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High Level Waste Technical Development Branch
Division of Waste Management
U. S. Nuclear Regulatory Commission
7915 Eastern Avenue
Mail Stop 623-SS
Silver Spring, MD 20910

Attention: Mr. Trueman Seamans

Subject: Contract No. NRC-02-82-030, Task Order 002 Draft Letter
Report

Dear Mr. Seamans:

Engineers International, Inc. (EI) has reviewed the nine documents under Task Order 002, and has prepared specific comments on each document. In addition, a separate attachment has been prepared assessing the rock mass strength of the Topopah Spring member at the Nevada Test Site (NTS). The objective of the document review has been to detail the adequacy of DOE plans to characterize the NTS for a possible geologic repository, and discuss the conformance and non-conformance of the plans with the proposed 10CFR60 rules.

Document 1 - "Conceptual Design Report, Exploratory Shaft - Phase I, Nevada Nuclear Waste Storage Investigations," CA9179-MS, Los Alamos National Laboratory, June 1982.

Document Summary

This document describes the conceptual design of a drilled exploratory shaft and the Phase I site characterization activities to be conducted from the shaft bottom. Ten appendices are included with the document, one of which describes the conceptual design of a conventionally sunk exploratory shaft (appendix A). The term conventional applies to shafts advanced by the drill and blast method. The design is well conceived, and could

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provide the basis for a Title I design of a site-specific exploratory shaft for the characterization of a geologic repository in tuff. Phase I investigations are designed to evaluate the suitability of the site for a Test and Evaluation Facility (TEF). The Phase II program will attempt to characterize site suitability for a geologic repository.

General Comments

The present plans, as discussed in the January 24-25, 1983, design workshop, are to construct a 144-inch internal diameter (I.D.) shaft by the drill and blast method. The depth will be about 1500 feet instead of the 3500 feet that is discussed in this report. Hence, appendix A of this report which discusses the design of a conventionally sunk shaft should be expanded to include liner construction and quality assurance requirements to meet 10CFR60 requirements. This is mentioned as one of the difficulties in conventional shaft sinking design and construction.

- Details of the cementing program are yet to be determined, and it is recognized that licensability requirements are a major factor. At present, class A neat cement with 2% calcium chloride is being specified; however, several other cements are being considered to accommodate site-specific conditions.
- The layout of the underground openings for the Phase II site characterization efforts appears to be adequate, and the objective of exploring over 300 acres of the host rock with 16,000 to 24,000 feet of horizontal core is well conceived (page 29).
- Horizontal holes, about 40 feet long, from shaft portholes will provide useful information. Program details should be provided.
- Mean values and the extent of variability of lithologic and structural properties, media properties, hydrology and in situ stress will be determined from the underground program (page 35). This effort will significantly aid site characterization, and details of this effort should be provided in the Site Characterization Report (SCR).
- An approach to licensability, especially for the proposed 144 inch I.D. shaft, is to construct the shaft in a conventional and expeditious manner, and later upgrading it should it be used as part of the repository (page 54). This approach needs careful analysis. Quality assurance controls and

state-of-the-art lining techniques should be utilized, although these may extend the schedule and increase the cost slightly over conventional and expeditious sinking techniques.

Quality Assurance Considerations

The document describes the basic quality assurance program requirements which must be met in order to comply with 10CFR60. Each participating organization in the exploratory shaft (ES) project is directed to prepare and implement a quality assurance program which is based on the accepted nuclear power plant guidelines (i.e. 10CFR50-Appendix B, and ANSI/ASME NQA-1-1979). The various programs are to be evaluated by the DOE before design or field work begins. The document then identifies critical areas of the quality assurance program, such as:

- Design control
- Construction and operational control

It is also of extreme importance that each quality assurance program for each participating organization be compatible. In other words, if one organization takes samples and another organization tests samples, the methods of establishing sample traceability must complement one another. This should be one of the main objectives of the DOE evaluation.

Also, with respect to Document Control, it must be recognized that numerous changes will be made throughout the project. Everything from conceptual testing programs to final design documents will undergo extensive revision. A key aspect of the quality assurance program must be to provide safeguards against the inadvertent use of obsolete documents.

Document 2 - "Preliminary Design and Definition of Field Experiments for Welded Tuff Rock Mechanics Program," SAND-81-1972 by the Sandia National Laboratory, June, 1982.

Document Summary

This report outlines the objectives, preliminary design and predictive modeling results for five field experiments. In general, all the field experiments are clearly defined in terms of the objectives, physical layout, and performance requirements. The discussion covers the following experiments:

- Small diameter heater experiment
- Unit cell canister scale experiment

Evaluation of Alternative Shaft Sinking Techniques for High-Level Nuclear Waste (HLW) Deep Geologic Repositories

**Final Report (Task 3)
June 1981 - July 1982**

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Golder Associates

**Prepared for
U.S. Nuclear Regulatory
Commission**