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MEMORANDUM FOR: Hubert J. Miller, Chief
Repository Projects Branch
FROM: Rob MacDougall, Program Analyst
Policy and Program Control Branch
SUBJECT: COMMENTS ON DOE DRAFT ENVIRONMENTAL ASSESSMENTS

At your request, I reviewed the draft environmental assessments (EA's), and have developed the enclosed comments. In conducting the review, I focused principally on areas of general applicability to all the draft EA's, and have not yet reviewed the comments developed by the functional staff on each draft EA. Since my comments arise from DOE's implementation of the guidelines and affect all or most of the nominated sites, I believe they are significant.

In sum, I can not find sufficient evidence that the draft EA's fulfill two central precepts in DOE's implementation guidelines: 1) that postclosure guidelines have primary significance in the site screening decisions; and 2) that DOE use conservative assumptions in applying the guidelines at the stage of nomination and recommendation of sites for characterization. Given these defects, the reasonableness of DOE's conclusions in applying the guidelines is not always manifest.

The point of my analysis should not be taken to suggest that certain sites be given more or less preference in DOE's selection of sites to be characterized. I fully support the view that NRC should not participate with DOE in selecting sites. Highlighting apparent systemic flaws in the methodology by which DOE made these decisions is a long way from telling DOE what sites to select, however, and I believe it is a necessary outgrowth of the Commission's statutory responsibility for concurrence in the siting guidelines.

As I understand it, there is still a question about whether comments of this nature would be permissible in a letter to DOE on its EA's. In WMPC's view, the staff cannot afford to ignore even an implicit DOE departure from the site screening principles the Commission took so much trouble to establish as national program policy. As we noted in our memorandum of December 28, 1984 on the draft EA Review Plan, the Commission reviewed the guidelines for "provisions that might lead DOE to select sites that would not be reasonable alternatives for an Environmental Impact Statement (EIS) [our emphasis]." We cannot believe the Commission would have the staff be indifferent to an implementation of the guidelines that might lead to the same result.

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B.N.S.

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We understand that you have no basic disagreement with the central point of these views, but I wanted to take this opportunity to pass them along for whatever assistance they could give you in obtaining the necessary concurrences in the final EA Review Plan. They are elaborated in Enclosure 2. If you have any questions about these views or the comments on the draft EA's, please let me know.

Rob MacDougall

Rob MacDougall, Program Analyst
Policy and Program Control Branch

Enclosures:

- 1. Comments on draft DOE EA's
- 2. WMPC Views on Scope of EA Review

~~NOTE: PREDECISIONAL until comments forwarded to DOE on EAs.~~

Done

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PROPOSED COMMENTS
ON DRAFT DOE ENVIRONMENTAL ASSESSMENTS

1. Overall DOE rankings of nominated sites do not appear to give primary significance to the postclosure guidelines. In Section 960.3-1-5 of its implementation guidelines on the basis for site evaluations, DOE says that "evaluations of individual sites and comparisons between and among sites ... shall place primary significance on the postclosure guidelines and secondary significance on the preclosure guidelines, with each set of guidelines considered collectively for such purposes. [DOE's emphasis]" This is one of the fundamental principles in Section 112(a) of the Nuclear Waste Policy Act: that the guidelines "specify detailed geologic considerations that shall be primary criteria for the selection of sites in various geologic media. [our emphasis]"

Despite DOE's assurances in Chapter 7.4.3.3 that it gave postclosure guidelines up to 85 percent of the weight (see page 7-132), its overall rankings of the sites correlate more closely to its ranking of the sites under preclosure guidelines. This can be shown from its rankings of each set of guidelines and its ranking of both together in Chapter 7:

Table 7-23, Ranking of sites for the set of postclosure guidelines^a
(From page 7-126)

Averaging	Pairwise Comparison	Utility Estimation
1. Deaf Smith	1. Davis Canyon, Deaf Smith	1. Yucca Mountain
2. Davis Canyon	2. Hanford	2. Deaf Smith
3. Hanford	3. Richton, Yucca Mountain	3. Davis Canyon, Hanford
4. Yucca Mountain		4. Richton

^aThe listing of more than one site for any particular rank indicates a tie.

