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March 28, 1983

WM Record File WM-10 101
WM Dir.
WM Dep. Dir.
WMPI JOB WMLL
WMHT RW WMHL
WMUR Others
rec'd 3-31-83 nb

Dr. Robert J. Wright
Project Manager
NRC BWIP, Review Project
WMHT
Mail Stop 623SS
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Bob:

Pursuant to Friday's promise, enclosed find copies of the Siera Club's statements for your files.

Thanks again for your courtesies of Thursday and Friday. Looking forward to receiving the SCA.

If this office can be of any assistance to you and those of your staff when you are in the area, otherwise do not hesitate to call.

Sincerely,

HOVIS, COCKRILL, WEAVER & BJUR

James B. Hovis

JBH:jrs

Enclosures

WM Record File 101
WM Project WM-10
Docket No.
PDR ✓
LPDR ✓
Distribution:
(Return to WM, 623-SS)

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WM-10 PDR

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SIERRA CLUB
Cascade Chapter

TESTIMONY ON THE ENVIRONMENTAL ASSESSMENT OF THE HANFORD SITE AS A HIGH LEVEL RADIOACTIVE WASTE REPOSITORY

Ruth F. Weiner, Ph. D., Chapter Chair
February 25, 1983

The public hearing on the draft guidelines for this process were held in Seattle four days ago. It is a little difficult to see how we can have a public hearing on site characterization and its environmental assessment when the final guidelines for such an assessment have not been decided upon, and I will repeat our earlier request that the whole process be delayed until we have decent specific guidelines at least. In the absence of these, we must rely on common sense and on the USGS Circular 779, which stated guidelines for geologic storage of radioactive waste in a manner far clearer and more succinct than the draft guidelines did anyway. Circular 779 states that a geologic repository should be able to withstand the mechanical and chemical stresses placed on it by hot, high-level radioactive waste in containers which eventually disintegrate.

It is also not clear what interaction the environmental assessment (EA) is to have with the three-volume Site Characterization Report (which I shall refer to as the BWIP Report). The notice for this public hearing states that comments will also be received on the BWIP Report. Indeed, without the BWIP Report, the EA is an empty, meaningless document, and it is hard to see what the general public can make of it. Some comments in the EA contradict the findings of the BWIP Report, and many are inconsistent with it. Given that situation, we should have the equivalent of the BWIP Report for the Nevada Test Site tuff and for bedded and domed salt sites before making any determinations about Hanford. A candidate site can only be selected when we have considered the nominees in geologic, hydrologic and geochemical detail. We must suspend judgment until the site characterization reports for the other candidates are complete.

In this context, I am not sure why salt beds are still being considered, and why the results from the Lyons experiment is not included in the EA. Even the limited information in the EA on salt ought to be enough to eliminate it as an appropriate geologic matrix. Was it included just to have a third candidate site, so DOE could get on with the selection of Hanford? It is imperative that a viable third candidate geologic matrix be selected and studied concurrently with the Hanford and Nevada sites.

It is unclear what the EA for the characterization of the Hanford site is supposed to do. Many of the inadequacies in the EA and questions raised by it, are, in fact, addressed in the BWIP Report. The "summaries of available information" throughout Section 3.0 of the EA (Evaluation of Statutory Requirements) are not summaries of what is in the BWIP Report, and that is what they should be.

By and large, the EA is a useless document. We would suggest that, for future hearings of this type, equivalents of the BWIP Report, or accurate summaries of such reports, be made available as pre-hearing documents. Only Section 3 of the EA really says anything, and this is the key section for discussion. Much of it is truistic (e.g., the first two paragraphs of Section 3.1.1), and can be ignored, but there is much to criticize in the substance:

Section 3.1.1.1 points out that atmospheric dispersion modeling for potential radiological accidents has not been done. Why not? This should certainly be done before a final EA is issued.; it is vital to assessment of any human health effects.

Section 3.1.1.2 repeats the fallacy about doses which is prevalent in DOE literature: that when a small population is exposed, the total dose is low. Whe are we going to get away from this and talk about isotope-specific doses? I don't doubt that the immediate danger is small, but why diminish it artificially?

