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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, Project Officer

Subject: Meeting Report - 1982 National Waste Terminal Storage
(NWTSS) Program Information Meeting, December 14-16, 1982,
Las Vegas, Nevada.

Dear Mr. Seamans:

Enclosed are two copies of the above-mentioned report. Please give
one copy to Dr. Lawrence Chase.

If you have any questions, please call me.

Sincerely,

ENGINEERS INTERNATIONAL, INC.

V. Rajaram
Project Manager

VR/ja

Enclosure

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MEETING REPORT

Contract No. NRC-02-82-030

Time: December 14-16, 1982
Place: Riviera Hotel
Las Vegas, Nevada
Purpose: Attend 1982 National Waste Terminal Storage (NWTS)
Program Information Meeting
Participants: Engineers International, Inc.

V. Rajaram, Project Manager
F. S. Kendorski, Assistant Project Manager

Meeting Summary:

The meeting provided a forum for the U. S. Department of Energy to inform the technical community and other interested persons about the status of their nuclear waste management efforts. Technical sessions were held relating to the Basalt Waste Isolation Project (BWIP), the Nevada Nuclear Waste Storage Investigations (NNWSI) in tuff, the Office of Nuclear Waste Isolation (ONWI) efforts in salt, and the subseabed program. However, technical issues regarding these programs were not discussed at depth. The NRC program, international programs, and state interactions, public involvement, and public information aspects were discussed in three sessions.

Dr. Rajaram attended sessions on the NNWSI program and BWIP program (December 16, 1982) and Mr. Kendorski attended sessions on the ONWI program and the BWIP program (December 15, 1982).

Overview of the NWTS Program

The NWTS program goals are to complete site characterization activities of at least three sites by 1987 and to recommend a site to the President by 1987 for NRC license application. The schedule assumes that the NRC review of the construction authorization application to be between 1987 and 1990, and if NRC license is obtained, repository construction would take place between 1990 and 1998. NRC commissioner Asselstine stressed that the NRC position on prediction of the geologic setting for 10,000 years is to rely on multiple barriers and numerical performance objectives. Frank Coffman of the DOE stressed the importance of the technical calibre of the people working on the NWTS program in making the project a success. The Waste Isolation Pilot Project (WIPP) was discussed by McGough of the DOE, who mentioned that data from 75 exploratory holes and 100 miles of seismic reflection surveys was utilized in site characterization.

Phase II of the project, termed Site and Preliminary Design Validation (SPDV), will be completed by June 1983. SPDV involves a 12-foot diameter and a 6-foot diameter shaft, with several hundred feet of drifting. Phase III, to start in June 1983, will involve a third shaft, repository development for TRU waste emplacement, and a test area for HLW. Dr. Goldstein of the New Mexico Department of Health and Environment, stressed the importance of state participation on the WIPP project.

The NWTS program strategy was discussed by Ballard of the DOE. He mentioned that a salt site should be selected by June 1983 and work for a site in granite would commence in FY 1983. Subseabed disposal is a long-term option which would require international concurrence. Carter of Battelle Laboratories summarized the progress of the NWTS program in 1982, and mentioned that engineering feasibility, licensing feasibility and cost would be primary factors in repository development. Carbiener of Battelle Laboratories mentioned that site specific trade off studies, systems engineering, waste package development, performance assessment, sealing studies, field testing, and at depth testing would be the primary focus in 1983. Regulatory and institutional aspects of the NWTS program would also receive attention during 1983.

BWIP Program Review

The BWIP program was discussed on the morning of December 15, 1982 and December 16, 1982. The geology, hydrology, waste package, in-situ stress measurement, seal development, and repository design aspects were discussed. The Site Characterization Report (SCR) of November 1982 was referred to in most papers, and very little additional detail was provided. Characteristics of the Middle Sentinel Bluffs and Umanum flows were provided, with a brief mention of the McCoy Canyon flow. Characteristics of the backfill to minimize waste package corrosion and enhance radionuclide retardation were discussed.