Table 7-25, Ranking of sites for the preclosure set of guidelines for reference weighting of subordinate groups^a (From page 7-129)

Averaging	Pairwise Comparison	Utility Estimation
1. Yucca Mountain	1. Hanford	1. Yucca Mountain
2. Hanford	2. Yucca Mountain	2. Hanford
3. Deaf Smith	3. Deaf Smith, Richton	3. Deaf Smith
4. Richton	4. Davis Canyon	4. Richton
5. Davis Canyon		5. Davis Canyon

^aThe listing of more than one site for any particular rank indicates a tie.

Table 7-26, Overall rankings of sites obtained by three aggregation methods for reference postclosure-preclosure weighting and reference weightings for preclosure groups^a (From page 7-131)

Averaging	Pairwise Comparison	Utility Estimation
1. Yucca Mountain	1. Hanford	1. Yucca Mountain
2. Deaf Smith	2. Yucca Mountain	2. Deaf Smith, Hanford
3. Hanford	3. Deaf Smith	3. Richton
4. Richton	4. Richton	4. Davis Canyon
5. Davis Canyon	5. Davis Canyon	

^aThe listing of more than one site for any particular rank indicates a tie.

In all three of the methods for ranking the postclosure guidelines, for example, the Davis Canyon site is ranked among the top three choices, and would therefore have been among the sites to be recommended for characterization. This site ranked last under all three methodologies for the preclosure guideline rankings, however. Despite its high ranking in the set of guidelines to which DOE is to accord "primary significance," Davis Canyon also ranked last in the overall comparison taking the pre- and post-closure guidelines together.

Similarly, Yucca Mountain ranked among the top three sites only once under the postclosure guideline ranking, and would thus have been recommended for site characterization under only one of the three ranking methodologies. In the three preclosure rankings, however, it ranked first, second, and first,

respectively -- the same rankings it received overall, despite its comparatively poor showing in the "primary" guideline set.

The same pre-eminence of preclosure guidelines shows up within the ranking methodologies. Under the pairwise comparison methodology, Hanford ranks third in the postclosure ranking, but first in the preclosure ranking, and is ranked first overall. Under the utility estimation method, Davis Canyon ties for third in the postclosure ranking, but is ranked last in the preclosure ranking, and last overall.

These examples are by no means to suggest that NRC believes that any particular sites should be accorded higher overall rankings at the expense of others. For one thing, these rankings are based on DOE's judgments in matching individual sites against individual guidelines in the first place, and as we intend to show below, there are also grounds to question how these judgments were made. The point here is only to note that from a look at the results of DOE's overall rankings, it appears that there could be difficulties in either or both of two areas: the data inputs into the ranking methodologies induced significant bias, or all three ranking methodologies are seriously flawed.

DOE says on page 7-132 that in applying the post- and pre-closure guidelines, it used a range of different weighting ratios, from 51:49 percent to 85:15 percent. It also asserts that even under the ratio giving postclosure guidelines "up to about" 85 percent of the weight, the results of the rankings did not differ from the rankings based on the 51:49 split. We question whether a 51:49 ratio accords any primary significance to postclosure guidelines, since the two percent difference is so far within any likely confidence interval for stochastic analysis that for all practical purposes, the weightings are at parity. It is even more difficult to conceive that an 85:15 weighting ratio "would not change the general result" from using a 51:49 ratio. Absent a showing to the contrary, it would appear that there is significant bias in the inputs, the methodologies, or both if DOE has to accord the postclosure guidelines more than 85 percent of the weight in order to produce any change in the overall rankings.

It is not NRC's job to rank the sites for DOE, but for the sake of assuring that postclosure guidelines get the overall primacy they deserve, it would be useful to have a more detailed discussion in Appendix B of the calculations and the weighting factors DOE used. Without them, NRC has little grounds for finding any reasonable connection between the principle of postclosure guideline primacy and the draft overall rankings.

