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YUCCA MOUNTAIN

YUCCA MOUNTAIN
SITE CHARACTERIZATION
PROJECT

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TECHNICAL DATA BASE
HANDBOOK

OCTOBER 1991
UNITED STATES DEPARTMENT OF ENERGY

YUCCA MOUNTAIN
SITE CHARACTERIZATION PROJECT

TECHNICAL DATA BASE HANDBOOK

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Prepared by

Technical and Management Support Services
Requirements Deployment Department
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and
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TECHNICAL DATA BASE HANDBOOK

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1.0 INTRODUCTION

The acquisition and development of technical data are activities that provide the information base from which the Yucca Mountain site will be characterized and may eventually be licensed as a high-level nuclear waste repository. It is essential that the technical data acquired by the Yucca Mountain Site Characterization Project (Project) be made available to all participants in a timely and controlled manner. The Project Technical Data Management Plan (TDMP) defines technical data management requirements and establishes a technical data management system for implementing data management controls. The following Project Administrative Procedures (APs) implement requirements defined in the TDMP:

1) AP-5.1Q, "Control and Transfer of Technical Data on the Yucca Mountain Project"

2) AP-5.2Q, "Technical Information Flow To and From the Yucca Mountain Project Technical Data Base (TDB)"

3) AP-5.3Q, "Information Flow Into the Project Reference Information Base (RIB)"

1.1 PURPOSE AND SCOPE

This handbook has been developed as a users guide for implementing AP-5.2Q and portions of AP-5.1Q addressing the transfer of data from participants to the TDB. The handbook provides general guidance to assist participants in:

1) Identifying how to use the TDB

2) Submitting data to the TDB (e.g. compiling data into consistent data structures and formats)

3) Retrieving data from the TDB

4) Modifying data previously submitted to the TDB.

Participants submitting data to or requesting data from the TDB must ensure they meet all procedural requirements established in AP-5.1Q and AP-5.2Q.

1.2 OVERVIEW OF THE TECHNICAL DATA MANAGEMENT SYSTEM

A general overview of the Project's technical data management system is provided in this handbook. The overview is intended to assist participants in their understanding of the system and to provide guidance on how different parts of the system should be utilized when submitting data to or requesting data from the TDB. Users of the handbook should reference the current TDMP for a more detailed description of the technical data management system and its interfaces with other Project management systems.

The Project technical data management system includes the following elements:

1) Project TDB
2) Project RIB
3) TDB Quarterly Report
4) TDB Handbook, Appendix F
5) Project Technical Data Catalog
6) Automated Technical Data Tracking System (ATDT)
7) Technical Data Parameter Dictionary (under development)

A brief description of each element follows.

The Project TDB consists of the following data bases:

1) Site and Engineering Properties Data Base (SEPDB)
2) Geographic Nodal Information Study and Evaluation System (GENISES)
3) Geologic and Engineering Properties: Bibliography of Chemical Species (GEMBOCHS)

These three components of the TDB are the repositories for the regional and site-specific technical data required in intermediate and license application analyses and models. The data contained in the Project TDB components are most appropriate for use in calculations where a complete range of values must be analyzed, such as in performance modeling and sensitivity analyses. A complete description of each TDB component is included in Chapters 2, 3, and 4 of this handbook which address each component of the TDB.

The Project RIB is a document consisting of a compilation and descriptive summary of fully interpreted Project technical data or information. It is subject to change control requirements established by configuration management. The information contained in the RIB represents a Project consensus on the current state of knowledge for a wide range of technical data parameters. The information presented in the RIB typically represents a highly-distilled interpretation synthesized from available sources (i.e., Project TDB, Project publications). As an example, the RIB may contain only a representative value or accepted range of values for a parameter, while the TDB may contain the full data set from which the representative value was derived. The RIB is the primary source of approved reference information.

The TDB Quarterly Report (formerly known as SEPDB Quarterly Report) is a document identifying the current content of each TDB component. Organizations requesting data from the TDB should refer to this report to identify data currently available within the TDB.

Appendix F of this handbook establishes criteria to be used by the Project to assist in identifying technical data to be submitted to the Project TDB and the appropriate component of the TDB to which the data should be submitted. The criteria should be used as guidance by the Project and includes both general and specific criteria.

The Project Technical Data Catalog is a catalog of all technical data acquired by the Project as required by the DOE/NRC Site-Specific Procedural Agreement for the Geologic Repository Site Investigation and Characterization Program. It includes a description of the data; the time (date), place, and method of acquisition; and where the data may be examined.

The ATDT is an information management system designed to maintain references to and demonstrate traceability of technical data from its interpreted form to its reduced and raw origins. It provides a centralized resource for determining status information on the development of technical data. The Project will use this system as a method for identifying and expediting the transfer of technical data for performance assessment calculations, design, construction, and licensing support. The Project Technical Data Catalog will be generated from the ATDT. The TDB Quarterly Report may be merged with the Project Technical Data Catalog after reference information related to existing data in the TDB have been included in the ATDT.

The Technical Data Parameter Dictionary (under development) will be an organized repository of standard information defined for each technical data parameter acquired for the Project. It will define the descriptive information and required parameter standards needed to provide consistency in the format and structure of technical data submittals to the TDB, and define the appropriate TDB component to which the data should be submitted. It will replace Appendix F of this handbook upon completion.

1.3 ORGANIZATION OF THE HANDBOOK

The handbook is organized by chapters for each component of the TDB. The three components of the TDB have different functions and requirements. While the organization of the chapters is similar, their contents vary. Each chapter provides guidance on how to submit data, request data, and modify previous submittals of data. The Appendices include specific examples for each of the TDB components and sample forms.

2.0 SITE AND ENGINEERING PROPERTIES DATA BASE (SEPDB)

2.1 OVERVIEW

2.1.1 Description of the SEPDB

The Site and Engineering Properties Data Base (SEPDB) is being developed and operated by Sandia National Laboratories as a component of the Project TDB in support of a license application. The SEPDB provides the controlled storage and reporting of scientific and engineering data generated by site characterization, performance assessment and design activities. It primarily contains the geologic, hydrologic, and rock property data from core sample testing and field measurements, but is intended for essentially all technical data that is acquired on the Project that is best stored in tabular form.

The SEPDB was started in the mid-1980s as the TUFF data base. In early 1988, it was changed from a hierarchical to a relational structure and given its present name. The relational structure ties the data to the exact coordinates of the core samples and field measurements, to the QA level, and to the document in which the data were published. The SEPDB is an extremely flexible data base which accommodates almost any table structure and allows users to specify the format of the output. Its relational structure and flexibility make it an excellent source of data for use in performance assessment and design.

