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PROJECT WM-11

Dr. Donald L. Vieth, Director
Waste Management Project Office
DOE Nevada Operations Office
P. O. Box 14100
Las Vegas, NV 89114

Dear Dr. Vieth:

Present schedules indicate that the Department of Energy (DOE) will submit a Site Characterization Plan (SCP) for the Nevada Nuclear Waste Storage Investigations (NNWSI) to the Nuclear Regulatory Commission (NRC) for review early in the last quarter of 1983. Also, exploratory shaft construction will start as early as November 1, 1983. The November 1, 1983 date will precede the NRC staff's comments on the SCP. In view of these schedules, it will be prudent to complete and document the review of certain issues regarding exploratory shaft construction and sealing prior to the start of shaft construction.

Two broad considerations are of concern: (1) that the site characterization activities will not compromise subsequent long term isolation and containment capabilities of the repository and (2) that plans for construction of the exploratory shaft will not preclude the acquisition of adequate information for site characterization. With these broad concerns in mind, a series of activities were initiated to identify and resolve issues concerning the exploratory shaft. First, the NRC evaluated alternative shaft sinking techniques. Our contractor report on this subject is attached (Golder Associates, 1983). Secondly, NRC reviewed the DOE report, "Conceptual Design Report, Exploratory Shaft - Phase I, Nevada Nuclear Waste Storage Investigations." I have attached copies of our contractor's comments (Golder Associates, 1982 and Engineers International, Inc., 1983). In addition, we held a number of preliminary discussions, including telephone conversations and the January 24-25, 1983 NRC-DOE Design Meeting, that addressed the method of construction, sealing, and plans for gathering information related to site characterization. These activities provide a starting point for the more detailed interactions that are now appropriate.

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With regard to the first of the two broad concerns mentioned above, 10 CFR 60.11(a) (6)(iii) calls for a description of "provisions to control any adverse safety-related effects from site characterization including appropriate quality assurance programs." Similar language is in section 113 (b)(1) (A)(ii) of the Nuclear Waste Policy Act of 1982.

The basic concern here is with the potential adverse effects due to penetration (e.g., exploratory shaft) of the repository horizon during site characterization. A shaft construction process that takes into account long-term sealing aspects is necessary. To the extent that we were able to evaluate such information in the recent (January 1983) Design Meeting, DOE plans appear to be appropriate. However, given the preliminary nature of the information discussed in this meeting, we will need more specific information and plans regarding the construction and sealing of the exploratory shaft.

The documented information needed by the NRC on the exploratory shaft relates to five areas: 1) shaft and seal design considerations, 2) construction plans and procedures, 3) sealing or grouting plans and procedures, 4) construction testing and inspection plans and procedures, 5) plans and procedures for gathering specific information related to site characterization, and 6) quality assurance for all of the above. The general type of information considered necessary by NRC on the above items is presented in the attached list. If DOE considers that other information is also applicable to the basic concerns, this information should also be provided.

We recognize that documented plans for shaft construction and sealing may have to be changed based on experience gained during construction. We would expect to be informed of significant changes to plans or schedules as they occur. This is needed since the NRC staff expects to visit the site and observe excavations and tests as they are done as provided for by 10 CFR 60.11(g).

With regard to the second broad concern mentioned above, we consider it prudent that the plan for obtaining site characterization data during shaft construction be identified before construction proceeds to the point where obtaining such data is precluded. Some significant and unique information about site properties (e.g., groundwater inflow into the shaft; rock strength and consistency) could be obtained during shaft sinking.

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While all of the information noted in the attachment need not be documented prior to starting shaft construction, we consider it prudent that it be provided early enough for us to complete our review and for you to make any adjustments necessary as a result of comments we may have.

Please contact me at your earliest convenience to establish a mutually agreeable schedule to work toward resolution of those issues which need to be reviewed prior to exploratory shaft construction and sealing.

Sincerely,

"ORIGINAL SIGNED BY"

Seth M. Coplan, Project Manager
High-Level Waste Technical
Development Branch
Division of Waste Management

Attachments:

1. Golder Associates, Evaluation of Alternative Shaft Sinking Technologies for High Level Waste (HLW) Deep Geologic Repositories, USNRC NUREG/CR-2854, 1983
2. Golder Associates, Letter #77 to Mr. Lud Hartung, 11/3/82
3. Engineers International, Inc., Letter to Mr. Trueman Seamans, 02/24/83

cc: W. Bennett, DOE
J. Fiore, DOE

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**INFORMATION CONSIDERED NECESSARY REGARDING
EXPLORATORY SHAFT CONSTRUCTION AND SEALING**

I. Shaft and Seal Design Considerations

- Provide an analysis of the potential effects of construction of the exploratory shaft on long-term sealing capabilities of the rock mass and identify factors that determine the nature and extent of such effects
- Describe how the selected excavation technique and shaft design accounts for limitations and uncertainties in long term sealing considerations
- Provide design specifications for the shaft construction and show how they deal with the factors affecting sealing
- Describe the seal design and materials
- Discuss the selected locations of any planned explorations or testing to be performed along the length of the shaft. Include discussion of data on sealing characteristics to be gathered and the limitations and uncertainties associated with the data
- Provide drilling history and results of geotechnical testing from the principal borehole, G-4

II. Construction Plans and Procedures

- Identify the acceptance criteria for construction of the exploratory shaft
- Identify procedures used to minimize damage to the rock mass penetrated
- Identify liner construction and placement technique. Include such information as: liner type, liner material testing and placement of liner. This information needs to be fully considered in application of any permanent sealing program

III. Sealing or Grouting Plans and Procedures

- Describe how the seals are expected to perform in sealing the exploratory shaft. Describe tests done, both laboratory and field, to determine their long-term durability and their compatibility, both chemical and physical, to the host rock environment.

- Describe the placement methods.
- Describe remedial methods to be used if sealing methods are not adequate.

IV. Construction Testing and Inspection Plans and Procedures

- Describe test and inspection procedures to be used during excavation (e.g., plumbness of hole, rock mass disturbance etc.) to determine acceptability of the shaft as constructed.
- Describe test and inspection procedures to be used during shaft liner construction. Include information such as grout injection rates, grout bond logs, thermal measurements of grout during curing, and liner instrumentation to be used.
- Describe test and inspection procedures to be used after sealing of the shaft to assess the results of the sealing effort in controlling adverse effects. Include information such as grout strength tests, visual identification of seal conditions, records of water inflow, assessment of seal bond to host rock, and logging of drill holes.
- Describe plans to document the above construction activities.

V. Plans and Procedures for Gathering Specific Information Related to Site Characterization

- Describe test plans and procedures used to obtain adequate data on site characteristics that can be measured either directly or indirectly during construction of the exploratory shaft. For example:
 - o Geologic mapping and rock mass characterization of the shaft walls
 - o Measurements of rates and quantities of groundwater inflow and collection of groundwater samples for testing
 - o Measurements of overbreakage during blasting
 - o Rock mechanics testing of samples obtained during drill and blast operations

VI. Quality Assurance (QA)

Administrative Procedures

- Identify the line of responsibility for implementing QA procedures down to and including the Construction Contractor

(10 CFR 50 Appendix B. Criteria I requires that "organizations performing quality assurance functions shall report to a management level such that this required authority and organizational freedom, including sufficient independence from cost and schedule when opposed to safety consideration, are provided")

- Identify the procedures to be used by the Quality Assurance organization for implementing and monitoring the QA program for exploratory shaft design, construction and testing.