2. DOE's system for applying individual guidelines does not appear to fulfill its commitment to apply conservative assumptions. In Section 960.3-1-4-2 of its implementation guidelines on site nomination for characterization, DOE says that it will, as necessary, use assumptions approximating conditions considered to exist or expected to appear at a site. These assumptions, it says, "will be realistic but conservative enough to underestimate the potential for a site to meet the qualifying condition of a guideline; that is, the use of such assumptions should not lead to an exaggeration of the ability of a site to meet the qualifying condition. [our emphasis]"

We see several examples of assumptions built into DOE's guideline application system that, in the absence of explicit justification, would not lead a reasonable observer to underestimate the potential of a site to meet qualifying conditions. Since these assumptions form the basis for DOE's application of the guidelines, which in turn underly the overall rankings of the sites, any non-conservative bias in these assumptions would lead to an exaggeration of the ability of a site to meet the qualifying conditions of the guidelines.

At the Commission's insistence, DOE revised the guidelines to specify in greater detail how the guidelines would be applied at each stage of siting, including the nomination and recommendation of sites for characterization. When the Commission concurred in the guidelines, it told the public that the implementation process "provides confidence that alternative sites will be selected in a manner that meets the requirements of the National Environmental Policy Act." (See FR Vol. 49, No. 133, July 10, 1984, p. 28137.) The examples of apparent non-conservatism set forth below can only undermine that confidence:

a. The binary system for determining the presence or absence of favorable and potentially adverse conditions does not acknowledge the degree of uncertainty associated with making such findings. To say that a favorable condition is present, or a potentially adverse condition is not, is to imply a degree of conclusiveness that may not be warranted by the available information. Once DOE makes these findings, however, the uncertainty in its extrapolations from the data appears to be lost in its ranking of the sites from that point on. A favorable finding made with a small degree of confidence counts as much as a favorable finding with a high degree of confidence. Thus, other things being equal, a site with, say, five favorable conditions, each with a 51 percent level of confidence, would receive a higher ranking for a guideline than a site with three favorable conditions, each with a 90 percent level of confidence.

This predisposition toward optimism works only for favorable findings. It is not counterbalanced by any conservatism in unfavorable findings because the comparative degree of uncertainty does not continue to affect rankings once DOE

has made these kinds of findings. A large degree of uncertainty in a finding that, say, a potentially adverse condition is present at a site does not lead to an exaggeration of the ability of that site to meet the applicable qualifying condition.

DOE can correct for this systemic bias in one or both of two ways: it can discount for uncertainty in weighting the favorable finding involved, or it can use more conservative assumptions in applying the guideline. In the draft EA's, DOE has not consistently shown an attempt to do either.

To choose one example, in assessing the Hanford site against the potentially adverse condition for postclosure rock characteristics (conditions that could require engineering measures beyond reasonably available technology, if such measures are necessary to ensure waste containment or isolation), DOE says "it is possible that rock conditions may contribute to stability problems because of high stresses at the repository horizon." DOE goes on to find that the potentially adverse condition is not present, presumably because "these conditions are not expected to affect containment or to compromise the site's isolation capability." This finding is cranked into DOE's site rankings even though DOE admits that "rock conditions at the repository horizon are very difficult to predict ... because of a lack of construction experience deep underground at the site or under similar conditions in basalt elsewhere." (See page 7-25.)

It is difficult to reconcile DOE's finding on this potentially adverse condition with its statement on page 6-3 that "a potentially adverse condition is stated to be 'present' unless the existing data and the conservative assumptions clearly support a conclusion that the condition is 'not present.' DOE intends this approach ... to be conservative, and no credit is taken in the absence of data."

b. In DOE's application of the technical guidelines, favorable conditions often appear to have more weight than potentially adverse conditions. A favorable condition is defined in the guidelines as a condition that is "not necessary to qualify a site," but "presumed to enhance confidence that the qualifying condition of a particular guideline can be met." A potentially adverse condition is defined as one "presumed to detract from expected system performance." Thus, wherever a favorable condition weighs more heavily than a potentially adverse one in a DOE ranking, it would by definition "lead to an exaggeration of the ability of a site to meet the qualifying condition."

It is difficult to select examples of non-conservative assumptions without calling into question the qualifications of the sites to which they are

applied, but we have found several examples that should be taken to underline not the defects in the site, but the defects in DOE's assumptions:

1. In several instances, the absence of a favorable condition appears to count more against a site than the presence of a potentially adverse one. In the postclosure guideline for geochemistry, for example, Yucca Mountain ties for second with two other of the five sites, and would be considered for characterization even with the presence of potentially adverse chemically-oxidizing groundwater conditions. Richton is not among the top three recommendable sites even though it has no potentially adverse conditions; its sole drawback appears to be the absence of a favorable condition reducing the predicted peak cumulative nuclide releases.

