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Revision 0

February 2007

Strategy for the Closure of the AP1000 Design Control Document Chapter 18 Human Factors Engineering Combined Operating License Information Items

AP1000 DOCUMENT COVER SHEET

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WCAP-16696-NP
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Strategy for the Closure of the AP1000 Design Control Document Chapter 18 Human Factors Engineering Combined Operating License Information Items

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February 2007

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LIST OF ACRONYMS AND ABBREVIATIONS

Terms used in this document are defined below to facilitate understanding of their use within this document.

AOP	Abnormal Operating Procedure
DCD	Design Control Document
EOF	Emergency Operations Facility
EOP	Emergency Operating Procedure
FBTA	Function Based Task Analysis
FSAR	Final Safety Analysis Report
HFE	Human Factors Engineering
HSI	Human System Interface
HRA	Human Reliability Analysis
I&C	Instrumentation and Control
ITAAC	Inspection, Tests, Analyses, and Acceptance Criteria
MCR	Main Control Room
MTIS	Maintenance, Test, Inspection and Surveillance
NOP	Normal Operating Procedure
NRC	Nuclear Regulatory Commission
OCS	Operation and Control Centers System
OER	Operating Experience Review
OSA	Operational Sequence Analysis
OSC	Operational Support Center
PRA	Probabilistic Risk Assessment
RAI	Request for Additional Information
RO	Reactor Operator
RSR	Remote Shutdown Room
RSW	Remote Shutdown Workstation
SER	Safety Evaluation Report
SRO	Senior Reactor Operator
SRP	Standard Review Plan
SSD	System Specification Document
TSC	Technical Support Center
V&V	Verification and Validation
WPIS	Wall Panel Information System

REFERENCES

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2. NUREG-0711, "Human Factors Engineering Program Review Model," U.S Nuclear Regulatory Commission."

3. APP-OCS-GBH-001, Rev. A (Proprietary), "AP1000 Human Factors Engineering Program Plan," Westinghouse Electric Company LLC.

4. APP-GW-GLR-012, Rev. 0 (Non-Proprietary), "AP1000 Human Factors Engineering Program and Human System Interface Design," (Technical Report 72), Westinghouse Electric Company LLC.

5. NUREG-0696, "Functional Criteria for Emergency Response Facilities," U.S. Nuclear Regulatory Commission, February 1981.

6. NUREG-0737, "Clarification of TMI Action Plan Requirements," U.S. Nuclear Regulatory Commission, November 1980.

7. OCS-GJR-001 (WCAP-14645), Rev. 2 (Non-Proprietary), "Human Factors Engineering Operating Experience Review Report for the AP600 Nuclear Power Plant," Westinghouse Electric Company LLC.

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11. APP-OCS-J1R-100, Rev. 0, (Proprietary) "A Function-Based Task Analysis Methodology and Implementation for AP1000," Westinghouse Electric Company LLC.

12. APP-OCS-J1A-030, Rev. A (Proprietary), "Function-Based Task Analysis Summary Report," Westinghouse Electric Company LLC.

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17. APP-GW-GLR-081, Rev. 0 (Proprietary), "Closure of COL Information Item 18.5-1, Task Analysis," (Technical Report 81), Westinghouse Electric Company LLC. [LATER]

18. OCS-GEH-024 (WCAP-14694), Rev. 0 (Non-Proprietary), "Designer's Input to Determination of the AP600 Main Control Room Staffing Level," Westinghouse Electric Company LLC.

19. OCS-GEH-030 (WCAP-14651), Rev. 2 (Non-Proprietary), "Integration of Human Reliability Analysis and Human Factors Engineering Design Implementation Plan," Westinghouse Electric Company LLC.

20. APP-GW-GL-011 (WCAP-16555), Rev. 0 (Non-Proprietary), "AP1000 Identification of Critical Human Actions and Risk Important Tasks," Westinghouse Electric Company LLC.

21. APP-GW-GLR-011, Rev. 0 (Non-Proprietary), "Execution and Documentation of the Human Reliability Analysis/Human Factors Engineering Integration," (Technical Report 59), Westinghouse Electric Company LLC.

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24. APP-OCS-J1-009, (Proprietary) "AP1000 Operations and Control Centers System Functional Requirements," Westinghouse Electric Company LLC. [LATER]

25. APP-OCS-J1-001, Rev. A (Proprietary), "AP1000 Alarm System Functional Requirements," Westinghouse Electric Company LLC.

