMPLES OF THESE FEATURES ARE:

- DIAS ALARM TILE DISPLAY FORMAT/FEATURES
- DIAS DEDICATED PARAMETER DISPLAY FORMAT/FEATURES
- DIAS MULTIPLE PARAMETER DISPLAY FORMAT/FEATURES
- CCS PROCESS CONTROLLER DISPLAY FORMAT/FEATURES
- CCS COMPONENT CONTROLS

ABB-CE EXPECTATIONS FOR THE CESSAR-DC CHAPTER 18 DSER

5A. THE DESIGN PROCESS FOR THE REMAINING CONTROL ROOM PANELS IS ACCEPTABLE.

- FUNCTIONAL TASK ANALYSIS EXPANSION
- PANEL DESIGN PROCESS
- DESIGN REVIEW
- DYNAMIC PROTOTYPE EXPANSION
- VERIFICATION ANALYSIS

5B. THE ITAAC WILL DEMONSTRATE THAT THE REMAINING PANELS HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THE REFERENCE RCS PANEL AND THAT THE REQUIRED INVENTORY OF INFORMATION AND CONTROLS IS AVAILABLE.

- CVCS ALARM TILES
- CVCS DISCRETE INDICATORS
- CVCS CRT PAGES
- CVCS PROCESS AND COMPONENT CONTROLS
- CVCS PANEL LAYOUT

ABB-CE EXPECTATIONS FOR THE CESSAR-DC CHAPTER 18 DSER

6. THE ITAAC WILL DEMONSTRATE ACCEPTABLE OPERATOR PERFORMANCE IN THE COMPLETE CONTROL ROOM.

   - ACCEPTANCE CRITERIA FOR NORMAL OPERATION

   - ACCEPTANCE CRITERIA FOR ABNORMAL OPERATION

CESSAR-DC CHAPTER 18 DOCUMENTATION

SIGNIFICANT DOCUMENTATION EXISTS SUPPORTING CHAPTER 18.

ABB-CE WILL CLEARLY IDENTIFY DOCUMENTS AND INFORMATION LOCATION WITHIN DOCUMENTS WHEN THEY ARE REFERENCED.

ABB-CE DOES NOT DESIRE TO PLACE BACKUP DOCUMENTS IN THEIR ENTIRETY ON THE DOCKET.

THOSE SECTIONS OF DOCUMENTS USED TO MAKE THE SAFETY DETERMINATION MAY BE PLACED ON THE DOCKET.

RCS Panel Review Information Needs:

- Operator Position Description
- Detailed System Description
- Function and Task Analysis of RCS
- Operator Information and Control Requirements
- HF Design Standards / Guidelines

IPSO Review Information Needs:

- Detailed System Description
- Function and Task Analysis
- Operator Information Requirements
- SPDS Requirements Analysis
- HF Design Standards / Guidelines
- Documentation Identifying Impact on Individual and Crew Performance for System 80+

Control Room Configuration Review Information Needs:

- Function and Task Analysis of Full System and CR Operations, Maintenance, and Surveillance Activities

- Manning Requirements Analysis

- Workload Analysis

- Link Analysis

- Position Descriptions of Control Room Personnel

- Detailed Layout of Control Room With Anticipated Furnishings

Status of CE Requested Review:

Sufficient information has not been provided (to date) to perform reviews of the RCS, IPSO, and control room configuration.

Staff cannot approve the three products without sufficient information on the design process used to develop each product.

Action Items From NRC/CE Meeting of April 17, 1992

1) Letter to NRC describing what CE wants certified
2) Docketed version of material given to NRC 4/17/92
3) Revised responses to RAI's
4) Review schedule with management
5) Revise Chapter 18
6) Review and comment on draft ITAAC/DAC
7) Determine scope of DCRDR and communicate it to NRC
8) Submit Human Factors Guidelines Document when it's available
9) Submit Human Factors Design Basis (for Standards and Guidelines) Document

- No response to these items has been provided.

Summary

Currently, staff cannot write a DSER without open items:

- Required Control Room Design and Implementation Process/DAC have not been provided.
- Sufficient information to support staff evaluation of RCS panel, IPSO, and control room configuration has not been provided.

