



# United States Department of the Interior

GEOLOGICAL SURVEY  
RESTON, VA. 22092

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Mr. Michael J. Bell, Chief  
High-Level Waste Licensing  
Management Branch  
Division of Waste Management  
United States Nuclear Regulatory  
Commission  
Washington, D. C. 20555

Dear Mike:

I have reviewed the draft regulatory guide, "Standard Format and Content of Site Characterization Report for High-Level Waste Geologic Repositories." In the course of the review, comments were provided from several of my colleagues.

We feel that the format of the guide, calling for 1) description of the site, repository design, and waste package, 2) identification of issues, and 3) plan to resolve issues, is logical and appropriate. With a few exceptions, the information asked for in the description section is complete, within the capacity of an applicant to provide, and at a suitable level of detail.

The future stability of the site has two timeframes of concern, and it might be useful to distinguish them in the guide: the operational phase of 50 to 150 years, and the long-term phase lasting as long as 10,000 to 1,000,000 years. Seismic stability as determined by instrumental seismology and the identification of faults on which significant movement has occurred in the Quaternary is the relevant concern for the first phase. The more difficult second phase involves slower or more sporadic processes over longer times and will require a multidisciplinary approach combining geomorphology, climatology, neotectonics, paleontology, isotope geology and stratigraphy. Although all of these elements are listed in the guide, at least by implication, the need for multidisciplinary approaches tends to get lost in the trees. A separate paragraph emphasizing it might be useful perhaps in section 3.8. For example, a distinction is made between Quaternary structures and older structures, but no distinction is made between Quaternary stratigraphy and older stratigraphic units. Since the identification and dating of Quaternary stratigraphic units has not been a strong point in some past DOE reports, it might be useful to include a separate section on Quaternary stratigraphy. It could come in the Geomorphology section as suggested by Gary Dixon, or could be included in 3.5 Stratigraphy and Lithology. As written, section 3.5 seems to emphasize subsurface geology and the physical stratigraphy of older units. Surficial geology and the younger units need emphasis somewhere.

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If that were done, the first paragraph at the top of p. 3-15 seems unnecessary. If all faults are completely characterized, as required in the preceding paragraph, there is no need to single out Quaternary faults here. Also, it is not clear what is meant by "apparent" offset vs. "true" offset. The amount of basement offset is irrelevant where the basement is at substantial depth as it is at NTS, Hanford, and the Gulf Coast domes. We are really concerned with the amount of offset and the likelihood of future offset at repository depths. It should probably be required that all Quaternary faults be trenched in order to determine their movement history, if possible.

It is asking too much to characterize jointing completely in an area of 200 km diameter (see section 3.7.2.4). My experience is that cross-cutting relations among joint sets are rarely observed and often ambiguous. Most joints probably die out at shallow depths anyway. Substantial effort will be needed for joints underground once the shaft is drilled. Then their relation to hydrology and to the surface expression of joints will need to be determined. Measuring thousands of joint orientations before that time would just be busywork.

It is not clear whether section 3.9.3 is an elaboration of section 3.9.2 or a separate requirement.

For most sites, section 3.5.1 will be a reasonable requirement as stratigraphy will not change much over 200 km. Dixon is correct in stating that, as written, 3.5.1 would be burdensome and unnecessary for the southern Great Basin.

The southern Great Basin is also somewhat special with regard to seismicity. As Dixon points out, it may be impractical to list all historic earthquakes in that area; however, it should be no problem for most other areas. For example, at the WIPP site, all known earthquakes in a 600 km circle were listed down to magnitude 1.5. Thus, the magnitude and intensity values suggested on page 3-9, and for which specific comment was sought, appear to be reasonable. I would emphasize again, however, that these listings will be of value only in assessing the risk to the operating phase of the repository. They are irrelevant as far as the long-term risk is concerned.

The use of "model" on page 3-4 to mean a description of the geology of a site repels most geologists.

I agree that regional heat flow cannot be obtained from remote sensing (section 3.6.7).

Section 3.6.8 should allow use of hole-to-hole and hole-to-surface measurements, but these should not be required at this stage.

Section 3.7.2.7, third line, strike "anomalous."

Somewhere in Section 5, it should be required to give the detailed drilling history of all test holes drilled to evaluate the site as well as descriptions of the testing technique and history of testing experience for each interval tested. USGS reports on WIPP holes illustrate what we have in mind.

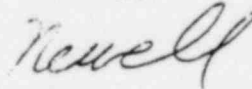
Section 5.4.2, item 4 is not clear to our hydrologists.

Section 5.4.6. The terms "monitoring" and "verification" should be defined in order to differentiate between observations made to verify interpretations of the hydrogeologic system, and those that will be made during the operational and post-closure phases of the repository to sense whether there are any indications that performance predictions may be in error. The latter we would call "monitoring."

Section 6.1, 3rd line, before "fractures" insert "material in the".

Section 12.4.3. "Verification" and "validation" appear to be used interchangeably. The DOE modelers draw distinctions between the two, and you will probably hear from them. One term can refer to using a model on a relatively simple problem that has an analytical solution and comparing the results. The other term can refer to comparison of model predictions with experiment. I don't know which is which, however. Section 12.4.3 should be expanded and made more explicit as it may be a crucial step in the licensing action.

Sincerely,



Newell J. Trask  
Geologist