INGRES (Version 6.3/03) is the relational data base software used by the SEPDB. INGRES is a product of Ask Computer Systems Inc., INGRES Products Division. The hardware for the SEPDB consists of a Digital Equipment Corporation (DEC) VAX 8200 computer. The computer configuration currently consists of 12 Mb of memory, two DEC RA-81 disk drives (451 Mb capacity each), and a DEC TU-81 magnetic tape unit. An eight-line terminal server provides Sandians access to the system through the Sandia Terminal Switching Network. The VAX 8200 operates under the standard VAX/VMS operating system (Version 5.3), which provides essential system utilities.*

2.1.2 The SEPDB Handbook

The purpose of this handbook is to make the use of the SEPDB by all Project participants as easy and straightforward as possible. It presents guidelines for determining the data that should be submitted to the SEPDB and how to submit it, how to request data, and how to modify previously submitted data if necessary. These guidelines will simplify all interactions with the SEPDB and will improve the time required for the SEPDB staff to enter new data into the data base and to produce data reports when requested.

* The use of brand, trade or firm names in this handbook is for identification purposes only and does not constitute endorsement by the U.S. Department of Energy, or impute responsibility for any present or potential effects on the natural resources.

2.1.3 SEPDB Contacts

The SEPDB is operated by Sandia's Technical Projects Division 6316. The primary contacts are:

Gary Tipton	SEPDB Administrator	FTS 844-3602/(505) 844-3602
Rick Orzel	System Manager	FTS 844-2880/(505) 844-2880
Paula Adams	Data Base Specialist	FTS 846-8178/(505) 844-8178

Gary should be the first point of contact with questions on how to submit data and on whether or not data is appropriate for storage in the SEPDB. Rick should be the first contact with hardware and software questions including how to use the menu driven program currently being developed to interact with the SEPDB from a terminal and how other systems can be connected to the SEPDB. Paula should be contacted first when requesting data reports.

The SEPDB staff welcomes all questions, concerns, and suggestions for improvement. Feel free to contact us at any time by phone or in writing. Written correspondence should be sent to:

SEPDB Administrator
Sandia National Laboratories
Technical Projects Division 6316
P.O. Box 5800
Albuquerque, New Mexico 87185

2.2 GUIDELINES FOR SUBMITTING DATA TO THE SEPDB

2.2.1 Types of Data to Submit

The parameters that are intended for storage in each of the three components of the TDB (i.e. SEPDB, GENISES, GEMBOCHS) are currently defined by Appendix F of this handbook. In general, the parameters intended for the SEPDB are those parameters whose data values are best stored in tabular form.

Table 2.1, which is presented at the end of this Section, can also be used as a guide to determine whether or not to submit data for entry into the SEPDB. Table 2.1 lists the parameters and topics that currently have data values stored in the SEPDB. If you have data that is not covered by either Appendix F or Table 2.1 but that you feel should be stored in the SEPDB, please discuss the data with the SEPDB Administrator.

As discussed in Section 1.2, the Project Parameter Dictionary is now being developed to define all parameters that are required for site characterization, design, and performance assessment. For each parameter, the Parameter Dictionary will specify to which of the three components of the TDB the data should be submitted. It will supersede Appendix F when complete in early 1992.

2.2.2 General Administrative Process for Submitting Data

The procedure for submitting data to the TDB is defined in Project Administrative Procedure AP-5.2Q, "Technical Information Flow to and from the Yucca Mountain Project Technical Data Base." Data submittal to the SEPDB is a fairly simple process accomplished by the following six steps:

1. Use the guidelines in Section 2.2.1 of this handbook to determine whether or not the data should be submitted for entry into the SEPDB.
2. Contact the SEPDB Administrator and discuss the format and scope of the data to be submitted.
3. Compile the data in the format discussed in step 2 (refer to Section 2.2.3 and the example in Appendix A) and prepare a Data Transmittal Record Package.
4. Prepare a Technical Data Information Form (TDIF) and obtain the Technical Project Officer's signature authorizing submittal of the data to the SEPDB.
5. Enter required TDIF information into the ATDT System.
6. Submit a copy of the TDIF along with a hard copy of the data to the SEPDB Administrator.

The key step in the process is completing the TDIF (step 4). The signed TDIF documents that all records supporting the data are in place and that applicable quality assurance requirements have been met. It also authorizes submittal of the data to the TDB and allows the ATDT system to track in which component of the TDB the data reside.

General instructions for completing the TDIF are included with each form and in AP-5.2Q. Blank TDIFs can be found in Appendix E of this handbook or can be obtained by contacting the SEPDB Administrator. An example of a SEPDB data submittal including the completed TDIF and the compiled data are presented in Appendix A.

2.2.3 Information to Include When Submitting Data

In addition to the data values for each parameter, the SEPDB tables have been structured to store important supporting information such as the location of core samples and field measurements, the test method and conditions used to generate the data, and the report in which the data are published. It is important to include this supporting information when submitting data to the SEPDB. Data entry into the SEPDB works best when the data values and supporting information are compiled in accordance with the table structures presented in the SEPDB Section of the Technical Data Base Quarterly Report. In general, data submitted to the SEPDB should be compiled as follows:

Parameter Information: List all parameters and their associated data values. Specify the units for each parameter and report any known uncertainties in the data.

Location Information: Report all information that specifies the location of core samples or field measurements. This should include the drill hole identifier and coordinates, the drill hole depth, and the sample identification number.

Test Conditions: Describe the test method and list all important test conditions such as date, time, temperature, pressure, flow rate, sample size, and instrument type.

The SEPDB data submittal shown in Appendix A is an excellent example of how data are best compiled for submittal to the SEPDB.

2.2.4 How to Submit Data on Floppy Disks or Tapes

Submittal of data on floppy disks or tapes can speed entry of the data into the data base. Since the SEPDB resides on a DEC VAX 8200, a VMS Backup tape is the preferred method for this type of data submittal. ASCII files in tabular format on tape or on 3.5 inch or 5.25 inch double sided, double density floppy disks can also be accommodated. Specific instructions must be supplied when submitting data on tapes or disks. The instructions should specify the type of tape or floppy, the file name(s), the data format (if different than ASCII), and describe the structure of the tables including column headings. Remember that a hard copy of the data is also required. Submittal of data on floppy disks or tapes should be discussed with the SEPDB staff before completing the TDIF.

