

NTS

TERMINAL WASTE STORAGE

MONTHLY TECHNICAL STATUS REPORT



July 31, 1978

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PROGRAM HIGHLIGHTS

1. The interim draft report containing the first stage of CSC's work on prediction of subsurface ground motion was completed.
2. Twenty-four stations of the seismic monitoring network are now operational.
3. The location for the first exploratory hole in Calico Hills was changed based on interpretation of magnetic and electrical geophysical data.
4. Two core holes were completed in the Climax Stock in the Pile Driver tunnel complex.
5. Drilling on the first exploratory hole at Yucca Mountain commenced on July 30, 1978.
6. Field reconnaissance of granitic rocks in southern Nevada continued, including locations in Esmeralda, Nye, and White Pine Counties.
7. The modeling of the Eleana Heater Experiment showed good agreement with field temperature data for conduction energy transfer.
8. A rough draft of the tuff scoping report was completed.
9. Review of the LASL quality program plan for their activities on the NTS Terminal Waste Storage Program was completed by Sandia Quality Assurance.
10. A geological reconnaissance of the region near the Yucca Mountain drill site suggested a high probability that large, reasonably unfaulted blocks of tuff exist in the area.

TECHNICAL STATUS REPORT
FOR MONTH OF JULY

NTS TERMINAL WASTE STORAGE PROGRAM

TASK 1 SEISMIC INVESTIGATIONS

SUBTASK 1.1 DATA PROCESSING AND ANALYSIS

The objective of this subtask is to define the ground motion environment from nuclear explosions as a function of yield and distance at specific candidate storage sites.

The following table shows the progress to date. The numbers are: events completed/events in data set.

	<u>Sandia</u> <u>Data</u>	<u>USGS</u> <u>Digital</u>	<u>USGS</u> <u>Analog</u>	<u>LASL</u> <u>Data</u>	<u>Total</u> <u>Data</u>	<u>Percent of</u> <u>Total Channels</u>
Pahute High-Yield Data Set	4/8	1/1	0/6	0/0	1/8	49
Pahute Intermediate-Yield Data Set	7/15	3/3	0/9	0/1	3/15	55
Yucca Data Set	10/25	3/3	0/6	0/8	5/24	(a)

(a) Total channels not determined.

The first of the data from USGS analog tapes have been digitized and received at Sandia. The first digitized data from Los Alamos tapes were also received during the same period.

SUBTASK 1.2 WEAPONS TEST GROUND MOTION DATA ACQUISITION

The objective of this subtask is to make ground motion measurements at specified locations to provide the basis for determining how weapons test-induced ground motion changes with depth, distance, and yield and to determine for candidate sites whether or not there is site-specific ground motion amplification.

During July, 96 ground motion measurements were made. Installations at Black Mountain, Yucca Mountain, Dome Mountain, and Fortymile Canyon could not be completed in time for the last event in July, removing any need for installation prior to the end of August. Installation of all or most of the stations is expected to be completed in August. Ue-4ae is a candidate for U-3cs as an alternate location for Station 19. The downhole canister at Ue-1L became noisy and arrangements have been made to remove the canister. After repair, the canister will not be returned to that location but instead will be held for use at another location.

SUBTASK 1.3 FACILITY HARDENING STUDIES

The objective of this subtask is to estimate the added cost required to protect a repository, at candidate NTS sites, against weapons test ground motion and to develop NRC licensable seismic design criteria.

1.3.1 Design Cost Scoping Studies

This study was completed in May 1978, and was distributed in final form on June 1, 1978.

1.3.2 Seismic Design Criteria

The objective of this activity is to develop seismic design criteria acceptable for licensing a repository at NTS.

This activity will not determine the actual characteristics of the seismic motion and will be site independent.

Work continued at a low level of effort during the month on the development of seismic design criteria. Personnel from SLA and JAB met in San Francisco to discuss details of the program. As a result of the meeting, attention will be focused on the following two major items: (a) the qualitative identification of failure modes of the tunnels, shafts, and mechanical/electrical equipment, and (b) the continuation of work on seismic design criteria with clear identification of the information that is lacking and what is required to provide this information.