CONTROL ROOM REQUIREMENTS OF 10 CFR 50.34(F)(2)

A CONTROL ROOM DESIGN THAT REFLECTS STATE-OF-THE-ART HUMAN FACTORS PRINCIPLES PRIOR TO COMMITTING DESIGN TO FABRICATION:

- STATE-OF-ART OFTEN IMPLIES THE VERY LATEST
  - MEANS A MOVING TARGET
  - INCONSISTENT WITH THE PRINCIPLES OF STANDARDIZATION
  - UNACCEPTABLE TO NUCLEAR INDUSTRY
- STATE-OF-ART INTERPRETED BY ABB/CE
  - JUSTIFIABLE IN TERMS OF "CURRENTLY ACCEPTED PRACTICE"
  - TIMEFRAME OF ESTABLISHING THE DESIGN PROCESS

Enclosure 3

STAFF REQUIRED INFORMATION NECESSARY FOR A HUMAN FACTORS SAFETY CONCLUSION UNDER 10 CFR 52

DOCUMENTATION THAT SUPPORTS THE HUMAN FACTORS DESIGN PROCESS FOR THE CONTROL ROOM (CERTIFIED UNDER TIER 1)

- ABB/CE EVOLUTIONARY DESIGN PROCESS FOR REMAINING DESIGN
  - IMPLEMENTS APPROVED FEATURES AND METHODS
  - RCS PANEL IS PROTOTYPE OF APPROVED FEATURES AND METHODS
  - PROCESS DAC TO IMPLEMENT REMAINING PANELS FROM RCS PANEL
  - EMPHASIS ON VERIFICATION AND VALIDATION TO DEMONSTRATE PRODUCT ACCEPTABILITY

CE REQUESTED STAFF REVIEW (APRIL 9, 1992)

- NRC TO APPROVE DESIGN PRODUCT FOR:
  - STANDARD FEATURES
  - RCS PANEL
  - IPSO
  - CONTROL ROOM CONFIGURATION

- NRC TO APPROVE PROCESS FOR:
  - IMPLEMENTATION OF REMAINING PANELS
  - VALIDATION OF ENSEMBLE

DCRDR REQUESTS

- ABB/CE requests DCRDR-type audit prior to DSER for:
  - RCS panel
  - IPSO
  - Standard MMI features

- ABB/CE DCRDR-type audit prior to FSER for:
  - Main control room configuration

RCS PANEL REVIEW INFORMATION NEEDS

1) RCS SYSTEM DESCRIPTION IN CESSAR-DC, CHAPTER 5

2) RCS FUNCTION AND TASK ANALYSIS

3) RCS PANEL DESIGN DESCRIPTION IN CESSAR-DC, SECTION 18.7.3

4) NUPLEX 80+ CONTROL COMPLEX INFORMATION SYSTEMS DESCRIPTION (NPX-80-IC-SD-791-01)

STANDARD MMI DESIGN FEATURES

1) NUPLEX 80+ CONTROL COMPLEX INFORMATION SYSTEMS DESCRIPTION, (NPX-80-IC-SD-791-01)

2) NUPLEX 80+ CRITICAL FUNCTIONS MONITORING SYSTEMS DESCRIPTION (NPX-80-IC-SD-790-02)

3) CESSAR-DC, SECTION 18.7.1

4) HUMAN FACTORS ENGINEERING STANDARDS AND GUIDELINES

5) HUMAN FACTORS ENGINEERING STANDARDS AND GUIDELINES BASIS DOCUMENT

IPSO REVIEW INFORMATION NEEDS

1) CESSAR-DC, Section 18.7.1

2) Nuplex 80+ Control Complex Information Systems Descriptions (NPX-80-SD-791-01)

3) Nuplex 80+ Critical Functions Monitoring Systems Description (NPX80-IC-SD-79-02)

4) Nuplex 80+ Design Bases Document

5) OECD Halden Reactor Project IPSO Reports

CONTROL ROOM CONFIGURATION REVIEW INFORMATION NEEDS

- Results of gross function and task walk-throughs
- Design basis staffing requirements
- Results of link analysis
- Description of operator's role in MCR
- Layout of MCR with anticipated furnishings