2.2.5 Verifying Data Entered into the SEPDB

After receiving a completed TDIF submitting data to the SEPDB, the SEPDB staff will enter the data and produce reports showing the submitted data as they have been entered into the data base. These reports will then be sent to the submitter for verification and approval of the data entry. The accuracy of each data entry is verified twice by the SEPDB staff. Therefore, the verification should focus on the scope and structure of the entered data. After reviewing the reports, the submitter must send a letter to the SEPDB Administrator documenting any corrections that are required and stating whether or not the data entry is approved. Once final written approval of the data entry is received, the data will be moved from temporary tables into permanent tables in the data base and made available to all Project participants.

2.3 GUIDELINES FOR RETRIEVING DATA FROM THE SEPDB

2.3.1 Technical Data Available from the SEPDB

Most of the geologic, hydrologic, and rock property data stored in the SEPDB are related to a specific drill hole and drill hole depth. As a result, one of the strengths of the SEPDB is its ability to provide site and engineering data from various sources at specific coordinates and depths.

The data that are currently available from the SEPDB are detailed in the SEPDB section of the Technical Data Base Quarterly Report. This report provides a comprehensive view of the current contents of the SEPDB by presenting the following information:

1. The parameters stored in the data base.
2. For each drill hole, a list of the parameters for which data are available including the reference report.
3. For each parameter, a list of the drill holes for which data are available including the reference report.
4. A list of the data available that are not associated with a drill hole core sample.
5. A list of all drill holes for which descriptive data (e.g. coordinates, elevations, depth, recovery, etc.) are available.
6. Details of the structure of each SEPDB table including parameter information, location information, test conditions, and tracking information.

This report should be used when requesting data from the SEPDB. A copy of the report can be obtained by contacting the Technical Data Manager at the Project Office. Table 2.1 at the end of this Section can also be used as a guide to the data currently available from the SEPDB. It provides a more detailed list of the parameters stored in the data base than the Quarterly Report.

The data that are available from the SEPDB can be reported in a wide range of table structures as specified by the user. This is made possible by the flexibility of the INGRES software. In addition, the relational character of the data base enables many different types of data to be reported at specific depths for drill hole core samples and at specific surface coordinates for non-core samples. The SEPDB data report shown in Appendix C is an excellent example of the ability of the SEPDB to provide various types of data in a format that can easily be used in performance assessment and design.

2.3.2 General Administrative Procedure for Retrieving Data

Data are requested from the SEPDB by simply filling out a Work Request form and sending it to the SEPDB Administrator. Work Request forms can be found in Appendix D of this handbook and in the SEPDB Section of the Technical Data Base Quarterly Report or can be obtained by contacting the SEPDB Administrator. Requests for data may also be made by making a telephone call to the SEPDB staff. In either case, the following information must be provided:

1. The requester's name, organization, address, and telephone number.
2. A description of the data that are being requested including a list of the specific parameters.
3. The desired format of the data report (a separate page showing the desired format including column headings is preferred).

An example of a completed Work Request in included in Appendix B.

No special approvals are required by Project participants to retrieve data from the SEPDB. However, non-participants must make their requests to the Yucca Mountain Project Manager; the YMP Technical Data Manager will notify the SEPDB Administrator of the approved request. Note that data requesters do not have to fill out a TDIF to retrieve data from the SEPDB. The TDIF is completed by the SEPDB staff after the data request is met.

The SEPDB staff will review all work requests and determine the availability of the requested data. If the data are available, reports will be produced and sent to the requester. The data reports will be hard copy listings of the requested data to satisfy Quality Assurance requirements. The data can also be provided on tape or floppy disk if specified (see Section 2.3.3).

Data from the SEPDB can be cited by referencing the SEPDB Product Number and year shown on the data reports and the Central Records Facility accession number as follows:

SEPDB, 19XX, Yucca Mountain Project Site and Engineering Properties Data Base Product ' SEPXXXX, Sandia National Laboratories, Albuquerque, NM (Y CRF Accession Number XXXXXXXXXXX)

The CRF accession number can be obtained by contacting either the SEPDB Administrator or the CRF staff.

2.3.3 Data Transfer on Floppy Disks or Tapes

The SEPDB data can easily be transferred to other systems on magnetic media. A VMS backup tape is the preferred method since the SEPDB resides on a VMS based system. However, data have been transferred as ASCII files on a TAR tape for use on a UNIX based system and on 3.5 inch and 5.25 inch floppy disks. Most requests for this type of transfer can be accommodated. The requirements must be clearly stated on the work request form including the type of system that the data will be used on, the type of media desired, allowable field lengths and format considerations, and the desired table structure. It is a good idea to contact the SEPDB staff and discuss this type of data transfer before filling out the work request form.

2.4 GUIDELINES FOR MODIFYING PREVIOUSLY SUBMITTED DATA

2.4.1 Guidance on What Constitutes a Modification

A modification is any change to data that were previously submitted for entry into the SEPDB under an approved TDIF. Modifications will only be made by the SEPDB staff in response to another approved TDIF authorizing the changes. Modifications must be made whenever previously submitted data are superseded by better data, supplemented with additional data, or found to be in error. This applies to all data that were submitted for entry including the parameter information, location information, test conditions, and tracking information.

2.4.2 Guidance on Completing the TDIF

A TDIF must be filled out to authorize modifications to previously submitted data. The TDIF is filled out exactly as for an original submittal to the SEPDB except that Part IV, Item 5 of the TDIF must also be completed. This item is completed by describing the exact changes that are to be made, the reason for the changes, and referencing the previous submittal.

2.4.3 Verifying the Modification

After receiving a completed TDIF authorizing modifications to previously submitted data, the SEPDB staff will make the modifications and produce data reports showing the new data. These reports will then be sent to the submitter for verification and approval. The submitter must then review the reports and send a letter to the SEPDB Administrator giving final approval of the changes.

2.4.4 Notification of Users of the Data

The SEPDB staff has developed an application program called the Internal Tracking System (ITS). One of its functions is to automatically identify recipients of SEPDB data that have subsequently been modified. Whenever the SEPDB staff modifies previously submitted data, the ITS will be used to identify everyone that received the data before they were changed. Each of these users will then be notified and the new data will be sent to them if requested.

Table 2.1 SEPDB Parameter and Topic List as of June 1991

Geologic Stratigraphy and Lithology

Stratigraphic unit
Lithologic description
Depth to bottom of interval
Interval thickness
Age (i.e. Quaternary, Miocene, etc.)