Section 3.1.1.2.1 and 2.2 are simplistic to the point of misstating some of the results in the BWIP Report. The statements regarding geochemical conditions are misleading - I will elaborate later in this statement. More data - summary data - is needed to back up a statement like " traveltimes (sic) exceeded 13000 years" In what direction? To what point? How are we to interpret a statement like: "the layered nature of the basalt system tends to encourage horizontal movement..."? That's just the movement we are concerned about. The "Preliminary Conclusions" are even stranger, to wit: " The characteristics of the basalts are in some cases straightforward and simple...in other cases...more difficult and challenging" Sometimes they're simple, sometimes they're not. This is a conclusion? The statemnt "At this time, it appears that site and engineered systems will be able to control releases of radioactive material..." etc. is gratuitous. Maybe it "appears" that way to DOE, but not enough evidence has been presented fcr it to appear that way to us.

Section 3.1.2.1.1 states that the formal three-step siting process was used to select Hanford as a candidate. We find it hard to believe that Hanford emerged after a national screening effort for candidate sites (page2-3). Hanford was selected as a candidate site long before the Radioactive Waste Policy Act was even a gleam in a Congressman's eye. All indications were, in 1979, that Hanford would be the site. This current process has been forced on a reluctant DOE by Congress. This sort of statment has no place in the EA.

Table 3-1 Who cares? Where, by the way, are any meetings with groups of people concerned with environment, public health, or nuclear issues?

Section 3.1.2.2.2 No, the DOE's program for characterization has not been conducted under an open door policy. Rather, it has been a door selectively open to promoters of the site. All of our information has come through our Washington DC office: they told us whom to contact and what to ask for. Moreover, the Yakima Nation are certainly affected tribes!

Sections 3.1.2.3 through 3.1.2.6 don't really say anything.

Sections 3.3 will be addressed in some detail , with reference to the BWIP Report, below. I will address myself primarily to the geochemistry; Adam Schultz, also representing Sierra Club, will address geology and hydrology. We will be happy to submit further written comments on behalf of Sierra Club for those sections of the BWIP Report on which we could not supply oral testimony today.I would like to move directly to a discussion of the geochemistry of the basalt. This is dealt with in Chapter 6 of the BWIP Report.

The assumption is made throughout this section that the repository temperature will not exceed 300°C., and that the emitted energy will not exceed 3.0 kw per waste container (Chapter 4, BWIP Report). While 3.0 kw seems a reasonable high value, little evidence is given that it will indeed be a maximum The literature on radioactive waste cites possible energy emission as high as 10 kw, although this is speculative. We certainly need a better justification for the 3.0 kw maximum. Moreover, data is not given for the temperature at the heater surface (Figure 4-14), yet the surface of the waste container is where any possible geochemical reactions will take place. Although data is given for a few reactions (e.g. solution of Cs and Sr in the presence of basalt) at different temperatures, no temperature coefficient is developed for reactions either with the basalt or the interstitial secondary minerals. Adsorption, desorption, and solution are generally highly temperature dependent, and temperature coefficients must be developed for the final EIS.

The primary chemical constituents of the rock are clearly aluminosilicates (Figure 6-5) and ought not to pose much concern for isotopic or cation exchange with radionuclides. The secondary minerals, in partiuclar the smectites and zeolites, are calcium-containing phases. Sr is a congener of Ca, whose chemical reactions are very similar, and Cs is known to deposit in Ca and Na matrices (it is a congener of Na). Sr has been observed to enter apatite matrices, for example. Therefore, exchange reactions need to be studied much more extensively than is apparent from the BWIP Report. I might add that such studies will be applicable to many other sites and situations, and are certainly worth doing generally.

The section on the behavior of the secondary minerals - clays - is very important to these considerations. The report states that at certain temperatures these clays may lose adsorbed water and become more permeable, allowing greater reaction and movement of released nuclides. We must evaluate this very carefully when comparing the Hanford site with other sites. The point here is: if it is not possible to find a matrix impermeable under all conditions, then relative permeability becomes paramount. Again, behavior above 300°C should be studied.