26. APP-OCS-J1-020, Rev. A (Proprietary), "Computerized Procedures System Functional Requirements," Westinghouse Electric Company LLC.

27. APP-OCS-J1-010, Rev. A (Proprietary), "AP1000 Display Functional Requirements," Westinghouse Electric Company LLC.

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34. APP-OCS-T2R-022 (Proprietary), "AP1000 Engineering Tests Phase 2 Test Report," Westinghouse Electric Company LLC. [LATER]

35. APP-DDS-J4V-001, Rev. B (Proprietary), "AP1000 Display Design Specification," Westinghouse Electric Company LLC.

36. APP-DDS-J4V-002, Rev. B (Proprietary), "Specification of Static and Dynamic Components in AP1000 Displays," Westinghouse Electric Company LLC.

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1 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to define the overall strategy to close "AP1000 Design Control Document" (DCD) (Reference 1) Chapter 18 Combined Operating License (COL) Information Items. This document also describes the current status of the AP1000 Human Factors Engineering (HFE) program and continuing efforts, which demonstrate that the execution of the HFE Program Plan is in accordance with Chapter 18 of the AP1000 DCD. The HFE Program is intended to be standard across the initial "fleet" of AP1000 plants.

This document is authored by Westinghouse and is written from a Westinghouse perspective because Westinghouse is the lead organization for the design and implementation of the AP1000 HFE Program. Work described in this document is in support of the AP1000 Reference Plant COL Application to be authored by Enercon.

This overall strategy is presented for consideration by the Nuclear Regulatory Commission (NRC). The NRC is requested to review this strategy and provide a Safety Evaluation Report (SER) on this strategy.

1.2 BACKGROUND INFORMATION

Final Design Approval of the AP1000 was granted on September 13, 2004. Since that date, Westinghouse and NuStart have been collaborating to address the objectives of the COL Information Items. To support the COL Application, the COL Information Items stated within the AP1000 DCD need to be closed. In order to facilitate this, Westinghouse prepared and submitted technical reports (TRs) to the NRC that address COL Information Items when work was completed. NuStart has been actively involved in the review of these TRs in order to provide both technical and operations insight and to promote standardization.

On November 7-9, 2006, Westinghouse, NuStart, and Enercon presented the current status of AP1000 HFE Program implementation to the NRC. As a result of this meeting, an action was assigned to Westinghouse to produce a TR documenting the proposed strategy to address and close the Chapter 18 AP1000 DCD COL Information Items. It was recognized that clarification and documentation of this overall strategy is necessary to establish general agreement on the process.

The information provided in this document is a formalization of the discussion that transpired during the November 7-9, 2006 meeting. The issuance of this document to the NRC completes the Westinghouse action item assigned at that meeting.

2 CLOSURE OF HFE COL INFORMATION ITEMS

2.1 OVERALL STRATEGY

Final Design Approval of the AP1000 was granted on September 13, 2004. Since this date, significant progress in the execution of the HFE Program has been made, including the planning, design and development of the Human System Interface (HSI) resources. This progress has been directed toward closure of COL Information Items. The purpose of the strategy described herein is to clarify the path to closure for COL Information Items.

This overall strategy is presented for consideration and endorsement by the NRC. The NRC is hereby requested to provide an SER on this strategy.

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2.2 TECHNICAL REPORTS PRIOR TO COL APPLICATION

In support of the overall strategy, technical reports have been and will continue to be issued to the NRC.
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3 SUMMARY OF AP1000 DCD INFORMATION ITEMS, RELATED TECHNICAL REPORTS

This section details the strategy for the COL Information Items as stated in each of the 14 subsections in Chapter 18 of the AP1000 DCD. It includes an overview of the work completed to date, plus identification of the ongoing and planned work to support the COL Application submittal. The elements of the Human Factors Engineering Program Review Model contained in NUREG-0711 (Reference 2) are identified with their corresponding section of the AP1000 DCD.

3.1 OVERVIEW – AP1000 DCD 18.1

Section 18.1 provides a general introduction to the discipline of human factors engineering and provides an annotated outline of the contents of Chapter 18.

There are no COL Information Items.

No further work is required.