An overview of the BWIP program was provided by Dr. Deju. This was followed by papers discussing the status of the BWIP project and plans for ongoing work. The plans for resolution of the waste package and site geochemistry issues were discussed by Dr. Babad. The cost reduction by going from a complex to a simple package was emphasized, and efforts to determine corrosion and performance of the canister in the repository environment were discussed. Turner discussed geo-engineering issues, primarily related to stability and preclosure performance assessment. Rock mass strength determination and verification of in-situ stress measurements will be accomplished from the exploratory shaft. Results of the heater test at the Near Surface Test Facility (NSTF) have shown that decrepitation of basalt does not occur at 5 kw of heating, and this was attributed to the basalt hav-

ing higher compressive strength than the Stripa granite (where decrepitation was observed at heating levels of less than 5 kw). Work plans for seal performance include development and characterization of seal materials and modeling the effects of the disturbed rock zone on effectiveness of the seal system in meeting overall repository performance. Baca discussed the results of the performance assessment models, and mentioned that resolving data uncertainties and refinement of the model were areas in which future work would be done.

The exploratory shaft program was discussed by Dietz, who mentioned that the middle Sentinel Bluffs (2986 ft deep) and Umtanum (3607 ft deep) are potentially acceptable horizons for shaft station breakout. The rock temperatures at these stations are expected to be 124° F and 136° F, respectively. A penetration rate of 15 feet per 24-hour day, a cutter life of 300 feet, and hole deviation at total depth of one foot are expected. Tungsten Carbide button bits made by Drilco and a Hughes bit are to be used for blind boring. A 3-foot disturbed rock zone is expected around the shaft, and a 3000 psi grout will be used for shaft sealing. The shaft is to be completed by October 1983, and cased by January 1984.

NNWSI Program Overview

The NNWSI program at the Nevada Test Site was discussed by Dr. Vieth of DOE and DOE subcontractors from Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), Sandia National Laboratory (SNL), U.S. Geological Survey (USGS) and Westinghouse Corporation. The presentations were candid, and exhibited a good understanding of the issues involved in designing a repository at Yucca Mountain. A realistic outlook was exhibited in the papers presented. One area of major concern to retrievability that is being studied by Sandia National Laboratory is the placement of 30 to 40 waste packages in horizontal holes which may be 600- to 700- foot long. The need for hole liners, thin engineered backfill versus slurry backfill in waste emplacement holes, and the possibility of overcoring horizontal holes are being studied. Another area of major concern to repository siting that is being addressed by the NNWSI program is the movement along faults due to tectonism in the Yucca Mountain area.

The interaction of the waste package and the host rock and its impact on overall performance assessment of the repository are being considered in design. The three key issues that will be discussed in the SCR are:

- radiation release
- site characteristics as they relate to release rates, and
- feasibility of repository construction.

Information needs for resolving these issues are being identified at present.

The four tuff horizons that were considered to date are the Topopah Springs, Bull Frog, Calico Hills and the Tram Unit. Based on geological interpretations of borehole data and laboratory rock mechanics data the Topopah Springs member has been identified for detailed site characterization. The desirable features of the Topopah Springs member are:

- sufficient compressive strength
- high thermal conductivity
- good thermal expansion
- low porosity
- 500 to 600 feet above water table

The geologic issues identified by Dr. Dudley of the USGS are:

- structural and stratigraphic continuity
- tectonic and seismic stability
- potential for volcanism
- hydrologic characterization

Twelve holes have been drilled to data in and around the Yucca Mountain block to define the geology and hydrology of the site. Hydrofracturing tests have been conducted in hole USW-G-1, and these tests indicate that the motion along cohesionless faults will not occur if the angle of internal friction along the fault is greater than 31 degrees. Dr. Dudley mentioned that exploration holes necessary to identify the location of perched aquifers will be drilled from the surface, but in-situ data gathering for the repository horizon will be done from the bottom of the exploratory shaft.

