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* BASALT WASTE ISOLATION PROJECT [BWIP], WASHINGTON
Draft Comments

OVERVIEW

Overall, the DEA is a reasonable summary presentation of the geological, geophysical and seismological data collected and utilized by DOE and their subcontractors in its repository siting studies to date. Very little of the basic geological, geophysical and seismological data is included within the EA, accordingly extensive reviews of data, including data quality and data interpretation, will be necessary to verify the summary statements and conclusions presented in the EA. It is anticipated that much of this information will be presented in the various investigation plans described in Chapter 4.

The draft Umbrella Site Technical Position [STP] has also been reviewed in conjunction with the DEA. The Site Technical Position [STP] is a very complete list of issues which must be addressed in order to satisfy the DOE's siting guidelines, in order to demonstrate suitability of the site as required by Chapter 6 of the EA. Chapter 6 of the DEA has clearly defined a number of guidelines for which insufficient data currently exist to permit the DOE to reach any conclusion in terms of suitability or non-suitability. The STP has clearly identified the data needs which would allow the DOE to complete their site assessment in terms of the DOE siting guidelines.

The following are comments on the specific chapters of the DEA and on those items or categories of items in the STP thought to be most important in demonstrating that the BWIP site is a suitable repository location.

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CHAPTER 3

This chapter includes a relatively thorough presentation of the physiography and geomorphology of the Hanford Site region and the stratigraphic column as known for the Hanford Reservation. The tectonic setting of the repository location in the Cold Creek Syncline, is appropriately presented. The reference repository location in the western Cold Creek syncline area is "tentatively interpreted to consist of large, relatively intact volumes of bedrock whose boundaries are defined by major or intermediate structures". The structural integrity of any repository location is a question which must be answered as quickly as possible especially in an area where tectonic deformation may be continuing. The DEA cites the use of geophysical surveys and surface and subsurface mapping to reach the tentative interpretation. The integrity of the repository location and the data utilized to reach any conclusion drawn by DOE must be thoroughly scrutinized by the NRC and its reviewers.

The structural analysis presented in Section 3.2.3.8 does not present a tectonic model to explain the observed structures and to predict future deformations. All of the structural features observed in the Hanford Reservation area must be explained in terms of the tectonic model so that deformation rates, stress and future seismicity in the vicinity of the reference repository location can be predicted for the proposed life of the facility.

The internal structure of the basalt unit selected for the location of the repository must be adequately known to predict groundwater movement within the basalt. Variations in the dense entablature and colonade portions of the individual flow basalts must be known before the final repository location is selected. [Assumptions used in the assessment of the potential groundwater pathways to date appear adequate. A significant portion of the additional information required to adequately predict groundwater movement may only result from direct observation and testing via the test shaft. The Cold Creek hydrologic "barrier" is a bedrock structural discontinuity that apparently represents an impediment to groundwater flow. This feature must be investigated thoroughly since structural features that impede groundwater flow are typically very recent geologic features.

CHAPTER 6

This chapter evaluates the suitability of the site against the DOE siting guidelines, some of which require site characterization [detailed siting studies] and other which do not require site characterization. This chapter clearly and appropriately presents the information available, describes the favorable conditions, identifies potentially adverse conditions and subsequently arrives at appropriate conclusions. DOE has been very candid in pointing out those areas where data is lacking and therefore conclusions are tentative. All of the geologically related issues fall under the category of evaluation items which require site characterization. Section 6.3.1.1.5 clearly identifies the uncertainties regarding the geologic studies and describes [on Table 6.2] the tectonic processes which could affect the hydrologic system of the repository location. This chapter also points out the need for identifying the geologic features which could potentially affect the groundwater movement in the basalt rock.

Section 6.3.1.3 on rock characteristics identifies numerous evaluations which need to be completed before the site can be qualified as a nuclear waste repository. Included in these items is a determination of the extent of the disturbed rock zone and possible stress induced failures or fractures within the dense basalt interior. The effect of heat on basalt could be a very significant item and needs to be thoroughly evaluated.

The current state of knowledge on tectonics as related to the evaluation process is appropriately presented in Section 6.3.1.7. The need for detailed interpretation of geophysical anomalies and specific structures is identified as well as the uncertainties in the rates and patterns of deformation for the Pasco Basin area. The uncertainty in the tectonic model in terms of the deformational process and its potential effect on the reference repository location are described. It is appropriately noted that the design earthquakes and the design ground motions cannot be determined until other factors involved in the site characterization are completed such as the tectonic model and the associated long term deformation rates. In this regard, continued monitoring of the micro-seismic activity and its possible relationship to structural features in the Pasco Basin area is warranted.

The preclosure section on rock characteristics [Section 6.3.3.2] clearly indicates the need for assessment of the stress conditions within the repository horizon and possible conditions which may be encountered as a result of stress induced instability and methods to counteract such instability. Other basalt flow geologic features to be assessed in order to allow for safe construction of a repository are also identified. The high stress condition indicated by core-discing needs to be thoroughly evaluated. Micro-seismic monitoring and acoustic emission monitoring would significantly help in this evaluation as well as information on the stress levels as obtained during the exploratory shaft program.

The preclosure section on tectonics clearly defines the need to provide a tectonic model for the Pasco Basin area so that deformation rates can be accurately determined. The uncertainties in the current level of knowledge of the tectonic stability of the region are clearly pointed on Page 6-155, next to last paragraph. The comment on Page 6-156 concerning nuclear facilities near the reference repository location is inappropriate since it is the long term seismicity which needs to be predicted for a repository facility.

CHAPTER 5

Chapter 5 describes the repository facility and the effects of locating and constructing the facility at the Hanford site. The only potential effect on the geology of the area would be localized stress relief phenomena possibly including rock bursts.

CHAPTER 4

This chapter on site characterization activities describes six additional work plans that are being developed and identifies other plans which will be described in the next draft of the EA. Of particular interest are the Tectonic Characterization Plan and the Lithologic Characterization Plan which address some of the key issues, namely the structure and integrity of the repository horizon as well as the tectonic modeling needed to establish rates of movement which could have an impact on preclosure and postclosure repository performance.

The geologic characterization tests in the exploratory shafts are briefly described. The plans for such activities require a detailed review to insure that all the geologic aspects of the repository including an assessment of in situ stress conditions are accounted for.

CHAPTER 2

This chapter deals with the decision process by which the reference repository location was identified. The geology, seismology and tectonics of the Hanford site area are presented in a sufficient level of detail to describe the selected site. However, little technical detail is provided to back up the selection of the reference repository location as the candidate site. Only the ten ranking criteria are listed and the method of analysis is presented. Due to the lack of detailed information, four basalt flows were appropriately selected for consideration as the repository horizon.

DRAFT UMBRELLA SITE TECHNICAL POSITION [STP] ON GEOLOGY

The STP has clearly identified the informational data needs required to address the geologic issues for the BWIP site. Of particular interest are the following three issues:

- 5.2 How does the stratigraphic setting effect waste isolation?
- 5.3 How does the structural tectonic setting effect waste isolation?
- 5.4 How does seismic activity effect waste isolation?

The information needs to respond to the above three questions are clearly stated by the NRC, in particular the information required to assess the present tectonic structural setting and the nature and rates of projected tectonic processes are particularly complete. If possible these last two items should be handled on a priority basis since they have the potential along with some of the stratigraphic information for disqualifying the BWIP site in accordance with DOE siting guidelines.