JOHN J. KEARNEY, Senior Vice President

see pocket 2 for enclosure

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March 20, 1985

Comments -- EA
U.S. Department of Energy
Attn: Comments -- EA
1000 Independence Ave., S.W.
Washington, D.C. 20585

Re: Notice of Availability of Draft Environmental Assessments for Proposed Site Nominations (49 Fed. Reg. 49,540)

This letter and the comments which follow are submitted on behalf of both the Edison Electric Institute ("EEI") and the Utility Nuclear Waste Management Group ("UNWMG"). EEI is the national association of investor-owned electric utilities, whose members serve 73 percent of all ultimate electric utility customers in the nation. The UNWMG consists of 46 publicly-owned and investor-owned electric utilities formed to monitor and assist in the resolution of nuclear waste management issues.

We have reviewed the above-referenced draft Environmental Assessments (EA's) in detail and find them to be comprehensive and informative. A very large body of technical detail on the various sites under consideration has been assembled in these volumes. The methodologies used to evaluate and compare the potential sites are reasonable in light of the information currently available. Indeed, as indicated in detail later in these comments, an independent evaluation by The Analytic Sciences Corporation ("TASC") confirms DOE's identification of the Hanford, Yucca Mountain and Deaf Smith sites as preferred repository locations.

There are, however, a number of areas in which the EA's can be improved. These comments are intended to be constructive and, hopefully, will prove helpful. It should be noted that we have not addressed transportation-related aspects of

the EA's. With respect to transportation matters, we endorse the comments submitted by the Electric Utility Companies' Nuclear Transportation Group.

The comments which follow are treated in two basic sections. The first consists of those important, general comments and conclusions which are presented in this letter. The second consists of specific, more detailed comments which are presented in a set of six enclosures hereto: one each for the Hanford, Yucca Mountain, Davis Canyon, Deaf Smith and Richton sites (i.e., those sites proposed for nomination); and a sixth containing specific comments pertinent, in common, to several (three or more) sites. The TASC report, mentioned above and discussed further in these comments, is included as enclosure 7.

1. Finalization of only five EA's. Under the Nuclear Waste Policy Act of 1982 ("NWPA" or the "Act") the Secretary of DOE is required to nominate "at least five sites that he determines suitable for site characterization for selection of the first repository site." NWPA, section 112(b)(1)(E). DOE has issued nine, highly detailed draft EA's and decided -- at least preliminarily -- to nominate five specified sites as suitable for characterization. See, e.g., Hanford EA, Section 7.1.1. Consistent with the requirements of the Act, DOE should now proceed to finalize only the EA's for those sites which it chooses to nominate as suitable for site characterization.

Thus far, DOE has produced nine documents, each of considerable scope and depth. The Department's comprehensive and useful treatment of information in these assessments is commendable. However, cost and schedule impacts must be considered.

DOE should not expend valuable time and resources completing reports that are not required. Further, and most important, unnecessary work must not be permitted to delay finalization of required EA's and -- as a result -- the overall siting process. Accordingly, DOE should complete only those EA's associated with sites actually nominated. Comments received by DOE concerning EA's covering sites not nominated could be appropriately considered within those EA's

which are finalized (e.g., in final EA's covering sites in the same geohydrologic settings as those containing sites for which EA's were not finalized) or in a separate volume addressing all such comments.

2. Comparative evaluation among sites. Each draft EA presents a wealth of data and other information. This information and application of the siting guidelines supports the conclusions presented in the EA's concerning the five sites proposed for nomination, as well as the three sites identified as preferred for characterization. However, a more detailed explanation of the process by which the five, and then the three, indicated sites were identified should be provided.

Chapter 7 is the same in all of the EA's. In every EA, each of the five sites proposed for nomination as suitable for site characterization is compared with the other four. Chapter 7 presents a detailed comparative evaluation of the Hanford, Washington; Yucca Mountain, Nevada; Davis Canyon, Utah; Deaf Smith, Texas; and Richton, Mississippi sites. It is also clear from Chapter 2 in each EA that a comparative evaluation has been performed leading to the identification of five sites for nomination. EEI/UNWMG suggest, however, that Chapter 2 in each of the EA's, and the common Chapter 7 in all, be expanded to explain the selection process in greater detail.

Chapter 2 of the final EA's for each of the five sites proposed for nomination should state more clearly the importance to site selection of establishing candidates in a variety of geohydrologic settings. Within this context, the selection of preferred sites in each geohydrologic setting should be explained in detail and with reference to the siting guidelines (e.g., 10 CFR §§ 960.3-1-1, 960.3-1-2). See also NWPA, section 112(a).

Chapter 7 describes the comparison among the five representative sites for each geohydrologic setting. EEI/UNWMG believe that the methodologies described and applied are appropriate and reasonable in light of the nature and amount of data available prior to detailed site characterization. We recommend, however, that this chapter be strengthened by

providing cross references to specific sections of chapters 5 and 6 where, in fact, preliminary results of performance assessments support the rankings among sites performed for each siting guideline. Further, chapter 7 should be expanded to include at least a brief description of the entire site selection process, covering all of the sites evaluated in the nine draft EA's. While most, if not all, of this information is already contained in the EA's, it is scattered throughout various chapters. Combining it in chapter 7 would serve to present, in one place, a unified, comprehensive discussion of the complete process of evaluation.

In addition, in view of the uncertainties presently existing in the characterization data, EEI/UNWMG agree that the performance of sensitivity analyses of the relative weightings given to various guidelines is a useful method to test the validity of the conclusions of the selection process. This being the case, however, it would be helpful to provide a more detailed description of the quantitative comparisons performed, and to present -- either in the EA's or in a separate document referenced in the EA's -- the actual numerical calculations which support DOE's conclusions that the site rankings are insensitive to all but extreme values of weighting factors for different sets of guidelines.

With regard to the site ranking, TASC has performed an independent comparative evaluation for EEI/UNWMG based on the system guidelines, extrapolations from existing data, and vulnerability to disruption. This analysis, which is described in a separate report included with these comments, confirms DOE's identification of the Hanford, Yucca Mountain, and Deaf Smith sites as preferred locations, distinctly ranked higher than either Richton or Davis Canyon when considered under both the preclosure and the postclosure guidelines.

3. Consideration of uncertainty. In dealing with uncertainties in the EA's, DOE has generally utilized an approach employing conservative assumptions in performing evaluations. For example, the estimates of pre-emplacement ground-water travel time presented in section 6.3.1.1.3(1) of the Hanford EA are based upon travel across the basalt flow tops, and do not consider movement through the flow

interior of the preferred candidate horizon. At Deaf Smith, where the diameter of the exploratory shaft is uncertain, the analysis was based on the larger shaft size, requiring the most resources. Similarly, the EA states that assumption of the larger shaft size "will set a high upperbound for assessing the resulting environmental impacts from the exploratory shaft program." Deaf Smith EA, pp. 4-23.

We believe that, in general, the use of conservative assumptions by DOE is justified for preliminary performance assessments of the repository system, and present evaluations of environmental impact. The Department, however, should emphasize that actual repository performance at all sites would likely prove better than predicted in the EA's because of the conservative assumptions used in the EA's. DOE should specifically note its application of conservatism in dealing with uncertainties -- in order to identify more clearly the reasonableness of its approach in performing comparative evaluations.

In addition, although the application of conservatism is proper, such application should be as uniform as possible. In some cases discrepancies appear even within individual EA's. Compare, e.g., Deaf Smith EA, Section 6.3.1.1.2 (groundwater travel time of between 87,000 and 361,000 years) with Table 6-9 (Page 1 of 14) (travel time of 769,000 years). To the extent practical, values of parameters specified in the EA's should be consistent -- as well as conservative -- or variations should be explained.

In this connection, there appear to be basic inconsistencies among the sites with respect to employment and migration impact analysis. Numbers vary considerably from site to site without adequate justification. Moreover, the very large population increase estimated in the Yucca Mountain EA appears to be due to an overly conservative analysis. Compare Yucca Mountain EA, p. 5-92 and Table 5-49 with Hanford EA, p. 5-59 and Deaf Smith EA, p. 5-105 and Figure 5-27. In such cases, we recommend adding a discussion of the degree of conservatism used to estimate such impacts, as well as an indication that the actual numbers would likely be much less.

4. Consistency. The EA's, in general, require some additional review and revision to assure consistency of basic data and analytical methodology among all EA's. For example, DOE should determine and systematically utilize consistent figures for the amount of waste considered from various sources. These figures should, of course, also be consistent with the transportation analysis in Appendix A.

In another area, inconsistencies in the number and size of shafts from the surface to the repository horizon, and in the method of incorporating shafts from the site characterization work into the actual repository should be either justified or reduced.

5. Representativeness of information. Some of the data employed could give rise to questions concerning the representativeness of information. For example, the rock characteristics utilized in considering the salt sites are generally based on data obtained at some distance from the actual site. It is clear that such an approach is both reasonable and sufficient to satisfy the requirements at this stage of the site selection process. However, DOE should better explain the appropriateness of utilizing information where questions concerning its representativeness -- with respect to the site in question -- might arise.

6. Cross-references. All of the EA's contain numerous, internal cross-references to other sections. A spot check of a number of these, however, has revealed some errors. See, e.g., Hanford EA, p. 6-40, Section 6.2.1.7.2 (improper reference to Section 5.4, should be changed to Section 5.2.3); Davis Canyon EA, p. 6-144, Section 6.3.3.2.4 (improper reference to Section 6.6.3.2.4, should be changed to Section 6.3.3.2.3). Although such mistakes are not generally serious, the EA's should be carefully reviewed to correct any such errors.

7. Executive Summaries. Page 3 of each Executive Summary cautions that "this Executive Summary does not provide a sufficient basis for commenting on the draft EA because of the amount and complexity of the information presented in that document." It must, nevertheless, be recognized that a great many readers -- including members of

Congress, executives and opinion leaders -- will have no choice but to limit their own personal review to the Executive Summary. For this reason, it is important that the Executive Summary accurately track the body of the text, and that its content reflect the principal findings, conclusions and uncertainties expressed in subsequent sections. In particular, the Executive Summary should only contain summary statements that are supported by the discussion in the text. DOE should carefully re-evaluate each Executive Summary with these points in mind.

