Nuclear Operating Company

South Texas Project Electric Generating Station 4000 Avenue F – Suite A Bay City, Texas 77414

July 23, 2009
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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Request for Additional Information

The attachments to this letter contain the responses to NRC staff questions included in Request for Additional Information (RAI) letter number 132 related to the Combined License Application (COLA) Part 2, Tier 2 Section 18.8 "COL License Information," as listed below:

18-1
18-2
18-3

When a change to the COLA is indicated, the change will be incorporated into the next routine revision of the COLA following NRC acceptance of the RAI response.

There are no commitments in this letter.

If you have any questions regarding these RAI responses, please contact me at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 7/23/09

Scott Head
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

ccc

Attachments:
1. Question 18-1
2. Question 18-2
3. Question 18-3

STI 32508238

DO91
NRO

cc: w/o attachment except*
(paper copy)

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RAI 18-1

QUESTION:

REQUIREMENTS:

10 CFR 50. 34 requires a control room design that reflects state-of-the-art human factor principles..(Automation is key state-of-the-art tool that needs to be addressed for its impact on human factors principles.)

The ABWR DCD Section 18.8.3, "Automation Strategies and Their Effect on Operator Reliability" states that automation strategies for plant operation shall be evaluated for effects on operator reliability and the appropriateness of the ABWR automation design shall be confirmed. It goes on to say the evaluation shall be performed according to the criteria of subsection II of Table 18E-1.

STP FSAR:

Section 18.8.3 of the FSAR states that the evaluation of automation strategies and confirmation of automation design is performed in accordance with Table18E-1 and Tier 1, Table 3.1, ITAAC 1.b.

STAFF EVALUATION:

The referenced material only speaks to automation via a reference to NUREG/CR-3331 and a statement that the HSI operating experience review will include "automation of process systems."

1. Will NUREG-3331 be used directly as the basis for determining automation strategies? Will it be supplemented?

2. ITAAC 3a also appears pertinent to automation strategies and confirmation of automation design in that it provides for "the allocation of functions to personnel, system elements, and personnel system combinations." (ITAAC 3.a(3)) Please describe how automation is addressed with the context of ITAAC.

RESPONSE:

1. The System Functional Requirements Analysis Implementation Plan (identified in Tier 2 Section 18E.2.3 and Table 18E-1 (III)) and the Allocation of Function Implementation Plan (identified in Tier 2 Section 18E.2.4 and Table 18E-1 (IV)) have been consolidated into one document identified as the Functional Requirements Analysis and Allocation of Function (FRA/AOF) Implementation Plan. The FRA/AOF Implementation Plan establishes the basis for determining automation strategies. This document references

and incorporates concepts from NUREG/CR-3331. In addition, the FRA/AOF Implementation Plan supplements concepts included in NUREG/CR-3331 with concepts included in IAEA-TECDOC-668, "The Quality of Human-Automation Cooperation in Human-System Interface for Nuclear Power Plants." In support of the Human-System Interface (HSI) design implementation process, the FRA/AOF Implementation Plan will be made available for NRC conformance review in accordance with Figure 18E-1.

2. The FRA/AOF Implementation Plan establishes the methods and criteria for addressing how automation is incorporated as established by the Human Factors Engineering (HFE) Program Plan. Consequently, automation is addressed in accordance with Tier 1 Table 3.1 ITAAC Item 1.b and further detailed with methods and criteria in accordance with Tier 1 Table 3.1 ITAAC Item 3.a.

The second paragraph in COLA Part 2 Tier 2 FSAR Section 18.8.3 will be revised to specify reference to ITAAC Item 3.a, as shown below:

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.

RAI 18-2

QUESTION:

REQUIREMENT:

The ABWR DCD COL license information item 18.8.6 states that, "Digital versus analog approaches for the Remote Shutdown System (RSS) shall be evaluated for reliability and the adequacy of the ABWR RSS design ... shall be confirmed."

STP FSAR:

FSAR section 18.8.6 indicates ITAACs 1 and 6 address this COL License information item.

STAFF EVALUATION:

The COL information item states that "digital versus analog design approaches" for the RSS will be evaluated. The staff understands this to be a pre-design / design activity verses a V&V activity. ITAAC 6 only addresses V&V activities and the ITAAC 1 reference only addresses training. Please explain how RSS design approaches will be evaluated.