3.2 HFE PROGRAM MANAGEMENT, NUREG-0711 ELEMENT 1 – AP1000 DCD 18.2

3.2.1 Combined License Information

Section 18.2.6 in Chapter 18 of the DCD lists two COL Information Items:

> (18.2-1) "The Combined License applicant referencing the AP1000 certified design is responsible for the execution of the NRC approved human factors engineering program as presented by Section 18.2."
>
> (18.2-2) "The Combined License applicant referencing the AP1000 certified design is responsible for designing the emergency operations facility, including specification of the location, in accordance with the AP1000 human factors engineering program."

3.2.2 Background Information

The HFE Program Plan is described in Chapter 18 – i.e., Chapter 18 is the HFE Program Plan. However, Westinghouse's engineering process requires that an engineering document be produced to facilitate the implementation of the program plan described in Chapter 18 of the DCD. To this end, APP-OCS-GBH-001, the "AP1000 Human Factors Engineering Program Plan (Reference 3) was written.

Reference 3 captures the technical content described in the AP1000 DCD Section 18.2, and provides additional details and describes implementation methods for incorporating HFE into the AP1000 design process. It is aimed at the engineers and functions as an implementation manual. The engineers are required to read the HFE Program Plan and a training presentation has been conducted for personnel involved in HFE design.

The HFE Program Plan addresses the following:

- Defines the project organization, including the identification of key personnel, plus the goals and roles and responsibilities of the different groups within the AP1000 Instrumentation and Control (I&C) organization.
- Identifies the HFE activities and relates them to the project lifecycle.
- Describes the HFE approach with respect to three areas:
  - Core: Areas where rigorous human factors input and methodologies are required.
  - Adjunct: Areas where the HFE function has a comparatively substantial role in the design process, although the HFE function does not have the primary responsibility.
  - Peripheral: Areas or systems where there is limited operator involvement and the tasks are not related to safety, and are not key to operations.
- Identifies the procedures, processes, design inputs, and deliverables.
- Describes the HFE Open Items Tracking System (Note that this system has been established and is in use.)
- Provides an overview of the Operation and Control Centers System (OCS) and HSIs.

3.2.3 Current Status

3.2.3.1 COL Information Item 18.2-1

The AP1000 HFE Program Plan has been issued. APP-GW-GLR-012, "AP1000 Human Factors Engineering Program and Human System Interface" (Reference 4), contains a markup of the DCD that includes a reference to the AP1000 HFE Program Plan. It also states that the HFE Program Plan fulfills COL Information Item 18.2-1 in the DCD.

3.2.3.2 COL Information Item 18.2-2

The Emergency Operations Facility (EOF) location and design is site-specific. Enercon is addressing the EOF for the AP1000 Reference Plant COL Application. A draft EOF implementation strategy has been produced for review. The strategy is to utilize the site's existing EOF. The strategy addresses the requirements in NUREG-0696 (Reference 5) and NUREG-0737 (Reference 6).

3.2.4 Way Forward

3.2.4.1 COL Information Item 18.2-1

Westinghouse considers COL Information Item 18.2-1 to be closed for the following reasons:

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Based on the information above, the totality of the work effort presented by this document, and by the previous request in APP-GW-GLR-012, "AP1000 Human Factors Engineering Program and Human System Interface Design," (Reference 4) the NRC should consider COL Information Item 18.2-1 closure to be acceptable and generically applicable to COL applications referencing the AP1000 design certification. It is requested that the NRC issue an SER documenting closure of COL Information Item 18.2-1 as documented in Reference 4.

3.2.4.2 COL Information Item 18.2-2

The DCD COL Information Item states: "The Combined License applicant referencing the AP1000 certified design is responsible for designing the emergency operations facility, including specification of the location, in accordance with the AP1000 human factors engineering program." Work to-date by Enercon demonstrates that responsibility has been assigned and that the work is progressing in accordance with the HFE Program Plan. The Final Safety Analysis Report (FSAR) Section 18.2 will be completed for the COL Application submittal. COL Information Item 18.2-2 closure will be requested at the time of the AP1000 Reference Plant COL Application.

The closure of COL Information Item 18.2-2 is site-specific, and is not necessarily standard across the entire initial "fleet" of AP1000 plants.