We appreciate the opportunity to provide comments on the draft EA's. The detailed comments in the enclosures contain, where appropriate, additional, specific information pertinent to the overall points enumerated above.

In summary, we believe that revision of the EA's in the manner suggested in these comments will help assure the production of extraordinarily comprehensive, high-quality statements which will be of considerable value in the site selection process. In both scope and depth of analysis, they will greatly exceed the requirements of the Nuclear Waste Policy Act. Such documents will explain the basis of DOE's decision to select certain sites for nomination and for detailed site characterization; will show how the decision was made by reference to the siting guidelines; and clearly permit an assessment of any potential effects on the environment before actions are taken. Since the final EA's will provide all the required information to explain the basis of DOE's decisions to select sites for nomination, we urge that such nominations -- and the final selection of sites for detailed characterization -- be made as soon as possible. The program urgently needs to begin the collection of additional site-specific data to allow responsible progress toward attaining program goals.

Furthermore, we believe that the issuance of the draft EA's for public review, which is not required, is reflective of the Department's rigorous and conscientious approach to implementing the high-level waste disposal program. We

would be pleased to discuss these comments with you in additional detail, or any other matters that may be of interest.

Sincerely,

John J. Kearney
Senior Vice President

Enclosures 1-7

See ltr to DOE
from Kearney, EEI
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Enclosure 1

Specific EEI/UNWMG Comments on Draft
Environmental Assessment
Hanford Site, Washington

Executive Summary

p. 6: Description of the selection of the preferred site in the Columbia Plateau

The language used to describe the designation of the Hanford site should more clearly track the description of the decision process as set forth in the Executive Summary (p. 4). We recommend that the language of Section 2.2.3 be changed to read as follows:

> The reference repository location at the Hanford Site is the only potentially acceptable site identified in the Columbia Plateau. Accordingly, on the basis of information and evaluations described in Chapter 2, the reference repository location at Hanford Site has been identified as the preferred site in the Columbia Plateau.

Chapter 5

Chapter 5 generally: Socio-economic impacts during and following repository closure and decommissioning

A complete analysis of the socio-economic impacts of a repository on a community should include a discussion of the impacts during and following closure and decommissioning. This is not provided in the Hanford EA. Although the rampdown might, indeed, be gradual -- with few impacts -- including such a discussion in the Hanford EA would ensure consistency among EAs, and would further indicate a long-term commitment by DOE to the chosen site.

Chapter 6

Chapter 6 generally: Assessment of suitability with current uncertainties

Throughout Section 6.3 of the EA for the Hanford site, the phrase "considerable uncertainty" is used to describe the status of the information that is the basis for evaluations of suitability (e.g., pp. 6-79, 6-111). This characterization of the information base could raise questions concerning the validity of the assessments.

In perspective, the data base for the Hanford site is much more extensive than the data base for the other candidate sites; all sites exhibit some geological and hydrological complexity; and all sites have uncertainties, to be expected prior to detailed characterization. The Hanford EA should reflect this perspective with text that indicates, as appropriate, that assessment results are reasonable and justifiable, and that reductions of uncertainty through detailed characterization are expected to enhance and confirm assessment findings presented in the EA. In other words, undue negation of assessment findings can and should be avoided.

An example of the need for balanced consideration of uncertainties is provided by the Hanford EA discussions of groundwater travel time evaluation. Page 6-65 states that results of the stochastic modeling approach, which project a median travel time of 81,000 years, are considered to be most representative. The same page states that all estimates are "very prelim-

inary" and also mentions -- without indication of significance -- groundwater movement through basalt flow interiors. Page 6-79 states that "... considerable uncertainty currently exists in these predicted travel times." Page 6-267 repeats the text of p. 6-65 concerning the 81,000-year estimate and extends it with Table 6-33, which indicates that the 81,000-year result has an extremely large standard deviation in comparison with other results, and with Figure 6-22, which shows finite potential for a travel time less than the disqualifying condition of 1,000 years. All results are based on the assumption/expectation that the boundary of the accessible environment is located 10km from the boundary of the disturbed zone.

These draft EA discussions present a picture of definitive travel time evaluation results offset by major uncertainties. An important role for groundwater movement in basalt flow interiors is suggested, but not clearly described.

An unduly qualified assessment can be overcome in the final EA (1) by avoiding descriptors such as "very" (preliminary) and "considerable" (uncertainty), and (2) by adding a concise, overall discussion of issues, uncertainties, and actions concerning evaluation of groundwater travel time at the Hanford site to help provide perspective. Such an approach should help assure that the Hanford site assessments relative to the guidelines are clearly understood.

The discussions in the Hanford site EA concerning geochemistry and rock characteristics would also benefit from a concise, overall discussion of assessment results and relevant uncertainties. The site's status relative to the geochemistry and rock property guidelines is obviously important to its comparative rankings in the site selection process and to its ultimate suitability for a repository.

pp. 6-25 through 6-39: Potentially applicable Federal environmental statutes

As part of the evaluation of the preclosure Environmental Quality technical guideline, Table 6-2, pp. 6-27 through 6-31, summarizes the potential application of major Federal environmental laws to the Hanford site. This list does not include all of the Federal environmental statutes that are considered in connection with evaluation of the Environmental Quality technical guideline in the draft EAs for the other sites, particularly the salt sites.

In order to ensure consistent evaluation of Federal environmental requirements at each of the candidate sites, a uniform list of Federal environmental statutes should be utilized in evaluating the Environmental Quality technical guideline in each EA. The draft EAs for the salt sites do utilize a uniform list of Federal environmental statutes (see, e.g., Deaf Smith EA, Table 6-2, pp. 6-21 through 6-33). This list of Federal environmental statutes should also be utilized in the evaluation of the Hanford site.

pp. 6-25 through 6-39: Projected ability to comply with applicable local environmental requirements

The evaluation of the preclosure Environmental Quality technical guideline identifies only Federal environmental statutes and legal requirements that may be applicable to a repository at the Hanford site (See Table 6-2, pp. 6-27 through 6-31). The evaluation contains no explicit statements with respect to State and local environmental requirements or the projected ability of the Hanford site to satisfy such requirements. The conditions included in this technical guideline (particularly favorable condition (1) and potentially adverse condition (1)) require consideration of the projected ability of the site to meet State and local procedural and substantive environmental requirements, as well as Federal environmental requirements, applicable to the site. The evaluation of this guideline should be modified to add a discussion of potentially applicable State and local environmental requirements by either: (1) developing a list of such requirements and the projected ability of the repository to satisfy these requirements; or (2) indicating that such a list is being developed and that environmental analyses conducted for DOE's existing nuclear activities indicate that compliance with applicable State and local environmental laws and regulatory requirements would not be a problem if the repository were located at the Hanford site, similar to the more general statement to this effect on page 6-26.

p. 6-69: Hydraulic testing

To the first bullet item, and following the quotation from NRC, 1983a, could be added a statement noting that the study of well hydraulics has become a well-established discipline in the last 30 years and its techniques are far more advanced than theoretical approaches to predicting flow in fractured media.

pp. 6-76, 6-78, 6-93, 6-95, etc.: Conclusion whether favorable conditions and potentially adverse conditions are present or not present

The evaluations of several of the favorable and potentially adverse conditions under the technical siting guidelines report a variety of conclusions other than "present" or "not present," such as "does not appear to be present" (p. 6-76), "is likely to be present" (p. 6-78), "not expected to be present" (p. 6-93), "appears likely . . . is not present" (p. 6-95). Conclusions worded in this manner inject unnecessary equivocation into the evaluation of the technical guidelines. Furthermore, the conclusions must -- in any case -- be reduced to "present" or "not present" for the comparative evaluations in Chapter 7. Therefore, the conclusion for each favorable or potentially adverse condition under the siting guidelines should be limited to a statement as to whether the condition is "present" or "not present."

p. 6-78: Difficulty of site characterization

The description of discontinuities in the geologic setting, that may make site characterization difficult, is appropriate. However, standing alone, it conveys some uncertainty as to whether the site can be adequately characterized.

Statements should be added to indicate that, in fact, the layered stratigraphy of the site will permit ready identification, evaluation, and demonstration of conditions -- including discontinuities and their histories -- by means of existing, established investigative techniques.

pp. 6-126 to 6-127, 6-210: Amount of tectonic investigation

The types of investigations are appropriately described here and in Chapter 3, but their number and extent are not. It would be helpful to further describe the nature and scope of those investigations by adding statements to describe such factors as the size of areas geologically mapped, the number and collective length of drill holes and exploratory trenches, and the line-miles of geographical surveys. It would also be helpful to indicate that tectonic studies of the Hanford area and region for several critical projects (dams and nuclear power plants) have been extensive and have passed rigorous review by the NRC.

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Enclosure 2

Specific EEI/UNWMG Comments On Draft
Environmental Assessment
Yucca Mountain Site, Nevada

Executive Summary

p. 6: Description of the selection of the preferred site in the Great Basin

The language used to describe the designation of the Yucca Mountain site should more clearly track the description of the decision process as set forth in the Executive Summary (p. 4). We recommend that the language of Section 2.2.3 be changed to read as follows:

> The Yucca Mountain site is the only potentially acceptable site identified in the Southern Great Basin in Nevada. Accordingly, on the basis of information and evaluations described in Chapter 2, the Yucca Mountain site has been identified as the preferred site in the Southern Great Basin in Nevada.

p. 17: Routine weapons testing disruptions of repository operations

The statement is made in the Executive Summary that routine weapons testing at the Nevada Test Site would temporarily disrupt operations at the repository. Without further description, this constraint appears to offer the potential for significant operations interruptions, and possible increased construction and operation costs.

Page 6-37 includes a statement, however, that such disruptions might occur only two or three times a year, for periods not exceeding 12 hours. Thus, any disruption of operations, or increased construction and operation costs, would not

be significant. The fact that such disruptions would be very infrequent and the impacts minimal should be included in the statement in the Executive Summary, as well as in Chapter 6. 1/

Chapter 5

Chapter 5 generally: Socio-economic impacts during and following repository closure and effects on Native Americans

A complete analysis of the socio-economic impacts of a repository in a community should include a discussion of the impacts during and following closure and decommissioning. This is not provided in the Yucca Mountain EA. Although the rampdown might, indeed, be gradual -- with few impacts -- including such a discussion in the Yucca Mountain EA would ensure consistency among EAs, and would further indicate a long-term commitment by DOE to the chosen site.