A draft report is now scheduled for September 30, 1978.

SUBTASK 1.4 EFFECT OF DEPTH ON GROUND MOTION

The objective of this subtask is the prediction of subsurface ground motion necessary for the seismic design of underground waste storage facilities when provided with the surface ground motion parameters and the necessary geological and physical description of the proposed site.

The interim draft report entitled "Effect of Depth on Ground Motion," containing the results of the first stage of CSC's work, was completed and transmitted to NV and Sandia Laboratories on July 11 (Milestone 1). The recommendation was made in the report to proceed with the effort to assess the effect of depth at receiver sites on ground motion according to CSC's statement of work. Verbal authorization to proceed was received from NV on July 21, following the review of the report by NV and Sandia Laboratories.

In addition to the completion of the interim report, digital high-pass and low-pass filters were developed, tested, and applied to a subset of the seismic data collected by Sandia Laboratories. The development of additional filters for use in the correction of the recorded acceleration, the derivation of displacement and velocity time series, and the calculation of response spectra was also continued. A computer program has been designed for use in calculating the amplitude spectrum of a particular wave type (p,s, surface) using the standard Fourier transform algorithm. The implementation of this analysis tool will be accomplished in the coming week. The outputs obtained from these signal processing activities will be compared with those obtained by Sandia to ensure that the results are consistent.

Geological information related to all the Sandia surface/subsurface seismic station pairs at the NTS has been received from the USGS.

TASK 2 GEOLOGIC INVESTIGATIONS

SUBTASK 2.1 TECTONICS, SEISMICITY, VOLCANISM, AND EROSION

The objective of this subtask is to assess the potential for damaging earthquakes, recurrence of volcanism, or acceleration of erosion in parts of the southern Great Basin. This will be done by investigating the rate, intensity, and distribution of faulting (the "tectonic flux") during approximately the last 25 m.y., monitoring and interpreting the present seismicity, and studying the past history of volcanism. In Fiscal Year 1978, it is planned to complete a preliminary study of faulting and volcanism on and near the Nevada Test Site, and to complete installation and begin full operation of the seismic monitoring network.

Twenty-four stations of the seismic network are now operating. Only about half of these are being recorded at Las Vegas, as the existing phone lines to Las Vegas are filled and no new stations can be recorded until transfer of the recording site to Golden, Colorado. Installation of the remaining stations is proceeding. Downhole-surface instrumentation at Pile Driver is in operation and is capable of recording ground motion from earthquakes. Other downhole equipment ordered has not yet been received.

First-stage sampling of NTS volcanic rocks younger than 11 m.y. is completed. Preliminary ages for about a dozen rhyolitic and basaltic rocks are now available. Six other units are being dated and will probably be completed in September. Dates on hand suggest a regional episode of basaltic eruptions between about 10-7.5 m.y. ago, accompanied by voluminous silicic volcanism at Black Mountain. Between about 7 and 3 m.y. ago few, if any, volcanic rocks were emplaced on

or adjacent to the Test Site. Beginning about 3 m.y. ago, small eruptions of basalt occurred at about 2.8 m.y., 1.3 m.y., 0.4 m.y., and 0.25 m.y. Apatite fission track ages of metamorphic rocks exposed west of Beatty and north of Black Mountain indicate that these basement rocks did not cool below 100⁰ C. until about 3 m.y. and 5 m.y. ago, respectively. The general correlation of these ages with the cessation of major volcanism may be significant.

Eight uranium series dates from five localities have now been reported. Some of these dates support the relatively old ages (>100,000 years and >400,000 years) interpreted for some faults associated with the Rock Valley system, and relatively young age (8,000-24,000 years) estimated for the Boundary Butte-Yucca Fault system. About 10 other dates of carbonate material are being done and results are expected before October.

The data-acquisition and processing system for handling alpha and high-resolution gamma-ray spectrometer data is assembled and is being tested to evaluate whether it meets specifications.

Work on the NTS tectonic-geologic map was begun in July.

The principal investigator devoted about 10 days to work connected with sites at Yucca Mountain and Calico Hills.

