

MEMORANDUM



TO: Ms. Charlotte Abrams
Geotechnical Branch
Division of Waste Management
US NUCLEAR REGULATORY COMMISSION
7915 Eastern Avenue
Silver Spring, MD 20910

86 JUL -7 P11:11

FROM: VJ Murphy
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DATE: July 3, 1986

SUBJECT: Record Notes - FEA Comments - Yucca Mountain

The enclosed set of comments concerns record notes to the NRC engineers concerning:

- perched water;
- lateral flexibility of repository;
- faulting in repository area.

These notes were prepared from a standpoint of engineering concern regarding the structure to be implaced [the repository] and the three variable factors noted above.

We trust that these comments are adequate for your intra-office needs; we are preparing documentation for these comments such as specific FEA references with regard to sections and paragraphs and/or particular references.

We will be pleased to provide any further information you may require.

:wpt-0554J

cc: John Trapp
A.B. Ibrahim

WM-RES
WM Record File
D-1003
WESTON

WM Project 10, 11, 16
Docket No. _____
X PDR ✓
LPDR (B, A, S)

B608080255 B60703
PDR WMRES EECWGC
D-1003 PDR

Distribution:
X Abrams

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RECORD NOTES

YUCCA MOUNTAIN REPOSITORY AREA

Faulting in Repository Area

The review that Weston Geophysical has performed concerning the area of the proposed repository indicates that only minimal faulting is anticipated to be encountered during construction/excavation procedures.

We believe that such a description of the particular site locale of Yucca Mountain is an oversimplification of the conditions that probably exist and will be disclosed during actual Site Characterization activities. It is noted that the area is intersected and/or bounded by designated faults [refer to enclosed cross-section and plan map drawings - FEA Figures 3-7 and 3-8] which indicate additional faults that project to and therefore probably through the geologic cross-section and the horizon levels that would be excavated.

In addition to faulting, the overall condition of the rock to be excavated is also of concern. The RQD [rock quality designation] is a low value, approximately 25%, and although this value is based on limited drilling information - a single hole, the FEA further indicates that "fracture density probably increases" - FEA, Page 3-15, so that ceiling support measures requiring bolting and lagging or ribs may be more extensive than a reading of the FEA would indicate.

The geologic attitude of adverse features such as fracturing related to faulting, is generally indicated as vertically oriented and can therefore be considerably underestimated in a vertical drilling program; angular orientation of drillholes complemented by geophysical measurements made in a number of orientations, during the earliest phases of site characterization is therefore an obvious need for fullest knowledge of the condition of rock prior to excavation.

The difficulty of using a nearby area for extrapolation of anticipated underground excavation conditions has been properly noted by others within the NRC and we concur in that observation.

RECORD NOTES

YUCCA MOUNTAIN REPOSITORY AREA

Perched Water

The potential for perched water is a matter of concern from an engineering geology standpoint independent of other geologic considerations.

Water may become perched immediately above or within the horizon levels of interest, and such can affect excavation activities as well as occur at some unknown periods after closure.

The presence of faulting and the potential for extensive fracturing are conditions that can result in such an adverse engineering condition of perched water.

The capability for perching is discussed extensively in the FEA, but from an engineering standpoint, it appears that the conclusions are rather speculative.

A well-known effect that corresponds to zones of active or recent faulting is the presence of an impervious barrier/membrane-like condition that blocks the normal flow of water through zones that otherwise would be considered pervious and permeable. Depending on the orientations and the extent of such zones, the condition of perching can be a relatively localized, anomalous occurrence, that will only be disclosed through an extensive drilling and geophysical measurement program. The engineering use of such data and the need for packer testing at a number of levels and locations becomes obvious. It is also noted that perching as an anomalous condition can have a limited extent, both horizontally and vertically.

RECORD NOTES

YUCCA MOUNTAIN REPOSITORY AREA

Lateral Flexibility

From an engineering standpoint, the lateral flexibility of repository can be impacted by the presence of faulting and fracturing related to faulting.

The geologic sections and maps presented in the FEA can be interpreted as of only minimal concern with a few such features intersecting the repository horizon and occurring near the boundaries proposed for the primary repository area. A brief review of the geologic sections and map of the area [Figures 3-7 and 3-8 of the FEA] indicate a distinct possibility that an oversimplification is presented relative to the lateral flexibility. The "Ghost Dance Fault" is depicted as a nearly singular feature transgressing the repository area and with limited vertical displacement designated on the geologic section.

