Department of Energy
Office of Civilian Radioactive Waste Management
Yucca Mountain Site Characterization Office
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Corrected version

OVERNIGHT MAIL

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DISPOSAL CRITICALITY ANALYSIS METHODOLOGY TECHNICAL REPORT

References: (1) Ltr, Brocoum to Bell, dtd 4/12/96
(2) Ltr, Milner to NRC, dtd 6/16/95

The purpose of this letter is to transmit for your information the Disposal Criticality Analysis Methodology Technical Report. It provides a preliminary description of a criticality analysis methodology that has both deterministic and risk-based components, though it uses a risk-based approach to demonstrate that the health and safety of the public are protected against potential criticality events. When fully developed, this methodology is expected to support demonstration that risks posed by potential criticality events in the postclosure period of regulatory concern for the potential Yucca Mountain repository are acceptable.

This technical report has been written to help focus our development of a disposal criticality analysis methodology and to describe the present state of development of that methodology. Many aspects of the methodology are not yet established, as indicated in the report. We will continue to develop the methodology and plan to present it to the NRC in the Disposal Criticality Analysis Methodology Topical Report.

In keeping with the 1995 recommendations of the National Academy of Sciences (NAS) on Yucca Mountain standards, the focus of the methodology presented in this technical report is the repository's ability to meet risk-based performance objectives to protect the health and safety of the public. The methodology provided in the technical report differs from the deterministic criticality analysis methodology applied to storage and transportation of nuclear waste that contains fissile material. Preliminary analyses indicate that potential criticality events would have little effect on the overall performance of the potential Yucca Mountain repository.

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We recognize that criticality events are considered undesirable even if the risks they pose are determined to be small. Therefore, in addition to assessing risks associated with potential criticality events, the probability of the events and the factors contributing to their potential for occurrence would be analyzed. This analysis would identify processes, conditions, and events most likely to lead to criticality.

We understand that the NRC is considering revisions to the existing regulations applicable to the potential Yucca Mountain high-level waste repository. We believe that a risk-based approach is the technically correct and appropriate approach to providing reasonable assurance that the health and safety of the public are protected during the postclosure period. While we recognize that a risk-based approach is not entirely consistent with the deterministic language in 10 CFR Part 60.131(b)(7), we believe that this rule is not meaningful or appropriate for the postclosure period. In addition, the double contingency exception provided in the rule, which prohibits criticality unless at least two unlikely and independent changes have occurred, is not expected to have much applicability for long-term disposal criticality because most changes that occur in that period are expected to have some significant degree of interdependence. Accordingly, we have stated to the NRC in several letters and interactions the need for revision to the existing criticality rule to clearly invoke risk-based demonstration of compliance. (References 1 and 2, technical exchange on disposal criticality control, October 10, 1995.)

In the interim, we are providing this technical report that describes a risk-based approach for evaluating potential criticality events during the postclosure period. We believe that this methodology, when fully developed, will support demonstration of compliance with a risk-based disposal criticality regulation. We welcome your comments on this report, and we would be pleased to discuss your comments and questions on it at the technical exchange between our staffs planned for October 1996.

If you have any questions on this letter or the enclosed document or would like to discuss them further, please contact April V. Gil at (702) 794-5578 or Paige R. Russell at (702) 794-1315.

Stephan J. Brocoum
Assistant Manager for
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AMSL:AVG-2611

Enclosure: (NOT RECORD MATERIAL)
Disposal Criticality Analysis
Methodology Technical Report

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PDR: October 18, 1996

This report was originally sent under the "original" cover letter (attached) and documented by you. However, the report was inaccurate and a new one is being sent to replace the original in your file system.

The PDR Code is noted on the bottom left-hand corner of the letter for your reference.

Call me on 7445 if you need further assistance with this (or Rick Weller on 7287). Thanks.

Edie Barbely *Eab*
DWM/NMSS

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