In addition, there are no discussions of Native American tribes even though the state includes Native Americans. With no discussion, it is not known whether potential impacts have been reviewed and found to be insignificant, or whether there has been no investigation. A discussion of possible impacts, if any, on Native American tribes should, therefore, be added to the Yucca Mountain EA.

1/ See also the specific comment herein concerning pp. 6-37 through 6-42 of the Yucca Mountain EA.

p. 5-1: Adequacy of data

The EA strongly emphasizes the preliminary nature of much of the data. For example, at p. 5-1 the Yucca Mountain EA states that "[t]he evaluation is preliminary because it is based on limited information about the environment of Yucca Mountain and its vicinity, about the social and economic conditions in the area that might be affected by a repository," and so forth. On the other hand, although not always specifically noted, conservative assumptions and analyses are made throughout the EA. The EA therefore should emphasize the appropriateness of the data actually utilized more strongly.

Chapter 6

pp. 6-37 to 6-42 (see also pp. 6-288 to 6-291): Strong ground motion from weapons testing and earthquakes

The EA implies that underground conditions will make it unsafe for workers to remain in the repository during weapons testing at the Nevada Test Site (NTS). Furthermore, it is stated that this may occur two or three times per year and require interruptions of up to 12 hours. This suggests that:

1. The repository and its systems will not be designed, or personnel may not be adequately provided for, to accommodate strong ground motion;

2. NTS explosions may produce shaking and consequences at the repository greater than those of earthquakes; and

3. Significant adverse results may include more frequent and longer interruptions of repository activities than stated.

As indicated in a later section (see pp. 6-288 to 6-291), however, the maximum earthquake (M 6.8) would produce a peak acceleration (0.4g) at the repository that is much stronger ground motion than that estimated at the site (0.016g to 0.32g) as a result of the largest permissible test at the NTS. Presumably, the seismic design for the repository will be based upon the largest expected earthquake and ground motion values, in which case test explosions at the NTS would be of no concern. This should be specifically noted, and if there is any other reason why repository activities should be affected by weapons testing, it should be stated.

pp. 6-44 through 6-73: Potentially applicable Federal environmental statutes

As part of the evaluation of the preclosure Environmental Quality technical guideline, Table 6-9, pp. 6-48 through 6-56, summarizes the potential application of major Federal environmental laws to the Yucca Mountain site. This list does not include all of the Federal environmental statutes that are considered in connection with evaluation of the Environmental Quality technical guideline in the EAs for the other sites, particularly the salt sites.

In order to ensure consistent evaluation of Federal environmental requirements at each of the candidate sites, a uniform list of Federal environmental statutes should be utilized in evaluating the Environmental Quality technical guideline in each EA. The EAs for the salt sites do utilize a uniform list of

Federal environmental statutes (see e.g., Deaf Smith EA, Table 6-2, pp. 6-21 through 6-33). This list of Federal environmental statutes should be utilized in the evaluation of the Yucca Mountain site.

pp. 6-113 to 6-120, 6-122: Descriptions of and references to geologic, geophysical, and geohydrologic investigations

The drill holes, geologic mapping, geophysical surveys, and geohydrologic investigations described here and in Chapter 3 are not characterized as providing information from the region that is reasonably representative of site conditions for the purposes of the EA. Except for the number of drill holes, there is no description of the amount of investigation.

The collective length of drill holes, the square miles (hectares) of geologic mapping, and the linear miles of different types of geophysical surveys are important indicators of the amount of investigation conducted. Descriptions of the extent and magnitude of investigations should be provided. A declarative statement that the "data from these investigations (particularly those that are derived offsite) are relevant to, and reasonably representative of site conditions and processes," would also make the results more meaningful.

pp. 6-114, 6-121, 6-135, 6-140, 6-141, 6-312, 6-314: Groundwater travel times and definition of the disturbed zone

Estimates of groundwater travel time to the accessible environment vary and are confusing (e.g., "more than 20,000 years," "at least 500 years," "exceeds 55,000 years," "more than

1000 years," "about 93,000 years," and "about 47,000 years"). The boundary from which the travel time to the accessible environment is estimated is also described in different ways (e.g., "the outer boundary of the primary repository area," "at the boundaries of the primary repository area," "the outer boundary of the repository disturbed zone," "disturbed zone conservatively assumed to include 25 to 50 m of the Topopah Spring welded unit," and "disturbed zone very conservatively placed at base of Topopah Spring welded unit").

It is important to emphasize that the disturbed zone can only be determined by site characterization. The Yucca Mountain EA should clearly indicate that calculations of groundwater travel time are based on assumptions for preliminary purposes only.

pp. 6-129 to 6-134, 6-176, 6-178: Presence of faults and significant fractures

The EA indicates, on the above-referenced pages, that:

1. major faults and fracture zones that might enhance downward flow are generally at the boundaries of the primary repository area;

2. fracture frequencies are high in the host rock;

3. the highly fractured host rock provides free drainage;

4. movement along faults could result in minor changes in the hydrologic system; and

5. an increase in the number of fractures caused by faulting generally would not be detrimental, but could increase the effective porosity which probably would increase the ability of the host rock to freely drain excess water, a favorable characteristic.

The first statement above suggests that major faults and fracture zones are outside or at the boundaries of the site, but that some may exist in the site, implying an unfavorable condition from the viewpoint of rupture-dynamics. Apparently, from a hydrologic standpoint, however, fractures in the host rock of the site are not a problem, and the formation of new fractures is actually suggested as a benefit. The distinction between fractures and faults, as hazards to the repository and as features beneficial to the hydrology of the host rock, however, is not clearly explained. Neither is there adequate explanation and justification of why the "ability of the host rock to freely drain excess water" is a favorable characteristic.

This section of the EA would be improved if the free-draining characteristic of the host rock, and its favorability for the Yucca Mountain site were explained. Also, the circumstances as to when faults and fractures are favorable or unfavorable might be better clarified.

pp. 6-178, 6-212, 6-264, 6-267, 6-268, 6-275, 6-276, 6-317: Thickness of the host rock, vertical and lateral flexibility for siting the repository

Statements are made that the host rock is "sufficiently thick," "more than four times the thickness required," "thick enough," "expected to be more than adequate," etc. to accommodate the underground facility and provide reasonable flexibility in location.

These statements are vague and do not describe the actual thickness of the host rock. Figure 6-15 shows a detailed section of the host rock and adjacent units, but displays no dimensions. It is implied that faults and fracture zones limit lateral flexibility, but earlier discussions suggest that faults and fractures are not a problem.

The factors that limit vertical and lateral flexibility in siting a repository should be more clearly identified and explained. The thickness of the host rock should be explicitly stated, and a detailed cross-section with dimensions should show the host rock relative to other units so that respective thicknesses can be discerned.

pp. 6-190, 6-204, 6-214, 6-219: Incorrect quotation of DOE siting guidelines

Various provisions of the DOE siting guidelines are quoted incorrectly in the Yucca Mountain EA. For example, the quotations of the qualifying conditions for the postclosure technical guidelines applicable to Climatic Changes (p. 6-190), Erosion (6-204), Dissolution (6-214), and Tectonics (6-219) each omit the second sentence of the respective qualifying condition. Other provisions of the guidelines are also quoted incorrectly in the EA.

The DOE siting guidelines represent the standard which serves as the basis for the evaluations set forth in Chapter 6. The guidelines appear to have been applied in evaluating the Yucca Mountain site as if the text had been set out correctly in

the EA. Nevertheless, misquotation of the guidelines could raise unnecessary questions with respect to whether the evaluations have been conducted pursuant to the correct standard. The above omissions should be corrected and the Yucca Mountain EA should be carefully reviewed against the DOE siting guidelines to ensure that they are quoted correctly throughout.

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Enclosure 3

Specific EEI/UNWMG Comments on Draft
Environmental Assessment
Davis Canyon, Utah

Executive Summary

p. 9: Summary description of groundwater flow

The description of the groundwater system in the vicinity of the Davis Canyon site fails to identify areas where it is thought that groundwater flow discharges. Since this information is of great importance in evaluating geohydrologic conditions at potential repository sites, it should be identified in the Executive Summary. The final sentence on p. 3-132 and Figure 3-39 of the Davis Canyon EA both indicate that discharges are to the Colorado River on the order of 10 to 12 miles from the proposed controlled area boundary of the Davis Canyon site. DOE should include this information in the Executive Summary.

Chapter 5

Chapter 5 generally: Effects on Native Americans

There are no discussions of Native American tribes, even though the state includes Native Americans. With no discussion, it is not known whether potential impacts have been reviewed and found to be insignificant, or whether there has been no investigation. A discussion of possible impacts, if any, on Native American tribes should, therefore, be added to the Davis Canyon EA.

pp. 5-1, 5-32: Representativeness of data

In certain instances, DOE has not based its analyses on site-specific information. For instance, the Davis Canyon EA at p. 5-1 states that "[t]he engineering feasibility studies rely heavily on previous non-site-specific engineering work . . . . Therefore, this engineering information must not be construed to be representative of a final site-specific conceptual design." Similarly, at p. 5-32, the salt disposal discussion states that the "repository program has not advanced to the point where the final selection of a disposal method can be made using data specific to the selected site," but does go on to evaluate the impacts of the various options.

The approach utilized by DOE is both reasonable and sufficient to satisfy the requirements at this stage of the site selection process. Section 960.3-1-4-2 of the DOE guidelines, itself, provides that analyses in the EAs may be based on either data gathered through site-specific testing, or on "extrapolations of regional data to estimate site specific characteristics and conditions." A general explanation of the appropriateness of non-site-specific data should, therefore, be included in both Chapters on impacts. Further, DOE should better explain the appropriateness of employing such data in particular instances when it is used -- in terms of its similarity to data at the site, the low sensitivity of results to variations in such

parameters, and so forth -- in order to more fully address the matter of representativeness with respect to the site in question.

p. 5-50: Adequacy of data

The EA strongly emphasizes the preliminary nature of much of the data. For example, the Davis Canyon EA, in discussing the impact on the air quality related values of the park, states at p. 5-50 that "the present analysis cannot be viewed as the final answer to impacts," and "can be viewed only as a preliminary examination that provides guidance on possible impacts." On the other hand, although not always specifically noted, conservative assumptions and analyses are made throughout the EA. The EA, therefore, should emphasize the appropriateness of the data actually utilized more strongly.