SUBTASK 2.2 ELEANA INVESTIGATIONS

The objective of the Eleana Investigations is to characterize the candidate mass located at Syncline Ridge with respect to its spatial dimensions, structural integrity, and fluid permeability. Achievement of the objective will result in a recommendation regarding the acceptability of the argillaceous argillite located at Syncline Ridge for terminal waste storage.

Work continued on compilation and writing of the Syncline Ridge report. Drill hole duties of the junior author in August and September will probably delay first draft of report until about November 1.

Detailed mapping of Quaternary in the area between Syncline Ridge and the Eleana Range is 90 percent completed. Significant results are:

1. Three major stratigraphic units of Quaternary deposits can be mapped. These subdivisions appear to be the same as those mapped north of the Syncline Ridge area and those mapped in southwestern NTS.
2. Divisions of the three major units can be made that have characteristics relatively independent of source area, lithology, and elevation; the major control appears to be climatic, indicating the possibility of correlation to larger areas.
3. Sequence of deposition, soil development, and general characteristics indicate the definite possibility of correlation of some Quaternary events in the NTS area with events of known age elsewhere. These correlations, when confirmed, could provide ages of surfaces in faulted areas which would then provide at least maximum ages of displacements more definitely than previously possible on many faults.

Mapping of Quaternary deposits in the Syncline Ridge area will be completed in late August or early September.

The UE17e and Eleana heater experiment reports have been submitted for final editing. Illustrations for the lithologic-log catalog for the Syncline Ridge area are complete and the report will be submitted for final editing by August 7.

SUBTASK 2.3 LOW TEST-INTERFERENCE AREAS

The objectives of this subtask are to evaluate the currently identified most crucial geologic and hydrologic factors affecting the waste-storage suitability of NTS areas that may not be excluded from use because of ground motion effects of nuclear weapons testing; and to develop plans for site verification investigations of those areas that are potentially suitable.

2.3.1 Jackass Flats

The objectives of the Jackass Flats Activity are to evaluate the depths and thicknesses of Eleana argillite, zeolitized tuff, and tuffaceous, unsaturated alluvium; and to evaluate the possibility of renewed earthquake activity along the Mine Mountain fault.

Geophysical measurements continued in the vicinity of the buried Mine Mountain fault, with emphasis on telluric traverses. Review of the performance of the VES contractor resulted in termination of the contract, and action was initiated to reaward the contract to the second bidder. The dipole-dipole induced-polarization survey was completed; the data were submitted to the University of Utah for interpretation under contract.

2.3.2 Calico Hills

The objectives of the Calico Hills Activity are to evaluate the postulated existence of an intrusive igneous rock mass at relatively shallow depths (1,000 ft. \pm) beneath the Calico Hills; to determine the degree of fracturing and mineralogical alteration of the rock at depths of 2,000 to

5,000 feet; and to assess the potential for renewed seismicity or volcanism along the known fracture zones in and adjacent to the Calico Hills.

Ground geophysical surveys similar to those in Jackass Flats were continued in the Calico Hills. In addition, surface magnetic traverses were run across areas showing peak anomalies in the draped aeromagnetic survey. Preliminary measurements in the field showed the magnetic susceptibility of the Eleana argillite to be high owing to the presence of magnetite. Action was initiated to relocate the first exploratory hole based on interpretation of the magnetic and electrical data.

2.3.3 Climax Stock

Drill hole U15-01 CTWS, UG#1, located in the right rib of the tail drift of the Pile Driver tunnel complex, was spudded June 27, 1978. Continuous cores of NX size were taken with total depth of 153.5 m (503.7 feet) and were received in the USGS Core Library.

Drill hole U15-01 CTWS, UG#2, located in the tail drift of the Pile Driver tunnel, was spudded July 21, 1978. Continuous cores were taken with depth at 53 m (175 feet) as of July 28.

Cores from these holes will be logged in August.