Thermal/Mechanical Stratigraphy

Thermal/mechanical unit
Interval top
Interval bottom

Geohydrology

Pore saturation
Natural state pore water content
Volumetric moisture content
Saturated matrix hydraulic conductivity
Matrix hydraulic conductivity
Relative hydraulic conductivity
Matrix saturation
Moisture tension
Vertical flux through matrix
Saturation @ natural state
Water content
Suction head
Moisture retention
Depth to water from land surface
Altitude of water surface above sea level
Depth correction
Transmissivity and pumping tests
Well hydraulic conductivity
Storage Coefficient

Rock Matrix Mineralogy

Weight percent of mineral phases
Normative minerals
Modal percent phenocrysts and lithics
Weight percent zeolites
Weight percent manganese oxide minerals
Petrographic description

Fracture Mineralogy

Weight percent of mineral phases
Weight percent zeolites
Weight percent manganese-oxide minerals

Whole Rock Chemistry

Weight percent chemical constituents
Weight percent loss on ignition
Adjusted oxides - H_2O free
Barth's cations
Niggli values

Fracture Chemistry

Stable isotopic analysis
U series isotopic analysis

Geothermal

Average surface temperature
Bottom hole temperature
Average geothermal temperature gradient

Chemical Analysis of Water Samples

Temperature
Carbon 13/Carbon 12 ratio ($\delta^{13}C$)
Carbon 14
Oxygen 18/Oxygen 16 ratio ($\delta^{18}O$)
Deuterium/Hydrogen ratio (δD or $\delta^{2}H$)
pH
Specific conductance
Dissolved solids
Suspended solids
Total alkalinity as $CaCO_3$
Total hardness as $CaCO_3$
Total hardness (noncarbonate) as $CaCO_3$
Sodium adsorption ratio
Percent sodium
Constituent concentrations
Gross alpha
Gross beta
Radium as 226Ra
Strontium 90
Uranium
Tritium

Rock Physical Properties

Natural state bulk density
Saturated bulk density
Dry bulk density
Grain density
Saturated weight
Dry weight
Matrix porosity
Effective matrix porosity
Sonic velocity

Rock Mechanical Properties

Compressive strength
Axial strain at failure
Strain rate
Young's Modulus
Poisson's Ratio
Bulk Modulus
Confining pressure

Rock Thermal Properties

Thermal conductivity

Faults

Depth
Stratigraphic unit
Strike and Dip

Table 2.1 SEPDB Parameter and Topic List as of June 1991 (continued)

Faults

Depth
Stratigraphic unit
Strike and Dip

Spring Data

Discharge
Dissolved solids
Specific conductance
Altitude
Temperature

Drill Hole Data

Feet cored
Feet recovered
Percent recovery
Nevada state plane coordinates, central zone
Ground elevation
Top casing elevation
Completion date
Survey date
Total depth
Total vertical depth

Underground Nuclear Events

Event name
Event coordinates
Ground elevation
Depth of burial
Date
Station name
Station coordinates
Elevation
Range
Travel time

Paleomagnetic Orientation

Intensity of remanence
Inclination of sample remanence
Declination of sample remanence
Declination of reference mark
Alternating Field demagnetization level
Half angle of cone of 95% confidence
Fisher precision parameter

Flood Data

Maximum discharge rate
Drainage area
Altitude range
Flood characteristics @ cross-sections

Meteorology

Precipitation

Soil Data

Pit size
Total borrow material
Type I or II aggregate portion
Moisture percent
Density
Moisture-density relationship (proctor)
California Bearing Ratio
Absorption
LA Abrasion
Angle of repose
Sieve analysis

3.0 GEOGRAPHIC NODAL INFORMATION STUDY AND EVALUATION SYSTEM (GENISES)

3.1 OVERVIEW

3.1.1 Description of the GENISES

GENISES is the geographic information system component of the Project TDB and is being developed and operated by EG&G Energy Measurements, Inc., Las Vegas, NV (EG&G/EM). GENISES is part of the YMP Technical Data Management System and is intended to provide a repository for technical data that are best characterized by spatial or geographic (map-oriented) features.

A geographic information system (GIS) is a computer program that links a relational data base containing attributes and spatial features to computer software programs designed to graphically display and query these features and attributes. GENISES provides the participants with a capability for geographic query and analysis. Spatial indexing, the central element of a GIS, furnishes the coordinate system, the "x-y-z" register for length, width and elevation. GENISES also provides the basis for queries, manipulation, merging, separation, and all other applications required in the analyses of spatial data.

There are two primary characteristics of map data: 1) the spatial information describing the location and shape of geographic features as well as their spatial relationships to other features; and 2) descriptive information about the features. GENISES stores the information as geographic points, lines, and polygons which can be graphically presented as maps. The tabular descriptive information is stored in a relational data base management system. GENISES links the graphic (spatial) and tabular (descriptive) data and maintains the relationships between the map features.

While GENISES facilitates generation of maps at different scales, projections and formats, it is not merely a computer system for making maps. Most importantly, GENISES is an analysis tool which allows spatial relationships between map features to be identified. For example, the length of a survey line or the total area of a particular soil type can be automatically calculated from stored attributes. GENISES provides the functionality to associate the spatial relationships between multiple types of information, and to create new relationships that can aid in determining site suitabilities, evaluate environmental impacts, assist in site selection, etc.

GENISES is a collection of computer hardware and software designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced data. The hardware for GENISES consists of a MicroVAX 3500 and a MicroVAX 3300. Plotting output services are provided by two Precision Image (Model C448) 400 dot per inch E-size color electrostatic plotters and high resolution film recorders. The user interface is by means of six GENISES workstations consisting of Tektronix 4208 color graphics terminals, five Calcomp digitizing tablets, and high speed nine track magnetic tape. FY91 system upgrades include replacing the VAX/VMS system with a UNIX-based file server and adding four SUN SPARC II workstations.

Efforts are underway to integrate the EG&G/EM YMP Support Office system with the EG&G/EM Remote Sensing Laboratory (RSL) GIS system located at Nellis Air Force Base. A 56K baud Ethernet link between the Valley Bank location and the Nellis facility will be installed during FY91.

ARC/INFO, a product of Environmental Systems Research Institute (ESRI) of Redlands California, is the software used for GENISES. ARC/INFO uses the relational data base management system INFO developed by HENCO to handle the descriptive (tabular) data. The ARC component was developed by ESRI for spatial data processing and manipulation.

3.1.2 The GENISES Handbook

The purpose of the GENISES Handbook is to provide general guidance to YMP participants on how to use GENISES. This section addresses the principal GENISES contacts, administrative and technical guidelines for submitting data to the data base, retrieving data from the data base, and modifying data previously submitted to GENISES.