We note that the range of ionic strength in the hydrogeologic flows varies over an order of magnitude, and the range of dissolved solid content is also quite broad (Table 6-7). This makes hydrochemical behavior more difficult to predict than if the range were narrower. The dissolved solids content seems high; this is probably favorable for limiting radionuclide travel within these flows, but it points to the need for laboratory experimentation simulating these conditions.

The discussion of uranium, Cs, Rb, Mo leaching from spent fuel rods (pp 6.3-1 and6.3-2) points up the need to study the behavior of spent fuel under various reducing and oxidizing conditions, and O_2 and N_2 pressures. The assumption that these ions are less soluble in reducing than oxidizing media is probably correct, but the experiment needs to be done. High solubility at pH 7 makes one suspicious about what could happen at pH 9. This entire section also contradicts statements about solubility in the EA. It also seems necessary to study these solubilities when the solutes are radioactive; the localized heating from the ionizing radiation should hardly be discounted.

Similar concerns surface on p. 6.3-3, where it is indicated that borosilicate glass leaches significantly at 300°C, the maximum temperature considered in the BWIP study. There is also a considerable literature on the reactions of irradiated glass and glass containing emitting radionuclides. Devitrification is known to be enhanced by ionizing radiation. Glass breakdown may even be such (as indicated at the bottom of p 6.3-3) that borosilicate glass would not be the matrix of choice for waste, when one considers the difficulty of making it in the first place. The work on glass and supercalcines is very important and will, of course, apply to the characterizatiom studies for other sites, since this behavior is independent of the geologic matrix or site.

In the discussion of canister materials, studies of how inoizing radiation affects corrosion are badly needed. If these studies were done, there is no explicit mention of them. Corrosion rates cannot be assumed to be independent of the presence of ionizing radiation.

The data on actinide solubilities given in Section 6.4.1 appears to be reassuring. However, the comparison of solubilities under reducing and oxidizing conditions given if Figure 6-15 is done for only two values of redox potential (Eh), The only reducing situation considered is pH10 (Eh -0.27 v.). A range of pH or Eh values should be discussed; pH 10 is the most basic solution considered in the study. What happens at pH 9 and 9.5, for example. Moreover, it is not necessary, and is misleading, to plot the solubility/MPC ration as a function of Eh for different nuclides, rather than simply giving solubility vs Eh curves for each nuclide. The MPC has changed over the years as we learn more about radiation damage, and we can't even now consider it a fixed immutable value. This presentation smacks of a false attempt at reassurance, and detracts from a generally good discussion of solubility.

The data on distribution coefficients is disturbing, and points again to the need to develop a temperature coefficient for each actinide. Why were temperatures above 150°C not studied? The temperature coefficient is particularly important because the actinides are sure to exist in more than one oxidation state under repository conditions. The ditribution data for the secondary minerals and interbed materials (Table 6-20) is particularly disturbing. Clearly the clay and zeolite minerals will pick up released actinides.

Considering volcanic glass as a natural analog of waste-doped glass may have a certain academic interest, but it is not a good comparison. The analogy ignores the effects of ionizing radiation on

glass structure, devitrification and hydration.

Unfortunately, the section dealing with uranium ore bodies as natural analogs does a disservice to, and markedly detracts from, a generally good study. This is one of those Rasmussen Report-type, your-chances-of-dying-from-a-nuke-accident-are-less than-your-chances-of-being-hit-by-a-meteor sort of comparisons.There are two glaring fallacies in the comparison of hazards (p.6.5-7). First, the maximum permissible concentration (RCG) is a value which is being changed as our knowledge of health effects increases. One has only to study the last few BEIR reports, notably absent from the bibliography, to realize this. The RCG does cancel out in considering the relative toxicity index. However, the second fallacy does not cancel out. That is: one cannot compare equivalent volumes of waste with those of ore, nor can one compare equivalent concentrations of uranium metal in the two, because they are very different physically. The uranium (and other actinides) in waste are far more physically and chemically labile than they are in ore. The "hazard index" is meaningless. Why go this route at all. No one in the general public believes this kind of comparison anyway, unless he or she already wants to , and it's poor science.