2.3.4 Paleohydrology

The FY 1978 objective of the Paleohydrology Activity is to locate the points of groundwater discharge near low test-interference areas of southern NTS and to determine the ages of discharge as a means of predicting groundwater flow paths under future, possibly wetter climates. This is part of a more comprehensive, longer-term paleohydrologic and

paleoclimatologic investigation to relate regional water levels and flow patterns to pluvial climates.

Data on areas of possible groundwater discharge during pluvial cycles were assembled in preparation for the August program review.

2.3.5 Regional Geoelectric Survey

The objective of this activity is to delineate the principal geologic and structural features that control groundwater movement in southern NTS, in adjacent off-site areas, and in areas down-gradient toward present and possible future discharge points.

No activity reported during July.

2.3.6 Yucca Mountain

This activity has the objective of beginning the evaluation of tuffs at or near NTS by characterizing their occurrence at Yucca Mountain and by retrieving samples for Subtask 3.2 laboratory studies.

The Longyear 44 (DOD) drill rig was moved to the Yucca Mountain exploratory hole site (UE25a #1) on July 29, 1978, and core drilling was started on July 30, 1978.

SUBTASK 2.4 SOLUTE-TRANSPORT MODEL

The objective of this subtask is the development of a digital hydraulic and solute-transport model to predict rates of movement of radioactive species and their concentrations in groundwater if they should be released from a

waste repository in the vicinity of Nevada Test Site. The interim objective to be reached by the end of FY 1978 is to complete the hydraulic model utilizing all data that are presently available.

Plans are being made and data are being checked for beginning hydraulic model runs. Runs should actually start about the end of August.

USGS met with Sandia Laboratories to discuss the application of sensitivity analysis to the solute-transport modeling program. Plans are presently being formulated to analyze the feasibility of applying the sensitivity analysis technique of Sandia to the USGS modeling effort.

Saturated-thickness maps of NTS and vicinity were prepared for the alluvial, tuff, and Paleozoic aquifers for presentation at the August program review.

SUBTASK 2.5 OFF-SITE INVESTIGATIONS

This subtask has two objectives to be attained sequentially: (1) the identification by mid-FY 1978 of large masses of granitic and closely related rock types, and argillaceous rocks in the state of Nevada, including a preliminary appraisal of the suitability of several high-potential areas for a terminal waste repository; and (2) a systematic appraisal of the state of Nevada, including recommendations of the most favorable areas of granitic, argillaceous, and other possibly suitable rock types by the end of FY 1979.

Subtask personnel continued field reconnaissance of granitic rocks in Esmeralda, northern Nye, and southeastern White Pine Counties. Four (4) sites in Esmeralda County, one (1) in northern Nye County, and

three (3) in southeastern White Pine County were investigated for rock type, fracture frequency, and general verification of data from literature study. Rock samples were collected for age determination, thin-section petrography, physical properties, and magnetic susceptibility.

Considerable work has been done on the report, "Preliminary Inventory of Clay-Rich Rocks in Eastern Nevada," excluding the Nevada Test Site. The rough draft is expected to be completed in August and then transmitted to reviewers.

University of New Mexico personnel reconnoitered tuff locations in Lincoln and northern Nye Counties. The purpose of the trip was to define the character and variability of different sections of tuffs in those counties.

The reduction of gravity data of the Las Vegas region began as a step toward producing a uniform gravity data set for southern Nevada. The data are from five sources and represent the most heterogeneous data set of the region. Several problems have been encountered and resolved in merging the data. The reduction is being done on the new Plouff-Godson system which automatically incorporates terrain corrections.

Plans for aeromagnetic surveys of several off-site regions were hardened from preliminary planning. Specifications for the surveys were drawn up and forwarded to the contracts office to let out for bid.

SUBTASK 2.6 TIMBER MOUNTAIN WRAP-UP

The objective of this subtask is to complete preliminary definition of the subsurface geology and structure of the Timber Mountain area.

Several modeling runs were completed on the gravity and preliminary aeromagnetic data. Aeromagnetic data from reflight lines were received from the contractor at the end of July and entry of these into the computer file was initiated.

