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PRELIMINARY ISSUES IN THE  
BWIP SITE NOMINATION  
ENVIRONMENTAL ASSESSMENT

October 5, 1984

Prepared By  
Envirosphere Company

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## Introduction

Envirosphere Company, in conjunction with Shannon and Wilson, Inc. and Cooper Consultants, Inc., has performed an initial review of the preliminary draft of the Site Nomination Environmental Assessment (EA) for the Basalt Waste Isolation Project. Our review was designed to develop a working familiarity with the document to subsequently enable a thorough evaluation of the adequacy of the version to be issued for public comment later this year.

As part of the review, a preliminary identification was made of major issues and concerns upon which attention should be focussed in reviewing the public draft EA. This report provides brief descriptions of each of those issues and concerns.

The issues listed in this report are specific to the proposed BWIP repository. Some of these are addressed in the EA, but not sufficiently. Others are absent in the EA and need to be addressed. The list focusses on issues that may be major potential concerns to the State of Washington.

## Underground Engineering

1. ISSUE: A more complete description of the repository design should be included in the EA because potential environmental impact depends upon design.

The level of concept design to be presented in various documents has been a continuing point of contention between the NRC and DOE. The Site Characterization Report included extensive detail on the concept design as it existed at that time. However, the EA has greatly summarized this detail, implying that design does not impact environmental assessment. It is our opinion that additional description of the design is necessary to make an evaluation of the potential environmental impact.

2. ISSUE: The EA downplays geotechnical uncertainty. More candor is required.

The uncertainties associated with underground engineering are generally either dismissed or not seriously considered in the EA. Contingency plans and options such as alternate designs should be included as policy, and should be considered part of the program at Hanford.

3. ISSUE: Inconsistencies should be resolved in the public version of the EA.

Several apparent contradictions are present in the EA. For example, in Section 6.3.1.3.4, page 6-89, the document states that "It is expected that the formation of secondary minerals will tend to seal fractures...". In Section 6.3.1.3.5, page 6-90, there is a discussion of "a reduction of rock mass quality if...the joint infilling degrades." In Section 6.3.1.3.6, page 6-98, the EA states that "Only the fracture infilling within the disturbed rock zones are expected to

dehydrate and possibly shrink, resulting in increased permeabilities and reduced isolation characteristics." Clearly there is a divergence of thought between these three sections on what will happen to the joint material, how large a volume of rock mass will be affected, and what the results will be in regard to waste containment.

As a further example, Section 6.3.1.1 discusses geohydrology and concludes on page 6-62 that "the existing data support the premise that the overall geohydrologic...characteristics of the reference repository location are likely to be compatible with waste containment and isolation." On page 6-145, the EA states "the volumetric flow rate [into the repository] is expected to be minimal...", and on page 6-149 "that unintentional excavation into highly pervious, localized zones might produce hazardous conditions of the inflow of large quantities of water occurs under high pressure." Potential for inflow would be determined by "forward probing", and controlled by "continuing repository development in a more favorable area", or "pressure grouting and dewatering". In addition (page 6-150), "the repository design would provide pumping stations...which could pump large quantities of water from the repository". If such extreme water control measures are necessary during construction, what confidence can be placed in the ability of the hydrologic setting to effectively contain the waste?

These inconsistencies should be resolved in the public version of the EA.

4. ISSUE      There is a general lack of justification and rationale for the in situ testing.

In Section 4.1.2.2.3, beginning on page 4-20, the in situ geomechanics characterization tests are discussed. Several types of tests are described, along with the rock properties to be measured or other objectives. There is, however, a general lack of context for the testing, i.e., why is the particular information needed? Along this line, Chapter 6 presents a variety of issues that will require in situ testing for resolution. For example, on page 6-80 there is a discussion of the extent of the disturbed zone and opening; on pages 6-89 ff. there is a conceptual discussion of thermal effects on rock mass strength, "which were not considered in support studies"; the need for creep testing is discussed on page 6-141; and Issue 1.5 above highlights the uncertainty of joint behavior. While the testing program may implicitly examine some of these questions, it is not clear that the tests (particularly large simulation tests) necessary to resolve the DOE issues will be performed. It would be useful to explicitly discuss the in situ testing program in terms of issue resolution as well as gathering design data and verifying the thermomechanical models. We hope to see this approach, along with greater overall detail, in the Site Characterization Plan.