3.3 OPERATING EXPERIENCE REVIEW, NUREG-0711 ELEMENT 2 – AP1000 DCD 18.3

3.3.1 Combined License Information

Section 18.3.1 of Chapter 18 in the AP1000 DCD states that Combined License applicant responsibilities identified in OCS-GJR-001, "Human Factors Engineering Operating Experience Review Report for the AP600 Nuclear Power Plant" (Reference 7), are presented in Sections 10.4.12, 16.2, 18.2.6, 18.6.1, 18.9.1 and 18.10.1 of the DCD.

3.3.2 Background Information

The Operating Experience Overview (OER) was completed for the AP600 project (see Reference 7). This was determined to be sufficient for AP1000 at the time of the AP1000 design certification. No COL Information Item regarding the OER is listed in Table 1.8-2 of the AP1000 DCD.

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The updated OER report, i.e., APP-OCS-GJR-001, "Human Factors Engineering Operating Experience Review Report for the AP1000 Nuclear Power Plant" (Reference 9), is currently being used by the AP1000 engineers as part of the design process.

3.3.3 Current Status

This HFE program element was completed and is part of the AP1000 certified design.

3.3.4 Way Forward

Resolution of other COL Information Items is dependent upon the AP1000 OER (Reference 9). Each of these Information Items is identified through reference in Section 18.3.1 of the AP1000 DCD. For

example, the reference to 18.9-1 from 18.3.1 directs that the OER be utilized in procedure development. In this case, the operating experience issues in the OER report are addressed as the plant procedure development activity is executed.

3.4 FUNCTIONAL REQUIREMENTS ANALYSIS & FUNCTION ALLOCATION, NUREG-0711 ELEMENT 3 – AP1000 DCD 18.4

3.4.1 Combined License Information

None.

Section 18.4.1 of the DCD states: "This section has no requirement for additional information to be provided in support of the Combined License application."

3.4.2 Background Information

The Functional Requirements Analysis and Function Allocation was completed for the AP600 Project. The method and results are documented in WCAP-14644, "AP600 Functional Requirements Analysis and Function Allocation" (Reference 10). Due to the similarities between the AP600 design and AP1000 from a safety, operations and maintenance perspective, the existing analysis for the AP600 design was certified as being applicable to AP1000.

3.4.3 Current Status

This HFE program element was completed and is part of the AP1000 certified design.

3.4.4 Way Forward

No further action required.

3.5 TASK ANALYSIS, NUREG-0711 ELEMENT 4 – AP1000 DCD 18.5

3.5.1 Combined License Information

Section 18.5.4 of Chapter 18 in the DCD lists two COL Information Items:

> (18.5-1) "The Combined License applicant referencing the AP1000 certified design will address the execution and documentation of the task analysis implementation plan presented in Section 18.5."
>
> (18.5-2) "The Combined License applicant referencing the AP1000 certified design will document the scope and responsibilities of each main control room position, considering the assumptions and results of the task analysis."

3.5.2 Background Information

Section 18.5 details the implementation plan for three major areas of task analysis, as follows:

- Functional Based Task Analysis (FBTA)
- Operational Sequence Analysis 1 (OSA-1)
- Operational Sequence Analysis 2 (OSA-2)

3.5.3 Current Status

3.5.3.1 Task Analysis

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3.5.3.2 Main Control Room Staffing Roles and Responsibilities

Regarding COL Information Item 18.5-2, APP-GW-GLR-010, the "AP1000 Main Control Room Staffing Roles and Responsibilities" document (Reference 16), was completed and submitted to the NRC. It describes the roles and responsibilities for each MCR staff position. The information contained in the

MCR staffing document is currently being utilized as an input into the design of the MCR equipment and layout, plus the detailed design of the HSI resources. [

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3.5.4 Way Forward

3.5.4.1 Task Analysis

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3.5.4.2 Main Control Room Staffing Roles and Responsibilities

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3.6 STAFFING AND QUALIFICATIONS, NUREG-0711 ELEMENT 5 – AP1000 DCD 18.6

3.6.1 Combined License Information

Section 18.6.1 of Chapter 18 in the DCD lists one COL Information Item:

> (18.6-1) "The Combined License applicant referencing the AP1000 certified design will address the staffing levels and qualifications of plant personnel including operations, maintenance, engineering, instrumentation and control technicians, radiological protection technicians, security and chemists. The number of operators needed to directly monitor and control the plant from the main control room, including the staffing requirements of 10 CFR 50.54(m), will be addressed."