3.1.3 GENISES Contacts

GENISES is maintained and operated by EG&G/EM YMP Support Office located in the Valley Bank Building, 101 Convention Center Drive, Suite 1010, Las Vegas, Nevada. The primary contacts are:

Jim Beckett, GENISES Technical Data Base Administrator, (702) 794-7448/FTS 544-7448
Susan Rohde, GENISES Product Coordinator, ([illegible] 295-8625/FTS 575-8625

GENISES is operated by a staff of spatial information experts. Feel free to contact the staff at any time by phone or by writing:

EG&G Energy Measurements, Inc.
Remote Sensing Laboratory
YMP Support Office
P.O. Box 1912, MS V-02
Las Vegas, NV 89125
(702) 794-7448 FAX (702) 794-7469

3.2 GUIDELINES FOR SUBMITTING DATA TO THE GENISES

Requirements and responsibilities for submitting technical data to the TDB are provided in YMP Administrative Procedure AP-5.2Q "Technical Information Flow To and From the Yucca Mountain Project Technical Data Base." This section provides some additional information and general guidelines for submitting technical data to GENISES.

3.2.1 Types of Data to Submit

AP-5.2Q establishes a requirement for identifying candidate data for the TDB. Appendix F of this handbook provides specific criteria, broken out by parameter categories, for identifying technical data that should be submitted to GENISES. A general description of the criteria for technical data for inclusion to GENISES includes those datasets that are characterized by geographic (map) features and locations. If you have data that are not covered by Appendix F but feel should be stored in GENISES, please discuss the data with the GENISES Technical Data Base Administrator. The GENISES Technical Data Base Administrator should be contacted prior to submission to assure compatible formats with GENISES and to determine the scope of datasets.

As discussed in Section 1.2, the Project Parameter Dictionary is now being developed to define all parameters that are required for site characterization, design, and performance assessment. For each parameter, the Parameter Dictionary will specify which of the three components of the TDB the data should be submitted. It will supersede Appendix F when complete.

3.2.2 General Administrative Process for Submitting Data

The following steps describe the flow for submitting data to GENISES:

1. Use the criteria established in the TDB Handbook, Appendix F to determine whether or not the data should be submitted for entry into GENISES.

2. Contact the GENISES Administrator to discuss transmittal media as well as the data format and attributes to be submitted. The GENISES Administrator will coordinate with participants to ensure that data formats and the scope of the datasets are appropriate for their intended use.

3. Prepare a Data Transmittal Record Package, including the Technical Project Officer's authorizing signature indicating all requirements have been met and the dataset is ready to be submitted to GENISES.

4. Prepare a Technical Data Information Form (TDIF).

5. Enter required TDIF information into the ATDT.

6. Submit a copy of the TDIF and a sample hardcopy of the data to the GENISES Administrator.

The key step in the process is completing the TDIF (step 4). The signed TDIF documents that all records supporting the data are in place and that applicable quality assurance requirements have been met. It also authorizes submittal of the data to the TDB and allows the ATDT to track in which component of the TDB the data reside. General instructions for completing the TDIF are included with each form and in AP-5.20. Blank TDIFs can be found in Appendix E of this handbook or can be obtained by contacting the GENISES Administrator. An example of a GENISES data submittal including the completed TDIF are presented in Appendix A.

3.2.3 Technical Considerations for Submitting Data to GENISES

The following subsections provide additional guidance for compiling datasets for submittal to GENISES. There are several supported methods for entering data into the GENISES: manual digitization, scanning, keyboard entry, use of coordinate geometry to enter legal descriptions and traverse data, and conversion and importation of digital data. Participants may provide data for submittal to GENISES as either a hardcopy product that will need to be automated or in a digital format.

Additional information, besides the actual data values, may be requested from the participant. A description of the source of the data will be required. If the data come from a technical report, the following information, must be provided: title, subtitle, author(s), publisher, date, document identifiers, document type, key words and abstract. These items are considered minimum requirements for traceability. A description of the original mapping scale, geographic location, datum reference, and coordinate projection will be required. Positional errors can be generated by one or all of these map descriptors if not properly reported and entered into GENISES GENISES supports numerous coordinate projections as identified in Table 3.1. A description of the data collection methodology, (i.e., surveyed, field mapping, photo-interpreted), and the automation methodology, (i.e., manual digitized, scan digitized, digitally recorded, or keyboard entry) are also desirable.

3.2.3.1 Automation of Data Through Digitization

Although digitally recorded data is preferred, participants may submit hardcopy map products to GENISES for automation by digitization. A fundamental consideration when digitizing maps is that the accuracy of the digital data is directly affected by the quality of the original map manuscript. Map manuscripts should be in good condition, clean and readable, not torn or folded. Map materials such as paper are affected by climatic conditions. To minimize distortions, map manuscripts ideally should be provided on a stable material such as mylar, that will minimize stretching and shrinking.

EG&G/EM currently captures points, lines and polygons on a map by tracing features using a digitizer tablet. Digitizing can also be accomplished using a device which scans a manuscript map in raster format and is subsequently converted to vectors.

3.2.3.2 Data Capture Through Keyboard Entry

In some cases, data must be captured by keyboard entry. This method is slow and tends to generate the largest data error rates. However, participants may submit hardcopy listings of tabular data to GENISES for keyboard entry. An example of data that could be entered through the keyboard is surveyed coordinates for x, y, and z with survey activity identification.

3.2.3.3 Data Entry Through Digital Import

If the participant has automated the data using a system other than ARC/INFO, it is possible to convert data to and from a variety of industry standard and government-supported formats (Table 3.2).

When transferring the data to GENISES for submittal, there are several media that can be used. Currently, 9-track computer compatible tape at 1600 or 6250 BPI is the most commonly used and preferred media. Facilities exist to accept data on 5-1/4 or 3-1/2" floppy, or 8mm cartridge.

3.2.4 Verifying Data Entered Into GENISES

The GENISES Technical Data Base Administrator will provide notification to the submitting participant when the data have been entered into GENISES. EG&G/EM procedures establish an internal review process and requires the submitting participant's review and approval. After internal review, a transmittal of a hardcopy listing or plot of the data will be provided to the participant for review. The participant will notify the GENISES Technical Data Base Administrator that the entry of the data is technically correct. If the data entry is not acceptable, the participant will specify the reason(s) and identify the corrections that are required. The GENISES Technical Data Base Administrator will initiate an edit process and will resubmit the edited results to the participant for review.

3.3 GUIDELINES FOR RETRIEVING DATA FROM GENISES

3.3.1 Technical Data Available from GENISES

GENISES contains technical data that are being collected on the Project which are best characterized by spatial or geographic (map-oriented) features. GENISES also contains descriptive data that are indexed by a geographic parameter. Points, lines, and polygons can be presented one at a time for a specific value, or mixed and matched to model a geographic area. The data that are currently available from GENISES are provided in the TDB Quarterly Report. This report should be used to determine the availability of data in GENISES.