The bibliography appears adequate; it is a bit troubling that most of the recent references are either Battelle Northwest reports or Rockwell Hanford Operations reports, rather than documents from the open, refereed literature. Conspicuous by their absence are references to any BEIR report, and to any of Rustum Roy's published work on supercalcines,

At this point, no conclusion about the suitablity of the Hanford site can be drawn. Neither the BWIP Report nor any study like it are going to tell us that a site is a good one. <u>The only way to characterize the candidate sites will be by comparing them, and comparing the advantages and disadvantages of each for waste isolation.</u> Site characterization must not proceed any further until a similar study is done in the same depth as the BWIP study for the Nevada Test Site tuff and for a viable third candidate site. Comparison at that level is the only honest way to do site characterization. While a site might be eliminated from consideration by such a study, it will never be confirmmed, because there are too many variables. The perfect site doesn't exist; we will have to choose the best among imperfect ones. The subsections of Section 3.0 of the EA which are titles "Preliminary Conclusions" should all be eliminated. No preliminary conclusions can or should be drawn until thorough comparisons have been made.

One final comment on Section 3.0: the statement is made that a "Finding of No Significant Impact" was issued for the drilling of the exploratory shaft. For the record: we objected to the issuing of this finding and asked for a public hearing on it. That request was denied.

The decision to apply only five of the guidelines and discuss them in the EA is questionable in its legality. Where in the enabling legislation is permission given to pick and choose among guidelines? And if the discussion requires consideration of the BWIP Report, that qualification should be stated explicitly.

We also note that some characteristics of the site addressed in the EA are <u>not</u> discussed in any detail in the BWIP Report, and the EA

discussion is totally inadequate for decision-making. Transportation considerations are a glaring example of this. There is no discussion of the routes to Hanford, the population densities along those routes, the normal traffic they carry, etc. There is, in fact, no study of the transportation question at all.

In discussion of "alternatives" the EA indulges in a dangerous game. It cites the loss of 200 jobs as a "no action" impact. However, if those 200 jobs are related to the experimental investigation of the site and the exploratory shaft drilling, they must have been in the nature of temporary jobs anyway. The assumption inherent here is that if people are employed to investigate a site, the site must be chosen because otherwise they will be deprived of employment. If only one of three candidate sites is selected, how does this apply to the two that aren't selected? Moreover, the "200 jobs" number has no data base to support it. Where did it come from? And on what basis does one hire people to do experimental work? The employment picture at Hanford is not discussed or analyzed adequately in the EA. This bias is exactly what we are afraid of: the argument will be made by DOE that a repository must be sited at Hanford because a lot of money has been spent, and people employed, investigating the suitability of Hanford, whether Hanford is the best of the three or not.

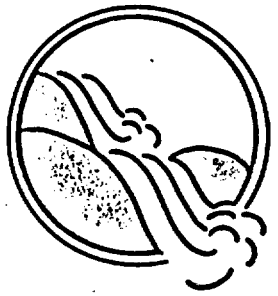
Section 3.4 "Comparative Evaluation With Other Sites" is, of course, inadequate on its face because there is no report on the other sites comparable to the BWIP Report, and no comparison can be made on the basis of the EA. Even the limited analysis in the EA of salt sites, however, indicates that they are not suitable.Thermal conductivity of salts is five times that of the other matrices. The statement "groundwater...can be controlled by standard engineering techniques..." (p. 3-81, EA) is made without factual support and appears to come out of thin air. Even the EA admits to other mineral values in the named salt deposits. Drop salt and find a viable third alternative.

There is no "good" site for spent fuel storage; at best, there are more and less acceptable sites - "bad" and "less bad" sites, if you will. The Radioactive Waste Policy Act does provide a framework and timetable for a rational site selection process. It is thus of overriding importance that the letter and spirit of the Act be adhered to. What we see instead, with this EA, is an attempt to subvert the Act and work around it. Perhaps this subversion is inadvertent, but the current attempt to rush a two-year process through and compress it into a few months and the issuance of this inadequate and useless environmental assessment, which does not even abide by the draft guidelines, make it appear that DOE is going to do what it can to put a repository at Hanford, no matter what the Federal law says and no matter what the real suitability of the site.