5. ISSUE: The shaft sealing technique discussion seems biased in favor of a potentially risky, drilled shaft/steel liner concept.

Section 4.1.2.1 of the EA discusses construction of the exploratory shaft. A shaft will be machine bored, a steel liner floated into place, and the annulus between shaft wall and liner filled with cement grout. In our opinion, complete grouting behind the steel liner is necessary not only for safety (analysis based on the data in the EA and full hydrostatic pressure at 1,189 meters depth gives a safety factor of about 1 for uniform loading conditions), but also to ensure sealing the repository from the overlying aquifers. Our experience indicates that this type of sealing is difficult even at much shallower depths. Several comments include:

- The heavy mud and grout may not differ sufficiently in density to avoid all mixing. More detail is required in the description of grouting procedures.
- Which geophysical tools will be used to evaluate the seal, and what uncertainties are involved?
- What will be done if voids are found?
- In the discussion of alternative shaft sinking methods (page 4-37), it is stated that alternative methods would be more costly. Some justification is needed. Grouting from surface boreholes (primary, secondary, and tertiary) prior to construction is a common technique that is not discussed. This section seems biased in favor of the potentially risky drilled shaft/steel liner concept.

6. ISSUE: The EA should provide a definitive statement on the diameter of the second exploratory shaft.

The EA (Section 4.1.2.1.3) indicates that the second shaft will be 12 feet or less in diameters. This dimension has wavered as the project has progressed. The EA should also evaluate the impact of the design earthquake and resultant vibratory motion and potential displacement on the integrity of the repository during construction and waste emplacement. The diameter should be defined at this point in the conceptual development of the test program.

7. ISSUE: The field studies proposed in Section 4.1.1 of the EA must take into account that the existing data base is not only deficient, but that much of the data has been shown to be inaccurate.

NRC's critique of the reference repository location in STP 1.1 indicates that some of the data used to date by DOE is inaccurate and/or based on false assumptions. The existing data base must therefore be purged of inaccurate information in order for the field studies outlined in Section 4.1.1 to be useful in characterizing the site.

8. ISSUE: Why have short placement holes been found to be more favorable than long holes. Is this a final decision?

The description of the Waste Emplacement Optimization Study indicates that placement holes 30 feet or less in length appear to be more favorable than 200 foot or longer holes, as previously considered. The EA should indicate the benefits and drawbacks of these two designs.

#### Geology/Tectonics

9. ISSUE: Design earthquakes, such as those used for WPPSS, have not been described in the EA for analysis of potential underground motion nor are there contingency plans in case of an earthquake.

The EA (Chapter 6.3.1.7.6, 6.3.3.4.3, and 6.3.3.4.5) indicates that a design earthquake and resultant vibratory ground motion will be determined when the site is characterized. It is our opinion, in keeping with Section 960.5-2-11 of the Final Guidelines for the Recommendation of Sites for Nuclear Waste Repositories dated July 3, 1984, that preliminary estimates of the maximum potential earthquake and expected vibratory ground motion in the repository should be provided for evaluation of the RRL as a candidate for site characterization.

The EA also states (Chapter 6.3.1.7.6) that "empirical data indicate that mines and mined tunnels are not adversely affected by earthquakes large enough to cause damage (often severe) to surface buildings and facilities." While this argument downplays the significance of vibratory ground motion in the repository, severe damage (including collapse) has occurred in underground openings. In some instances amplification of peak ground motion with depth, rather than reduction, has occurred. Further, the existing data base is largely from depths of less than about 150 feet and therefore is of limited use in studying a deep underground opening.