3.6.2 Background Information

The area of plant staffing requires a large input from operations and maintenance, and it is partially site-specific. This issue of staffing and qualifications is being addressed on behalf of the COL Applicant.

3.6.3 Current Status

A number of studies or assessments have already considered staffing, qualifications and organizational aspects. These include work undertaken by Westinghouse (see Reference 16 and 18). FSAR Section 18.6 will refer to FSAR Section 13.1, "Organization Structure of Applicant," for discussion of staffing and qualifications. A draft FSAR Section 13.1 has been developed and presented for review. It includes a staffing and qualification implementation strategy which considers the following:

- Standard Review Plan (SRP) 13.1.1, "Management and Technical Support Organization"
- SRP 13.1.2 and 13.1.3, "Operating Organization"
- Regulatory Guide 1.8, "Qualification and Training of personnel for Nuclear Power Plants"
- ANSI/ANS 3.1-1993, "Selection, Qualifications and Training of Personnel for Nuclear Power Plants"

3.6.4 Way Forward

FSAR Section 18.6 will be completed at the time of COL Application submittal. This will be based upon the FSAR Section 13.1 (as described above) and further reviews of relevant regulatory guidance (e.g., SRP 18.0). If required, subsequent revisions will be conducted based on the results of other HFE analyses that are completed as part of the implementation of the HFE Program Plan.

Work is progressing in accordance with the HFE Program Plan. COL Information Item 18.6-1 has elements that may be site specific, and are not necessarily standard across the entire initial "fleet" of AP1000 plants. Enercon is addressing Staffing and Qualifications for the AP1000 Reference Plant COL

Application. Closure of COL Information Item 18.6-1 for the AP1000 Reference Plant will be requested at COL Application.

3.7 HUMAN RELIABILITY ANALYSIS/HFE INTEGRATION, NUREG-0711 ELEMENT 6 – AP1000 DCD 18.7

3.7.1 Combined License Information

Section 18.7.1 of Chapter 18 in the DCD lists one COL Information Item:

> (18.7-1) "The Combined License applicant referencing the AP1000 certified design will address the execution and documentation of the human reliability analysis/human factors engineering integration implementation plan that is presented in Section 18.7."

3.7.2 Background Information

Section 18.7 of Chapter 18 in the DCD details the purpose and outlines the implementation plan for the integration of the Human Reliability Analysis (HRA) with HFE. The details of the plan are documented in WCAP-14651, "Integration of Human Reliability Analysis and Human Factors Engineering Design Implementation Plan" (Reference 19).

3.7.3 Current Status

Based on the HRA and Probabilistic Risk Assessment (PRA), a screening analysis has been completed and is documented in APP-GW-GL-011, "AP1000 Identification of Critical Human Actions and Risk-Important Tasks," (Reference 20). The results of this analysis demonstrated that there are no critical human actions, 22 post-accident risk-important tasks, and 38 representative MTIS tasks. This work, documented in APP-GW-GLR-011, "Execution and Documentation of the Human Reliability Analysis/Human Factors Engineering Integration" (Reference 21), has been submitted to the NRC for review. A number of requests for additional information (RAIs) were issued and these are currently being resolved.

3.7.4 Way Forward

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3.8 HUMAN-SYSTEM INTERFACE DESIGN, NUREG-0711 ELEMENT 7 – AP1000 DCD 18.8

3.8.1 Combined License Information

Section 18.8.5 of Chapter 18 in the DCD lists one COL Information Item:

