18.8 COL License Information

The information in this section of the reference ABWR DCD, including all subsections, is incorporated with the following departure and supplements.

STD DEP T1 3.4-1

18.8.1 HSI Design Implementation Process

The following site-specific supplement addresses COL License Information Item 18.1.

The Human-System Interface (HSI) design implementation process is conducted according to Appendix 18E (ABWR Human-System Interface Design Implementation Process). As noted in Section 18E.3, the HSI design process and implementation process correspond to the Tier 1, Table 3.1 Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC).

18.8.2 Number of Operators Needing Controls Access

The following site-specific supplement addresses COL License Information Item 18.2.

Evaluation of the number of operators needing access to the controls on the main control panel is performed in accordance with Tier 1, Table 3.1, ITAAC 3.a(3)(c) related to personnel skills and ITAAC 4.a related to task analysis. Confirmation of the adequacy of the control room staffing arrangement is performed in accordance with Tier 1, Table 3.1, ITAAC 6.a(4)(b) related to control room staffing. Roles and responsibilities of the Shift Supervisor/Manager and the Unit Supervisor are defined in Subsection 13.1.2.2.

18.8.3 Automation Strategies and Their Effect on Operator Reliability

The following site-specific supplement addresses COL License Information Item 18.3.

Evaluation of automation strategies and confirmation of automation design is performed in accordance with Table 18E-1 and Tier 1, Table 3.1, ITAAC 1.b and 3.a.

18.8.4 SPDS Integration With Related Emergency Response Capabilities

The following site-specific supplement addresses COL License Information Item 18.4.

Paragraph 3.8a of NUREG-0737, Supplement 1, requires

(1) Reviewing the functions of the operating staff that are necessary to recognize and cope with rare events that (a) pose significant contributions to risk, (b) could cause operators to make cognitive errors in diagnosing them, and (c) are not included in routine operator training programs.

(2) Combining the results of the review with accepted human factors principles to select SPDS parameters, data display, and functions.

(3) Designing, building, and installing SPDS and training its users.

Reviewing the functions of the operating staff considers insights from probabilistic risk assessment and human reliability analysis and is performed in accordance with Tier 1, Table 3.1, ITAAC 4 related to task analyses. Selection of safety parameter display system (SPDS) parameters, data display, and functions, including incorporation of the SPDS function as part of the plant status summary information on the large display panel (Subsection 18.4.2.1, Item 14), is performed in accordance with Tier 1, Table 3.1, ITAAC 5 related to HSI design. SPDS training is an integral part of control room operator training and identification of training needs is performed in accordance with Tier 1, Table 3.1, ITAAC 1.b(3) related to training.

18.8.5 Standard Design Features Design Validation

The following site-specific supplement addresses COL License Information Item 18.5.

Validation of the main control room standard design features is performed in accordance with Tier 1, Table 3.1, ITAAC 6.

18.8.6 Remote Shutdown System Design Evaluation

The following site-specific supplement addresses COL License Information Item 18.6.

Evaluation of reliability, and confirmation of design adequacy, of the Remote Shutdown System is performed in accordance with Tier 1, Table 3.1, ITAAC 5.a(2) related to HSI design, ITAAC 1.b(3) related to training, ITAAC 6.a(2)(a) related to validating equipment hardware and software-driven functions, and ITAAC 6.a(6) related to performance measures.

18.8.7 Local Valve Position Indication

The following site-specific supplement addresses COL License Information Item 18.7.

Valve position indication (VPI) requirements, including monitoring that satisfies Regulatory Guide 1.47, are met as discussed in Subsection 1A.2.18 and Subsection 7.1.2. The following valves, for which evaluations indicate that local VPI is needed, are required to have a positive, mechanical indication of the valve's overall position which can be determined by direct observation at the valve without instruments or power:

(1) All power-operated valves,

(2) All large manual valves (i.e., 5 cm or larger),

(3) Small manual valves (i.e., less than 5 cm) which are important to safe plant operations.

Local VPI requirement evaluation records shall be placed in the HFE Issue Tracking System. The local VPI requirements are imposed at a project-level and a component-level. A project-level design manual imposes requirements for standard HSI practice and NUREG-0700 compliance from system designers and specifiers of local control stations involving local VPI. Valve manufacturers are required to certify that valves meet valve procurement specifications, including compliance with local VPI requirements.

18.8.8 Operator Training

The following site-specific supplement addresses COL License Information Item 18.8.

An operator training program that meets the requirements of 10 CFR 50 is addressed in Section 13.2. Identification of personnel training needs is performed in accordance with Tier 1, Table 3.1, ITAAC 1.b(3) related to training.

18.8.9 Safety System Status Monitoring

The following site-specific supplement addresses COL License Information Item 18.9.

The human factors aspects of TMI Item I.D.3 are addressed by the detailed design implementation process that is performed in accordance with Tier 1, Table 3.1 ITAAC. The design meets RG 1.47 (Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems) recommendations as described in Subsections 1A.2.18 and 7.1.2.10.2.