In light of the apparent inadequacy of the state-of-the-art in assessing deep ground motions, the EA should provide a specific plan outlining DOE's approach to assessing the vibratory ground motion at repository depth, and for evaluating how the effects of ground motion and duration of motion will be influenced by in situ stresses and the cavity geology. There is a need to recognize the uncertainty in the technical area and to include contingency plans and impacts in the EA.

10. ISSUE: The mechanism and source of the microearthquake swarm activity near the RRL, and how these earthquakes relate to ongoing tectonism, have not been adequately evaluated.

The EA (Sections 2.1.2, 3.2.4) indicates that microearthquake swarms do not appear to be related to mapped or unmapped faults. However, lineaments from satellite imagery, high-resolution aeromagnetic and gravity surveys, and regional geologic mapping suggest an association

between inferred base structure and the swarm activity. These data should be evaluated and incorporated as appropriate, in an assessment of the tectonics and of the impact that this seismicity will have on repository performance.

11. ISSUE: There is insufficient evidence to conclude that faults in the Yakima Fold Belt are generally absent in the synclinal troughs, contrary to statements in Section 3.2.3.8 of the EA.
12. ISSUE: The seismicity of the RRL should be termed "moderate" rather than "relatively low in comparison to the moderate seismicity of the Columbia Plateau region," as it is described; in Section 3.2.4 of the EA.

This terminology in the EA is misleading. Further, the distinction between the seismicity of the RRL and the Columbia Plateau in general is well defined since earthquakes are thought to occur randomly with no known association to geologic structures.

13. ISSUE: The EA (Section 6.3.1.8) gives insufficient attention to the occurrence of natural gas within and below the Columbia River Basalt Group.

Information from existing wells (i.e., the 17,000 foot Shell Oil Company well nearby) and other geologic and geophysical data relevant to the occurrence and potential distribution of oil and gas should be evaluated to better assess the potential for reserves beneath the RRL and the possibility of radionuclide contamination of these resources at a distance from the repository.

#### Geohydrology

14. ISSUE: The hydrogeologic issues raised previously by the U.S. Geological Survey and by the State of Washington and their contractor following reviews of the Site Characterization Plan still have not been adequately addressed in the EA.

The U.S. Geological Survey has identified several major concerns with the RHO investigation related to the site hydrology. These concerns are expressed in their letter of August 25, 1983 from Mr. Doyle Frederick to Mr. Robert Morgan of U.S. DOE. These concerns related to limitations of the data base to adequately characterize and model the Pasco Basin, and to the validity of the hydrologic testing and data evaluations. Previous State of Washington issues based on review of the Site Characterization Report also pertain to these concerns. These are issue numbers 4, 5, 11, 12, and 13. Several references are made in the EA acknowledging the limited and, in some cases, insufficient data base: Sections 3.3.2, page 3-63 and 3.3.2.2, page 3-75 (lack of groundwater flow interpretation); Section 3.3.2, page 3-66 (lack of knowledge on groundwater flow directions); and Section 5.2.1.2.2, page 5-28 (lack of radionuclide travel times).

It is our opinion that the public version of the EA should provide a section on the status of and response to issues raised by the U.S. Geological Survey and the State of Washington in order to better assess the candidacy of the Hanford Site. This proposed section would be equally applicable to underground engineering and geologic/tectonic issues.

15. ISSUE: Data on radionuclide transport and groundwater travel times are not presented in this draft of the EA.

Section 6.4.2 of the EA does not present available results on radionuclide transport or groundwater travel times pending revisions requested by USDOE. Presentation of these results is imperative for an adequate analysis of the public version of the EA.

16. ISSUE: The relevance of microearthquake swarm activity to fracturing of the basalt, and to the potential for a resultant increase in vertical conductivity of groundwater has not been addressed in the EA.

In that the microearthquake swarms occur within or just below the basalt, it must be assumed that these seismic events result in/or from slippage and adjustments along discontinuities within the basalt rock mass. The EA fails to address the effect that this movement has had and will continue to have on the development of vertical conduits for groundwater.