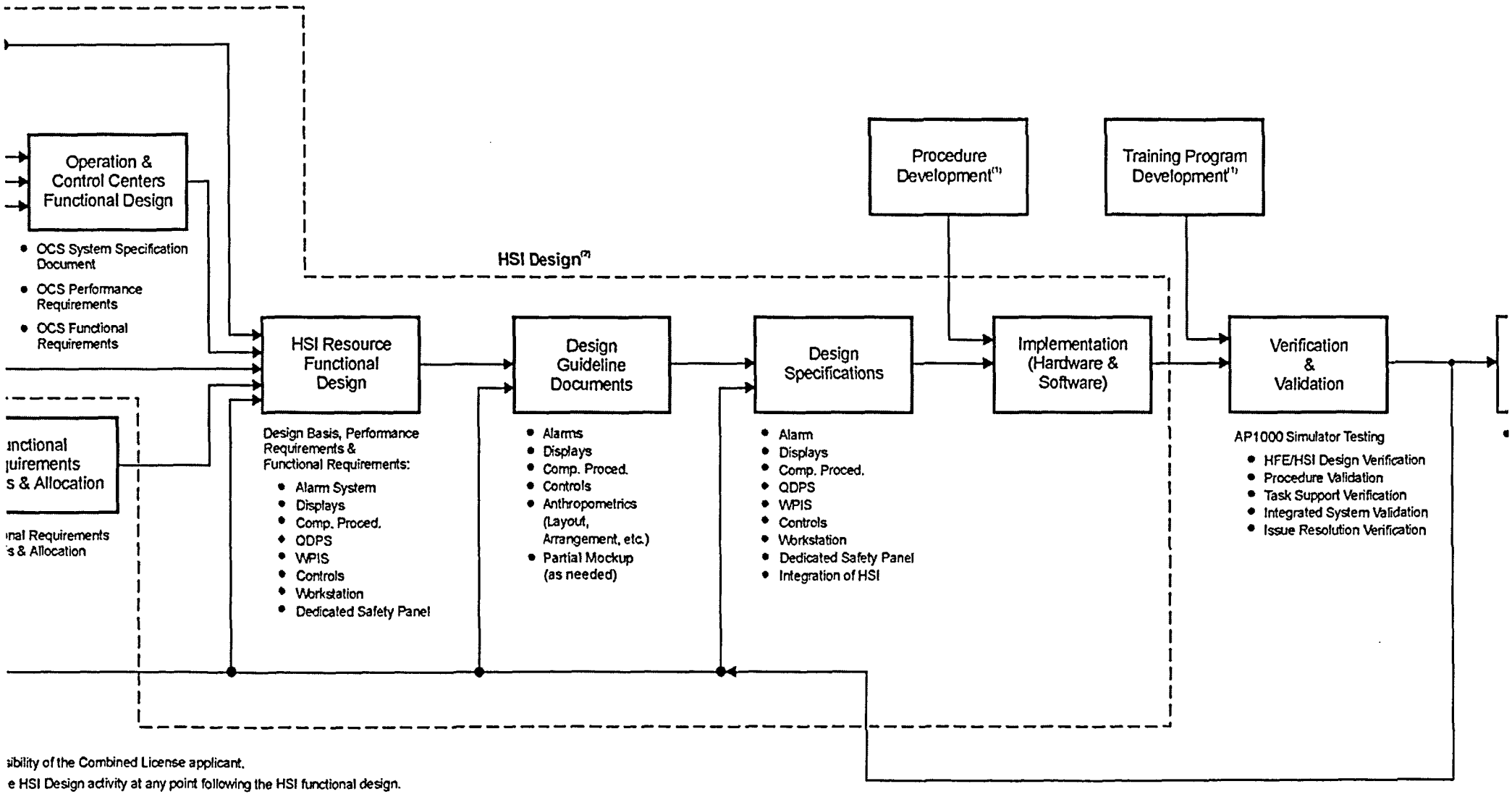
> (18.8-1) "The Combined License applicant referencing the AP1000 certified design will address the execution and documentation of the human system interface design implementation plan that is presented by Section 18.8."

3.8.2 Background Information

The HSI design section of Chapter 18 in the DCD describes the Operation and Control Centers (OCS) and HSI resources design and implementation within the HFE Program. DCD Section 18.8 describes the method by which the previously described areas of work form the basis of the AP1000 HSI design. It describes the method by which the HRA, staffing roles and responsibilities, OER, task analyses, engineering test results and the functional requirements analysis and allocation are integrated into the design process, including the design iteration process.

The HSI design implementation process encompasses a number of areas of work, as follows (and as illustrated in Figure 1):

- Operation and Control Centers Functional Design
- HSI Resources Functional Design
- HSI Design Guidelines
- Engineering Tests
- Design Specifications
- Implementation



sibility of the Combined License applicant.
e HSI Design activity at any point following the HSI functional design.