SUBTASK 2.7 ALTERNATE GRANITIC SITE EVALUATIONS

The objectives of this subtask are: (1) to identify specific potential waste repository locations in granitic rocks both on and off the Nevada Test Site (but within the state of Nevada); (2) to prepare sufficiently detailed evaluations of each of these sites to select a few for further evaluation; and (3) to do both of these by the end of the second quarter of FY 1978.

Review of a draft report, "A Preliminary Evaluation at 30 Granitic Rock Sites for a Radioactive Waste Storage Facility in Southern Nevada," is still in progress.

TASK 3 MEDIA INVESTIGATIONS

SUBTASK 3.1 ARGILLACEOUS EXPERIMENTS

The objective of this study is to characterize sufficiently the response of Eleana argillite to the thermal and structural loadings imposed by the emplacement of high-level waste to permit a preliminary assessment of the suitability of Eleana argillite (or any argillite) for isolation of high-level waste.

3.1.1 Eleana Heater Experiment

The objectives of the activity are: (1) to determine whether Eleana argillite can withstand sufficient thermal loading to allow economic isolation of high-level waste; (2) to provide data for corroboration of thermal/mechanical models; and (3) to assess the reliability and suitability of available test hardware and instrumentation and determine if the development of new instrumentation technology is required for future long-term tests.

A second wattmeter has been installed in the three-phase heater circuit in order to provide a direct measurement of the total power. A slight imbalance of the circuit has been observed but is of no concern. On July 10, the water level in S-3, the sump hole, dropped to slightly less than 3 feet in depth and has remained at this level. The temperature data has been plotted with the conduction energy model and shows good agreement.

3.1.2 Laboratory and Modeling Support

The objective of the modeling portion of this activity is to analyze the near-field thermal and structural response of argillite to operation of the heater experiment to determine the effectiveness of present models and areas where model improvements may be required. The objectives of the laboratory portion of this activity are to determine sufficient thermal, mechanical, mineralogical, physical, and chemical properties of samples from the J subunit of the Eleana formation as functions of temperature and pressure to allow assessment of the effectiveness of the argillaceous media as a waste migration barrier.

The modeling of the heater experiment shows good agreement with the temperature data for conduction energy transfer. Thermal stress modeling is being done at present. The thermomechanical laboratory data necessary for the modeling effort was analyzed and made available. The preliminary radiochemistry evaluation of the Eleana argillite has been completed. The results of work at Sandia and LASL to date are being written up as technical reports at the respective laboratories. The microautoradiography technique for studying sorption of U(IV) has been developed at LASL.

The parametric modeling of far field effects is in progress. This work was delayed because of the field problems in starting the heater experiments.

SUBTASK 3.2 TUFF EXPERIMENTS

The objective of the tuff experiments is to provide an initial evaluation of tuffs on or near the NTS for nuclear waste isolation. Meeting the objective of this subtask is

contingent upon favorable results of an initial scoping evaluation and a midyear decision to proceed with a tuff heater experiment.

3.2.1 Tuff Heater Experiment

The objectives of the heater experiment are to identify the short-term, near-field thermal and mechanical response of a candidate tuff to an applied thermal load and to identify any critical in situ mechanisms that would eliminate tuff from further consideration as a medium suitable for terminal storage of HLW.

Design of three phenomenology experiments has begun. Two experiments, one in welded and one in nonwelded tuff, address the water generation issue and the third experiment addresses the joint behavior in welded tuff due to a thermal load. The experiments are to be conducted at a nominal 1,400-foot depth in the G-tunnel facility.

3.2.2 Laboratory and Modeling Support

The objectives of the laboratory and modeling support are: (1) to prepare for NAS level review a scoping evaluation of tuffs on or near the NTS for nuclear waste isolation; (2) to develop the data base and modeling capability needed for field experiment design and repository parametric modeling; and (3) to identify critical failure mechanisms which would disqualify tuff from further consideration as a disposal medium.

Modeling work is under way to support the proposed field experiments. A Sandia report is in preparation covering the thermal physics work done for the scoping activity. Batch sorption coefficient measurements

for ^{239}Pu and ^{241}Am on well J-13 core have been started at LASL. Core requirements were determined for the Yucca Mountain exploratory hole.