17. ISSUE: Potential vertical conductivity of contaminated groundwater could impact existing and future deep water wells.

The location and depth of existing wells in and around the Pasco Basin should be examined more closely to evaluate potential impact on the aquifer system. Also, considering the suspected regional extent of the deeper aquifers, projections of future water use throughout the extent of those aquifers should be considered in the evaluation of future impacts (Sections 2.1.5 and 2.1.6 of the EA).

18. ISSUE: Site characterization studies will have to eliminate technical uncertainties about the geohydrologic systems to meet the requirements of NRC's STP 1.1.

The EA (pg. 2-70) indicates that "site characterization studies would be necessary to reduce or eliminate these uncertainties," in reference to uncertainties about the complexity of the geohydrologic system beneath the RRL. In our opinion, the burden of proof is on DOE to describe in the EA the site characterization studies that will permit defensible conceptual models of the flow system, defensible external and internal boundary conditions, and defensible values of hydraulic parameters in order to support predictions of repository performance.

19. ISSUE: DOE's methodology and timetable for determining the hydraulic effect of the major geologic structures on groundwater flow should be presented in Section 3.3.2 of the EA.

Determination of the effects of the major anticlinal ridges, fault zones, and discontinuities would result in a significant improved understanding of the geohydrologic flow paths and the extent of the deep aquifers. Consequently, this is considered to be a critical (and difficult) task for the site characterization studies. Because of its importance to the success of meeting the qualifying conditions for site selection, we feel that a methodology and timetable for determining the hydraulic effects of these structures should be provided in the EA.

20. ISSUE: What will be the significance of the interference of the exploratory shafts to the measurement of natural variations in groundwater levels?

We anticipate that a piezometric baseline will be established that shows the existence of steady state or predictable hydraulic conditions prior to significant interference by large scale pump testing or excavation exploratory shafts. As per NRC's STP 1.1 position, a technical consensus should be developed that such a baseline has been established.

21. ISSUE: What is the likelihood, and what are the impacts from thermally bouyant groundwater, heated by the hot radwastes, rising as a geothermal system?

The EA (Section 5.2.1.2.2) should discuss the possibility as an expected effect from operation of a repository at the reference repository location.

22. ISSUE: The EA understates the potential for hydraulic connection to the Columbia River, and the expected effects of construction and operation on the repository geology.

In spite of insufficient data, the EA (Table 5-1) indicates that there is no expected connection to surface water from the repository depth, and there is no expected identifiable effect on geology from the construction and operation of a repository at the Hanford site. These points are at least partially contradicted in the text of the EA. The tables and text should be made consistent and should reflect the current state of knowledge about the site.

#### Terrestrial/Aquatic Ecosystems

23. ISSUE: The impact of threatened and endangered species on BWIP suitability for site characterization or a repository is unclear.

Three bird species that nest on the Hanford Site are being considered for protection by the Endangered Species Act of 1973 (page 3-87). Would these additions to the threatened and endangered species list disqualify Hanford for a BWIP repository?

24. ISSUE The EA should clearly address whether site characterization, construction, and operation of the proposed repository or any of its support facilities will conflict with the Hanford reach of the Columbia River if it is protected by the Wild and Scenic Rivers Act of 1970 (p. 2-73)

The Hanford reach of the Columbia River, the only remaining free flowing portion of this river, is being considered for protection by the Wild and Scenic Rivers Act. How will such a designation affect the location of the proposed repository on the Hanford Site?

#### Radiology

25. ISSUE: Will plants or animals that inhabit the Hanford Site accumulate radionuclides sufficiently from the proposed repository to biomagnify them up to levels that could threaten either local wildlife or human health? (p. 3-81)

Biomagnification of radionuclides at Hanford has been a significant problem associated with surficial storage of nuclear wastes. Burrowing and predatory mammals are the most notable biomagnifiers of the Hanford Site. Will the operation of the proposed repository contribute significantly to this process?

