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September 15, 1984

Dr. John Trapp
Geology-Geophysics Section
Division of Waste Management, NMSS
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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Dear John,

Enclosed please find preliminary selected comments regarding sections 3 and 6 of a preliminary draft of the Swisher EA, and a brief trip report regarding the meetings of September 10 and 13.

It is important to note that because of very limited available time, my review comments are very preliminary and are based solely on a first reading, without benefit of any references. Hence, substantial modification is anticipated prior to a final submittal.

As evident from the meeting on September 13, all items of my preliminary comments regarding the BWIP site have been recognized before, and in large part involve published evidence with which I am unfamiliar. Consequently, I am withholding those comments until I am more familiar with the available data.

Very sincerely,



Richard H. Berry

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TO: Dr. John Trapp
Geology - Geophysics

FROM: R.H. Berry

SUBJECT: Trip Report for attendance at NRC meetings of September 10 and 13,
regarding EAs of the Swisher and BWIP sites.

DATE: September 16, 1984

The following paragraphs outline my participation in two NRC meetings conducted at your Silver Spring offices on September 10 and September 13, 1984. My attendance was upon your written request of August 31, 1984, under authorization of contract #AT-(49-24)-1597. My one-week preparation for the two meetings included a review of the NRC Standard Review Plan (June 22, 1984), the general DOE guidelines of May 14, 1984, a preliminary draft of Sections 3 and 6 of the Swisher EA, and Sections 2 through 6 of the BWIP EA.

The September 10 meeting involved the Swisher Site and included preliminary remarks by NRC staff regarding the Review Process and organization. The meeting of September 13 involved the BWIP EA. Both meetings were spent largely in presentation of preliminary draft comments by participants of the respective review teams, review of the NRC Site Technical Position (STP) and general technical discussions. In both cases, the last function of the agenda involved a summary of those technical items which presently appear most critical to the NRC licensing process.

Enclosed with this trip report are my comments regarding the Swisher site, written in the format of Table 7 of the Standard Review Plan, which generally reflects my verbal comments at the meeting. My verbal comments regarding the BWIP site were mostly redundant in terms of the comments of others, and have not been subsequently prepared in writing.

SUBJECT: Preliminary Selected Comments regarding the Swisher EA
PREPARED BY: Richard H. Berry
DATE: September 15, 1984

Comment 6-1

Section 6.3.1 Geohydrology, Favorable Condition

Page 6-124, Paragraph 1

Inadequate Consideration of Available Data

This paragraph claims a favorable condition largely on the basis of estimated vertical permeabilities of the evaporite sequence comprising the aquatard, hydrologic unit HSU B. However, it appears that the derivation of those estimates (section 3.3.2.1.2) may fail to adequately account for jointing within the aquatard, noted elsewhere in the EA (e.g. page 6-143), paragraph 1 and page 6-178, paragraph 5). Because jointing commonly is capable of producing permeabilities that are several orders of magnitude greater than those of the parent rock, it is possible that their effects could play an important role in terms of all guidelines involving hydrologic travel times.

Consequently, it appears that a discussion is necessary to explain how jointing is accounted for in assessing the effective permeability of hydrologic unit HSU B. It also appears necessary to discuss the significance, if any, of the heavy water flows which are typically encountered within strata of the same evaporite sequence in southeastern New Mexico, as particularly exemplified by problems associated with shaft construction for the potash industry.

Section 6.3.1.6 Dissolution, Disqualifying Conditions

Page 6-174, Paragraph 4

(Interior Dissolution) Available Alternative Interpretations

The subject statement contends that interior dissolution will not create a hydrologic connection between the repository and surrounding geohydrologic units within 10,000 years. One of the stated bases for that judgement is that the deepest known evidence for such dissolution is about 1000 feet above the proposed repository. Although the depth of such evidence is unreported in the EA, it would appear to correspond to a depth of about 1700 feet in the vicinity of the repository, and include almost two thirds of the total repository cover. On the basis of reported evidence, it is uncertain as to how or when such dissolution occurred, or why such dissolution would not be anticipated to presently exist at still greater depths, including that of the proposed repository.

In light of other possible evidences of interior dissolution (comment 6-3), there does not appear to be any compelling reason to discount the likelihood that such interior dissolution is associated with steeply inclined solution channels developed along joints and fracture zones, as commonly associated with deep dissolution elsewhere. Were this condition to extend to repository depths, it would appear to represent a disqualifying condition.

