

WM DOCKET CONTROL
CENTER

Detlof von Winterfeldt
26424 Athena Avenue
Harbor City, CA 90710

'86 SEP 18 A9:08

July 22, 1986

Mr. Ben Rusche
Director,
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1000 Independence Ave., S.W.
Washington, D.C. 20585

WM Record File <u>109</u>	WM Project <u>1</u>
	Docket No. _____
	PDR <input checked="" type="checkbox"/>
	LPDR _____
Distribution:	<u>EDM</u>
<u>POB HJB</u>	<u>Linehan</u>
<u>POB MRK</u>	<u>Justus</u>
(Return to WM, 623-SS)	<u>JTC</u> <u>A</u>

Dear Mr. Rusche:

As you may recall, I participated in the National Academy of Science's review of DOE's methodology for siting the first radioactive waste repository as a decision analyst consultant to the Board of Radioactive Waste Management. I now have reviewed the final documents "A multiattribute utility analysis of sites nominated for characterization for the first radioactive-waste repository - a decision aiding methodology" (DOE-RW-0074, in the following referred to as "Methodology Report") and "Recommendation by the Secretary of Energy of candidate sites for the first radioactive-waste repository" (DOE-S-0048, in the following referred to as "Recommendation Report"). I will comment on these two documents solely as an individual decision analyst.

In brief, I believe that the conclusions drawn in the Recommendation Report are based on selective and misleading use of the analysis described in the Methodology Report. It is extremely hard to find in the Methodology Report any support for the selection of the specific set of three sites recommended for characterization. Instead, I find a convincing analysis that clearly rejects the Hanford site and, furthermore, supports the selection of the Richton Dome site over the Deaf Smith site. The way the Methodology Report was interpreted in the Recommendation Report, in my opinion, comes very close to a misuse of an otherwise excellent analysis.

The following detailed comments are provided in four sections. First, I will describe the perspective of my comments and the assumptions on which they are based. In the second section, I will criticize the inclusion of the Hanford site as a candidate for characterization. In the third section, I will criticize the choice of the Deaf Smith site over the Richton Dome site. The fourth section will summarize my comments and add some concluding remarks.

003808

8610010157	860722
PDR WASTE	PDR
WM-1	

Perspective of the comments. To put my detailed comments into perspective, let me first state my opinion that the analysis described in the Methodology Report is sound, thorough and state-of-the-art. It arrives at a clear and stable rank ordering of the five sites (Yucca Mountain, Richton Dome, Deaf Smith, Davis Canyon, and Hanford, in that order). My argument is not based on a criticism of that report, but rather on the conclusions drawn from it. My arguments are also not based on a criticism of the judgments by DOE experts and managers that went into the multiattribute utility analysis. These judgments were made prior to the knowledge of the results of the analysis and, specifically, before the analysis based site rankings became known. I have more confidence in these judgments than in the judgments applied in the Recommendation Report which were made after the analysis results were known. My criticisms are based mainly on the mismatch between the judgments made during the analysis and those applied after the analysis.

I realize, of course, that the multiattribute utility analysis described in the Methodology Report is only a decision aiding tool, and that other judgments are necessary to select an appropriate portfolio of sites. Two additional judgments are important to make a portfolio decision: diversity of geohydraulic settings and diversity of rock types. According to the Recommendation Report "Any combination of the three recommended sites will,...., provide the maximum diversity in geohydraulic settings." This consideration, therefore, should not influence the selection of the three sites. Diversity of the host rock is the remaining criterion not addressed in the Methodology Report that could conceivably change the recommendation from those suggested by the results reported in the Methodology Report. My criticisms are not based on the use of the diversity judgments to arrive at a final portfolio, but rather on the peculiarities of the implied value judgments in this final choice.

Criticism of the choice of the Hanford site. The analysis clearly identifies Hanford as the overall loser among the five sites. It is important to point out that the analysis led to that conclusion based on the judgments of DOE experts and managers. The fact that these judgments are expressed in monetary units is incidental to the fact that Hanford is clearly the worst of all sites. Any expression of the impacts of the sites, even without further analysis, would lead to rejection of Hanford as a reasonable candidate.