26. ISSUE: The potential that the background of natural and human-generated radiation at the Hanford Site could interfere with monitoring potential radioactive emissions from the proposed repository or any of its support facilities should be clearly addressed (page 6-12 ff.).

The Hanford Site has elevated levels of radiation originating from natural sources, plutonium production and reprocessing, and rad-waste storage and disposal. How will the radiation background produced from these sources interfere with monitoring the potential releases from the reference repository?

#### Land Use

27. ISSUE: Can USDOE obtain necessary ownership, surface and subsurface rights, and control access to the proposed repository for very long periods of time? (p. 3-78, 5-54, and 6-1)

Rights to minerals on certain portions of the Hanford Site are owned by private interests. USDOE, therefore, does not control all aspects within the Site's boundaries. Can USDOE expect to control all forms of access to the reference repository for the period leading to the closure and decommissioning of the facility?

28. ISSUE: The EA (Section 6.2.1.5) understates the importance of "presence of nearby hazardous installations or operations that could adversely affect repository operation," a potentially adverse condition, particularly with regard to the 200 West area.

#### Meteorology

29. ISSUE: The potential for short term radioactive releases from accidents at the proposed repository exceeding Washington State air quality standards or failing to meet the requirements specified in Section 960.5-1(a)(1) should be clearly addressed. (page 6-9)

Atmospheric modeling of short-term dispersion characteristics at Hanford has not been performed. Accidental releases of radionuclides would more likely occur on a short-term, rather than long-term, basis. Are the short-term atmospheric models sufficient to predict radionuclide concentrations under plausible accidental conditions?

#### Socioeconomics

30. ISSUE: Will the additional employment created by the proposed repository affect in either an adverse or beneficial way the housing market or public services?

A thousand workers could be employed by the proposed repository at the peak of its operation. An updated study of what this employment condition means to the affected region will be needed to project employment and public service supplies into the 1990s. What could Benton/Franklin Counties expect from such an increase in regional employment?

#### Transportation

31. ISSUE: Does the area surrounding the reference repository site have an adequate transportation system? (page 3-103)

Rail, highway, water and air modes of transport are in place and indicated to be useable without major reconstruction except as currently planned. This descriptive material leads to the question: will the added load from radioactive wastes transport adversely impact this system under operating conditions?

32. ISSUE: The EA should explain the rationale for the assumed 70/30 (rail/highway) modal split.

The EA (pg. 5-37) indicates a probable transportation modal split based solely on "payload advantages". The rationale for the proposed modal split should be broadened to consider other factors, and the evaluation should be presented in more detail.

33. ISSUE: Is the definition of "Regional" too restrictive to encompass problem areas related to transportation modes? (page 5-35)

In the EA, outer boundaries are defined to be intersections with major interstate highways or major railroad connections. This definition arbitrarily limits the scope of consideration of all transportation issues to a flat terrain with reasonably low population density and low accident risk potential. A significant portion of the State of Washington is thereby excluded from subsequent analyses. Isn't this arbitrary definition too restrictive for properly evaluating transportation related impacts?

34. ISSUE: Will the people of the State be exposed to greater risks due to peak shipments rather than average shipment values as indicated in the EA? (page 5-35)

The EA uses average values for shipments as a basis for transportation planning and assessment (Table 5-3). Peak shipment values could be an order of magnitude greater due to variations in waste generation or delays in route due to meteorological conditions or other reasons. The narrow definition of "regional" arbitrarily excluded adverse terrain, water crossings, slide prone areas, and areas with typically adverse meteorological conditions which could cause delays of shipments and result in peak values many times greater than average values. Will the peak values of shipments pose greater transportation risks than indicated by the average values used in the EA?