My statement should not be construed as an attempt simply to block siting of a repository at Hanford. In fact, the BWIP Report is a valuable document and much of it is well done - it is just what we have been asking BWIP for these last few years. My staement is a plea

to abide by the Waste Policy Act, to make full use of the time the Act allows for site characterization, to make a scrupulously honest assessment of this site and comparison with others. DOE ought to be able to complete this study without either promoting the Hanford site or glossing over its defects. We are prepared to assist as best we can in suchan honest assessment. We residents of Washington, in particular, cannot afford to simply say "Put it anywhere, but just don't put it here". We, most of all, are concerned with the accuracy of site evaluation.

We would also like to see DOE (and the State of Washington!) make a positive attempt to include and involve nuclear critics in the evaluation process. Most of us don't know what is happening at the test site from day to day, or even year to year. We learned about these hearings from our own office in Washington D.C. - the public notice in the Seattle press what hardly have allowed enough time for a thorough reading of the BWIP Report (though I surely commend DOE for those notices). The problem of radioactive waste storage is a problem of great magnitude and considerable difficulty. There is no solution as such - only acceptable compromise. We must work together to achieve such a compromise. We ask to be included in the working process, not shut out of it as we have been.



SIERRA CLUB -
Cascade Chapter

TESTIMONY OF ADAM SCHULTZ ON BEHALF OF THE CASCADE CHAPTER OF THE SIERRA CLUB BEFORE THE U.S. DEPARTMENT OF ENERGY HEARINGS ON THE PROPOSAL TO NOMINATE THE BASALT WASTE ISOLATION PROJECT SITE FOR CHARACTERIZATION STUDIES AS A POSSIBLE HIGH LEVEL RADIOACTIVE WASTE REPOSITORY, HELD IN RICHLAND WASHINGTON, 25 MARCH 1983

Mr. Chairman, I am Adam Schultz, member of the Executive Committee and Chairman of the Energy Committee of the Cascade Chapter of the Sierra Club. I represent a constituency of approximately 9000 Sierra Club members in Washington State. I have come to talk today both in my capacity as a Sierra Club representative, and as a geophysicist.

Site Characterization Report for the Basalt Waste Isolation Project:

Under the Geoengineering Section on page 6, it is correctly noted that determination of strength and durability of basalt indicate that the behavior of large rock masses measured in situ is generally different from that measured in small laboratory specimens. A single rock mass measuring two meters on a side has been cut into

the sidewall of the Near-Surface Test Facility tunnel. Two heater tests were run in the hope of simulating the heat from a nuclear waste package. From these two tests on this single sample, it was concluded that basalt responds to thermal loading in a predictable manner, and maintains its structural integrity when exposed to temperatures of 450 degrees C. It was noted that horizontal deformation was less predictable than vertical deformation, and this was attributed to the presence of verticle joints in the basalt block.

A couple of points must be made. First, are we to infer from this that the evaluation of the response of basalts to thermal loading at the Hanford facility is based upon a few tests run on a single sample? What guarantee is there that the sample is representative of the material in place at the final nuclear waste storage location? Indeed, the sample in question was carved out of the Pomona Flow, not the Grande Ronde Basalt. There is no mention of the statistical significance of these findings, as well there shouldn't be since the variance of a single sample is infinite. I would caution against applying results obtained from small laboratory samples to this question since the BWIP report has already stated that small laboratory samples are not necessarily indicative of the state of large in situ rock masses. I am also concerned that an anisotropy in thermal loading response was found for this sample. This suggests that anisotropic conditions may be common in the basalt. Of course, with a single sample it is impossible to know if this is the case. In short, the report indicates that we know next

to nothing about the response of large in situ basalt masses to thermal loading.