3.8.3 Current Status

3.8.3.1 Operation and Control Centers Functional Design

3.8.3.1.1 Operation and Control Centers System Specification Document

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3.8.3.1.2 Concept of Operations

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3.8.3.1.3 Operations and Control Centers System Functional Requirements

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3.8.3.2 HSI Resources Functional Design

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3.8.3.3 HSI Design Guidelines

The main purposes of APP-OCS-J1-002, "AP1000 Human System Interface Design Guidelines" (Reference 30), are to provide an adequate HFE design for the OCS and HSI resources and to establish an integrated design. These guidelines provide consistent direction to engineers producing the specific HSI resources. Ultimately, this will result in a consistent set of HSI resources that allow plant operators to easily control and monitor the plant under all plant conditions.

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3.8.3.4 HSI Engineering Tests

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3.8.3.5 Design Specifications

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3.8.3.6 Implementation

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3.8.4 Way Forward

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3.9 PROCEDURE DEVELOPMENT, NUREG-0711 ELEMENT 8 – AP1000 DCD 18.9

3.9.1 Combined License Information

Section 18.9.1 of Chapter 18 in the DCD lists one COL Information Item:

(18.9-1) "See Section 13.5 for a discussion of the responsibility for procedure development."

3.9.2 Background Information

Section 18.9 of Chapter 18 in the DCD provides a reference to the procedure development document WCAP-14690, "Designer's Input to Procedure Development for AP600" (Reference 38). Since the AP1000 plant will be operated in the same manner as the AP600 plant, the AP600 document is directly applicable to AP1000.

3.9.3 Current Status

A substantial amount of work has been completed to date. This includes the production of APP-GW-GLR-040, "Plant Operations, Surveillance and Maintenance Procedures," Reference 39, which directly addresses COL Information Item 18.9-1.

Plant operating procedures are developed in accordance with the specific guidelines provided in APP-GW-GJP-100, "AP1000 Normal Operating Procedures Writer's Guide" (Reference 40). These guidelines detail the development methodology, relevant human factors guidelines and incorporate

industry and regulatory standards. It also specifies the process to review and approve the procedures. Procedure authors have undergone the requisite training in developing AP1000 operating procedures.

The schedule for the production of the procedures is divided into three Phases. Phase 1 comprised 3 Emergency Operating Procedures (EOPs), 15 Normal Operating Procedures (NOPs), and 2 Abnormal Operating Procedures (AOPs). These procedures supported the development of the simulation utilized in the engineering tests.

The Phase 2 procedures comprised 20 EOPs, 9 NOPs and 1 Surveillance Test Procedure. These procedures supported OSA-1. The plant operating procedures included in Phases 1 and 2 are issued and available for review.

The completion of the Phase 3 procedures will be undertaken following the COL. These include:

- 11 remaining EOPs
- 20 NOPs to support EOP actions
- 47 additional NOPs
- 43 AOPs
- 15 Post-72 Hour Procedures (estimated)
- 150 Maintenance Guidelines (estimated)
- 200 Surveillance Guidelines (estimated)
- 50 Refueling and Outage Procedures (estimated)
- 3000 Alarm Response Guidelines (estimated)
- 1 Administrative Guideline

Subsequent revisions of the procedures may be produced based on the results of other HFE analyses that are completed as part of the implementation of the HFE Program Plan (e.g., the task analysis, HRA, HSI design implementation, training, and the verification and validation [V&V] activities).

3.9.4 Way Forward

COL Information Item 18.9.1 has been addressed via the issuance of Reference 39. The DCD markup in Reference 40 declares that COL Information Item 18.9-1 is complete. Adequate work has been completed to demonstrate the process to develop the AP1000 Operating Procedures. It is requested that the NRC issue an SER documenting closure of COL Information Item 18.9-1.

3.10 TRAINING PROGRAM DEVELOPMENT, NUREG-0711 ELEMENT 9 – AP1000 DCD 18.10

3.10.1 Combined License Information

Section 18.10.1 of Chapter 18 in the AP1000 DCD lists one COL Information Item:

> (18.10-1) "See Section 13.2 for a discussion of the responsibility for training program development."

3.10.2 Background Information

Section 18.10 of Chapter 18 in the DCD refers to WCAP-14655, "Designer's Input to the Training of the Human Factors Engineering Verification and Validation Personnel" (Reference 41).

