HLWYM HEmails

From: Roland Benke
Sent: Friday, April 23, 2004 2:51 PM
To: Banad Jagannath
Cc: Asadul Chowdhury; Amitava Ghosh; Simon Hsiung; Biswajit Dasgupta; Roland Benke; Wesley Patrick; Budhi Sagar
Subject: draft Criteria for Significance to Preclosure Safety
Attachments: DraftPreclosureSignificanceCriteria_r4.WPD

Banad:

Please find the draft criteria attached for distribution to the larger preclosure team. Thanks to all who provided comments.

Roland

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Subject: draft Criteria for Significance to Preclosure Safety
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PRELIMINARY DRAFT
DEVELOPMENT OF PRECLOSURE CRITERIA FOR HIGH, MEDIUM, AND LOW SIGNIFICANCE TO PRECLOSURE SAFETY
(APRIL 2004)

Proposed Criteria for the Significance of Functional Areas to Preclosure Public Safety.

Functional Area Classification	Criteria	
	Category 1 Event Sequences and Normal Operations	**Category 2 Event Sequences**
High Significance to Preclosure Public Safety	The functional area contains normal operations or at least one Category 1 event sequence with an annual public dose of **1.5 mrem or more**	The functional area contains at least one Category 2 event sequence with a public dose of **500 mrem or more**
Medium Significance to Preclosure Public Safety	The functional area contains normal operations or at least one Category 1 event sequence with an annual public dose of **0.15 mrem or more**	The functional area contains at least one Category 2 event sequence with a public dose of **50 mrem or more**
Low Significance to Preclosure Public Safety	The functional area contains normal operations or Category 1 event sequences each with an annual public dose **less than 0.15 mrem**	The functional area contains Category 2 event sequences each with a public dose **less than 50 mrem**

Proposed Criteria for the Significance of Functional Areas to Preclosure Worker Safety.

Functional Area Classification	Criteria	
	Category 1 Event Sequences and Normal Operations	**Category 2 Event Sequences**
High Significance to Preclosure Worker Safety	The functional area contains normal operations or at least one Category 1 event sequence that results in a worker dose rate of **100 mrem/hour or more**	Category 2 event sequences are not applicable
Medium Significance to Preclosure Worker Safety	The functional area contains normal operations or at least one Category 1 event sequence that results in a worker dose rate of **5 mrem/hour or more**	Category 2 event sequences are not applicable
Low Significance to Preclosure Worker Safety	The functional area contains normal operations or Category 1 event sequences each resulting in a worker dose rate **less than 5 mrem/hour**	Category 2 event sequences are not applicable

Note: The 100 mrem/hour criterion corresponds to the minimum dose rate for a “high radiation area” and also represents that a 1-hr worker exposure would exceed the weekly dose quota of 100 mrem (i.e., 5000 mrem / 50 working weeks = 100 mrem/week). The 5 mrem/hour criterion corresponds to the minimum dose rate for a “radiation area.”

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DEVELOPMENT OF PRECLOSURE CRITERIA FOR HIGH, MEDIUM, AND LOW SIGNIFICANCE TO PRECLOSURE SAFETY
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Purpose

In preparation for a risk-informed review of the License Application, the primary objective for developing the proposed criteria is to identify areas for detailed review within the preclosure safety analysis. The criteria can also be used to prioritize the requests for additional information from DOE. The criteria for significance to preclosure safety should be general enough so they can be applied to both functional areas and SSCs. In other words, we want to use the criteria to answer 2 questions. What functional areas have a high/medium/low significance to preclosure safety? What SSCs have a high/medium/low significance to preclosure safety? In addition, the criteria should be detailed enough to account for the significant differences in the regulatory dose limits based on the categorization of the event sequences. Separate criteria have been developed for public and worker safety (see previous page). These criteria neither replace nor affect the definition of the "Important to Safety" in 10 CFR Part 63.

Application of the Proposed Criteria for Significance to Preclosure Safety

- As part of the first iteration of the NRC-CNWRA preclosure safety analysis, the proposed criteria will be applied to determine the significance of <u>functional areas</u> to preclosure safety. Due to the current lack of quantitative information on event sequence likelihood, the criteria will not be applied to determine the significance of individual SSCs to preclosure safety at this stage of the analysis. When more quantitative information is available in the future, criteria similar to those proposed for the <u>significance of functional areas to preclosure safety</u> could be applied to establish the significance of individual SSCs to preclosure safety. To be consistent with the NRC position that normal operations are not included in the definition of important to safety for SSCs, normal operations also would not be included in any criteria for significance of SSCs to preclosure safety.