Chapter 6

pp. 6-9, 6-11, 6-15, 6-40, 6-42, 6-60, 6-71, 6-82, 6-165 and 6-211: Internal inconsistencies

There are a number of internal inconsistencies within Chapter 6 of the EA for Davis Canyon, such as different values being given for a single parameter; inconsistent conclusions based on the same underlying information; and inconsistencies between the evaluations under the siting guidelines, and the tabular summaries of these evaluations. For example, inconsistent values are given for groundwater travel time to the acces-

sible environment on p. 6-82 (137,000 to 239,000 years) and p. 6-211 (123,000 to 153,000 years). Similarly different values are given, without explanation, for the annual radiation dose which a maximum exposed individual is predicted to receive from all pathways during construction and operation on pp. 6-9, and 6-11 (less than 0.01 millirem/year) and on pp. 6-15 and 6-71, the summary table on p. 6-60 and Table 6-17 on p. 6-165 (0.15 millirem/year).

Additionally, on p. 6-40, it is stated that DOE projects the ability to meet all Federal and Federally-derived environmental requirements evaluated in Table 6-2 (pp. 6-21 through 6-39c) except the Utah Air Conservation Act, for which there is some uncertainty. However, on p. 6-42, it is stated that there is uncertainty with respect to the ability of the site to comply with the requirements of both the Utah Air Conservation Act and the Endangered Species Act, again based on Table 6-2.

Such inconsistencies may result in questions concerning the accuracy of the EA. Therefore, these and any other inconsistencies should be either explained or corrected.

pp. 6-79, 6-107, 6-108, 3-2, 3-12, 3-18, 3-114, 3-121: Adequacy of geologic, hydrologic, and tectonic investigations

The EA refers to descriptions of the regional geology and geohydrology in the vicinity of the site that are presented in Chapter 3, indicating that investigations have been numerous. This is supported by the extensive reference list of reports at the end of Chapter 3. However, descriptions of the investiga-

tions themselves are notably absent. On pp. 3-2 to 3-16 and pp. 3-114 to 3-117, for example, the geologic and hydrologic conditions are described and referenced, but, unlike the EAs for other sites, the types, extent, and magnitude of investigations providing the information base of the descriptions are not indicated. On p. 6-107 only a general description of type of investigation is given, e.g., "Geophysical studies included purchase and interpretation of a considerable amount of seismic reflection data for the area." Also, maps do not show the location of geophysical survey lines.

The absence of a description of the investigations detracts from the completeness of the condition descriptions. Also, in view of the limited amount of site-specific data available from the site, the large amount of regional investigation and data relevant to the site should be emphasized.

The condition descriptions would be improved if statements were added to describe such factors as the size of areas geologically mapped, the number and collective length of drill holes and exploratory excavations, and the line-miles of geophysical surveys.

pp. 6-79, 6-80: Representativeness of regional studies and data to site conditions

The EA describes the information on regional geology and geohydrology as data that are "relevant" to the site, and states that "in general, uncertainties exist, because the present

data base is limited." However, the regional data are not described in terms of how they are relevant to the site, and the degree to which they are representative of conditions expected to be found at the site during site characterization. Further, although uncertainties are acknowledged, no indication is given as to the likelihood of their being overcome by detailed site characterization.

The relevance of regional and area investigations, and the representativeness of their data to conditions at the site, should be described. It would be helpful to add statements to the EA describing the uniformity of the geology, particularly the thickness and character of stratigraphic units in the deep subsurface (as indicated by the large number of drill holes and geophysical survey lines, whether closely or widely spaced) in the region surrounding the site. This uniformity permits correlation of units and extrapolation of data on rock characteristics from the region to the site with confidence, particularly with respect to depth, thickness, general lithology, and groundwater. Thus, the regional data are very representative of conditions expected at the site. It would also be helpful to note that the layered stratigraphy, many parts of which are almost-continuously traceable for miles around the repository, provides abundant means for detecting anomalies and discontinuities, and for determining their extent and history during more detailed characterization.

pp. 6-81, 6-105, 6-106, 3-49, 3-50, 3-142: Dissolution of host rock

The EA states: "The logs from the GD-1 core and other boreholes in the site vicinity indicate no evidence of dissolution in the site vicinity" (p. 6-81). Sources of information on dissolution are described on p. 6-105 as boreholes, cores, geophysical logs, and field mapping of surface exposures. However, with the exception of field mapping, wherein features indicative of dissolution are described, the types of evidence characteristic of dissolution observable in the other sources are not described. On the other hand, the discussion of carnallite beds in the core of GD-1 (p. 3-142) is a valuable contribution regarding positive evidence of no dissolution.

In general, the absence of evidence of dissolution is not necessarily the same as positive evidence of no dissolution. Sources of information, such as geophysical logs, must permit recognition of dissolution features if they are to be reliable indicators that dissolution features are absent. Borings, wells, and geophysical logging techniques should be qualified in terms of their ability to recognize and define dissolution in salt. Toward this end, it would be helpful to describe evidence present where dissolution has been observed and its characteristic signature in geophysical logs has been demonstrated, and to contrast this with observations near the site.

pp. 6-81, 6-90, 6-91, 6-140, 6-141, 3-27: Thickness of the host rock

The description of the thickness and character of the host rock is very good. However, there are some minor inconsistencies in the thickness stated, e.g.,

"approximately 60 m" -- page 3-27

"approximately 61 m" -- page 6-81

"a minimum of 55 m" -- page 6-140

"between 55 and 65 m" -- page 6-141 (See also pp. 6-90 to 6-91).

These minor inconsistencies could cause some confusion and should be eliminated or explained.

pp. 6-90 to 6-91: Lateral flexibility of the candidate horizon

The evaluation of favorable condition (1) of the post-closure Rock Characteristics technical guideline focuses primarily upon the thickness of the candidate horizon to demonstrate the flexibility offered by the site in selecting the depth, configuration and location of the underground storage facility. However, this favorable condition also requires consideration of the lateral flexibility provided by the site. Figure 3-11 on p. 3-23 indicates that the lateral extent of the preferred candidate horizon is several miles in the vicinity of the proposed repository site. Therefore, a statement should be added to this evaluation that the candidate horizon also provides substantial

lateral flexibility in the final selection of a site for a repository, based upon the information set forth in Figure 3-11 and the discussion thereof.

p. 6-94: Incorrect quotation of DOE siting guidelines

Various provisions of the DOE siting guidelines are quoted incorrectly in the Davis Canyon EA. For example, the second sentence of the qualifying condition for the postclosure Climatic Changes technical guideline has been omitted from the quotation of that qualifying condition on p. 6-94. Other provisions of the guidelines are also quoted incorrectly in the EA.

The DOE siting guidelines represent the standard which serves as the basis for the evaluations set forth in Chapter 6. The guidelines appear to have been applied in evaluating the Davis Canyon site as if the text had been set out correctly in the EA. Nevertheless, misquotation of the guidelines could raise questions with respect to whether the evaluations have been conducted pursuant to the correct standard. The above omission should be corrected and the Davis Canyon EA should be carefully reviewed against the DOE siting guidelines to ensure that the siting guidelines are stated correctly throughout.

pp. 6-108, 6-109, 6-147, 6-148, 6-219: Earthquakes and seismic design

Estimates of preliminary seismic design values are not completely consistent (0.30g, p. 6-108, and 0.35g, p. 6-147), and are described improperly in comparison to those used for nuclear power plants. Further, the description of earthquake sources on p. 6-219 is a little confusing, and perhaps inconsistent, relative to other descriptions of the tectonic environment.

Admittedly, earthquakes and seismic design for a repository are not severe problems, especially at this site with its record of tectonic quiescence. However, descriptions of postulated events and estimated accelerations at the site are confusing and should be clarified. Evaluations of maximum earthquakes and maximum accelerations at a site should be qualified to clearly indicate that they are not only conservative, but will be subject to more detailed specification by later site characterization studies. It should also be stated that development of seismic design parameters, using methodologies and criteria for nuclear power plants, is not appropriate for repositories.

20 March 85

Enclosure 4

Specific EEI/UNWMG Comments on Draft
Environmental Assessment
Deaf Smith County, Texas

Chapter 2

pp. 2-9, 2-12: Criteria utilized in area-to-location screening

The description of the process used in area-to-location screening in the Permian Basin in Chapter 2 of the Deaf Smith EA reports on the use of criteria from DOE/NWTS-33(2). The text and Tables 2-1 and 2-2 describe only those criteria that were found "useful" without describing which criteria were not utilized and for what reasons. Criteria not included in Tables 2-1 and 2-2 are (II) Geohydrology (omitted from Table 2-1 only), (III) Geochemistry, (V) Tectonic Environment, and (X) Socio-economic Impact. Their absence naturally raises questions as to whether or not these omissions are significant.

DOE should modify Tables 2-1 and 2-2 to list all the criteria of DOE/NWTS-33(2), and add a brief notation for each criterion not used to explain why it was not considered useful.

Chapter 6

Chapter 6 generally: Need for integration and perspective for technical issues

As illustrated by examples cited below, there are frequent circumstances in Chapter 6 of the Deaf Smith EA wherein the text refers to technical problems, but little indication is given that the problems are recognized, will be addressed, and will be resolved.

These circumstances are a consequence of the structure and format of the EAs, certain characteristics of the Deaf Smith site, and the status of information concerning the site. Specifically, the EA approach of discussing each site suitability guideline individually does not readily provide an overall perspective on the various technical issues affecting suitability. Perspective is essential for the Deaf Smith site because there is at present a lack of on-site data, the site is geologically and hydrologically complex, and physical properties of the site may be difficult to evaluate reliably.