3.10.3 Current Status

A draft training program implementation strategy has been produced for review. The strategy encompasses work performed by an industry task force facilitated by NEI as captured by NEI 06-13, "Template for an Industry Training Program Description" (Reference 44).

FSAR section 18.10 has been written and presented for review. NEI 06-13 has been submitted to the NRC for review and endorsement. If required, subsequent revisions of the training program will be produced based on the results of other HFE analyses that are completed as part of the implementation of the HFE Program Plan (task analysis, HRA, HSI design implementation, procedures, and V&V activities).

3.10.4 Way Forward

COL Information Item 18.10-1 will be addressed via the issuance of FSAR Section 13.2, "Training Program Development." COL Information Item 18.10-1 can be closed at the time of COL Application when FSAR Section 13.2 is submitted along with the completed application.

3.11 HFE VERIFICATION AND VALIDATION, NUREG-0711 ELEMENT 10 – AP1000 DCD 18.11

3.11.1 Combined License Information

Section 18.11.1 of Chapter 18 in the DCD lists one COL Information Item:

> (18.11.1) "The Combined License applicant referencing the AP1000 certified design will address the development, execution and documentation of an implementation plan for the verification and validation of the AP1000 human factors engineering program. The programmatic level description of the AP1000 verification and validation program, presented and referenced by Section 18.11, will be issued by the combined License applicant to develop the implementation plan."

3.11.2 Background Information

The AP1000 HFE V&V program is certified at a programmatic level. Section 18.11 of Chapter 18 in the DCD states that the description of the HFE V&V program and an outline of the V&V activities are documented in WCAP-15860, "Programmatic Level Description of the AP1000 Human Factors Verification Validation Plan" (Reference 42). This reference will be used to develop the implementation plan.

3.11.3 Current Status

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3.11.4 Way Forward

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3.12 INVENTORY – AP1000 DCD 18.12

3.12.1 Combined License Information

Section 18.12.4 states: "This section has no requirement for additional information to be provided in support of the Combined License Application."

3.12.2 Background Information

Section 18.12 of Chapter 18 in the DCD outlines the process to determine the inventory of instruments, alarms and controls for AP1000, and the method to incorporate the FBTA, the HRA, and the Emergency Response Guidelines into this process. The section describes the design basis and the selection criteria utilized to establish the minimum inventory of controls, displays, and alarms required to monitor and actuate the safety-related systems associated with the critical safety functions. Table 18.12.2-1 in Section 18.12 of the DCD provides a list of the minimum inventory of fixed-position controls, displays and alerts.

The minimum inventory of controls, displays and alerts is included in the design of the MCR and RSW.

3.12.3 Way Forward

Section 18.12 of the DCD provides design information and does not identify any requirements for HFE analyses.

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3.13 DESIGN IMPLEMENTATION, NUREG-0711 ELEMENT 11 – AP1000 DCD 18.13

3.13.1 Combined License Information

None.

3.13.2 Background Information

For completeness with respect to NUREG-0711 (Revision 2), Section 18.13 is included in Chapter 18 of the DCD. However, the AP1000 is a new plant rather than a plant modernization. The portions of Element 11 of NUREG-0711 (Revision 2) that apply to new plants are included in the scope of Section 18.11, "Human Factors Engineering Verification and Validation."

3.13.3 Way Forward

No action required.

3.14 HUMAN PERFORMANCE MONITORING, NUREG-0711 ELEMENT 12 – AP1000 DCD 18.14

3.14.1 Combined License Information

None.

3.14.2 Background Information

Section 18.14 of Chapter 18 in the DCD states that human performance monitoring is applicable after the plant is placed in operation. No HFE analyses related to human performance monitoring are identified in the DCD. However, in preparation for a new plant, Enercon is addressing the requirements for human performance monitoring for the AP1000 Reference Plant COL Application.

3.14.3 Current Status

A draft human performance monitoring implementation strategy has been produced for review. Work is ongoing to review current programs from the COL Applicant's existing nuclear plants and to review relevant regulatory guidance for potential additional HFE requirements (i.e., NUREG-0711, SRP 18.0, etc.).

3.14.4 Way Forward

The COL Applicant will describe and commit to implement a program that meets the requirements of NUREG-0711. The FSAR Section 18.14 will be completed for the AP1000 Reference Plant COL Application.