A rough draft of the tuff scoping report will be submitted for review in the first part of August.

SUBTASK 3.3 GRANITIC EXPERIMENTS

The objective of this subtask is to provide a basic characterization of the Climax granite response to thermal and structural loadings. Specifically, the objective is to obtain the response at depth of a typical Basin and Range granite (the Climax Stock) to an imposed thermal load, and to answer the question of whether a crystalline rock waste repository can be established at or near NTS.

3.3.1 Climax Heater Experiment

Heater Test No. 1 was constructed in FY 1977. For FY 1978, the objective is to operate the test facility according to the written experimental plan and to analyze and report the results.

No significant activity.

3.3.2 Laboratory and Modeling Support

The objectives of the laboratory and modeling support for the granitic experiments are to (1) plan Heater Test No. 2; (2) evaluate rock mechanics instrumentation, provide instrumentation input to the Heater Test No. 2 design, and start instrumentation design and fabrication for Heater Test No. 2; (3) evaluate and choose a finite element rock mechanics

code for modeling the mechanical behavior of the thermally stressed rock, and begin to get the code operational; and (4) carry out laboratory studies or radionuclide sorption on Climax Stock granitic samples in order to evaluate possible variations in sorption as measured on crushed material compared with flow through fractures.

Batch sorption coefficient measurements for ^{237}Pu and ^{241}Am with two Climax Stock granite cores and preequilibrated synthetic groundwater have been started. Ambient and elevated (70°C.) temperatures are being used with three particle sizes. Samples for one- and two-week contact times have been sacrificed, and aqueous and solid fractions are being counted. Four- and eight-week contacts are in progress.

A conceptual design of an experiment to measure thermal properties of cores from the site of the heater tests has been decided upon and mechanical engineers have begun the actual design of the experimental apparatus. Fabrication of the first parts should commence in August. Conductivity, diffusivity, and expansion will be measured as a function of temperature at ambient pressure. The current plan is to monitor thermal gradients and the movement of temperature pulses along the length of cylindrical cores by means of closely spaced thermocouples mounted on the outside of the cores. The experiment will be conducted under vacuum to minimize conductive and convective heat losses from the surface of the sample.

SUBTASK 3.4 ALLUVIUM STUDIES

The objective of this subtask is to provide a preliminary evaluation of the waste isolation potential of alluvium.

No significant activity.

TASK 4 NTS ENGINEERING AND TECHNICAL SUPPORT

SUBTASK 4.1 DRILLING PLANS AND ENGINEERING

The objective of this subtask is to provide for accomplishment of technical support requirements of program participants by the NV prime A-E support contractors (F&S and H&N) and the NV prime operating contractor (REECo). These requirements are not specifically related to other established subtasks and activities of the Repository program but rather are general program support, minor in nature, and appropriately not planned in advance.

SUBTASK 4.2 F&S GEOLOGY AND CORE LIBRARY SUPPORT

The objective of this subtask is to (1) provide and maintain a cadre of F&S geologists to support the Repository program participants; and (2) to provide for prorated core library and general support to maintain, handle, and store rock samples in the Mercury core library and provide general support to USGS on the Repository program.

Fenix & Scisson geologists provided support to (1) Subtask 2.1, for the continued mapping of Quaternary deposits and fault scarp profiling; (2) Activity 2.2.2, for completion of UE17e report; (3) Activity 2.3.2, for assistance on ground magnetic traverses at Calico Hills; and (4) Activity 2.3.6, for field trip and site location at Yucca Mountain.

Three geologists were hired to provide support for the Terminal Waste Storage program.

TASK 5 QUALITY ASSURANCE

SUBTASK 5.1 QUALITY ASSURANCE

The objective of the Quality Assurance subtask is to develop and implement the NTS Terminal Waste Storage Program Quality Assurance Plan.

