



## **ESBWR Design Control Document** *Tier 2*

Chapter 13  
*Conduct of Operations*

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## Abbreviations And Acronyms

<u>Term</u>	<u>Definition</u>
10 CFR	Title 10, Code of Federal Regulations
ANS	American Nuclear Society
ANSI	American National Standards Institute
CAS	Central Alarm Station
COL	Combined Operating License
DBT	Design Basis Threat
DCD	Design Control Document
EOF	Emergency Operations Facility
ERDS	Emergency Response Data System
GE	General Electric Company
GEH	General Electric – Hitachi Nuclear Energy
HFE	Human Factors Engineering
HSI	Human-System Interface
IAEA	International Atomic Energy Agency
IEEE	Institute of Electrical and Electronic Engineers
MCR	Main Control Room
NRC	Nuclear Regulatory Commission
NUREG	Nuclear Regulatory Commission Technical Report
OSC	Operational Support Center
PA	Protected Area
PRA	Probabilistic Risk Assessment
RSS	Remote Shutdown System
SECY	Secretary of the Commission
SPDS	Safety Parameter Display System
SSC(s)	Structure, System and Component(s)
TEDE	Total Effective Dose Equivalent
TMI	Three Mile Island
TSC	Technical Support Center
UPS	Uninterruptible Power Supply
VBS	Vehicle Barrier System
V&V	Verification and Validation

## 13. CONDUCT OF OPERATIONS

This chapter provides information relating to the operational plans for the ESBWR. The purpose of this chapter is to provide reasonable assurance that the Combined Operating License (COL) applicant's organization will be able to operate the ESBWR in a manner that protects the public health and safety.

### 13.1 ORGANIZATIONAL STRUCTURE OF APPLICANT

This section is the responsibility of the COL applicant. The organizational structure must be consistent with the Human System-Interface (HSI) design assumptions used in the design of the ESBWR. These assumptions are described in Chapter 18. The organizational structure consistency with the ESBWR HSI design must be documented. The COL Applicant referencing the ESBWR will submit documentation that demonstrates that their organizational structure is consistent with the ESBWR Human Factors Engineering (HFE) design requirements and complies with the requirements of 10 CFR 50.54 (i) through (m) (COL 13.1-1-A).

#### 13.1.1 COL Information

##### *13.1-1-A Organizational Structure*

The COL Applicant referencing the ESBWR will submit documentation that demonstrates that their organizational structure is consistent with the ESBWR Human Factors Engineering (HFE) design requirements and complies with the requirements of 10 CFR 50.54 (i) through (m) (Section 13.1).

#### 13.1.2 References

None

## 13.2 TRAINING

### 13.2.1 Reactor Operator Training

The Training Program Development for Reactor Operator Training is described in Subsection 18.10. The Implementation of Licensed Operator Training Program validation of baseline training documentation in the full scope simulator is described in Subsection 18.12. The Monitoring of Licensed Operator Training Program validation over the operating cycle (and after changes to the plant, staffing, and training program) by analyzing and trending full scope simulator performance is described in Subsection 18.13.

Reactor operator training is an operational issue. The COL Applicant will provide a description of, and the schedule for, the training program for reactor operators and senior reactor operators, and the licensed operator requalification program (COL 13.2-1-A).

### 13.2.2 Training for Non-Licensed Plant Staff

Non-licensed Operator training is described in Subsection 18.10, Training Program Development. The Monitoring of Non-Licensed Operator Training Program validation over the operating cycle (and after changes to the plant, staffing, and training program) by analyzing and trending plant human performance data is described in Subsection 18.13.

Training for non-licensed plant staff is an operational issue. The COL Applicant will provide a description of, and the schedule for, the training program for non-licensed plant staff (COL 13.2-2-A).

### 13.2.3 Incorporation of Operating Experience

The results of reviews of operating experience are incorporated into training and retraining programs in accordance with the provisions of Three Mile Island (TMI) Action Item I.C.5, NUREG-0737 (Reference 13.2-1). The organizational responsibilities for accomplishing this are clearly identified. The Operator Experience Review input to the Training Program is described in Section 18.3.

### 13.2.4 Training Requirements for Preoperational and Low-Power Testing

A training program for the plant staff is developed. The program includes all phases of plant operation including preoperational testing and low-power operation in accordance with the provisions of TMI Action Item I.G.1, NUREG-0737 (Reference 13.2-1). The Plant Staff Training Program Development is described in Subsection 18.10.

### 13.2.5 COL Information

#### 13.2-1-A *Reactor Operator Training*

The COL Applicant will provide a description of, and the schedule for, the training program for reactor operators and senior reactor operators, and the licensed operator requalification program (Subsection 13.2.1).