It is therefore of engineering concern that other faults that can be readily projected across and through the primary repository area may have similar or greater vertical offsets and therefore result in a step-like geometric configuration of the particular horizon level of interest for the repository. This is a condition that can be readily assessed from an engineering geological standpoint by closely-spaced drillholes along selected traverses, high-resolution geophysical logging of the drillholes, and surficial geophysical profiling of shallow marker horizons that can be related geologically to the deeper repository level of interest.

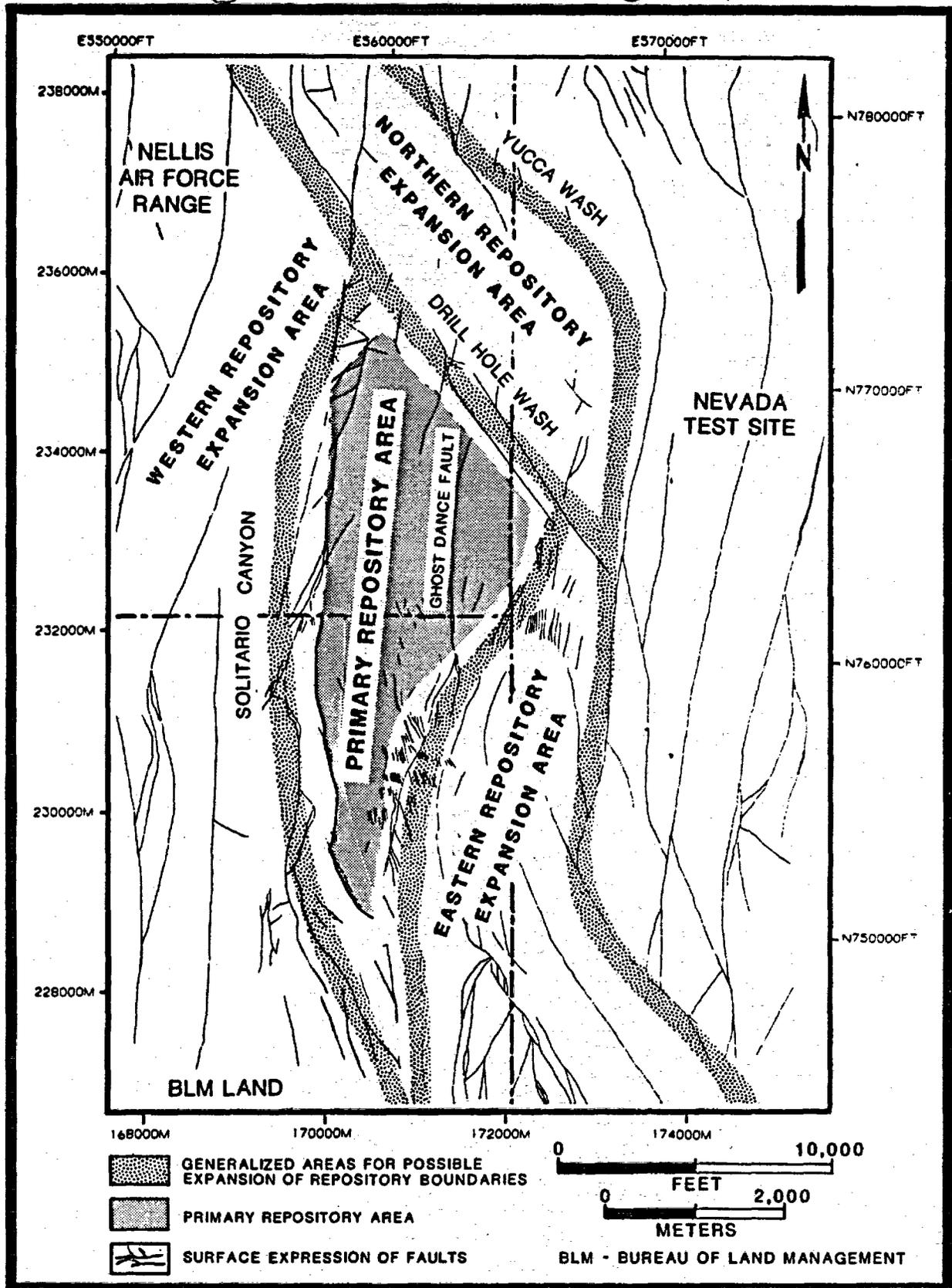


Figure 3-8. Generalized outlines of the primary repository and possible expansion areas. Modified from Mansure and Ortiz (1984).