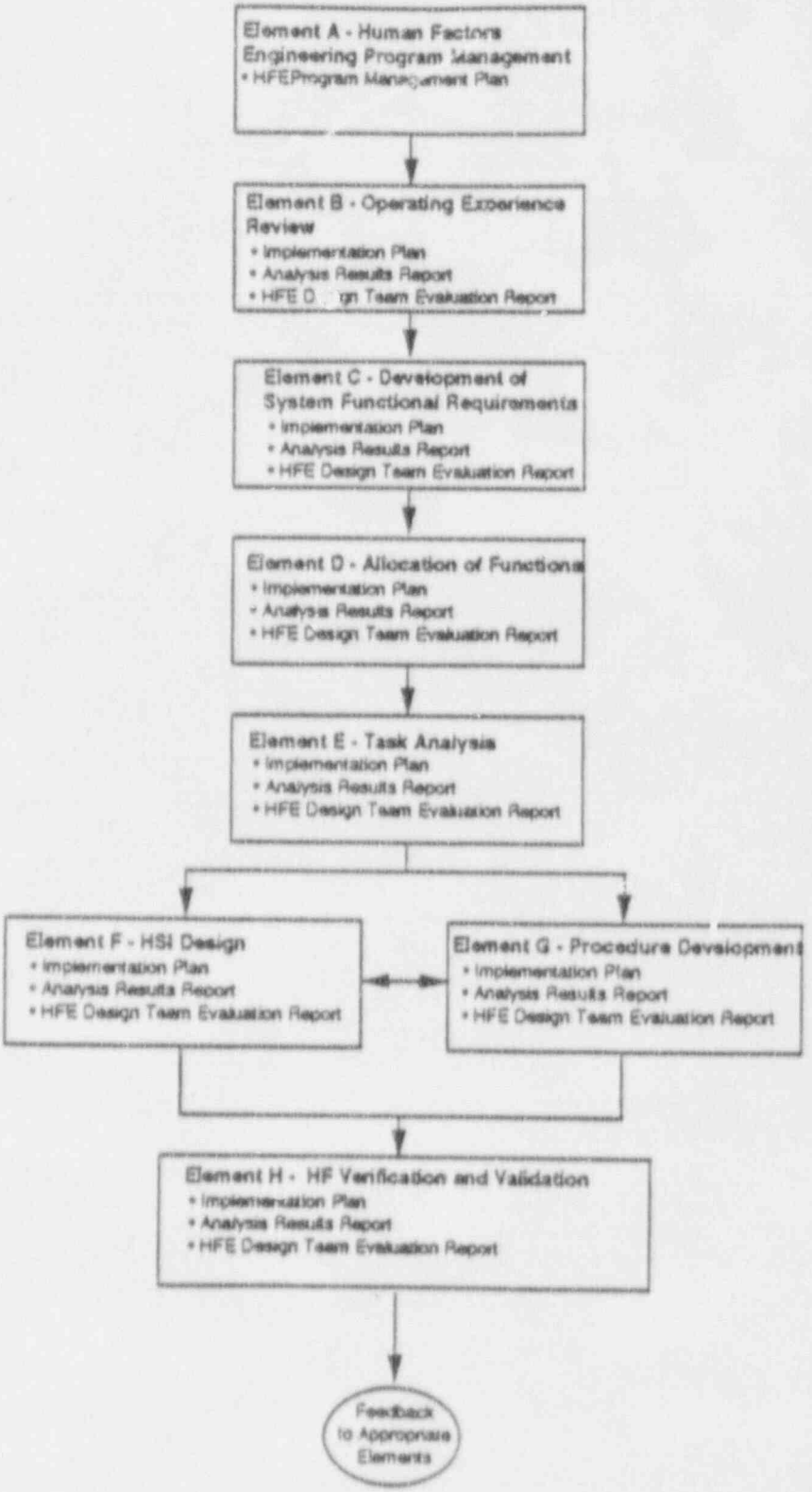
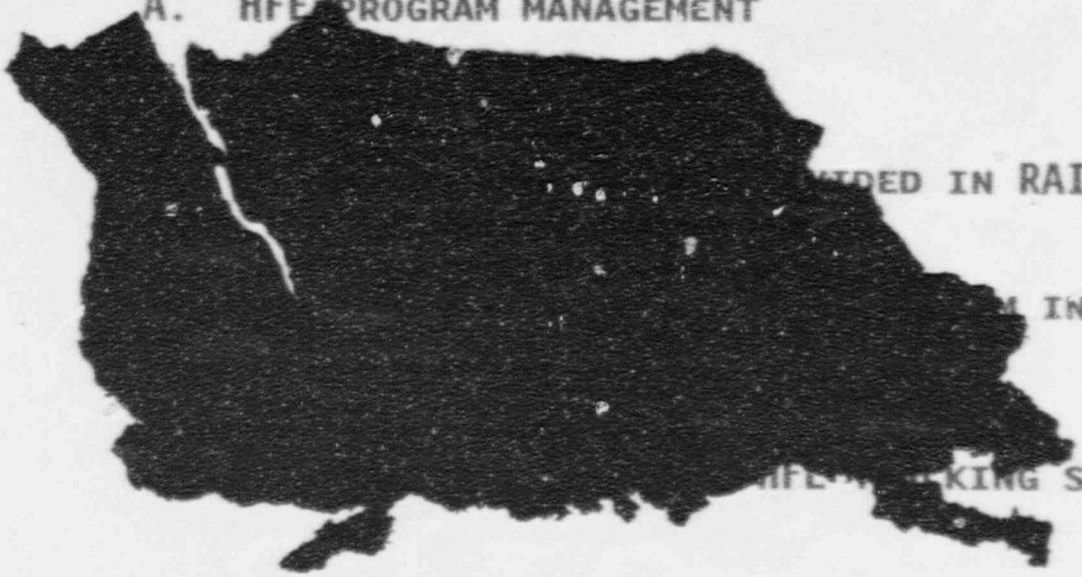