35. ISSUES: Will the projected types of non-radioactive shipments have significant impacts on the people, environment and transportation systems of the state? (page 5-35)

The EA dismisses non-radioactive shipments as having no impact on transportation. However, the uncertainties acknowledged in Chapter 6 could greatly impact non-radioactive as well as radioactive shipments. In addition, the narrow definition of "regional" arbitrarily limits the necessity to consider non-radioactive shipments in other areas of the State which could pose impacts within the defined "region" under a variety of economic, social, or natural conditions. Will these factors cause non-radioactive waste shipments to impact the people of the state or transportation modes utilized for shipment of radioactive wastes?

36. ISSUES: Will highways and connecting roads be adequate to handle the added shipments? (page 5-37 - 5-39)

With assumed splits among traffic modes, the added one to two trucks per day (average 1.75) is stated to be handled with minor changes and little impact to populations enroute. Is the "regional" limitation in the EA too restrictive in addressing this issue?

37. ISSUE: Can the railroad transport system carry the peak shipments on the available network? (page 5-39 - 5-40)

The EA uses average values for rail shipments and a narrow definition of "regional" to arbitrarily limit consideration of the impact on the rail transport mode. Peak shipments resulting from delays due to weather and other factors and rail system deficiencies outside of the defined region could adversely impact the rail transport system. Can the peak shipments be handled on the existing rail network when deficiencies outside the defined region are included?

38. ISSUES: Have potential radiological effects been addressed in sufficient detail to evaluate normal exposure and accident conditions? (page 5-40 - 5-41)

Cancer rates for normal exposure and accident conditions were evaluated on a regional basis based on national "unit risk factors" with sub-categories of occupational and nonoccupational risk factors (Tables 5-5 and 5-6). Using a narrow definition of "regional" arbitrarily limits the population exposed to risk to very low number, thereby resulting in low total numbers of cancer cases and accidental exposures. Would expansion of the defined region significantly increase the potential exposure to radiological effects and accidents?

39. ISSUE: Will non-radiological effects be a significant safety consideration? (page 5-42)

Table 5-7, page 5-43 indicates no abnormal number of accidental deaths and injuries during the life of the site and other pollutants are considered insignificant in this area of sparse population. Are there mitigating circumstances such as winter icing conditions or slow speeds that will create significant traffic hazard impacts thereby increasing overall numbers of accidental deaths and injuries?

40. ISSUE: Are relevant data and data uncertainties sufficiently described for performing the analysis of favorable, adverse and qualifying conditions as prescribed by 960.5-2-7? (page 6-29 - 6.30)

Some of the relevant data are uncertain, thus some of the resulting evaluations are similarly uncertain. There are uncertainties regarding repository design, accident rerouting, waste shipment mode distribution, waste shipping cask design and factors influencing shipping modes and routes. What effect on the transportation analysis is posed by these data uncertainties?

41. ISSUE: Are the data sufficient to conclude that the Hanford Site is qualified with regard to the transportation guideline qualifying condition? (page 6-38)

The analysis of favorable conditions and potentially adverse conditions indicates that the site is qualified in accordance with the transportation guideline and that there are no use conflicts, undesirable construction features, unacceptable environmental risks or

public health risks. Transportation risks are stated to be in compliance with the guideline. With so much uncertainty in critical data and with the public perception of this lack of certainty, how can the Hanford Site be considered as meeting the transportation guideline qualifying condition?

42. ISSUE: Will the population or environment of the State of Washington or adjacent states be exposed to risk of accident or damage due to the use of inappropriate modes of transportation such as air, passenger trains and barge (water)? (page 3-103)

Air, passenger train and barge (water) transportation modes pose serious risks of accident or other damage exposures to the population or environment of the state, yet are mentioned in the EA as potential transport modes. They should be described as non-usable modes. Will these modes ever be utilized? If so, how will the accident or damage potential be eliminated?

43. ISSUE: Why is there no discussion of total commodities shipped by truck in a manner similar to the rail discussion? (page 3-106)

The public is aware that commodities shipped by truck currently include low-level radioactive wastes as well as non-radioactive commodities. Isn't a discussion of the impacts of total commodities, including low level radioactive shipments, an important factor in public perception of the proposed transportation activity.