***13.2-2-A Training for Non-Licensed Plant Staff***

The COL Applicant will provide a description of, and the schedule for, the training program for non-licensed plant staff (Subsection 13.2.2).

**13.2.6 References**

- 13.2-1 NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980.

### 13.3 EMERGENCY PLANNING

Emergency planning is not within the scope of the ESBWR design. However, design features, facilities, functions, and equipment necessary for emergency planning are considered in the design bases of the standard plant.

The ESBWR Standard Plant complies with all the Technical Support Center (TSC) design requirements. Specifically, a TSC of sufficient size to support 26 people consistent with Section 2 of NUREG-0696 (Reference 13.3-2), is located in the electrical building. Display capability in the TSC includes a workstation that at a minimum is capable of displaying the parameters that are required of a Safety Parameter Display System (SPDS). The SPDS function is described in GE Report NEDE-33217P (Reference 13.3-1).

The TSC is environmentally controlled to provide room air temperature, humidity and cleanliness appropriate for personnel and equipment.

The room is provided with radiological protection and monitoring equipment necessary to ensure that radiation exposure to any person working in the TSC would not exceed 0.05 Sv (5 rem) Total Effective Dose Equivalent (TEDE) as defined in 10 Code of Federal Regulations (CFR) 50.2 for the duration of the accident. The level of protection is similar to the Main Control Room (MCR).

The TSC is provided with reliable voice and data communication with the MCR and Emergency Operations Facility (EOF) and reliable voice communications with the Operational Support Center (OSC), Nuclear Regulatory Commission (NRC) Operations Centers and state and local operations centers. The EOF is not within the scope of the ESBWR Standard Plant. It is the responsibility of the COL Applicant to identify the EOF and the communication interfaces for inclusion in the detailed design of the TSC and MCR. The design of the communications system should meet the guidance provided in Section 4 of NUREG-0696 (Reference 13.3-2). The COL Applicant is responsible for the design of the communication system located in the EOF in accordance with NUREG-0696 (Reference 13.3-2). The COL Applicant is responsible for the design of the communication system located in the EOF in accordance with NUREG-0696 (Reference 13.3-2) (COL 13.3-2-A). Control room data communication of Emergency Response Data System (ERDS) data with the NRC Operations Centers is also provided as appropriate. The COL Applicant is responsible for identifying the OSC and the communication interfaces for inclusion in the detailed design of the control room and TSC (COL 13.3-1-A). The detailed guidance is provided in Section 3 of NUREG-0696 (Reference 13.3-2).

The OSC communications system shall have at least one dedicated telephone extension to the control room, one dedicated telephone extension to the TSC, and one telephone capable of reaching on-site and off-site locations, as a minimum. Any supplemental communications systems are also to be specified by the COL Applicant as appropriate.

In a building adjacent to the main change rooms, decontamination facilities and supplies for use by on-site individuals are provided. The COL Applicant will provide supplies at the site for decontamination of on-site individuals in the service building adjacent to the main change rooms (COL 13.3-3-A). Showers and waste collection equipment are used to ensure spread of contamination is controlled and disposal cost of waste material is minimized. The central location is convenient to health physics support personnel who supervise their activity.

### 13.3.1 Preliminary Planning

Not required.

### 13.3.2 Emergency Plan

To be provided by the COL Applicant.

### 13.3.3 COL Information

#### *13.3-1-A Identification of OSC and Communication Interfaces with Control Room and TSC*

The COL Applicant is responsible for identifying the OSC and the communication interfaces for inclusion in the detailed design of the control room and TSC (Section 13.3).

#### *13.3-2-A Identification of EOF and Communication Interfaces with Control Room and TSC*

The COL Applicant is responsible for the design of the communication system located in the EOF in accordance with NUREG-0696 (Reference 13.3-2) (Section 13.3).

#### *13.3-3-A Decontamination Facilities*

The COL Applicant will provide supplies at the site for decontamination of on-site individuals in the service building adjacent to the main change rooms (Section 13.3).

### 13.3.4 References

- 13.3-1 GE Energy, "ESBWR Man-Machine Interface System and Human Factors Engineering Implementation Plan," NEDE-33217P, Class III (Proprietary), Revision 3, July 2007, and NEDO-33217, Class I, (Non-Proprietary), Revision 3, July 2007.
- 13.3-2 NUREG-0696, "Functional Criteria for Emergency Response Facilities," December 1980.