18.8.10 PGCS Malfunction

STD DEP T1 3.4-1

As part of the verification and validation effort, the COL applicant shall consider malfunctions of the Power Generation Control function of the ~~process computer system~~ Plant Computer Functions *(Subsection 18.4.2.6.1).*

The following site-specific supplement addresses COL License Information Item 18.10.

Malfunctions of the Power Generation Control function are evaluated using dynamic task performance testing. The evaluation is performed in accordance with Tier 1, Table 3.1, ITAAC 6.a(5) related to operational conditions and upsets, and ITAAC 6.a(6) related to performance measures.

18.8.11 Local Control Stations

The following site-specific supplement addresses COL License Information Item 18.11.

Evaluation of operations at local control stations critical to plant safety is performed in accordance with Tier 1, Table 3.1, ITAAC 2.a(3) related to critical functions, ITAAC 4.a(3) related to critical tasks, and ITAAC 6.a(4)(a) related to function and task achievement.

18.8.12 As-Built Evaluation of MCR and RSS

The following site-specific supplement addresses COL License Information Item 18.12.

The as-built configurations of the main control room (MCR) and the remote shutdown system (RSS) are verified for conformance with the validated configurations. The

verification is performed in accordance with Tier 1, Table 3.1, ITAAC 7, and the results are documented in a report.

18.8.13 Accident Monitoring Instrumentation

The following site-specific supplement addresses COL License Information Item 18.13.

Accident monitoring instrumentation requirements, including TMI Item II.F.1 and the recommendations of Regulatory Guide 1.97, are met as discussed in Subsection 1A.2.17 and Section 7.5. TMI Item II.F.1 in NUREG-0737 (Clarification of TMI Action Plan Requirements, November 1980) concerns the potential for increased operator error due to adding accident monitoring displays and controls in the control rooms of existing plants. Accident monitoring instrumentation is part of the integrated HSI that is human factor engineered according to the HSI design implementation process described in Appendix 18E. The process considers (a) the use of accident monitoring information by an operator during both normal and abnormal plant conditions, (b) integration into emergency procedures, (c) integration into operator training, and (d) other alarms during emergency and need for prioritization of alarms.

18.8.14 In-Core Cooling Instrumentation

The following site-specific supplement addresses COL License Information Item 18.14.

The standard ABWR design has reactor pressure vessel (RPV) level instrumentation that provides adequate detection and indication of in-core cooling as required by this TMI item (Ref: NUREG-1503, Subsection 20.5.30). In-core cooling instrumentation requirements, including TMI Item II.F.2 and the recommendations of Regulatory Guide 1.97, are met as discussed in Subsection 1A.2.16 and Section 7.5.

In-core cooling instrumentation is part of the integrated HSI that is human factor engineered according to the HSI design implementation process described in Appendix 18E. The process considers the types and locations of displays and alarms. It also considers (a) the use of in-core cooling information by an operator during both normal and abnormal plant conditions, (b) integration into emergency procedures, (c) integration into operator training, and (d) other alarms during emergency and need for prioritization of alarms.

18.8.15 Performance of Critical Tasks

STD DEP T1 3.4-1

The COL applicant shall evaluate the adequacy of the HSI with respect to providing the controls, displays and alarms necessary for timely performance of critical tasks. Critical tasks shall include, as a minimum, those operator actions which have significant impact on the PRA results, as presented in Section 19D.7, and the operator actions to isolate the reactor and inject water for the postulated event scenarios of a common-mode failure of the Safety System Logic and Control System and/or the Essential ~~Multiplexing System~~ Communication Function *concurrent with the design basis main*

steamline, feedwater line or shutdown cooling line break LOCA (Paragraph V.2.d of Table 18E-1). The results of this evaluation shall be placed in the HFE Issue Tracking System.

The following site-specific supplement addresses COL License Information Item 18.15.

The HSI evaluation for timely performance of critical tasks is performed in accordance with Tier 1, Table 3.1, ITAAC 2.a(3) related to critical functions, ITAAC 4.a(3) related to critical tasks, and ITAAC 6.a(4)(a) related to function and task achievement.

18.8.16 Plant Status and Post-Accident Monitoring

The following site-specific supplement addresses COL License Information Item 18.16.

In Subsections 20.4.23 and 20.5.31 of NUREG-1503, the USNRC staff concluded that the standard ABWR I&C design meets RG 1.97 and features discussed in Section 7.5 of NUREG-1503 adequately address TMI Item I.D.5(2). Plant status and post-accident monitoring requirements, and the recommendations of Regulatory Guide 1.97, are met as discussed in Subsections 1A.2.15, 1A.2.16 and 1A.2.17. Plant status and post-accident monitoring instrumentation is part of the integrated HSI that is human factor engineered according to the HSI design implementation process described in Appendix 18E. Other TMI items concerning status and monitoring instrumentation are addressed in Subsections 18.8.9, 18.8.13, and 18.8.14.