The DCD SER (NUREG-1503) indicates the ABWR DCD did not conclusively accept the RSS instrumentation HFE design plan because there was insufficient detail at that point to assess whether the benefits of the design would offset the increase in human error potential. Consequently the DCD was issued with the COL information item and is thus contingent on the COL applicant completing an "evaluation of the digital versus analog design approaches for the Remote Shutdown System." The basis for including the COL license information item is limited to the potential for Human error introduced because of the transition from normal digital MCR controls to analog RSS controls and the evaluation only needs to address this issue. But as indicated in the SER the basis for conclusions like, "because RSS operations are relatively simple, training the operators to adjust to the analog RSS should not be an undue burden on them," need to have a basis or rationale to support them.

The staff requests this evaluation be provided to comply with the specific language used in the DCD.

RESPONSE:

The design requirements for the Remote Shutdown System (RSS) are described in ABWR DCD Tier 2 Sections 7.4.1.4, 7.4.2.4, and 18.5, and incorporated by reference in the STP 3 & 4 COL application with no departures that affect the RSS design. The RSS design requirements include analog hard-wired equipment. Credit for the RSS analog hard-wired equipment is accepted (NUREG-1503 Section 7.2.6 Defense in Depth, page 7-34) to address the diversity and defense-in-depth requirements.

The RSS human-system interface will be defined during the Functional Requirements Analysis and Allocation of Function (FRA/AOF), Task Analysis (TA), and Human-System Interface System (HSI) Design activities. These analyses will include the identification of controls, displays, and alarms specified to be in a fixed position, and consideration of the suitability of the controls, displays, and alarms in accordance with accepted human factors practices and principles. The analyses will be performed in accordance with Tier 1, Table 3.1, ITAAC Item 5.a(2) related to HSI design.

Both the Main Control Room (MCR) and RSS will be designed in accordance with the STP 3&4 HFE Program Plan which requires development and application of an HSI Requirements Document and an HSI Guidelines Document to ensure consistency in the presentation of both interfaces. This consistency will minimize the potential for human error during the operator's transition from the mostly digital MCR interface to the analog RSS interface. The design process is performed in accordance with Tier 1 Table 3.1 ITAAC Item 5.a(2) related to HSI design. Additionally, the design of the MCR will not exclusively utilize soft controls. The MCR also will include dedicated hard switches, including dedicated component level hard switches, and dedicated displays and indicators. Thus, operators will become familiar with the use of dedicated displays and indicators, and with the operation of dedicated switches in the MCR. Use of dedicated devices in both the MCR and RSS will provide consistent dedicated interfaces, including normally active displays in RSS, thus reducing the extent of the cognitive transition from the MCR interface to the RSS interface, and reducing the potential for human error introduced as a result of the transition.

Appropriate mitigating factors (e.g., training) for assisting the transition to the RSS interface will be identified, and the adequacy of the RSS interface will be demonstrated during Integrated System Validation.

The second paragraph in COLA Part 2 Tier 2 FSAR Section 18.8.6 will be revised to add reference to ITAAC Item 5.a(2) related to HSI design as shown below:

> 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.

RAI 18-3

QUESTION:

REQUIREMENT:

ABWR DCD COL license information item states that the necessity to provide local valve position indication for each valve in any of the following categories shall be evaluated:

1. All power-operated valves
2. All large manual valves
3. Small manual valves (i.e., less than 5cm) which are important to safe plant operations.

STP FSAR:

FSAR Section 18.8.7 states, "Power-operated valves and manually operate valves 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.

STAFF EVALUATION:

Operating experience indicates existing designs for small valves do not always have positive, mechanical indication as part of their design. Instead, administrative measures are used to control position. Please confirm you intend to apply this commitment to all small valves important to safe plant operation.

RESPONSE:

Local valve position indication (VPI) is necessary only for those valves which are determined, after evaluation, to require local VPI. For small valves important to safe plant operation which do not require positive, mechanical indication, the administrative controls, as described in FSAR Subsection 13.5.3.4.1 "Administrative Procedures," provide the appropriate measures to control valve position.

Accordingly, the second paragraph in COLA Part 2 FSAR Section 18.8.7 "Local Valve Position Indication" will be revised to clarify the site-specific supplement that addresses COL License Information Item 18.7, as indicated below:

> 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 ~~Power-operated valves and manually operated~~ 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., 5cm or larger);

(3) Small manual valves (i.e., less than 5cm) 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, ~~and valves and shop drawings are QA inspected for~~ including compliance with local VPI requirements.