I will now draw your attention to Section 3.6, Geophysical Studies of the Hanford Site and the Reference Repository Location. We can conclude from this section that there is a great paucity of seismic data convering the deep Hanford Basalts. A seismic reflection test by the BWIP in 1978 showed that significant amounts of seismic energy failed to penetrate to the Umtanum flow of the Grande Ronde Basalt sequence. This indicates that there is a conspicuous lack of reflection seismic control for the Reference Repository Location. This is not surprising however, since basalt is well known for its acoustically resistive nature. What it does mean however, is that even greater emphasis must be placed on other, independent geophysical means of determining subsurface rock structure.

In addition to determining both the regional and site-specific structural characteristics, the quality of the host rock must also be determined. By this I mean the degree of fracture and fluid content. In an effort to provide more structural information, a series of aeromagnetic investigations were made. The degree of coverage and apparent quality of this data seems to be good, so this aspect of the investigation in not a point of concern.

What is troublesome is the incomplete gravity coverage of the reference repository location. No gravity contour map exists, though it is reported that more data is being collected. This makes

it impossible to evaluate the site characterization proposal in terms of our knowledge of the site specific regional gravity field. Until this information is available, consideration of site characterization is premature. I note that knowledge of the gravity field, when combined with other geophysical parameters, will enable the estimation of the local bulk porosity of the basalt, a vital piece of information.

In regions covered by a basaltic cap, the magnetotelluric technique is often advantageous. This technique is used to estimate the electrical conductivity of subsurface rock structures. The conductivity is a sensitive indicator of the composition and temperature of the rocks. In the temperature regime of the Hanford basalts, the conductivity will indicate the presence of conductive fluid and sediments embedded within the extremely resistive dry basalts. This information is among the most important to be obtained prior to site characterization. BWIP contracted two magnetotelluric surveys in 1978 and 1979. The analysis of these data is incorrect on a number of counts. First, no account was made of surface distortion effects. By this I mean the local distortion of electric fields due to complex surface geology. Instead of a proper rigorous analysis utilizing static distortion theory, the assumption was made that the subsurface rock structures were laterally infinite in extent, and internally homogenous. This type of an interpretation is known as a one-dimensional layered earth. Indeed, phase information which is necessary for a proper interpretation of magnetotelluric data was not recorded. In

addition, full tensor magnetotelluric soundings were not performed at 18 of the 48 sites. The tensor data is necessary to provide information about anisotropy. I have already mentioned that the thermal loading test of basalt indicated possible material anisotropy. It is most important to estimate the electrical anisotropy of the reference repository location. This might indicate the presence of an aligned system of fluid channels in the basalt. Furthermore, there is a complete lack of magnetotelluric data for the actual reference repository location. We must be satisfied instead with data taken from sites on the order of kilometers distant.

Despite the shortcomings of the magnetotellurics performed at Hanford, the conclusion is drawn (and I quote from "Geological Studies of the Columbia Plateau - A Status Report 1979") that "The fiscal 1979 tensor magnetotelluric survey indicated a very complex electrical strike pattern; therefore, disproving the initial basic assumption of a uniform northwest-southeast electrical strike. Because of this known divergence within electrical strike, the fiscal year 1978 scalar data were utilized only as a gross subsurface indicator" (RHO-BWI-ST-4, pp E-31). In effect this means that the 1978 data is being thrown out, and the 1979 data is more complex than the earth modelling procedure used can account for. It is my inclination to disregard the results obtained from these soundings. This indicates that more of the absolutely necessary magnetotelluric sounding, done properly by allowing for surface distortion effects, tensor information, remote reference noise

removal and two or three dimensional modelling procedures, is necessary before site characterization can be considered.

Geophysical well logging is discussed in Section 3.6.7. The BWIP has utilized well logging as a method of determining the stratigraphy of the basalt, as well as attempting to characterize the hydrological conditions. I am concerned by a statement on page 3.6-27 that "most of the rock-mass properties have been derived from laboratory measurements of core, rather than from analysis of borehole logs.". Once again, I must point out that BWIP admits that laboratory measurements are not necessarily indicative of in situ conditions! Also on this page we see that "Direct calculations of porosities cannot be done as there is no calibration of basalt available". Certainly BWIP must admit that a thorough knowledge of basalt porosity is essential for an understanding of the hydrology, yet there are no in situ porosity measurements.