3.3.2 General Administrative Process for Retrieving Data

The data available in GENISES can be provided to participants in either hardcopy or digital form. Non-participants should make any requests to the YMP Project Manager who will notify the GENISES staff of the approved request. Products include: individual thematic data layers, copies of existing map products, modifications to existing map products, new map products, tabular data listings, and reports. Data are requested from GENISES by filling out a GENISES Work Request form and sending it to the GENISES Technical Data Base Administrator. GENISES

Work Request Forms may be found in Appendix D of this handbook and in the TDB Quarterly Report or can be obtained by contacting the GENISES Administrator. Requests for data may also be made by telephone to any of the GENISES staff. An example GENISES Work Request form is provided in Appendix B. The following instructions provide guidelines for completing the GENISES Work Request.

1. Enter the Requester's name, date of the request, organization name and group or office code, telephone number and complete address specifying where the product should be sent.

2. Purpose of Requested Data: Enter a short description of how this product will be used (e.g. report figure, presentation, planning, scientific study).

3. Will the product be used in Quality-Affecting work?: Enter Yes or No.

4. Date Due: Enter the required delivery date.

5. Comments: If the request is for copies of existing maps or reports, the requester should provide the EG&G/EM map reference number located in the lower right corner of all map products, or the product number for tabular and report data. If the request is for a new product, the requester should provide a description of the product, including the types of data being requested. Indicate any constraints, limitations, assumption or general comments regarding the product, including:

   a) geographic parameters by name, position, or area, i.e., the bottom left and upper right coordinates or an activity area.

   b) data item(s) or name(s) as described in the Project Data Catalog.

   c) period of data, i.e., 1/1/88 to present.

   d) any details that need to be emphasized, i.e., all secondary roads as red lines.

If the request is for a modification to an existing product, the requester should provide a description of any modifications, deletions or additions to the previous product in the comments field, also include the product number for a map.

6. Product Format: Enter Hardcopy or Digital. If Hardcopy, identify the number of copies of the product, and if the product is a map, the size or scale desired. If the product is a digital output, identify the Operating System (VMS, UNIX, MS-DOS, etc.), file format (e.g. DLG, DXF, ASCII, ARC/INFO Export file, etc.) and the output media (e.g. CCT, floppy, etc.).

No special approvals are required by participants to retrieve data from GENISES. However, release of data to non-participants requires prior approval from the YMP Project Manager. A TDIF is not required to request data from GENISES.

Map products from GENISES can be cited by referencing the GENISES product number shown on the map products as follows:

GENISES TDB, 19XX, Yucca Mountain Site Characterization Project Geographic Information System Technical Data Base Product No. YMP-XX-XXX.X, EG&G Energy Measurements, Inc, Remote Sensing Laboratory, Las Vegas, NV

3.4 GUIDELINES FOR MODIFYING PREVIOUSLY SUBMITTED DATA

3.4.1 Guidance on What Constitutes a Modification

Once a submission to GENISES has been completed and accepted by the participant, any modifications will need to be initiated under another approved TDIF. A participant may discover errors or necessary changes or additions to data contained in a previous data submittal. A new data submittal package will be prepared by the participant. The TDIF should clearly identify that the submittal is modifying a previous submittal.

3.4.2 Guidance on Completing the TDIF

A TDIF must be filled out to authorize modifications to previously submitted data. The TDIF is filled out exactly as for an original submittal, except that Part IV Item 5 of the TDIF must also be completed. This item is completed by describing the exact changes that are to be made, the reason for the changes, and referencing the previous submittal.

3.4.3 Verifying the Modification

Upon receipt of a complete TDIF authorizing modifications to previously submitted data, the GENISES staff will make the modifications and produce appropriate products to show the new data (e.g. hardcopy listing or plot). These products will be provided to the submitter for review and approval. The submitter must notify the GENISES Technical Data Base Administrator in writing whether or not the modification of the data is acceptable. If the data modification is not acceptable, the submitter will specify the reason(s) and identify the corrections that are required. The GENISES Technical Data Base Administrator will initiate an edit process and will resubmit the edited results to the submitter for review, and final approval of the changes.

3.4.4 Notification of Participants of Dataset Changes

The recipient of a GENISES product, who requires notification of any subsequent errors, omissions, or modifications to that product, will be required to provide a letter to the GENISES Technical Data Base Administrator and a copy to the YMP Technical Data Manager, requesting that the product be made a controlled product. A request will then be submitted to the YMP Document Control Center to control the product. The GENISES Technical Data Base Administrator will notify the YMP Document Control Center when updates, corrections, or modifications to the data base would impact the controlled document.

If a participant has a copy of a data file or product that is not controlled, but will be used by the participant in quality affecting work, the participant should notify the GENISES Technical Data Base Administrator to verify that modifications have not been made.

Table 3.1 Currently Supported Coordinate Projections.

Albers conic equal-area
Azimuthal equidistant
Bipolar oblique conic conformal
Chamberline trimetric
Craster parabolic
Cylindrical equal area
Eckert IV
Eckert VI
Equidistant conic
Plate Carree or Simple cylindrical
McBryde-Thomas flat polar quartic
Galls stereographic
longitude/latitude (not a projection, but a spherical reference system)
Gnomonic
Van der Grinten I
Hammer-Aitoff equal-area
Lambert Azimuthal equal-area
Lambert conformal conic
Standard Mercator
Miller cylindrical
Mollweide
Oblique Mercator or Hotine
Orthographic
General vertical near-side perspective
Polar Stereographic
Polyconic
Robinson
Simple conic
Sinusoidal (Sansom-Flamsteed
State Plane Coordinate System (SPCS)
    East-West zones use LAMBERT, North-South zones use TRANSVERSE
Stereograhic
Transverse Mercator
Two-point equidistant
Universal Transverse Mercator

Table 3.2 Currently Supported Conversions.

U.S. Geological Survey (USGS) Digital Line Graph (DLG) files

USGS GIRAS files

USGS Digital Elevation Model (DEM) files

U.S. Bureau of Census DIME and TIGER files

ETAK MapBase Files

ERDAS image processing and grid format

U.S. Department of Interior GRASS raster format

U.S. Soils Conservation Service MIADS raster format

IGES exchange files for computer-aided drafting and design files

AutoCAD Drawing Exchange Files (DXF)

U.S. Department of Interior MOSS and AMS (WAMS) files

Scitex DIGIT and other Scitex binary files for map printing and publishing

Gerber plot files

National Geodetic Survey (NGS) control point files

ORACLE tables

INGRES tables

Intergraph files using the SIF exchange format (supported by the ARC SIF product from ESRI-Canada).

