

U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

**NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING**

**SUBJECT: SUMMARY OF THE NAS PEER REVIEW:
SURFACE CHARACTERISTICS,
PRECLOSURE HYDROLOGY, AND
EROSION**

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**PRESENTER'S TITLE
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Background

- **The “Surface Characteristics, Preclosure Hydrology, and Erosion” Technical Basis Report (TBR) was the first in a series of planned technical reports for addressing technical site suitability for the Yucca Mountain site, as described in the Program Plan**
- **The TBR addresses the technical basis that will be used to support guideline compliance assessments for the disqualifying and qualifying conditions for surface characteristics, preclosure hydrology, and erosion**

Background

(Continued)

- **The suitability process called for an independent peer review of the TBR to be completed**
- **The NAS formulated its panel of experts in May 1994 and completed the review December 1, 1994, on schedule**
- **DOE appreciates the efforts of the NAS in providing a timely and thorough review**

General Comments

- **The NAS peer review comments can be grouped into three categories:**
 - (1) *The TBR did not effectively communicate data and conclusions;*
 - (2) *The TBR did not consider all relevant and available data and information; and*
 - (3) *The scientific design/approach or method were inadequate*
- **The comments did not come as a surprise because of NAS panel feedback offered on the field visit and during the information gathering process**

DOE Reaction by Category

- **CATEGORY 1: *The TBR did not effectively communicate data and conclusions***
 - The TBR summarizes technical information related to specific regulatory issues and, as such, results from research. It is not a research document
 - Separation of the supporting technical arguments from the regulatory arguments made development of the TBR difficult. Divorcing the technical basis from compliance assessment is complex to execute, difficult to convey, and hard for people unfamiliar with program to understand

DOE Reaction by Category

(Continued)

- **DOE agrees that its TBR was ineffective in properly conveying well-articulated arguments, and that such arguments are key to the success of the document. DOE must be more cognizant of this in its review of future draft documents prior to their release**
- **The management process was not as effective as DOE had expected. DOE has taken action to more closely manage such deliverables through detailed acceptance criteria and greater management oversight**

DOE Reaction by Category

(Continued)

- **CATEGORY 2: *The TBR did not consider all relevant and available data and information***
 - The TBR was intended to address a subject area limited by the regulation it was ultimately meant to address. By design, not all available information related to the technical issues were deemed relevant for addressing the regulatory issue
 - DOE used available data or information that could be referenced in documenting its conclusions
 - If references from non-DOE sources are available in a citable form and are germane, DOE intends to acknowledge these sources in the future

DOE Reaction by Category

(Continued)

- **CATEGORY 3: *The scientific design/approach or method were inadequate.* Some of these comments paralleled NRC comments on the Extreme Erosion Topical Report:**
 - ***The TBR relied on a single dating technique from which to derive technical conclusions--varnish cation ratio (VCR) technique***
 - » **DOE has completed thermo-luminescence and U-series dating to verify our surficial deposits mapping, and it has pursued cosmogenic isotope dating to corroborate VCR dates on boulder deposits and to date bedrock exposures**
 - » **New sensitivity studies are looking at (1) how different dating techniques bound the ages of deposits used to establish the VCR calibration curve, and (2) how use of the curve influences boulder deposit age determination**

Technical Comments Under Category 3

- ***The areal extent of the erosion study was too local and did not look at a variety of deposits or locations that may exhibit higher rates of erosion***
 - **While the focus was on local erosion rates, DOE's evaluation of studies addressing erosion on a regional basis only further support its conclusion that erosion rates are low. This evaluation could have been addressed in the TBR**

Technical Comments Under Category 3

(Continued)

- ***By focusing on relict boulder deposits, and with the dating technique used, there was a systematic bias toward selecting the oldest, most stable deposits***
 - **DOE's approach to understanding landscape stability was to examine the most temporally stable landforms on the hillslopes. How they formed and what has happened around them is key to understanding how stable the landscape has been during the Quaternary Period**
 - **From a performance perspective over 10,000 years, DOE's hillslope erosion rates can be underestimated by two orders of magnitude and would not pose a concern either for (1) unroofing a repository or for (2) exposing a potentially important hydraulic interface between the bedded tuffs and the Topopah Spring unit. The performance impact does not justify additional work**

Conclusion

- **DOE's conclusions are sound, but it agrees that its documentation was deficient**
 - **The Department is addressing parallel comments provided by the NRC in their review of DOE's Extreme Erosion Topical Report**
 - **DOE intends to recast its arguments addressing surface characteristics, preclosure hydrology, and erosion if it prepares a License Application for a repository at Yucca Mountain**