## 13.4 OPERATIONAL PROGRAM IMPLEMENTATION

Operational Programs are specific programs that are required by regulation. The COL Applicant should fully describe Operational Programs, as defined by SECY-05-0197 (Reference 13.4-1) and Regulatory Guide 1.206 (Reference 13.4-2), in an application for a combined license. The COL Applicant shall develop a description of the Operational Programs (COL 13.4-1-A).

The COL Applicant will also provide implementation milestones for Operational Programs that are required by NRC Regulation (COL 13.4-2-A).

### 13.4.1 COL Information

#### *13.4-1-A Operation Programs*

The COL Applicant shall develop a description of the Operational Programs (Section 13.4).

#### *13.4-2-A Implementation Milestones*

The COL Applicant will provide implementation milestones for Operational Programs that are required by NRC Regulation (Section 13.4).

### 13.4.2 References

- 13.4-1 SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," October 2005.
- 13.4-2 Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants," June 2007.

## 13.5 PLANT PROCEDURES

### 13.5.1 Administrative Procedures

An Administrative Procedures Plan shall be generated and describe administrative procedures that provide administrative control over activities that are important to safety for operation of the facility. These procedures include those, which provide the administrative controls in respect to procedures, and those, which define and provide controls for operational activities of the plant staff.

The COL Applicant shall develop the Administrative Procedures (COL 13.5-1-A).

### 13.5.2 Operating and Maintenance Procedures

The development of Operating Procedures is generally described in Section 18.9 Procedure Development.

A Plant Operating Procedures Development Plan shall be generated and have the following attributes:

- That the scope encompassed by the procedures development process includes those operating procedures defined in Subsection 13.5.2, which direct operator actions during normal, abnormal and emergency operations. The procedure development process will also include consideration of plant operations during periods when plant systems/equipment are undergoing test, maintenance or inspection.
- The procedure development process will address methods and criteria for the development, verification and validation, implementation, maintenance and revision of procedures. The methods and criteria shall be in accordance with TMI I.C.1, NUREG-0737 (Reference 13.5-3).

The development of Operating and Maintenance Procedures is the responsibility of the COL Applicant (COL 13.5-2-A).

Implementation of the Plant Operating Procedures Development Plan shall establish:

- Procedures that are consistent with the requirements of 10 CFR Part 50 and the TMI requirements described in NUREG-0737 (Reference 13.5-3) and Supplement 1 to NUREG-0737 (Reference 13.5-7).
- Requirements that the procedures developed shall include, as necessary, the elements described in American National Standards Institute (ANSI)/American Nuclear Society (ANS)-3.2-1994:R1999, (Reference 13.5-2), as endorsed by Regulatory Guide 1.33 Rev. 2 (Reference 13.5-5).
- That the operator basis for plant operating procedures shall use actions identified in the operational task analysis and Probabilistic Risk Assessment (PRA) efforts in support of the Standardized Design certification, Standardized Plant Design Emergency Procedure Guidelines and consideration of plant-specific equipment selection and site-specific elements such as the service water intake structure.

- That the definition of the methods through which specific operator skills and training needs, as may be considered necessary for reliable execution of the procedures, will be identified and documented.
- That the procedures specified above shall be made available for the purposes of the Human Factors Verification and Validation (V&V) described in GE Report NEDE-33217P (Reference 13.5-1) provided under separate cover.
- Procedures for the incorporation of the results of operating experience and the feedback of pertinent information into plant procedures in accordance with the provisions of TMI I.C.5, NUREG-0737 (Reference 13.5-3).

The COL Applicant shall establish a Plant Operating Procedures Development Plan (COL 13.5-4-A).

The following procedures shall be included in the scope of the Plant Operating Procedures Development Plan described above:

#### ***System Procedures***

Procedures as delineated in Section A3 of ANSI/ANS-3.2-1994; R1999 (Reference 13.5-2), as endorsed by Regulatory Guide 1.33 Rev. 2, shall be prepared as appropriate.

#### ***Procedures For Off-Normal Or Alarm Conditions***

Procedures for off-normal or alarm conditions that require operator action in the MCR and Remote Shutdown System (RSS) shall be prepared as appropriate.

#### ***General Plant Operating Procedures***

As discussed in Section A5 of ANSI/ANS-3.2-1994; R1999 (Reference 13.5-2), as endorsed by Regulatory Guide 1.33 Rev. 2, procedures shall be prepared for the integrated operations of the plant.

#### ***Procedures for Combating Emergencies and Other Significant Events***

As discussed in Section A10 of ANSI/ANS-3.2-1994; R1999 (Reference 13.5-2), as endorsed by Regulatory Guide 1.33 Rev. 2, procedures shall be provided to guide operations in emergencies and other significant events.