4.0 GEOLOGIC AND ENGINEERING PROPERTIES: BIBLIOGRAPHY OF CHEMICAL SPECIES (GEMBOCHS)

This section to be provided at a later date

APPENDIX A

EXAMPLES OF DATA SUBMITTALS TYPES

SEPDB SUBMITTAL TDIF

YMP-023-R0

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
TECHNICAL DATA INFORMATION FORM

Page 1 of ____

(Check one or more):

☐ DATA RESULTING FROM DATA ACQUISITION *(complete Parts I and III)*
Data Tracking Number (DTN) ____

☒ DEVELOPED DATA *(complete Parts I, II, and III)*
Data Tracking Number: SN900[illegible].58.00[illegible]

☒ DATA TRANSFER *(complete Parts III and IV)*

PART I Identification of Data and Source

Submittal Date 7/10/91 (MM/DD/YY) WBS Number [illegible] Is Data Qualified? No

Preparer: Robledo Loretta (Last Name, First, Initial) PDA Org [illegible]

Principal Investigator: Nimick Frances E (Last Name, First, Initial) PI Org SNL

Participating Organization Generating Data [illegible]

Automated Recording System Data Source NA

Parameter: NA Parameter No NA

Parameter Category NA Parameter Category No NA

Report Number SAND88-1581

Title/Description of Data Linear Thermal Expansion Coefficient for Tuff

Activity Number [illegible] Governing Plan [illegible] (Acronym)

Comments NA

SEPDB SUBMITTAL [illegible]

YMP-023-R0

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
TECHNICAL DATA INFORMATION FORM

Page 2 of ____

PART II Data Acquisition and Development Information

Acquisition/Development Method Laboratory Tests on [illegible] Samples Using a Push Rod Tilatometer

Identification Number of Test N/A

Sample Number N/A

Acquisition/Development Location [illegible]

Period of Data Acquisition/Development [illegible]
MM DD YY — MM DD YY

PART III Source Data

A. If ALL data identified by a previous TDIF(s) was transferred or used to generate developed data, identify the DTN(s) assigned to the TDIF(s)

N/A

B. If only a portion of the data identified by a previous TDIF(s) were transferred or used to generate developed data, identify the DTN(s) assigned to to the TDIF(s)

N/A

SEPDB SUBMITTAL TDIF

YMP-023-R0

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
TECHNICAL DATA INFORMATION FORM

Page 3 of ____

PART IV Transfer of Data ***(Use this page only if data were transferred.)***

Date of Transfer: 7/10/91 (MM / DD / YY)

A. Complete one of the following:

TDB Component: SEPDB

Other Recipient: N/A (Last Name / First Name / Initial)

Recipient Organization: N A

B. Technical Data Base Submittal Supplementary Information

1. Format of document containing submitted data (e.g., magnet tape, floppy disc, etc.). Attach any remarks regarding special storage format or data organization that might be required. NOTE: A hard copy of the submitted data is required.
   Hard copy only

2. Number of attached pages containing data ____

3. Identification number(s) or Local Record Center (LRC) code(s) on each submitted document:
   51/L01B-2/1/78; 51 L01B-5 1 80; [illegible]
   51/L01B-9/7/82; 51 L01B-12 2 82; [illegible]

4. Are submitted data published? ☑ Yes ☐ No

   Published reference: SAND88-[illegible] "Thermal Expansion Data for Unsaturated Tuffs from Yucca Mountain, Nevada"

5. If submittal includes a modification (addition, correction, etc.) to a previous submittal, indicate reference to previous submittal. Also indicate which data is to be removed or superceded, the data and information as it should be in the TDB, and the reason for the modification (include attachments if necessary).
   N/A

6. The attached data was collected for the Yucca Mountain Site Characterization Project and is hereby authorized for inclusion in the TDB. All appropriate reviews and quality assurance requirements have been met.

   TPO Signature/Organization ____ MM DD YY ____

7. For TDB Administrator Use

   Acceptance Date ____ (MM DD YY)

   Rejection Date ____ (MM DD YY)

SEPDB DATA SUBMITTAL

THERMAL EXPANSION EXPERIMENTS DATA COMPILATION FORM FOR THE YMP SEPDB

PART 1 SAMPLE LOCATION AND IDENTIFICATION

SAMPLE ID Perp A SAMPLE ORIGIN UE-25a#1

SAMPLE DEPTH (ft) 1188.0 TEST NO 1

PART 2 PARAMETERS

HEATING CURVE DATA

TEMPERATURE RANGE DURING HEATING	°C	23-50	50-100	100-150	150-200	200-250	250-300
	°F	77-122	122-212	212-302	302-392	392-482	482-572
LINEAR THERMAL EXPANSION COEFFICIENT DURING HEATING (10^{-6}°C^{-1})ª		8.5	8.8	13.8	18.8	20.8	N/C
ESTIMATED EXPERIMENTAL UNCERTAINTY (10^{-6}°C^{-1})ª		N/D	N/D	N/D	N/D	N/D	N/A
PORE PRESSURE (MPa)		0.1	0.1	0.1	0.1	0.1	N/A

COOLING CURVE DATA

TEMPERATURE RANGE DURING COOLING	°C	300-250	250-200	200-150	150-100	100-50	50-23
	°F	572-482	482-392	392-302	302-212	212-122	122-77
LINEAR THERMAL EXPANSION COEFFICIENT DURING COOLING (10^{-6}°C^{-1})ª		N/C	N/C	N/C	N/C	N/C	N/C
ESTIMATED EXPERIMENTAL UNCERTAINTY (10^{-6}°C^{-1})ª		N/A	N/A	N/A	N/A	N/A	N/A
PORE PRESSURE (MPa)		N/A	N/A	N/A	N/A	N/A	N/A

PART 3 EXPERIMENT CONDITIONS

EXPERIMENT TECHNIQUE Dual Push Rod Dilatometer

SAMPLE LENGTH (cm)	SAMPLE DIA (cm)	SAMPLE WIDTH (cm)	SAMPLE THICKNESS (cm)	PRETEST SAMPLE MASS g	POSTTEST SAMPLE MASS g
2.55	N/A	0.5	0.5	N/D	N/D

HEATING RATE (°C/min)	COOLING RATE (°C/min)	TYPE OF ATMOSPHERE	DRAINED OR UNDRAINED	CONFINING PRESSURE MPa	INITIAL SAMPLE SATURATION	TYPE OF PORE FLUID
1	N/D	Air	Undrained	0.1	Natural-state	N/A

PART 4 REFERENCE AND SUPPORTING INFORMATION

QA LEVEL OF DATA-GATHERING ACTIVITY TBD

SNL TDP DATA-SET ID [illegible]