I am uncomfortable with the conclusions reached about seismic activity in the reference repository location. Based upon the historical record, the statement is made that continuing microearthquake activity in the area surrounding the site indicates that stress is being continually relieved. It is notable that three earthquake sequences occurred near the site in 1969, 1979 and 1981. Earthquakes of depth greater than 6 kilometers seem to occur at the same average rate as the rest of the Columbia Plateau region. On page 3.7-54, it is hypothesized that "slip was occurring on columnar joints in thick, competent basalt flows". On the same page it is

stated that "Whether deeper earthquakes are related to geological structure is unknown, since the structure and rock types beneath the basalt are largely unknown". I must point out that first, though the total amount of seismic energy released at the site and appearing in the historical record is small, the area is not strictly aseismic. Also, the historical record only starts at about 1850 and significant quantities of quality data exist only for the last 15 to 20 years. The estimation of seismic risk based upon this record fails to take account of the brevity of the record. The nuclear waste depository must be designed for thousands of years of operating duration, yet only twenty years of data is being considered. This part of the country is a seismic hotspot. New ocean crust is being created just offshore at the Juan de Fuca Ridge, and is being subducted under North America in the Puget Sound region. The Cascade volcanic chain is evidence of this plate tectonic activity. It is certainly presumptuous and unwise to design the storage facility to withstand conditions found only in this past century when there are large scale regional manifestations of massive tectonic activity. Yet according to Section 3.7, surface facilities at Hanford are built to withstand the shock of the 1936 Milton-Freewater earthquake. I am perfectly willing to go out on a limb and state that there shall certainly be earthquakes larger than this magnitude 5.7-5.8 earthquake during the next 1000 year period.

I must express concern once again about the applicability of mechanical property measurements made in the laboratory. I quote from section 4.2-1, "The strength parameters are necessary to

determine whether stress conditions introduced by excavation and operation of the repository will cause instability in the rock mass, which could reduce its ability to isolate the waste materials. Difficulty in obtaining these parameters on a large scale arises from the need for very large-capacity load-application devices and complicated and expensive specimen-preparation measures. Large-scale strength tests have not yet been conducted in this investigation". Why haven't these large scale tests been a priority? Once again, site characterization is premature until we have basic facts about the in-situ mechanical characteristics of the Grande Ronde basalts!

Draft Environmental Assessment for Characterization of Hanford Site:

The Draft Environmental Assessment as an independent document is hopelessly incomplete. This EA would be rejected out-of-hand were it considered independent of the Site Characterization Report. For all its flaws, the Site Characterization does represent a serious and well intentioned effort to describe the appropriateness of the Hanford site for purposes of nuclear waste disposal, the EA does not.

I have already addressed the main points to be found in Sections 2.4.4, 2.4.5, 2.5.3, 3.1.3.4, and 3.1.3.5. A fatal flaw to be found

in the draft EA is found in section 3.4 - Comparative Evaluation With Other Sites. It is impossible to perform a comparative evaluation of the six other sites purported to be serious alternative candidates to the Hanford site without the existence of Site Characterization Reports for each site. On what basis can we make a comparison? Indeed, there is no detailed information on the alternative sites present in the Environmental Assessment. I can not discuss the geological and geophysical nature of these sites since this information is not present in the document! Therefore, I can only conclude by stating the following:

The BWIP Site Characterization Report is a useful and well organized document which should serve as the prototype for similar documents to be produced for each alternative site. The site characterization for Hanford points out the lack of hard information in existence pertaining to large scale in situ basalt rock masses. More information is necessary before site characterization should be seriously considered, especially in light of the complete lack of detailed information about the alternative sites in the draft Environmental Assessment. All we ask is that the Department of Energy adhere strictly to the letter and intent of the Waste Policy Act. We did not come here today to insist that the site should not be located at Hanford. On the contrary, we will do all in our power to assist in the fair evaluation of all sites.