#### ***Procedures for Maintenance and Modification***

All maintenance and modification procedures including those that require operator actions in the MCR or RSS shall be prepared as appropriate.

#### ***Procedures for Radiation Control***

Procedures for the control of radioactive releases as discussed in Section A7 (d) of ANSI/ANS-3.2-1994; R1999 (Reference 13.5-2), as endorsed by Regulatory Guide 1.33 Rev. 2, shall be prepared as appropriate.

#### ***Procedures for Calibration, Inspection and Testing***

Calibration, inspection and testing procedures that require operator actions to be taken in the MCR or RSS shall be prepared as appropriate. The COL Holder will ensure that all portions of

the safety-related logic circuitry are adequately covered in the surveillance procedures as described in Generic Letter 96-01 (Reference 13.5-6) (COL 13.5-6-H).

### ***Procedures for Radiation Monitoring***

Procedures for the monitoring of radioactive releases as discussed in Subsection 5.3.7.4 of ANSI/ANS-3.2-1994: R1999 (Reference 13.5-2), as endorsed by Regulatory Guide 1.33 Revision 2, shall be prepared as appropriate.

### ***Procedures for Handling of Heavy Loads***

Procedures for load handling and load handling equipment shall be prepared as appropriate using the guidance of Section 5.1 of NUREG-0612 (Reference 13.5-4).

The COL Applicant shall include the above-mentioned procedures in the scope of the Plant Operating Procedures Development Plan (COL 13.5-5-A).

In addition to the above, for Emergency Procedures development,

- A writer's guide shall be developed and implemented which defines the process for developing emergency procedures. The writer's guide will contain objective criteria that require that the emergency procedures developed are consistent in organization, style, content and usage of terms.
- The documentation describing the emergency procedure development activity results shall include, but is not limited to:
  - The objectives of the emergency procedure development process,
  - The methods employed during emergency procedure development,
  - Deviations from generic technical guidelines approved by the NRC, and
  - Discussion of any design change recommendations and/or negative implications that the current design may have on safe operation as a result of emergency procedures development plan implementation.

The COL Applicant shall develop Emergency Procedures (COL 13.5-3-A).

### **13.5.3 COL Information**

#### ***13.5-1-A Administrative Procedures Development Plan***

The COL Applicant shall develop the Administrative Procedures (Subsection 13.5.2).

#### ***13.5-2-A Plant Operating Procedures Development Plan***

The development of Operating and Maintenance Procedures is the responsibility of the COL Applicant (Subsection 13.5.2).

#### ***13.5-3-A Emergency Procedures Development***

The COL Applicant shall develop Emergency Procedures (Subsection 13.5.2).

#### ***13.5-4-A Implementation of the Plant Procedures Plan***

The COL Applicant shall establish a Plant Operating Procedures Development Plan (Subsection 13.5.2).

***13.5-5-A Procedures Included In Scope Of Plan***

The COL Applicant shall include the above-mentioned procedures in the scope of the Plant Operating Procedures Development Plan (Subsection 13.5.2).

***13.5-6-H Procedures for Calibration, Inspection and Testing***

The COL Holder shall develop Calibration, Inspection and Testing Procedures (Subsection 13.5.2).

**13.5.4 References**

- 13.5-1 GE Energy, "ESBWR Man-Machine Interface System and Human Factors Engineering Implementation Plan," NEDE-33217P, Class III (Proprietary) Revision 3, July 2007, and NEDO-33217, Class I (Non-Proprietary), Revision 3, July 2007.
- 13.5-2 ANSI/ANS-3.2-1994: R1999, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants."
- 13.5-3 NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980.
- 13.5-4 NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," July 1980.
- 13.5-5 Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)," Revision 2, February 1978.
- 13.5-6 Generic Letter Number 96-01, "Testing of Safety-Related Logic Circuits," January 1996.
- 13.5-7 NUREG-0737 Supplement 1, "Clarification of TMI Action Plan Requirements," January 1983.

## 13.6 PHYSICAL SECURITY

### 13.6.1 Preliminary Planning

#### *13.6.1.1 Site Physical Security*

##### 13.6.1.1.1 Physical Barriers

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#### **13.6.1.1.2 Vital Areas**

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#### **13.6.1.1.3 Detection Aids**

**13.6.1.1.4 Communications****13.6.1.1.5 Access Controls****13.6.1.1.6 Security Lighting****13.6.1.1.7 Security Power Supply****13.6.2 Security Plan****13.6.3 COL Information****13.6.4 References**