There is no doubt that Hanford is the worst site in terms of post-closure criteria. It is also the worst or equal to the worst site on ten of the 14 pre-closure criteria. There appears to be no reasonable set of weights for which Hanford would come out to be a "pre-closure winner." The Recommendation Report proposes a set of weights, however, by arguing to ignore repository and transportation cost (a steep \$2.710 Billion higher than the second most expensive site, Davis Canyon). Aggregating over the remaining 12 criteria, Hanford does indeed become a "winner" by an equivalent amount of \$12 Million over the second best site (Yucca Mountain) and \$158 Million over the worst site (Davis Canyon). The Recommendation Report uses this scheme to point to the pre-closure superiority of Hanford. However, it fails to acknowledge that Hanford is still the worst or equal to worst on all eight health and safety criteria. The only criteria on which Hanford "shines" are the four having to do with aesthetics, archaeological/historical/cultural, biological and socioeconomic impacts.

In my opinion, the Hanford site, being the worst on the post-closure criteria and the worst on all but four pre-closure criteria comes close to being a dominated site that never should be chosen, unless other criteria and/or a very peculiar set of judgments are invoked. My interpretation of the inclusion of the Hanford site in the set of the three finalists is that in DOE's judgment the combined drawbacks of Hanford (worst post closure radiological impacts, worst pre-closure health effects and worst costs by at least \$2.710 Billion) are outweighed by its advantages in terms of aesthetics, archaeological/historical/cultural, biological, and socioeconomic benefits combined with the increased diversity of adding another host rock to the portfolio.

Criticism of the choice of the Deaf Smith site over the Richton Dome site. The arguments leading to the inclusion of the Deaf Smith site over the Richton Dome site also require a fair amount of selective use of the analysis. There is little doubt that, in terms of post-closure criteria, both sites are excellent and virtually indistinguishable. On the pre-closure criteria the Richton Dome site is better or equal to the Deaf Smith site on eleven of the fourteen criteria. The only criteria on which the Deaf Smith site is better are: public radiological fatalities from the repository, biological impacts, and socioeconomic impacts. Richton Dome is better or equal to the Deaf Smith site on seven of the eight pre-closure health criteria. It is true, however, that on all criteria the two sites are very close, except for transportation and repository costs. The combined difference here is a significant \$650 Million.

Since both sites are salt sites, the task of choosing among them cannot involve judgments of the diversity of the host rock, and instead boils down to weighing the non-cost impacts against the cost differential of \$650 Million. By choosing the Deaf Smith site over the Richton Dome site, DOE essentially signals that the very small advantages of the Deaf Smith site on one health criterion and the biological and socioeconomic criteria outweigh its disadvantages in the other seven health-criteria, the archaeological/historical/cultural criterion and an additional cost of \$650 Million.

Conclusions. The logical implications of the judgments and estimates made by DOE experts and managers themselves as reported in the Methodology Report clearly argue for exclusion of the Hanford site and for choosing the Richton Dome site over the Deaf Smith site. The most important conclusion that I draw from the Recommendation Report's inclusion of the Hanford and Deaf Smith sites is that DOE is apparently willing to accept more health effects and an additional cost of \$3.360 Billion in return for several minor advantages of the two sites. As a decision analyst, I find these implications inconsistent with the Methodology Report. As a concerned member of the public and a taxpayer, I find them irresponsible.

In conclusion, I would like to commend DOE for an excellent analysis, and for its thorough documentation of this analysis in the Methodology Report. After the strong criticism following the December 1984 publication of the site evaluation and the recommendation of Yucca Mountain, Deaf Smith and Hanford, DOE implemented a rigorous approach that suggested a quite different mix of sites. Unfortunately, it appears that DOE chose to ignore the implications of its own analysis, and of its own experts' and managers' opinions, and instead simply repeated the choice that was made one and a half years ago.

Sincerely,



Detlof von Winterfeldt
Associate Professor,
Systems Science Department
University of Southern California

cc: Frank Parker