DOE's understanding of the technical issues associated with the Deaf Smith site and its strategic approach to addressing and resolving them are, in fact, sound. The soundness of the DOE approach can be inferred by an informed reviewer who can link the discussions of the individual guidelines and can deduce, utilizing expertise, key elements of the DOE strategy. Many reviewers may not, however, have these capabilities.

An example of the circumstances outlined above is the discussion of geohydrology on pp. 6-81 and 6-82 of the Deaf Smith draft EA. This discussion states that attempts to measure in situ properties have generally been unsuccessful; that laboratory measurements are not representative; that flow probably occurs through discrete channels or fractures, rather than through the media for which measurements are being attempted; and that identification and characterization of the flow paths is problematical. Collectively, these statements suggest that

improved characterization of the site resulting in the reduction of particular uncertainties will be difficult. After identifying (but not discussing) these site characterization issues, however, the EA proceeds by describing flow modeling approaches and results. The modeling approach is stated to be conservative, and results show that "Preliminary calculated conditions meet the limits . . . by wide margins" (p. 6-82).

The results of the conservative modeling studies suggest, by themselves, that the minimization of uncertainties in values for certain site physical properties and flow paths might not be essential. When the flow modeling results are combined with results of the brine migration, waste package performance, and disruptive scenario evaluations, it then becomes quite clear that safety performance of a repository at the Deaf Smith site would not depend significantly on nuclide transport in the site geohydrology. Difficulties in evaluating geohydrologic properties for the Deaf Smith site are therefore not a significant problem, but this fact is not evident from the individual, guideline-oriented discussions in the EA.

The information presented in Chapter 6 of the EA shows that a repository at the Deaf Smith site could provide long-term safety with high margins. This finding could be communicated more effectively by adding a section which integrates the results of the individual guideline assessments, and provides perspective

on the individual technical issues. The discussions for the individual guidelines could reference this section as necessary and appropriate.

pp. 6-18 through 6-44: Projected ability to comply with State and local environmental requirements

The evaluation of the preclosure Environmental Quality technical guideline includes an extensive listing of Federal and Federally-derived environmental laws and regulatory requirements, and the projected ability of a repository located at the Deaf Smith site to comply with such requirements (Table 6-2, pp. 6-21 through 6-33). The evaluation also includes a listing of other potentially applicable State statutory and regulatory requirements (Table 6-3, pp. 6-34 through 6-35), but does not offer any evaluation of the projected ability of the Deaf Smith site to satisfy such requirements. Further, there is no identification of potentially applicable local environmental laws and regulations, or the projected ability of the Deaf Smith site to satisfy such requirements. The EA simply states that "The DOE intends to comply with the substantive requirements of applicable State and local laws and regulations" (p. 6-41).

The conditions included in the Environmental Quality technical guideline (particularly favorable condition (1) and potentially adverse condition (1)) require consideration of the projected ability of the site to comply with Federal, State and local environmental requirements. The evaluation of this technical guideline should be expanded to discuss the projected

ability of the site to comply with State and local environmental requirements. For example, such projections could be added to Table 6-3, similar to the discussion included in Table 6-2.

pp. 6-81, 6-92, 6-108: Representativeness of regional studies and data to site conditions

The EA states: "The geohydrologic analysis is based on the assumption that site conditions and parameters are either not significantly different from the regional conditions or can be derived from the evaluation of regional trends" (p. 6-81). No rationale is offered to support this statement, however, thus raising questions. In view of this statement, and others elsewhere to the effect that site-specific data are lacking, 1/ the relevance of the regional and areal investigations, and the representativeness of their data to conditions at the site, should be described. In particular, it would be helpful to add statements to the EA describing the uniformity of geology, particularly the thickness and character of stratigraphic units in the deep subsurface, as indicated by the large number of drill holes and geophysical survey lines, whether closely or widely spaced, in the region surrounding the site. This uniformity permits the correlation of units and extrapolation of data on rock characteristics from the region to the site with confidence,

1/ E.g., elsewhere the EA states: "It has been assumed that the limited core tested from adjacent boreholes is representative of the in situ rock at the site and that site stratigraphy is as indicated from present exploration. Some uncertainty exists because the nearest exploration hole is approximately 5.6 kilometers (3.5 miles) from the site" (p. 6-137).

particularly with respect to depth, thickness, general lithology, and groundwater. Thus, the regional data are very representative of conditions expected at the site.

pp. 6-82, 6-85, 6-98, 6-116, 6-122 and 6-209: Internal inconsistencies

There are a number of inconsistencies within Chapter 6 of the Deaf Smith EA, such as different values for a single parameter, and inconsistencies between the evaluations under the siting guidelines and the tabular summaries of these evaluations. For example, different values are given, without explanation, for the pre-waste-emplacement groundwater travel time from the disturbed zone to the accessible environment on pp. 6-82 and 6-209 (87,000 to 361,000 years) and on p. 6-85 and the summary table on p. 6-116 (769,000 years). Similarly, the evaluation of favorable condition (2) under the postclosure Climatic Changes technical guideline on p. 6-98 concludes that the favorable condition is not present, but the summary of this evaluation on the table on p. 6-122 states that the favorable condition is present.

Such inconsistencies may cause questions with respect to the accuracy and appropriateness of data utilized in the EA. Therefore, these and any other inconsistencies should be explained or corrected.

pp. 6-92, 6-93, 6-139: Description of the host rock lithology and thickness

The host rock is described in different ways as follows:

Page 6-93	Page 3-41
Upper salt, 5.6m (thick)	Upper salt, 24m, with traces and stringers of siltstone, etc.
Muddy salt, 0.75m	
Middle salt, 10.7m	Middle salt, 6m, nearly pure
Muddy salt, 0.9m	
Lower salt, 32m	Lower salt, 18m, with thin layers and pockets of claystone
50m total thickness	48m total thickness

These descriptions display variations and are confusing, especially in view of different lithologic terms, i.e., "muddy zones," "claystone/siltstone partings," "interbeds," and "stringers," to identify impurities in the salt or intervals separating it into more-or-less pure salt.

The descriptions of lithology and thickness should be consistent in each chapter or, if more detailed in one or arbitrarily subdivided into units for ease of discussion in another, the reasons for the differences should be explained.

pp. 6-96, 6-99, 6-105 and 6-108: Incorrect quotation of DOE siting guidelines

Various provisions of the DOE siting guidelines are quoted incorrectly in the Deaf Smith EA. For example, the quotations of the qualifying conditions for the postclosure technical guidelines applicable to Climatic Changes (p. 6-96), Erosion (p. 6-99), Dissolution (p. 6-105) and Tectonics (p. 6-108) each omit the second sentence of the respective qualifying condition. Other provisions of the guidelines are also misquoted in the EA.

The DOE siting guidelines represent the standard which serves as the basis for the evaluations set forth in Chapter 6. The guidelines appear to have been applied in evaluating the Deaf Smith site as if the text had been set out correctly in the EA. Nevertheless, misquotation of the guidelines could raise unnecessary questions with respect to whether the evaluations have been conducted pursuant to the correct standard. The Deaf Smith EA should be carefully reviewed against the DOE siting guidelines to ensure that the siting guidelines are quoted correctly throughout.

p. 6-107: Dissolution of host rock

The EA states "There is no evidence of Quaternary dissolution of the host rock in any core or geophysical logs from the wells near the site." There is no supporting evidence for this statement, however, or description of the observations on which this conclusion is based.

The borings, wells, and geophysical logging techniques should be qualified in terms of their ability to permit recognition and definition of dissolution in salt. Toward this end, it would be helpful to describe the evidence where dissolution has been observed and its characteristic signature in geophysical logs has been demonstrated and to contrast this with observations near the site.

pp. 6-110, 6-144, 6-145, and 3-58: Earthquakes and seismic design

The EA states on p. 3-58: "[A] magnitude 5.3 event could occur on a fault anywhere within the Palo Duro Basin and would have an epicentral Intensity of VI or VII, corresponding to a peak ground acceleration of 20 percent gravity," and "A magnitude 6.3 earthquake on the Amarillo Uplift, about 55 to 80 kilometers . . . from the Deaf Smith site, would cause a peak ground acceleration of about 5 percent gravity at the site." The EA states on p. 6-144: "The maximum credible earthquake at the site . . . is equivalent to a peak horizontal ground acceleration of 0.2 gravity." And on p. 6-145, the EA states: "Seismic events of magnitude 6.3 postulated . . . for the Amarillo Uplift would not produce excessive ground motion levels at the site relative to design limits used for nuclear facilities elsewhere."

Admittedly, earthquakes and seismic design for a repository are not severe problems, especially at this site with its record of tectonic quiescence. However, the above descriptions of postulated events and accelerations at the site are unnecessarily confusing and should be clarified.

The reason that magnitude 6.3 events on the Amarillo Uplift would not produce excessive ground motion at the site is not because of design limits used for nuclear facilities elsewhere, but because the ground motion level likely to be used as a design basis for the site is the 0.2g acceleration that could result from a magnitude 5.3 earthquake occurring anywhere in the Palo Duro Basin, even near the site. Further, evaluations of maximum earthquakes and estimations of maximum peak accelerations at a site should be qualified to clearly indicate that they are conservative and will be determined by later, detailed site characterization studies. It should also be stated that development of seismic-design parameters at this time, using methodology and criteria for nuclear power plants, is not appropriate for repositories.

pp. 6-112 to 6-113: Potential for petroleum resources and human intrusion

Discussion of this subject refers to information contained in Chapter 3. Statements could be added, however, that would strengthen the descriptions of resource potential on pp. 3-86, 3-92, and 3-93. In particular, it should be emphasized

that many exploratory wells have been drilled in the vicinity of the site and have been unsuccessful in locating sustainable, economic sources of petroleum production.

20 Mar 85

Enclosure 5

Specific EEI/UNWMG Comments on Draft
Environmental Assessment
Richton Dome, Mississippi

Chapters 3 and 5

pp. 3-39, 5-1: Representativeness of data

In certain instances, DOE has not based its analyses on site-specific information. As a particular example, the Richton EA states at p. 3-39 that site-specific data are not available for evaluation of geomechanical conditions at the site, but that estimates have been used instead from empirical correlations, experience at other sites, and engineering judgments. The EA also indicates, at p. 5-1, that the engineering feasibility studies rely heavily on previous, non-site-specific engineering work, and that the engineering information presented must not be taken as representative of a final, site-specific conceptual design.