Therefore, it appears essential that all existing information which is either indicative or suggestive of interior dissolution (see comment 6-3), be comprehensively assessed to establish its nature and origin, in order to evaluate the likelihood of present or future dissolution in or near the repository and its effects on rates and migration paths of groundwater.

Comment 6-3

Section 6.3.1.6 Dissolution, Disqualifying Conditions

Page 6-174, Paragraph 4. (Interior Dissolution)

Inadequate consideration of available data and available alternative interpretations

The subject statement contends that interior dissolution will not create a hydrologic connection between the repository and surrounding geohydrologic units within 10,000 years. One of the stated bases for that judgement is that existing interior dissolution is minor (page 6-174, paragraph 2). However, no evidence is presented to support such a condition. Instead, the data presented could be interpreted to suggest the opposite. These include recognition of deep interior dissolution at multiple locations (page 3-43, paragraph 1) and several possible surface manifestations on the High Plains, such as effects on Quaternary drainage development (page 3-41, paragraph 5, page 6-172, paragraph 3), subsidence as a possible cause for creation of Pleistocene lakes (page 6-182, paragraph 4), and the pronounced but unexplained circularity of topographic features (figure 3-46, page 8-103).

When coupled with depth uncertainties (comment 6-2), such evidence could be interpreted to pose a serious question regarding present or future isolation of the repository. Consequently, it appears essential that the various aspects noted above be thoroughly described and explained in terms of the nature and the extent of existing interior dissolution, including an assessment of their origins and potential future behavior.

Comment 6-4

Section 6.3.1.6 Dissolution, Disqualifying Conditions

Page 6-174, Paragraph 4 (Interior Dissolution)

Available alternative interpretations

The subject statement contends that interior dissolution will not create a hydrologic connection between the repository and surrounding geohydrologic units within 10,000 years. One of the stated bases for that judgement is that the rates of interior dissolution are prohibitively slow. However, the application of such rates assumes that interior dissolution has yet to extend deeper than the uppermost salt, which presently remains to be established (comment 6-2). In addition, the rates themselves (as derived on page 3-43, paragraph 2), appear to assume a lateral uniformity of dissolution which may not necessarily apply. Just as likely, present and past dissolution could be locally concentrated along bedding planes and steeply dipping joints and fracture surfaces, as typified by deep dissolution elsewhere. Furthermore, numerous world-wide evidence indicates that in such circumstances, dissolution can be particularly rapid given a regime.

Consequently, the application of rates which assume lateral uniformity first require the establishment of the nature of past and future interior dissolution, involving a comprehensive assessment of existing data indicative or suggestive of existing interior dissolution (comment 6-3).

Comment 6-5

Section 6.4.2 Long Term Post Closure Performance Assessments

Page 6-301, last paragraph

Inadequate consideration of available data, available alternative interpretation

The subject paragraph states that the analysis of peripheral salt dissolution described in section 6.3.1.6 is based "on the highest estimated local, short term rates. These are considered to exceed maximum plausible long term rates because they exceed escarpment retreat (an apparently related process) by approximately five times."

The statement involves two uncertainties. The first involves the "highest estimated local short term rates." As described in section 3.2.3.3, these rates are based on stream solutes. Hence, they are current, rather than Quaternary rates, and presumably relate largely to present climactic conditions. However, as noted at the bottom of page 6-155, higher rates would be expected during wetter climates (including Quaternary and future pluvial times). In addition, it seems plausible that rates of peripheral dissolution would continuously increase as internal dissolution progressively developed.

Furthermore, as mentioned on page 3-40, paragraph 3, rates from stream solutes vary by "four orders of magnitude," expressing an extreme level of uncertainty associated with an unknown complex of controlling factors. Consequently, the rates applied in section 6.4.2 appear equally uncertain, especially when projected to different climates of the future.

The second uncertainty of the subject statement involves the "apparent" relations between peripheral dissolution and escarpment retreat. The EA fails to disclose the nature of that relationship, and the EA treatment of the relationship

Comment 6-5 (continued)

suggests that it is expressed with comparable uncertainty in the references. As such, it appears that the relationship, as it stands, is inadequate to suggest that the rates are conservative.

Given the uncertainties associated with those rates, it would appear that some other means is required for assessing rates of future peripheral dissolution. One possibility may include an assembly of geologic field relationships adequate to generally reflect rates or amounts of Quaternary retreat of the solution fronts.