44. ISSUE: Should routing and climatological situations be described in more detail to assure that highway and rail connections from mainlines and access routes are fully defined?

Shipments will have to leave mainline railroads and interstate highway routes to go onto access roads leading to the site. The exit points and classification yards are key points of potential accident problems. Will routing and climatological conditions at key exit and classification points pose greater risks than indicated in the EA and can the activity at those key points be more fully described to define the risks involved.

45. ISSUE: Is it adequate to consider only "Regional" limits in determination of accident rates and accident potentials?

Trains and trucks do parallel or cross watercourses enroute to the site. It is possible for a radioactive waste cask to fall into the Columbia River, for example. Accident potentials are proportional to miles traveled and should be considered from source to site. Shouldn't a broader scope of evaluation of potential accidents be used to assess probable situations impacting the site.

46. ISSUE: Is the nature of the waste transport vehicles, loads and operations such that no reconstruction of roads or tracks is required? (page 3-103 and 6-31)

Vehicle center of gravity changes may create instability on super-elevated tracks or roads at low speeds. Traffic obstructions due to required low speeds could impede normal traffic and reduce safety. Slide potential exists on mainline railroads and interstate highways. Escort requirements and public perception problems could lead to traffic congestion or other problems. Could these factors taken in combination necessitate some reconstruction or realignment of roads or tracks?

#### Performance Assessment

47. ISSUE: The maximum probable dose to an individual worker should be discussed.

The preliminary draft EA states that "previous studies indicate occupational exposure rates of approximately 0.6 rem per year". (page 6-164) However, the maximum probable dose to an individual should be discussed to assess compliance with 10CFR Part 20. The number of exposed individuals and their average annual dose should be described. Organ doses from internal emitters should also be considered.

48. ISSUE: Releases of airborne particulate radionuclide from waste handling should be estimated.

The analysis of radiation exposures to the public from routine repository operations examines the release of krypton-85. (page 6-165) To ensure a complete analysis, radionuclide releases in the form of airborne particulates from handling of spent-fuel assemblies should also be estimated, even if these make minor contributions to the total offsite dose.

49. ISSUE: The analysis of radiation from accidents during repository operations is incomplete and needs further justification for the assumptions that are used.

The analysis of radiation exposures from preclosure accidents at the repository (page 6-166) uses a scenario in which the hoist fails during lowering of a waste container to the repository and estimates the dose to the maximally exposed individual. Why are assessments of the radiation dose to occupationally exposed workers and other onsite personnel not also performed?

The analysis of offsite exposures assumes a HEPA filter efficiency of 99.97 percent. What is the justification for this assumption? NRC allows a maximum of 99 percent efficiency to be assumed in safety analyses for nuclear power plants. The placement of HEPA filters should also be specified. If they are not always to be in the ventilation train, the switchover mechanism must be considered, delay times estimated, and failure modes analyzed.

What are the bases for extrapolating from the cited data to assume release of one percent of the spent fuel in the form of airborne particulates? Which isotopes were used to calculate does? What is the source or model used for the assumed dose factor? Is the dose factor for the whole body? If so, organ doses should also be calculated.

The hoist-drop accident is analyzed in the EA because it presents a worst-case scenario for container breaching, except for fire and explosion. Will the public draft EA consider the two latter scenarios and analyze their consequences? If not, justification for excluding analyses of fire and explosion should be provided.

50. ISSUE: The EPASTAT code used to model radioactive releases to the accessible environment does not account for in-growth of daughter products.

The EA employs the EPASTAT code to calculate cumulative radionuclide flux at the accessible environment. This code excludes radionuclide chain decay (page 6-174), and, presumably, does not model the build-up of daughter products from such decay processes. Some of these daughter products are important contributors to the releases to the environment. Further, the EPA standards in 40 CFR Part 191 do not discriminate between those nuclides originally contained in the waste and daughter products. Will the EA provide a more detailed description of the methodology employed in this code?