It is clear that the approach taken by DOE is both reasonable and sufficient to satisfy the requirements at this early stage of the site selection process. In addition, section 960.3-1-4-2 of the DOE siting guidelines provides that analyses in the EAs may be based on either data gathered through site-specific testing, or on "extrapolations of regional data to estimate site specific characteristics and conditions." A general explanation of the appropriateness of non-site-specific data should, therefore, be included in both chapters on impacts referencing the above guideline. Further, DOE should better explain the appropriateness of employing such data in particular

instances when it is used in terms of its similarity to data at the site, the low sensitivity of results to variations in such parameters, and so forth, in order to more fully address the matter of representativeness with respect to the site in question.

Chapter 6

pp. 6-14, 6-59c, 6-72, 6-106 and 6-164: Internal inconsistencies

There are a number of inconsistencies within Chapter 6 of the Richton EA, such as different values being given for a single parameter, and inconsistencies between the evaluations under the siting guidelines and the tabular summaries of these evaluations. For example, different values are given, without explanation, for the estimated horizontal distance that could be traveled by groundwater in the salt stock on p. 6-72 (23 meters in 10,000 years) and the summary table on p. 6-106 (15 meters in 100,000 years). Similarly, different values are given for the annual radiation dose expected to be received by the maximum exposed individual on p. 6-14 (less than 0.01 millirem/year), the summary table on p. 6-59c (less than 0.06 millirem/year) and Table 6-20 on p. 6-164 (.0056 millirem/year).

Such inconsistencies may cause questions to be raised with respect to the overall accuracy of the data utilized in the EA. These and any other internal inconsistencies should be explained or corrected.

p. 6-70: Nature and extent of investigations

The relevant data on geology, hydrology, etc., in support of this chapter are referenced to descriptions in Chapter 3. However, the descriptions in Chapter 3 are of conditions and do not include the investigations on which they are based. A minor exception is on page 3-17, where the EA states that the stratigraphy of the dome and adjacent area is "based on data from numerous borings."

The lack of description of the investigations detracts from the authority of the condition descriptions. Further, in view of the limited amount of on-site data available, the large amount of regional investigation and data relevant to the site should be emphasized.

The condition descriptions would be improved and their soundness enhanced if statements were added to describe the size of areas geologically mapped, the number and collective length of drill holes and exploratory excavations, and the line-miles of geophysical surveys.

p. 6-86: Incorrect quotation of DOE siting guidelines

Various provisions of the DOE siting guidelines are quoted incorrectly in the Richton EA. For example, the second sentence of the qualifying condition for the postclosure Climatic

Changes technical guideline has been omitted from the quotation of that guideline on p. 6-86. Other provisions of the guidelines are also quoted incorrectly in the draft EA.

The DOE siting guidelines represent the standard which serves as the basis for the evaluations set forth in Chapter 6. The guidelines appear to have been applied in evaluating the Richton site as if the text had been set out correctly in the EA. Nevertheless, misquotation of the guidelines could raise unnecessary questions with respect to whether the evaluations have been conducted pursuant to the correct standard. The above omission should be corrected and the Richton EA should be reviewed against the DOE siting guidelines to ensure that the siting guidelines are quoted correctly throughout.

p. 6-128: Substitution of information applicable to Cypress Creek for information applicable to Richton Dome

A page from Table 6-11 of the EA for the Cypress Creek site has been substituted for p. 2 of Table 6-13 on p. 6-128 of the Richton EA. This page should be deleted and replaced with p. 2 of Table 6-13 for Richton.

pp. 6-146, 6-147, 6-217: Earthquakes and seismic design

The EA states:

1. "the maximum earthquake at the site will be magnitude 5.3 ... with maximum ground acceleration of 14 percent of gravity" (p. 6-146);

2. "The maximum earthquake shaking for Richton Dome site is projected to be lower than for half of the nuclear plants and is significantly less than values that have generally been allowed for nuclear facilities" (p. 6-146);

3. "The maximum earthquake that might occur at random locations in the region...was estimated as Richter magnitude 5.3...and accelerations on the order of 14 percent of gravity" (p. 6-217); and

4. "The repository will be designed to operate assuming these maximum earthquakes" (p. 6-217).

Admittedly, earthquakes and seismic design for a repository are not severe problems, especially at this site with its record of tectonic quiescence. However, in view of the limited site-specific investigations to date, it is premature to commit to seismic-design parameters at the EA stage. Estimates of maximum earthquakes and maximum accelerations at the site should be qualified to clearly indicate that they are not only conservative, but will be determined by later site characterization studies. It should also be stated that development of seismic-design parameters at this time, using methodology and criteria for nuclear power plants, is not appropriate for repositories.

20 Mar 85

Enclosure 6

Specific EEI/UNWMG Comments on Draft
Environmental Assessments
Applicable to
Three Or More Sites

Executive Summary

Content of Executive Summary

Page 3 of each Executive Summary has a caution that "this Executive Summary does not provide a sufficient basis for commenting on the draft EA because of the amount and the complexity of the information presented in that document." While this type of comment is generally true of any Executive Summary, it must nevertheless be recognized that a great many readers, including members of Congress, executives and influential opinion leaders, will be forced to limit their personal review to the Executive Summary and perhaps one or two other key sections. For this reason, it is important that the Executive Summary accurately track the body of the text, and that its content reflect the principal findings, conclusions and uncertainties expressed in subsequent sections. In particular, the Executive Summary should only contain summary statements that are supported by the discussion in the text. DOE should carefully re-evaluate each Executive Summary with this thought in mind.

Davis Canyon,	p. 20
Deaf Smith,	p. 18
Richton,	p. 19

Uniform treatment of salt creep effects

Section 6.3.3 of the Executive Summary for Davis Canyon indicates that waste retrieval could be adversely affected by a variety of factors including thermal cracking, radiation effects

on the mechanical behavior of the rock, creep around and stresses on the overpack, and brine migration toward the canister. By contrast, the equivalent section for the Deaf Smith site states only that "the openings of the repository will remain stable enough to allow the retrieval of waste if necessary." In addition, few potential problems with waste retrieval are identified for the Richton site.

The possible effect of salt creep on retrieval of canisters during the "caretaker period" after repository operation should be related to the relevant salt properties at each site.

It is suggested that the characterization of potential difficulties for waste package retrieval that appears in the Davis Canyon EA be used in the EAs for all salt sites, unless there are significant differences in mechanical properties of the salt at each site, in which case these differences should be noted.

Chapters 4 and 5

Yucca Mountain,	Chapter 4, Section 4.1.2 (p. 4-7), Chapter 5, Section 5.1.1.3 (p. 5-9)
Hanford,	Chapter 4, Section 4.1.1.6 (p. 4-10), Chapter 5, Section 5.1.3.1 (p. 5-23), Figure 5-7 (p. 5-19)
Deaf Smith,	Chapter 4, Section 4.1.2 (p. 4-23), Chapter 5, Section 5.1.1.3 (p. 5-12), Table 5-1 (p. 5-4)

Exploratory shafts and surface facilities

The EAs contain wide variations among the number and size of shafts drilled for site characterization and repository operations, as follows:

	Yucca Mountain	Hanford	Deaf Smith
Site Characterization			
main shaft (diameter)	12 ft.	6 ft.	10 ft.
safety shaft (diameter)	6 ft.	6 ft.	22 ft.
Operations			
no. of shafts	6	9	5
diameter	-	12 ft. max.	21 ft. to 31 ft.

The technical basis for these variations is not apparent in the EAs. Overly large diameter shafts, such as the Deaf Smith safety shaft appears to be, are extremely expensive and time consuming to build, and it is speculative whether they will be in the correct location to be incorporated into reposi-

tory operations should that particular site be chosen. Therefore, in instances where these variations have a significant effect on impacts, DOE should explain the variations.

Similarly, the repository surface facilities should be essentially identical for all sites (except for variations in layout). All processing operations, transport services and operating personnel requirements should be the same for all sites. The capital and operational costs of the surface facilities will vary only with differences in local construction costs and labor rates. Accordingly, surface facility descriptions for all EAs should be the same, or variations explained or otherwise justified.

Yucca Mountain,	pp. 4-25 to 4-26;	5-39 to 5-44
Davis Canyon,	pp. 4-80 to 4-95;	5-50 to 5-66
Richton,	pp. 4-90 to 4-100;	5-48 to 5-64
Deaf Smith,	pp. 4-82 to 4-93;	5-47 to 5-64
Hanford,	pp. 4-27 to 4-34;	5-43 to 5-44

Clean air requirements

The presentation of data with respect to air quality impacts during site characterization, construction, and operation, and the evaluation of that data, is inconsistent among the EAs. In general, the treatment of this topic in the Yucca Mountain and Hanford EAs is much more cursory than the treatment in the other three EAs. For its part, the Hanford EA does contain, in Chapter 5 (regional impacts), a brief discussion with no quantitative analysis, basing its conclusions on comparable construction projects in which a lack of adverse air quality

impacts was experienced. This approach appears to be reasonable. Further, Chapter 4 of the Hanford EA (impacts of site characterization) also contains a somewhat more expanded analysis.

Deaf Smith exemplifies the more thorough treatment of the air quality issue. There are, however, apparent inconsistencies among the three EAs that contain more detailed analyses of air quality impacts. For example, vehicle emissions and fugitive dust from earthmoving activities are both considered in the Deaf Smith evaluation of air quality impacts during repository operation (see p. 5-61, Section 5.2.5.2), while such factors are apparently not considered in the comparable analysis in the Davis Canyon EA (see p. 5-59, Section 5.2.5.3). Even if these quantities are negligible, the Davis Canyon EA should make clear that they were included in its analysis. In addition, the format of the air quality impacts evaluations varies in many ways among EAs and makes comparisons difficult in general.

