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QA: N/A  
Project No. WM-00011

DEC 11 2006

OVERNIGHT MAIL

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**COMMENTS ON DRAFT INTERIM STAFF GUIDANCE (ISG), DOCUMENT  
HLWRS-ISG-02, *PRECLOSURE SAFETY ANALYSIS - LEVEL OF INFORMATION AND  
RELIABILITY ESTIMATION***

In response to the U.S. Nuclear Regulatory Commission's (NRC) request for comment in the Federal Register Notice (71 FR 57584), dated September 29, 2006, the U.S. Department of Energy (DOE) is providing the enclosed comments on the Draft ISG, Document HLWRS-ISG-02, *Preclosure Safety Analysis - Level of Information and Reliability Estimation*.

The DOE appreciates the effort undertaken by the NRC staff to develop the Draft ISG related to the review of design and operational information and reliability estimates required for the preclosure safety analysis (PCSA) and the opportunity to provide comments on that Draft ISG. The DOE finds the Draft ISG to be useful as it provides guidance on the level of information and technical bases for reliability estimates needed to demonstrate compliance with the performance objectives in Code of Federal Regulations, Title 10, Part 63, Section 63.111 (10 CFR 63.111).

Enclosure 1 contains specific suggested changes to the proposed Yucca Mountain Review Plan (YMRP) section presented in Draft ISG, Document HLWRS-ISG-02. Enclosure 2 contains detailed technical comments on other sections of the Draft ISG.

The staff has proposed changes to YMRP Sections 2.1.1.2.2 Review Method 2 and 2.1.1.2.3 Acceptance Criterion 2, which would require addressing important to safety (ITS) structures, systems, and components (SSC) using review methods and acceptance criterion in YMRP Section 2.1.1.2. In view of the construct in 10 CFR Part 63 and the YMRP that certain specific information criteria such as design bases and design criteria are only applicable to ITS SSCs, DOE recommends that the proposed changes clarify that certain specific information criteria, such as design bases and design criteria, are not applicable to non-ITS SSCs.

DOE especially commends your attention to Comments 2, 3, and 7 of Enclosure 2.

DOE intends to quantify event sequence reliability with uncertainties represented as probability distributions. The question arises as to the appropriate number within that distribution to use in categorizing an event sequence. DOE believes that scientific and technical precedent point to use of the mean value of the distribution as the appropriate metric for event sequence categorization. Comment 3 refers to lines 89-90 of the ISG, which contains the sentence "The use of mean sequence frequencies to categorize events in the PCSA is acceptable with adequate technical bases and consideration of uncertainty." To be consistent with the regulation, the word "events" in this sentence should be changed to "event sequences." Furthermore, DOE recommends that the definition of the mean value of a probability distribution be included after this sentence to add precision to the guidance. DOE further notes that in Comment 7, lines 465-472, point to the use of a fraction of a confidence interval to base a conclusion about categorization of an event sequence. This is inconsistent with the above quoted sentence on lines 89-90, which points to the use of the mean value as the appropriate categorization metric. DOE recommends deletion of the sentence beginning on line 467 with "In this example, using the confidence . . . is less than 1.0." DOE also recommends a change in lines 470-472 such that it reads as follows: "The number of expected drops, in this example, would be the mean value of a joint probability distribution of both the conditional drop probability and the number of lifts."

Comment 2 makes the case that explicit quantification of software failure probabilities for use in event sequences is beyond the current state-of-art. NRC and the National Aeronautics and Space Administration have been and are currently engaged in research efforts with respect to software modeling and quantification of software failure probabilities. As described in more detail in Comment 2, it is not practical for the PCSA to explicitly include software failures. DOE recommends that the following sentence be inserted after the sentence beginning on line 86 and the sentence beginning on line 240: "Explicit quantitative reliability estimates of software failure modes during event sequences are beyond the state-of-art and are not expected for the PCSA. It is acceptable to use reliability estimates of digital control units, which would implicitly include hardware and software effects."


Enclosure 2 also contains an additional technical comment regarding the consideration of software failures mentioned on page 3 (lines 84-85) in the Reliability Estimates section of the Draft ISG. The field of software reliability or software safety is not quantitatively treated as hardware. DOE suggests that this section be clarified or modified such that explicit quantitative software reliability estimates are not expected and that reliability estimates will be made at the level of controller units that implicitly include both software and hardware.

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There are no new regulatory commitments in this letter or its enclosures. Please contact Mark H. Williams at (702) 794-5567 or e-mail mark\_williams@ymp.gov, or Charlotte A. Zaccone at (702) 794-5520 or e-mail charlotte\_zaccone@ymp.gov for any additional information required.

  
for Mark H. Williams, Director  
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RAO:CAZ-0183

Enclosures:

1. Department of Energy's Comments on the Proposed Changes to the Review Methods and Acceptance Criteria of the YMRP Presented in Draft Interim Staff Guidance, Document HLWRS-ISG-02
2. Department of Energy's Technical Comments on Other Sections of Draft Interim Staff Guidance, Document HLWRS-ISG-02

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