- Application of the criteria requires some knowledge of the event sequence frequencies to allow for estimates of the event sequence categorization (i.e., Category 1, Category 2, or Beyond Category 2). The consequence for each event sequence should be combined with an estimate for the categorization of the event sequence.

- Since the first iteration of the NRC-CNWRA preclosure safety analysis does not contain quantitative estimates of event sequence frequencies, it may not be possible to assign a single categorization to each event sequence. For those cases, conclusions will be posed for each of the plausible categorizations (such as: if Category 1, then conclusion A; if Category 2, then conclusion B). Implicitly, event sequences estimated to be Beyond Category 2 would be screened out based on frequency. Sometimes enough uncertainty exists for those event sequences with low probabilities of occurrence, such that a Category 2 assignment cannot be ruled out. The Category 2 criteria may be applied to those event sequences for screening based on consequence.

- Initially, multiple significance ratings (one for each plausible categorization) may be assigned to a single event sequence. An event sequence having multiple ratings with large differences (e.g., if Category 1, then high significance; if Category 2, then low significance) represents an area where the significance to preclosure safety is highly dependent on the event sequence frequency. In those cases, the significance to preclosure safety cannot be assessed accurately until more information is obtained. As an initial path forward, specific information needs that enable the assessment of significance to preclosure safety should be given high priority.

BACKGROUND MATERIAL

Public limits used for developing the preclosure criteria for significance to preclosure safety and a comparison to post-closure

PRECLOSURE: Public	POST-CLOSURE: Public
15 mrem annual dose during normal operations and Category 1 event sequences	15 mrem/yr probability-weighted expected dose from the credible scenarios (e.g., basecase, igneous activity, faulting)
5 rem dose from each Category 2 event sequence	
Event sequences estimated to have less than one chance in 10,000 of occurring before permanent closure do not have to included in the preclosure safety assessment	Features, events, and processes estimated to have less than one chance in 10,000 of occurring within 10,000 years of disposal do not have to be included in the performance assessment

Category 1 Event Sequences and Normal Operations
DOE plans to demonstrate compliance with the public dose limits for Category 1 event sequences and normal operations in three parts:
(1) Dose from each Category 1 event sequence plus D_{norm} should be less than 15 mrem (where D_{norm} represents the annual dose from normal operations).
(2) Frequency-weighted dose to the public from Category 1 event sequences and normal operations should be less than 15 mrem/yr.
(3) The occurrence of multiple Category 1 event sequences within a singe year of operation is called a combination. Only those combinations that are expected to occur at least once before permanent closure should be considered. The total dose from each combination plus D_{norm} should be less than 15 mrem.

Category 2 Event Sequences
DOE plans to demonstrate compliance by showing that the public dose from each Category 2 event sequence is less than 5 rem. (Note: DOE also plans to show compliance with each of the organ dose limits.)

Background on the Post-Closure Criteria for High, Medium, and Low Significance to Waste Isolation (Excerpt from the Executive Summary of the RISK INSIGHTS BASELINE REPORT, PREDECISIONAL DRAFT FOR CONCURRENCE, 2/10/2004)

> ... the staff grouped the risk insights into three categories of relative significance (high, medium, and low), based on contribution to, or effect on, the waste isolation capabilities of the repository system.
>
> Although individual risk insights are supported by quantitative analyses, classifying the risk insights by relative significance to waste isolation is more qualitative. Staff judgment was used, as needed, when combining information from different analyses. Significance is evaluated relative to the waste isolation capabilities of the repository system. Three criteria were considered in evaluating the significance of the risk insights:
>
> (1) Effect on the integrity of waste packages;
> (2) Effect on the release of radionuclides from the waste form and waste package; and
> (3) Effect on the transport of radionuclides through the geosphere and biosphere.
>
> In general, high significance is associated with features, events, and processes that could: (1) affect a large number of waste packages; (2) significantly affect the release of radionuclides; or (3) significantly affect the transport of radionuclides through the geosphere or

biosphere. Medium significance is associated with a lesser effect on waste packages, radionuclide releases, or radionuclide transport, and low significance is associated with no or negligible effect.