Figure 1. HFE Elements

(Draft 4/17/92)

ABB/CE HFE PROCESS TO DATE

A. HFE PROGRAM MANAGEMENT



IDED IN RAI RESPONSE

INCLUDING HFE

KING SYSTEM

ABB/CE HFE PROCESS TO DATE (CONT.)

B. Operating experience review

- ALWR Utility Requirements Document Chapter 10
- Operating reactor experience (LERs, Information Bulletins, DCRDR reports, etc.)
- Industry and regulatory studies (INPO, EPRI, Halden, NRC, etc.)
- Licensed reactor operators in design and review process

ABB/CE HFE PROCESS TO DATE (CONT.)

C. DEVELOPMENT OF SYSTEM FUNCTIONAL REQUIREMENTS

- NEXT GENERATION SYSTEM 80 STANDARD DESIGN
- INCORPORATION OF OPERATING EXPERIENCE REVIEW RESULTS
- INTEGRATION OF CRITICAL FUNCTION AND SUCCESS PATH APPROACH
- ORGANIZATION OF SYSTEM FUNCTIONS VIA FUNCTION AND TASK ANALYSIS

ABB/CE HFE PROCESS TO DATE (CONT.)

D. ALLOCATION OF FUNCTION

- o PHILOSOPHY -- CHANGES FROM PREVIOUS GENERATION (SYSTEM 80) ONLY TO ADDRESS PROBLEMS

- o IMPLEMENTATION -- NO CHANGES IN RCS INDICATING AND CONTROL FUNCTIONS

ABB/CE HFE PROCESS TO DATE (CONT.)

E. Task analysis

- Function and task analysis performed using accepted methodology (CEN-307)
- Verification of availability of necessary indications and controls
- Analysis of tasks confirmed as part of validation

ABB/CE HFE PROCESS TO DATE (CONT.)

F. MMI DESIGN

- o DESIGN BASES
- o DESIGN DEVELOPMENT
- o MULTIDISCIPLINARY DESIGN REVIEW
- o DYNAMIC PROTOTYPES
- o SUITABILITY VERIFICATION AND FEEDBACK
- o DOCUMENTED DESIGN

ABB/CE HFE PROCESS TO DATE (CONT.)

G. Procedures development

- Operational support information subsumed by NPOC Strategic Plan (Building Block 7)

ABB/CE HFE PROCESS TO DATE (CONT.)

H. HF VERIFICATION AND VALIDATION

- AVAILABILITY VERIFICATION PERFORMED BASED ON FTA
- SUITABILITY VERIFICATION PERFORMED AS COMPONENT OF ITERATIVE DESIGN
- VALIDATION TO BE PERFORMED ON ENSEMBLE, NOT APPROPRIATE TO INVIDIDUAL PANELS

ACTION ITEMS FROM NRC/CE MEETING OF APRIL 17, 1992

DATE TO BE PROVIDED	ITEM
4/30/92	1) Letter to NRC describing what ABB/CE wants certified
5/8/92	2) Docketed version of material given to NRC 4/17/92
5/8/92	3) Revised responses to RAIs
4/8/92	4) Review schedule with management
7/31/92	5) Revise Chapter 18
5/8/92 (initial)	6) Review and comment on draft ITAAC/DAC
4/24/92	7) Determine scope of DCRDR and communicate it to NRC
5/23/92	8) Submit Human Factors Guidelines Document when it's available
5/23/92	9) Submit Human Factors Design Basis (for Standards and Guidelines) Document