Also, the treatment of Prevention of Significant Deterioration ("PSD") regulations is inconsistent among EAs. The Deaf Smith EA seems to assume the applicability of PSD regulations as to visibility only (see p. 5-64, Section 5.2.5.4.4). Richton, on the other hand, states in Chapter 4 (see p. 4-95, Section 4.2.1.3.2) that PSD requirements do not apply because they do not cover the particular primary fugitive and mobile source types present (a factor seemingly fairly independent of

location). The Yucca Mountain EA, meanwhile, finds in Chapter 4 (at pp. 4-25 and 4-26, Section 4.2.1.3) that PSD requirements would not likely be triggered during testing, but may be triggered during operation (see p. 5-39, Section 5.2.5.1). Furthermore, the Yucca Mountain EA states at p. 5-44 that it has foregone consideration altogether of PSD regulatory impacts because of "the uncertainties involved in many of the emission estimates and modeling assumptions."

To ensure uniform treatment of this subject, and to enable comparisons to be made more easily among the EAs, it is recommended that the above inconsistencies in coverage be eliminated, or that variations be explained, and that a more consistent format for presenting both the input data and the conclusions as to impacts be adopted.

Yucca Mountain,	p. 4-35
Davis Canyon,	pp. 4-45, 5-27, 5-29
Richton,	pp. 4-53, 4-55, 5-28
Deaf Smith,	pp. 4-48, 4-125, 5-28
Hanford,	pp. 4-38, 4-39, 5-67, 5-68

Worker safety and health

The treatment of worker health and safety appears to be a consideration generic to all sites, with the exception that different regulations may be applicable depending on the medium being mined. The analysis of worker health and safety, however, and the application of regulatory standards, is inconsistent among the EAs, as described below. To enhance uniformity of treatment, and to aid in the comparison of impacts among EAs, the

variations described below -- in terms of both input data and the application of health and safety regulations -- should be either explained or eliminated, and the analyses should be made uniform.

1. <u>During Site Characterization</u>: The Yucca Mountain EA at p. 4-35 and the Hanford EA at p. 4-39 contain an estimate of numbers of expected worker injuries and fatalities during site characterization. On the other hand, the Davis Canyon EA at p. 4-45, Richton EA at p. 4-55 and Deaf Smith EA at p. 4-48 contain estimates only of injury and fatality rates (that is, injuries and fatalities per work-hour) during characterization. Projected work-hours, which would allow specific numbers of injuries and fatalities to be calculated, are not provided. Thus, this impact cannot be compared among the EAs.

Further, it is unclear why the analyses were based on different sources. The Yucca Mountain analysis was based on 1982 statistics provided by the National Safety Council, the Hanford analysis was based on a 1980 DOE Report, and the other three analyses were based on 1976-79 statistics provided by the Mine Safety and Health Administration (Department of Labor). These differences in approach should be explained or otherwise justified.

2. <u>During Construction, Operation and Closure:</u> All five of the above EAs discuss occupational safety and health during construction, operation and closure, at Section 6.3.3.2, in their evaluations of the preclosure technical guidelines for

Rock Characteristics. The discussion is mostly qualitative, relating to whether certain significant health and safety concerns are likely to be present.

In the Hanford EA there is also a discussion of occupational safety and health in Chapter 5 at p. 5-67, which references and summarizes the Chapter 6 analysis and gives specific numbers of expected injuries and fatalities during mining and construction. Also, at p. 5-68, there is a reference to the Chapter 6 analysis for a discussion of safety during the operational phase, although that discussion appears to address only radiological hazards. Davis Canyon, Richton, and Deaf Smith, on the other hand, each provide in Chapter 5 (at pp. 5-28 or 5-29) only an estimate of rates of injuries and fatalities due to nonradiological hazards during waste handling operations. They do not provide an estimate of work hours, which would allow specific numbers of injuries and fatalities to be calculated. Furthermore, none of these three EAs references the discussion of occupational safety in Section 6.3.3.2. (Note also that in the Davis Canyon EA at Section 6.3.3.2.4, p. 6-144, the reference to Section 6.3.3.2.4 apparently is an error and should be changed to Section 6.3.3.2.3.) Further, while the Yucca Mountain EA does contain the Section 6.3.3.2 discussion, it apparently contains no discussion at all in Chapter 5 of occupational safety, and no reference to the Chapter 6 discussion.

In order to enhance consistency and aid comparison among sites, the discussion of occupational health and safety during construction, operation and closure should be made more uniform, or reasons should be presented for variations.

3. Application of Occupational Health and Safety Regulations: Four of the EAs (Davis Canyon, Richton, Deaf Smith, and Hanford) discuss the applicability of various federal and state occupational safety and health regulations. The discussions in the EAs, however, cite different regulations and different reasons for deeming the various regulations to be applicable. By contrast, Yucca Mountain apparently contains no discussion whatsoever of the applicability of health and safety regulations. These differences should be either eliminated or explained.

Chapter 5

Yucca Mountain,	Section 5.4
Deaf Smith,	Section 5.4
Davis Canyon,	Section 5.4
Richton,	Section 5.4
Hanford,	Section 5.2.3

Socio-economic impacts and mitigation

All of the EAs estimate and discuss socio-economic impacts. However, none of the EAs contains any significant discussion of impact mitigation. While this approach may be

suitable for ranking the sites, it can unnecessarily overstate the negative impacts associated with the repository, and this should at least be noted.

In addition, the EAs do not fully discuss the positive socio-economic impacts of hosting a repository. In fact, a repository can bring a large number of benefits to a community. These can include increased local employment, higher wages and improved road and rail facilities.

In all the EAs, DOE should provide a more realistic assessment of the impacts by discussing positive impacts more fully, and by expanding the discussion of mitigation measures as to negative impacts. A more complete discussion of benefits should also be included.

Yucca Mountain,	Section 5.1.2.1, Table 5-10
Deaf Smith,	Section 5.1.3.1, Table 5-11, Figure 5-11
Richton	Section 5.1.3.1, Table 5-11, Figure 5-11
Davis Canyon	Section 5.1.3.1, Table 5-11, Figure 5-11

Receipt of spent nuclear fuel and high level waste

The rate of spent nuclear fuel (SNF) receipt in the EA analyses does not conform to the DOE Mission Plan. Also, it is inconsistent among the sites and is frequently inconsistent within an EA for a specific site. For example, Yucca Mountain SNF receipt equates to approximately 1,500 MTU/yr. Table 5-11

and Figure 5-11 for Deaf Smith and the other salt sites, on the other hand, utilize receipt rates that differ from the Yucca Mountain receipt rate, as well as with each other. These conditions make it difficult to compare the sites on the basis of cost, staffing, and socio-economic impact, and it is difficult in general to scale up those factors to Mission Plan conditions of 3,000 MTU per year.

For consistency, the EA analyses should -- if at all possible -- be based on a uniform rate of receipt of material. This rate should be the Mission Plan basis of 3,000 MTU/yr. While such consistency may not be a necessary prerequisite to performing a valid comparison among sites, it will be of significant assistance.

Chapters 5 and 6

Yucca Mountain,	Chapter 5, Figure 5-4 (p. 5-7), Tables 5-1, 5-3, etc. (p. 5-9); Chapter 6, Section 6.4.2.1.1 (p. 6-306)
Hanford,	Chapter 5, Sections 5.1.2.1 (p. 5-18), 5.1.3.1 (p. 5-23), 5.1.4.2 (p. 5-37), Figure 5-7 (p. 5-19), Table 5-9 (p. 5-37)
Deaf Smith,	Chapter 5, Section 5.1.1.2 (p. 5-8), Figure 5-2 (p. 5-9), etc.; Chapter 6, Section 6.4.2.2.1 (p. 6-171), Table 6-27 (p. 6-173)

Canister design

The design of the sealed canister containing spent nuclear fuel (SNF) is affected by the acceptable thermal load, corrosive properties of the material, and structural forces imposed by the host medium. This may account for the wide

variations in equivalent consolidated fuel rods contained in apparently similar size canisters for use at Yucca Mountain, Hanford, and Deaf Smith, but this is not clear from the presentations. For example, a 25" I.D. canister at Yucca Mountain holds the equivalent of seven PWR assemblies, while a 21-1/2" I.D. canister at Deaf Smith holds ten.

The packing efficiency in the canister has wide ranging effects. It dictates the number and size of the canisters and, in turn, the amount of underground work and volume of excavated material. It, therefore, should also affect -- to some degree -- the overall design of the surface facility. Where different canister design criteria are used at each site, meaningful comparison among sites thus becomes difficult. Variations in canister design criteria should, therefore, be explained and justified or, where possible, eliminated. Of course, no such justification or elimination of inconsistencies is required if DOE can show that the results of the analyses are relatively insensitive to such measures.

Chapter 6

All EAs

Appendix IV

The types of information identified in Appendix IV to be utilized in the evaluation of each site under the DOE technical siting guidelines appear to be present in each EA.

However, all of this information is not always discussed or referenced in the evaluations under the technical guidelines in Chapter 6.

For example, the evaluation of the preclosure Environmental Quality technical guideline in the EA for the Hanford site (Section 6.2.1.6, p. 6-25) does not contain specific discussions of -- or references to discussion of -- existing air quality and trends, existing surface-water and groundwater quantity and quality, existing terrestrial and aquatic vegetation and wildlife, or existing aesthetic characteristics, each of which is a type of information identified in Appendix IV. All of these matters are discussed in Chapter 3 of the Hanford EA (Section 3.4) and the implication is that the discussion of environmental impacts in Chapter 6 is based upon the baseline environmental data set forth in Chapter 3.

In order to facilitate compliance with the requirements of Appendix IV, the evaluation of this technical guideline in Chapter 6 of the Hanford EA should contain a cross-reference to the discussion of these matters in Chapter 3. Similarly, a review of each EA that is to be finalized should be undertaken to ensure that when the types of information identified in Appendix IV as being applicable to a particular technical guideline are not set forth separately in the evaluation of that technical guideline in Chapter 6, the Chapter 6 evaluation contains a cross-reference to the portions of the EA where the information is presented.

Deaf Smith,	pp. 2-19, 2-20, 6-7 through 6-10
Davis Canyon,	pp. 6-8 through 6-11
Richton,	pp. 6-8 through 6-11, 6-146

Application of reactor siting criteria to repository siting

In several places in the EAs, comparison is made between repositories and nuclear power plants with respect to approaches to evaluations. One example is the methodology for evaluating maximum values and estimating values of peak ground acceleration at a repository site (see Richton EA, p. 6-146). Among other matters, the application of reactor based earthquake criteria to a repository ignores the fundamental differences between an above-ground facility and a below-ground facility.