2. Conversely, the presence of a favorable condition sometimes seems to count more for improving a site's rank than the presence of a potentially adverse condition counts against it. In the postclosure guideline on rock characteristics, Richton and Davis Canyon tie for first place even though each has the potential for thermally-induced physical, chemical, or radiation-related phenomena that could affect waste containment or isolation. Yucca Mountain is not among the top three candidates in this guideline; even though it has no potentially adverse conditions, it does not enjoy the presence of host rock that is sufficiently thick and laterally extensive to permit flexibility in locating and configuring an underground facility.

The apparent deference to favorable conditions is not limited to postclosure guidelines. For the preclosure guideline on tectonics, Richton ties for first place even with evidence of active faulting within its geologic setting. Yucca Mountain shares the same potentially adverse condition, but ranks last, apparently because its seismicity is not significantly less than that generally allowable for the construction and operation of nuclear facilities.

3. DOE should explain in greater detail what kinds of transuranic wastes, if any, it intends to emplace in a repository licensed by NRC. In Section 5.1.1 of all the EA's, DOE describes a repository that "can handle, package, and dispose of spent fuel, commercial high-level waste (CHLW) from reprocessing of spent fuel, transuranic (TRU) waste, defense high-level waste (DHLW), and low-level wastes generated on the repository site." (See page 5-2.) We are uncertain whether DOE is contemplating disposal of TRU in a licensed repository, and if so, whether the TRU would be exclusively from licensed activities, whether it would include TRU from unlicensed atomic energy defense activities, and the extent to which it would affect the disposition of existing and anticipated wastes of either type. Since any disposal plans for TRU in a licensed repository would have major implications not only for NRC's program

but DOE's, we believe DOE should clarify its plans for these wastes as they affects its plans for siting and developing a repository under the Nuclear Waste Policy Act.

WMPC VIEWS ON THE IMPLEMENTATION
OF DOE GUIDELINES AND THE SCOPE
OF NRC'S EA REVIEW

In its preliminary concurrence decision, the Commission noted that "Unless DOE has applied the guidelines in a reasonable way in making its siting decisions, the Commission may be unable to adopt DOE's EIS." (49 FR 9660) The Commission went on to say that "the success of the site selection process will depend on the proper implementation of all these procedures [envisioned in the Nuclear Waste Policy Act] in concert rather than any single procedure [such as the Commission's concurrence in the guidelines.]" (49 FR 9661)

As a condition for concurrence, the Commission required DOE to specify in greater detail how the guidelines would be applied at each siting stage, including site nomination and recommendation. It rejected DOE contentions that this exceeded NRC statutory authority, and asserted "broad jurisdiction over matters regarding protection fo the public health and safety ... and over environmental impacts arsing from NRC licensed facilities."

When the Commission concurred in DOE's revised guidelines, it said they provided "confidence that alternative sites will be selected in a manner that meets the requirements of the National Environmental Policy Act (NEPA)." This did not mean that the Commission's concurrence ended its concern. In discussing the information required for site nomination, for example, the Commission said it "expects that DOE's environmental assessments will provide more detailed information ... along with a full description of the data that supports the findings being made." The Commission also required DOE to obtain NRC concurrence in all subsequent revisions of the guidelines, arguing that any revisions might affect NRC ability to carry out its broad statutory responsibilities.

The record of NRC's concurrence in the guidelines is thus clear on three key points. First, over DOE objections, the Commission consistently asserted a broad scope of NEPA responsibilities, including the ultimate adoption of an EIS, as the basis for an NRC interest in DOE siting alternatives. Second, the Commission made clear to commenters that because there are limits to the specificity that generic guidelines can reasonably achieve, it expected DOE to provide the requisite supporting information for its decision in subsequent applications of the guidelines, specifically including the EA's. Third, the Commission reserved to itself a continuing right to review and concur in the guidelines for DOE's NEPA-related decision-making. Given this record of a close and abiding concern for the content of the guidelines, it is difficult to conceive that the Commission intended their implementation to be outside the scope of the staff's review.