Quality Assurance has reviewed the quality program plan submitted by LASL for their activities on the NTS Terminal Waste Storage Program. The review was based on applicable elements of the NRC Standard Review Plan, Section 17.1. The NRC Standard Review Plan is anticipated to be the basis for NRC review of the overall quality program at the time of license application. Applicable elements of the Standard Review Plan are intended to be used as a guide for review of all participating organizations' quality program plans to assure consistency of review by QA and proper preparation for future NRC license reviews. Review of the LASL program will be completed by the August 1, 1978, schedule and comments forwarded to LASL and DOE/NV. No other quality program plans have been submitted to QA for review.

SUBTASK 5.2 QUALITY CONTROL

Two USGS personnel attended the quality assurance symposium sponsored by Richland Operations Office on July 19 and 20 in Richland, Washington.

Several meetings of USGS personnel were held to review the quality control procedures applied in geophysical logging at the NTS under existing logging contracts. An ad hoc committee was established to complete a systematic evaluation of those logs planned for use in the waste program as part of the geophysical characterization of repository volumes.

TASK 6 PROGRAM MANAGEMENT

This task provides for the overall NTS Terminal Waste Storage program technical overview by a technical management contractor (Sandia Laboratories) and a program management function within the USGS on the Repository program. It includes assisting the DOE Program Manager in the preparation and maintenance of program and management plans, technical direction and management of technical program plans, and review and evaluation of technical program and technical status and cost reports.

SUBTASK 6.1 PROGRAM MANAGEMENT (Sandia)

A meeting was held in Albuquerque, New Mexico, on July 13, 1978, with representation of Sandia and the USGS to discuss the initiation of a sensitivity analysis of the USGS regional solute transport model for the NTS Terminal Waste Storage Program. USGS summarized their data base collection and transport modeling effort and Sandia presented their recently developed statistical methodology for parameter sensitivity analysis. It was decided at the meeting that the sensitivity analysis would be very useful in identifying where additional hydrological data collection efforts should be concentrated. As a first step, the sensitivity analysis is to be applied to the 2-D regional hydraulic model. Resources to address this study are being identified by USGS.

On July 14, 1978, a meeting was held at Germantown to discuss Tuff Studies and to determine the steps necessary to complete the Tuff Scoping Report. This report would be used as a vehicle to initiate dialogue with NAS relative to the suitability of tuffs as repository media.

On July 17, 1978, a geological reconnaissance of the region near the Yucca Mountain drill site suggested a high probability that large (1 x 5 mile), reasonably unfaulted blocks of tuff exist in the area. Faults with displacements of about 10 to 30 feet transect the block but are judged not to preclude continued site investigations.

During July 19-21, a meeting was held at PNL with the WISAP project manager and members of his staff to discuss the applicability of the Waste Isolation Safety Assessment Program to the NTS Terminal Waste Storage Program. The WISAP project (funded through ONWI) consists of four tasks aimed at assessing the safety of long-term geologic isolation of radioactive wastes: (1) release scenario analysis, (2) waste form release data, (3) release consequence analysis (transport and dose to man), and (4) transport data. Although Task 3 is essentially ready for use, Task 1 will not be ready until October 1978. Tasks 2 and 4 are continuing efforts of data collection and analysis. With respect to funding (\$3.1 million in FY 1978), the program is substantial and it appears that the NTS waste program could benefit technically from the use of Tasks 1 and 3 when a specific site is found and sufficient data has been generated for a safety analysis. However, the WISAP project does not have the capability of analyzing near-term, near field repository phenomena such as thermomechanical effects, waste-rock interactions, and media thermal degradation. Periodic follow-up contacts will be made so that the best advantage may be gained from the WISAP project.

A seminar was attended on July 19 and 20, 1978, in Richland on QA activities as related to the geotechnical aspects of the NWTs program. Basalt, NTS, ONWI, and WIPP waste management activities were summarized. Group discussion focused on geotechnical considerations for quality assurance programs regarding the siting, characterization, and licensing of repository facilities. The general consensus was that complete documentation must be provided for all "material information," its

mode of procurement, and all professional judgments accruing therefrom. Ad hoc correspondence committees were established to further consider (1) record keeping requirements and systems for NWTs programs, (2) QA aspects of laboratory and field experimental tests, and (3) the format for a guiding QA plan applicable to all NWTs programs. It was proposed that the seminar reconvene at some future date if participant interest is sufficient.

