

January 27, 2012

Dr. Said Abdel-Khalik, Chairman  
Advisory Committee on Reactor Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

SUBJECT: RESPONSE TO ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
RECOMMENDATIONS ON DRAFT FINAL BRANCH TECHNICAL  
POSITION 7-19 REVISION 6

Dear Dr. Abdel-Khalik:

On November 14, 2011, the Advisory Committee on Reactor Safeguards (ACRS) sent a letter providing its recommendations on the draft final Revision 6 of Standard Review Plan (SRP) Branch Technical Position (BTP) 7-19, "Guidance for Evaluation of Diversity and Defense-in-Depth in Digital Computer-Based Instrumentation and Control Systems," to the Executive Director for Operations (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11314A108). The staff of the U.S. Nuclear Regulatory Commission (NRC) presented this BTP to the ACRS Instrumentation and Controls subcommittee on September 7, 2011, and to ACRS during its 588<sup>th</sup> meeting on November 3, 2011. During these sessions, the NRC staff proposed to incorporate the interim staff guidance (ISG) document DI&C-ISG-02, "Task Working Group #2: Diversity and Defense-in-Depth Issues," Revision 2, dated June 5, 2009, into BTP 7-19, Revision 5, to form Revision 6 of the BTP and the associated technical justification.

This letter contains the NRC staff's responses to the ACRS recommendations and discussion of BTP 7-19, Revision 6.

#### ACRS Recommendation 1

Draft Final Revision 6 to SRP BTP 7-19 should be issued subsequent to incorporation of the modifications noted in the discussion regarding Sections 1.8, 3.1, 3.5, 3.7, and 4.6.

#### Staff Response

The ACRS letter made three recommendations for Sections 1.8, 3.1, 3.5, 3.7, and 4.6 of BTP 7-19: (1) incorporate the ACRS-recommended edits to the "note" found in Sections B.3.5 and B.4.6, (2) include a figure comparing the use of two manual initiation means versus one initiation means discussed in Sections B.1.5 and B.3.1, Item 6, and (3) include additional clarification in the wording of Sections B.1.8 and B.3.7 to address postulated spurious actions caused by a software common-cause failure (CCF) of the automated protection system.

(1) Response to Recommendation 1 concerning Section B.3.5 and B.4.6

The staff agrees in principle with this recommendation. Although the staff would not normally employ the level of conservatism associated with design basis analyses in the analysis of plant response to a beyond design basis event (e.g., in time available for operator action), the staff acknowledges that consideration of uncertainty is appropriate in circumstances where there is limited margin between the time available and time required for operator action. Accordingly, the staff proposes to address Recommendation 1 by modifying the note. The modified note would focus on uncertainty in the difference between time available and time required for operator action. In its assessment of this difference, the staff would expect the extent of evaluation of uncertainty in the estimate of time available to be dependent on the size of the margin and level of uncertainty associated with the estimate of time required. The proposed modified version of the note is shown below:

Proposed:

Note: As the difference between Time Available and Time Required for operator action is a measure of the safety margin and as it decreases, uncertainty in the estimate of the difference between these times should be appropriately considered. This uncertainty could reduce the level of assurance and potentially invalidate a conclusion that operators can perform the action reliably within the time available. For complex situations and for actions with limited margin, such as less than 30 minutes between time available and time required, a more focused staff review will be performed.

(2) Response to Recommendation 1 concerning Sections B.1.5 and B.3.1, Item 6, and Figure 1

The staff will add Figure 1 (see Enclosure) to BTP 7-19, Revision 6, in Section B.1.5. The acceptance criteria in Section B.3.1, Item (6), will reference the figure.

(3) Response to Recommendation 1 concerning Section B.1.8 and B.3.7

The staff accepts the ACRS recommendation concerning additional clarification in the guidance addressing postulated spurious actuations caused by CCF of the automated protection system. To improve the clarity of the document and maintain consistency with DI&C-ISG-02, the staff will revise the last paragraph in Section B.1.8 and add a paragraph. The staff will also replace Section B.3.7 with a paragraph similar to the added paragraph. These proposed changes are shown below:

Proposed for Section B.1.8:

Failures of the automated protection system stemming from a software CCF can cause spurious actuations. The plant design basis addresses the effects of certain software CCF-caused spurious actuations.

The overall defense in depth strategy of a plant should prevent or mitigate the effects of credible spurious actuations caused by a software CCF that have the potential to place a plant in a configuration that is not bounded by the plant's design basis. The effects of some credible postulated spurious actuations caused by a software CCF in the automated protection system may not be evaluated in design basis accident analyses. In these cases an analysis should be performed to determine whether these postulated spurious actuations could result in a plant response that exceeds specified plant design basis limits. Further, the analysis should identify whether adequate coping strategies, prevention or mitigation, exist for these postulated spurious actuations (e.g., emergency, normal, and diverse equipment and systems, controls, displays, procedures and the reactor operations team). If existing coping strategies are not effective for responding to the credible postulated spurious actuations that result in the plant exceeding its design basis, the licensee should develop additional coping strategies.

Proposed for Section B.3.7:

In cases where a credible postulated spurious actuation(s) caused by a software CCF is not evaluated in design basis accident analyses, an analysis should be performed to determine whether these postulated spurious actuations result in a plant response that exceeds specified plant design basis limits. Further, the analysis should identify whether adequate coping strategies exist for these postulated spurious actuations. A review of the analysis should be performed to confirm that a coping strategy has been identified for the effects from credible spurious actuations caused by a CCF that have the potential to place the plant in a configuration that is not bounded by the plant design basis accident analyses.

ACRS Recommendation 2

The discussion of the difference between time available and time required in SRP Chapter 18, Appendix 18A, "Crediting Manual Operator Actions in Diversity and Defense-in-Depth (D3) Analyses," should be revised to be consistent with Recommendation 1 for Sections 3.5 and 4.6.

Staff Response

As part of resolving comments on draft Appendix A, "Crediting Manual Operator Actions in Diversity and Defense-in-Depth Analyses," to Chapter 18, "Human Factors Engineering," of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," the staff will revise the draft to include text that is consistent with the resolution of ACRS Recommendation 1 for Sections 3.5 and 4.6 of BTP 7-19, Revision 6. That recommendation concerned guidance regarding the evaluation of uncertainties in both time available and time required. Specifically, the staff will revise the text on the Phase 1 analysis, described in Section C, "Staff Position," of Appendix A. The Phase 1 analysis establishes the time available for the operator action and the initial estimate of the time required for operator

action. In addition, the staff will make conforming changes to Chapter 18, Appendix A, Phase 2, which provides guidance for preliminary validation of the Phase 1 analysis.

Summary

In response to the ACRS letter dated November 14, 2011, and the discussion in this letter, the staff plans to issue BTP 7-19, Revision 6, with the proposed changes described above and presented in the enclosure.

We appreciate the recommendations and comments provided by the ACRS.

Sincerely,

***/RA by Martin J. Virgilio for/***

R. W. Borchardt  
Executive Director  
for Operations

Enclosure:

Figure 1: Comparison of Methods Using  
Two Manual Initiation Means Versus One  
Manual Initiation Means

cc: Chairman Jaczko  
Commissioner Svinicki  
Commissioner Apostolakis  
Commissioner Magwood  
Commissioner Ostendorff  
SECY

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Figure 1: Comparison of Methods Using Two Manual Initiation Means Versus One Initiation Means