51. ISSUE: Will the public draft EA provide an estimate of the radionuclide concentrations in drinking water to assess compliance with 40 CFR Part 191? (page 6-182) The proposed rule, 40 CFR 191, would mandate a drinking water standard for the first 2000 years after repository closure.

52. ISSUE: Will the public draft EA compare BWIP with other candidate sites in terms of total radionuclide releases during the first 100,000 years, as required by the proposed rule 40 CFR 191?

53. ISSUE: Is the BWIP program committed to NRC's Site Technical Position 1.1 - Hydrologic Testing Strategy from the Basalt Waste Isolation Project?

54. ISSUE: Near-field and very near-field performance assessments are needed to provide credibility for far-field assessments.

We note that the Site Characterization Report included both near-field and very near-field performance assessments, whereas the EA only addresses the far-field assessments. It is our opinion that near-field and very near-field performance assessments are needed to give credibility to the far-field assessments in the EA.

### Generic Issues

55. ISSUE: The 6 mile (10 km) impact area vertical boundary is an arbitrary and artificial limit that should not restrict the evaluation of impacts.

This limit has been used in a number of places in the EA, notably with regard to siting criteria where flows above the deepest topped aquifer within 6 miles are excluded (pg. 2-60); where groundwater travel times to a vertical boundary at 6 miles from the repository are considered (pg. 2-63); and where earthquakes within 6 miles of the repository are considered (pg. 3-38). In each of these instances, there is no justification for this arbitrary limit, and the limit could serve to eliminate data outside of the 6 mile limit that have critical significance to the siting evaluation.

56. ISSUE: Is a 25-41 percent additional cost for a repository at Hanford (relative to other sites) acceptable when it could represent 2 billion dollars?

The EA includes a summary of cost estimates for repositories in different geologic host rocks (Table 6-10, page 6-159) which shows costs for a basalt repository to be significantly higher (25-41 percent) than for other host rock repositories. In our opinion, such a large additional expense would strongly favor selection of other, less expensive options. However, the EA indicates that a 25 to 41 percent higher cost is considered generally consistent with the cost of the other options. The public version of the EA should provide a rationale for this contention to eliminate the appearance of bias aimed at keeping the Hanford site competitive with the other sites that DOE is considering.

57. ISSUE: The public version of the EA should be consistent with 10 CFR 960 and address the issues raised in the Mission Plan and other documents.

The DOE began work on the Hanford site prior to the Mission Plan and the Nuclear Waste Policy Act of 1982. As these documents now reflect governmental policy for the selection process of candidate repository sites, the public version of the EA should be consistent with the siting guidelines set forth in 10 CFR 960. In addition, the Mission Plan outlines a series of key issues to be addressed in evaluating site suitability (Volume II, Ch. 1). These issues, as well as those raised previously by NRC, USGS, and the State of Washington, should be clearly addressed in the EA.

58. ISSUE: There is a need for DOE to establish a procedure to provide the State of Washington with timely technical updates of new data and work in progress at Hanford.

We understand that new data are available which have not been included in the EA (i.e., recent block tests applicable to underground engineering). It would be desirable for DOE to establish a system for timely transfer of new data to the State of Washington and their

contractor for the State's assessment of the progress at Hanford. Similarly, DOE should provide the State with timely updates of what types of work are currently underway, and what their scheduled completion dates are.

59. ISSUE: The EA must address the issue of defense waste disposal.

Rather than assume that there will be no defense wastes in the Conceptual System Design Description (Section 5.1.1), the EA should be based on the concept of including defense waste as specified in NWPA. If there is no commingling, the defense waste can be backed out at a later date.

60. ISSUE: The EA is overly optimistic in its evaluation of the suitability of the RRL for site characterization.

Section 6.3 of the EA generally indicates that all of the qualifications that require site characterization either are met or can likely be met. Considering the large number of critical issues that cannot be evaluated without site characterization studies (particularly with regard to the geohydrologic system), the EA should be written to better reflect the significance of these uncertainties. It should also address the outlook for ever definitely satisfying all of the qualifying conditions in the General Siting Guidelines.