USGS was visited on July 31, 1978, at Golden, Colorado, to obtain their thoughts concerning the desirability of investigating ground motion effects on nonpoint-source energy release along earthquake-producing faults. Present methods of analysis that describe potential earthquake-induced ground motion at NTS utilize the point source assumption. A follow-up visit to private contractors who might be able to effectively model a distributed fault release is planned for August.

The one milestone scheduled for July, the third quarter technical review meeting, will be held August 7, 1978, and will be included in the August report.

SUBTASK 6.2 USGS PROGRAM MANAGEMENT

Preparation of the FY 1979 work plan was initiated. Task 2 is to be renamed "Geologic and Hydrologic Investigations," and has been reorganized into five principal disciplines to improve efficiency of planning, reporting, and accounting. The current Subtask 6.2 will become Subtask 2.1 in FY 1979 and will include technical responsibility for maintaining a coherent, interdisciplinary approach to repository exploration and characterization.

The Technical Program Officer participated at NV on July 19 in a briefing by LASL regarding development of an underground experimental and demonstration facility in tuff.

TASK 7 SPENT FUEL TEST

The objective of this task is to safely emplace, store for a three- to five-year period, monitor, and retrieve approximately 11 spent reactor fuel canisters. Also, a series of rock mechanic tests will be conducted to determine the response of the granite to imposed thermal loads in geometries relevant to the design and safe operation of crystalline rock repositories.

SUBTASK 7.1 EXPERIMENT PLANNING AND DESIGN

The data acquisition system has been increased in scope and capacity. The specifications are being written to reflect this. As part of the data acquisition system, a borehole video camera system has been evaluated and is being purchased.

On July 18, Fenix & Scisson was directed to start on mining design of the experimental array. Later in the month, it was suggested that the access hole be moved to the northwest end of the canister storage drift. A decision on this arrangement is expected early next month.

An investigation to determine the canister storage hole drilling method was conducted during the month by F&S and REECo. It was recommended that a test hole be drilled using a 22-inch diamond core barrel to determine bit life and drill rate.

The mechanical engineering group was assembled in July, increasing that staff from two in June to seven by the end of July. These members include a design engineer, control system engineer, quality assurance engineer, plus a designer and a coordinator. In addition, two design engineers and a designer were temporarily made available.

Shielding requirements were established such that the maximum radiation dosage at contact will be 100 mrem per hour. This includes every phase of handling the spent fuel rod assemblies from cask loading in the shielded assembly building (E-MAD) to the storage wells. Surface contact dosage during the several years of storage will be less than 1/4 mrem. Layout drawings of the shield casks have progressed.

Plans for improving and simplifying the canister handling grapple have begun.

SUBTASK 7.2 FUEL CANISTER ENGINEERING

Criteria for the fuel assemblies to be stored in the facility were analyzed and transmitted to NV and Westinghouse-AESD. A meeting was later held in Pittsburg at which specific fuel assemblies were identified. A review of calculations concerning maximum fuel rod cladding temperature as a function of canister skin temperature commenced.

SUBTASK 7.3 FACILITY CONSTRUCTION

Exploratory core hole EX-1 was completed and EX-2 was advanced 250 feet. The average rate of penetration for the month was 28 feet per day based on a 5-day week. The rate increase to 50 feet per day by the end of the month was attributed to a change in bit type and a two-shift operation. It is anticipated that all exploratory drilling will be completed in August.

The muck pocket at the shaft station, which is used to transfer mucked rock from rail cars to the muck hoisting bucket, was repaired. The muck hoisting bucket was attached to the personnel car and was used to remove muck from the tunnel enlargement at the exploratory hole location.

The new 5 KV underground power cable was installed and work continued on hooking up this cable.

On July 13, a meeting was held at Mercury to discuss the general underground ventilation system for mining and canister storage operations. It was concluded that that access hole could not be used as an emergency egress from the mine.

A proposal was made by DOE/NV to use a surplus 24-foot x 70-foot metal building currently located in Area 5 at NTS for the GSTF instrumentation facility. Studies are being conducted to determine this possibility.

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