Laboratory testing of core for mechanical properties will be supplemented with data from the Rocha slot and cased block tests in the G-tunnel. Laboratory tests will continue to determine effects of lithophysae, confining pressure, and sample size on rock strength. Tillerson mentioned that data from tests on the Topopah Springs core and G-tunnel rock are being compared to determine the laboratory to in-situ scaling factors. The advantages of horizontal emplacement over vertical holes were discussed by Leo Scully. He also mentioned that normal and emergency retrievability from horizontal holes was being studied.

Myers of LANL discussed the exploratory shaft and underground test facility proposed at Yucca Mountain. The 12-foot-diameter shaft is to be conventionally sunk to a depth of 1600 feet, and structure mapping will be done during sinking. Coring from the shaft breakout

is planned and confirmation of the fracturing observed in the core will be done by mapping the drifts. The underground test program will consist of diffusivity tests, heater tests, slot test and other geomechanics in-situ tests, and ten horizontal holes totalling about 2500 feet.

ONWI Program Overview

The ONWI program in defining a salt repository is still in the generic stage since three sites are being screened to permit the selection of one site for detailed site characterization by July 1983. Site characterization efforts in the Permian Basin (Texas), Paradox Basin (Utah) and Gulf Coast Salt Domes (Louisiana, Mississippi and Texas) were discussed by Newcomb, Laughon, and Swanson, respectively. The Permian Basin is geologically complex, and definition of the extent of the Ogallala aquifer is being done. Salt cycles 4 and 5 in the Deaf Smith and Swisher county areas of Texas are about 130 to 190 feet thick and 100 to 160 feet thick, and 2100 to 2900 feet deep and 1900 to 2700 feet deep, respectively. In Gulf Coast Salt Domes, four have been identified in decreasing order of favorability. They are: Richton in Mississippi, Vacherie in Louisiana, Cypress Creek in Mississippi, and Oakwood in Texas. In the Paradox Basin, Salt cycle 6 has been identified with a thickness of 160-240 feet and a depth of 2700 feet.

Performance assessment models have been developed by ONWI, and in FY 1983, utilization of these models using laboratory and in-situ data is planned. A general program of in-situ testing in salt was described by Ubbes of ONWI. Geological, geoengineering, hydrological, and geochemical tests are planned from the exploratory shaft bottom. Geoengineering tests will consist of core jacking tests, with and without heat, for determining the modulus of deformation, and monitoring of drift, shaft and liner stresses and deformations. A quality assurance (QA) program is being developed by ONWI to meet DOE (5700.6A) and NRC (10CFR Part 60, subpart G) specifications. Murthy mentioned that traceability, retrievability and reliability are being stressed in all geotechnical investigations. A generic salt repository design was described by Eschen of Stearns-Roger.

A detailed design for an exploratory shaft in salt will be developed after a salt site has been selected. A design life of 100 years is being considered for shaft design. A shaft of about 10-foot diameter will be constructed either by the blind hole drilling method or the drill and blast technique (Paradox and Permian basins). Waste package design was discussed by Basham of Battelle Laboratories. Waste type, thermal, crushing and corrosion considerations, and repository interface are the factors affecting package design. A 250° C peak salt temperature and a 375 w/m² representative heat load

in the repository are design limits being used. Brine quantities per package estimated for spent fuel, CHLW and DHLW are 80 litres (1), 80 l, and 13 l, respectively.

Closure

The 1982 NWTIS Program Information Meeting was a forum for all people concerned with nuclear waste disposal to meet and discuss technical, regulatory and institutional issues. Technical details relating to the issues were not discussed; however, technical contacts were made with people working on the BWIP, NTS and the salt programs.

Cost Breakout

Travel expenses for the trip are attached.