Similarly, the EAs for the salt sites utilize a concept of remoteness derived from an "analogy" with nuclear reactor regulation. The use of this analogy is overly conservative, however, and can, indeed, be misleading to the extent it suggests that the impacts of operations or accidents at power reactors are comparable to those for a waste repository. Considering the entirely different operations carried out at these facilities -- and the vast difference in operating conditions, such as temperature, pressure and differences in stored energy -- it is clear that an analogy between the two types of facilities for the purpose of defining remoteness is not appropriate.

It is suggested that a more proper criterion for defining remoteness be developed based on potential radiological

impact. 1/ Alternatively, the conservatism of the power reactor analogy -- as presented in the EAs -- should be specifically noted.

Davis Canyon,	p. 6-148
Richton,	p. 6-147
Deaf Smith,	pp. 6-143 through 6-149
Yucca Mountain,	pp. 6-288 through 6-298
Hanford,	pp. 6-209 through 6-215

Induced seismicity from construction

Only the Davis Canyon EA appears to address the potential for induced seismicity as a result of repository excavation (p. 6-148). The potential for such seismicity should be acknowledged for all sites, and an indication provided of any studies underway to evaluate this potential.

Davis Canyon,	pp. 6-106 to 6-112
Deaf Smith,	pp. 6-108 to 6-111
Hanford,	pp. 6-126 to 6-137
Yucca Mountain,	pp. 6-219 to 6-235

Reference to study of earthquake damage to underground structures

The evaluation of the postclosure Tectonics technical guideline (particularly potentially adverse condition (2)) in the Richton EA includes the following statement:

> A study of earthquake damage to underground structures that evaluated 107 cases in eight countries determined that significant damage occurred only at surface accelerations greater than 0.5 g. Only minor damage was observed in

1/ In this connection, the radiological bases for establishing population criterion for reactor siting (see 10 CFR §§ 100.10, 100.11) might be utilized.

> some cases at surface accelerations of 0.2 g to 0.5 g (McClure, 1981, p. 79-80) [Richton EA, p. 6-97].

The evaluation then compares the anticipated surface accelerations at Richton (0.14 g) from expected earthquake activity with the results of the study and concludes that these accelerations are not expected to affect waste containment and isolation.

This study, as referenced in connection with the Richton site, seems equally appropriate and applicable to the other potential sites. Therefore, a statement similar to that quoted above could be added to the discussion of the postclosure Tectonics technical guideline in each of the other EAs. A comparison of the results of the study with the anticipated surface acceleration at each site from expected earthquake activity would add support to the conclusion in each EA that any such activity is not expected to affect waste isolation and containment at the site.

Yucca Mountain,	Chapter 6, Section 6.4.1.2.2, Table 6-41
Hanford,	Chapter 6, Section 6.4.1.4.2
Deaf Smith,	Chapter 6, Sections 6.4.1.2. and 6.4.2.2.

Failed Fuel

Radiological assessment of operations should be on a consistent basis with regard to failed fuel rods. The Yucca Mountain analysis is based upon a 1 percent failure rate at the reactor; Hanford uses 0.5 percent; and the Deaf Smith analysis claims that it will receive less than 6 failed fuel rods per

year. The Hanford value is sufficiently conservative and either should be employed throughout the EAs or variations explained or otherwise justified.

Davis Canyon,	p. 6-174
Yucca Mountain,	p. 6-304
Richton,	p. 6-171
Deaf Smith,	p. 6-171
Hanford,	p. 6-223

Age of spent nuclear fuel

These subsections list an assumption that waste (spent fuel) is emplaced 10 years after the fuel is discharged from the reactor. This appears to be a reasonable assumption that provides consistency to the analyses in the EAs. Although the HLW contract specifies that fuel older than 5 years will be accepted by DOE when DOE becomes obligated to receive spent fuel from a utility, in reality the age of the fuel is likely to be greater than 5 years. The assumption that 10 year-old fuel is emplaced reflects this reality.

In its Comments on the Draft Mission Plan, EEI pointed out that the implication of assuming the emplacement of 5 year-old fuel may be unnecessarily restrictive, especially for the first repository. EEI suggested at that time that it may be desirable to base designs on 10 year-old fuel to optimize the environmental and economic aspects of the repository program. (See Detailed Comments of EEI/UNWMG on the December 20, 1983

Volume I of Mission Plan, p. 1, attached to a cover letter dated January 31, 1984 from John J. Kearney to Charles R. Head.) The same reasoning applies to the EAs.

Davis Canyon,	p. 6-174
Yucca Mountain,	p. 6-306
Richton,	p. 6-171
Deaf Smith,	p. 6-171
Hanford,	p. 6-229

Waste and package description

These subsections briefly describe the waste forms and waste package subsystem. However, they are brief and could more thoroughly cover the range and quantity of waste forms and packages that might be emplaced in the repository.

Sections 5.1.2.1 and 5.1.2.2 (pp. 5-20 to 5-24) of the Yucca Mountain EA discuss in detail the range and quantity of each type of waste, and Table 5-10 of this EA lists "Waste quantities by waste category." It would be helpful if this type of information were incorporated into the waste package subsystem analysis of all EAs.

Davis Canyon,	p. 6-195
Yucca Mountain,	p. 6-309
Richton,	p. 6-195
Deaf Smith,	p. 6-193

Waste package failure

These subsections do not clearly define the point of waste container failure. They do discuss the primary failure

mechanisms, but do not adequately define that point at which the container is considered to have corroded sufficiently to cause collapse from surrounding stress.

Section 6.4.2.3 of the Hanford EA (p. 6-233) addresses this point. Package lifetime is defined "as the time required to deplete 7.5 centimeters (3 inches) of container wall, not the actual designed 8.3 centimeters (3.3 inch) thickness of the container wall." A similar approach to waste container failure would be helpful in the other EAs.

Davis Canyon,	p. 6-209, Appendix 6A
Deaf Smith,	pp. 6-206, 6-207, Appendix 6A
Richton,	p. 6-206, Appendix 6A

Extent of the disturbed zone

The EAs indicate that the estimate of the extent of the disturbed zone "may be revised when site-specific data at the repository horizon becomes available." This statement, however, is overly weak, could be misleading, and is made too late in the discussion of the disturbed zone in each EA.

It should be clearly stated on the above-cited pages, and in the first paragraph of Appendix 6A, that descriptions of the "disturbed zone" are for preliminary calculation purposes only, and incorporate conservative estimates, but that site characterization is required for determination of the disturbed

zone. In view of the limited thermal, mechanical, and hydrologic data existing on the host rock at the site, estimates of the disturbed zone are very likely to be revised following site characterization. The discussion should also clearly reflect understanding that the extent of the disturbed zone may depend on the interaction of various thermal, mechanical and hydrologic effects.

Chapter 7

Chapter 7 generally: Comparative evaluation of four sites not nominated

Chapter 7 in all of the EAs is identical -- each of the five sites proposed to be nominated as candidates for the first nuclear waste repository is compared with the other four candidate sites. Section 112(b)(1)(E)(iv) of the NWPA requires "a reasonable comparative evaluation by the Secretary of such site with other sites and locations that have been considered." Clearly, Swisher, Texas; Lavender Canyon, Utah; Vacherie Dome, Louisiana and Cypress Creek Dome, Mississippi, although not proposed to be nominated, have been "considered." Furthermore, it is clear from a reading of Chapter 2 in the EAs for Deaf Smith, Davis Canyon and Richton that a comparative evaluation of sites within each geohydrologic setting has been performed. The preferred site in each geohydrologic setting was selected consistent with Section 112(a) of the NWPA, which directs the Secretary "to the extent practicable, to recommend sites in

different geologic media." We recommend, however, that this chapter be strengthened by providing cross references to specific sections of chapters 5 and 6 where, in fact, preliminary results of performance assessments support the rankings among sites performed for each siting guideline. Further, Chapter 7 should be expanded to include at least a brief description of the entire site selection process, covering all of the sites evaluated in the nine draft EAs. While most, if not all, of this information is already contained in the EAs, it is scattered throughout various chapters. Combining it in Chapter 7 would serve to present, in one place, a unified, comprehensive discussion of the complete process of evaluation.

Chapter 7 generally: References

Throughout many chapters of each EA, DOE has provided information to direct the reader to the source of information which supports conclusions drawn. The summary tables in Chapter 6 (for example, Table 6-7 in the Deaf Smith EA) contain valuable references to other sections in the EA for the reader to find the basis on which a summary statement is made. Chapter 7, on the other hand, contains no such references to other parts of the EA, nor to open literature. DOE should consider providing parenthetical references to other sections of the EA from which conclusions are drawn in the body of the text of Chapter 7.

p. 7-10: Confusing nomenclature in describing groundwater travel time

The discussion of minimum travel time for groundwater at the Yucca Mountain site refers to the Calico Hills non-welded tuff unit. A reader unfamiliar with the Yucca Mountain site may be confused by this designation, however, since Calico Hills is a feature clearly seen in Figure 2-7 of the Yucca Mountain EA to be east of the Yucca Mountain site, whereas discussion on page 2-5 of the EA indicates that groundwater flow will be toward the southwest.

Possible clarification may be obtained by reference to the "Calico-Hills non-welded tuff unit underlying Yucca Mountain" on page 7-10.

Sections 7.3.2.1.3 and 7.3.3.2: Basis for cost estimates

The cost of siting, construction, operation and closure are discussed in Sections 7.3.3.2 (1983 dollars) and the cost of transportation is covered in Section 7.3.2.1.3 (1984 dollars). It would be helpful if these were all normalized to either 1983 or 1984 dollars to enable direct comparison.

pp. 7-120 to 7-124, 7-132: Description of aggregation methods

In view of the uncertainties presently existing in the characterization data, EEI/UNWMG agree that the performance of sensitivity analyses of the relative weightings given to various guidelines is a useful method to test the validity of the conclusions of the selection process. This being the case,