SNL DATA REPORT NUMBER SAND88-1301

THIS DCF COMPLETED BY Barry Schwartz 6313 1 25 88

Name SNL Div Date

ª To obtain thermal expansion coefficients in units of 10^{-6}°F^{-1}, multiply by 5/9

COMMENTS

N/A = not applicable, N/C = not computed, N/D = no data available, TBD = to be determined

Run #113

GENISES SUBMITTAL TDIF

YMP-023-R0

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
TECHNICAL DATA INFORMATION FORM

Page 1 of ____

(Check one or more):

☐ DATA RESULTING FROM DATA ACQUISITION *(complete Parts I and II)*
Data Tracking Number (DTN): ____

☒ DEVELOPED DATA *(complete Parts I, II, and III)*
Data Tracking Number: GS000000000001.000

☒ DATA TRANSFER *(complete Parts III and IV)*

PART I Identification of Data and Source

Submittal Date: 09/06/91 (MM / DD / YY) WBS Number: 1.2.3.4 Is Data Qualified? No

Preparer: SMILKO (Last Name) Nancy (First) (Initial) PDA Org: USGS

Principal Investigator: SMILKO (Last Name) Nancy (First) (Initial) PI Org: USGS

Participating Organization Generating Data: SMILKO Inc.

Automated Recording System Data Source: N/A

Parameter: N/A Parameter No.: N/A

Parameter Category: N/A Parameter Category No.: N/A

Report Number: N/A

Title/Description of Data: Streamflow Measurement Station Update

Activity Number: N/A Governing Plan: YMP (Acronym)

Comments:

YMP-023-R0 **YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT** Page 2 of 3

TECHNICAL DATA INFORMATION FORM

PART II Data Acquisition and Development Information

Acquisition/Development Method: Weather Service Data

Identification Number of Test: N.A. Sample Number: N.A.

Acquisition/Development Location: 3600N 11700W, 3730N, 115°30W

Period of Data Acquisition/Development: 01 01 83 (MM / DD / YY) 01 01 85 (MM / DD / YY)

PART III Source Data

A. If ALL data identified by a previous TDIF(s) was transferred or used to generate developed data, identify the DTN(s) assigned to the TDIF(s):

N/A

B. If only a portion of the data identified by a previous TDIF(s) were transferred or used to generate developed data, identify the DTN(s) assigned to to the TDIF(s).

N/A

AP5.1Q
AP5.2Q

GENISES SUBMITTAL TDIF

YMP-023-R0 **YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT**
TECHNICAL DATA INFORMATION FORM Page 3 of 3

PART IV Transfer of Data ***(Use this page only if data were transferred.)***

Date of Transfer: 09 03 91
MM / DD / YY

A. Complete one of the following:

TDB Component: GENISES

Other Recipient: N.A.
Last Name First Name Initial

Recipient Organization: N.A.

B. Technical Data Base Submittal Supplementary information:

1. Format of document containing submitted data (e.g., magnet tape, floppy disc, etc.). Attach any remarks regarding special storage format or data organization that might be required. NOTE: A hard copy of the submitted data is required.

Hardcopy

2. Number of attached pages containing data: 6

3. Identification number(s) or Local Record Center (LRC) code(s) on each submitted document:

GI910903010000.000

4. Are submitted data published? ☒ Yes ☐ No

Published reference: National Weather Services (Online System)

5. If submittal includes a modification (addition, correction, etc.) to a previous submittal, indicate reference to previous submittal. Also indicate which data is to be removed or superceded, the data and information as it should be in the TDB, and the reason for the modification (include attachments if necessary).

Modification to YMP-90-058.1, YMP-90-058.1

YMP-90-45.2, YMP-90-59.1, YMP-90-046.2

YMP-90-060.1

6. The attached data was collected for the Yucca Mountain Site Characterization Project and it is hereby authorized for inclusion in the TDB. All appropriate reviews and quality assurance requirements have been met.

TRO Signature/Organization 09 30 91
MM / DD / YY

7. For TDB Administrator Use:

Acceptance Date: ______
MM / DD / YY

Rejection Date: ______
MM / DD / YY

AP5.[illegible]
AP5.20

September 30, 1991

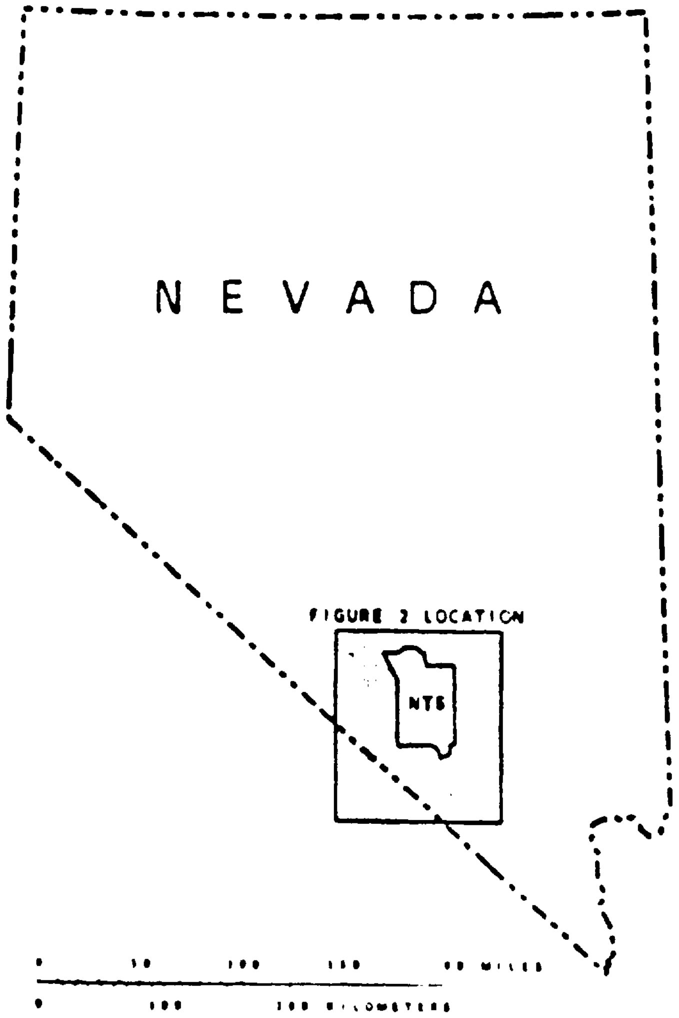
TO: Jim Beckett
GENISES Database Administrator

FROM: Nancy Smilko

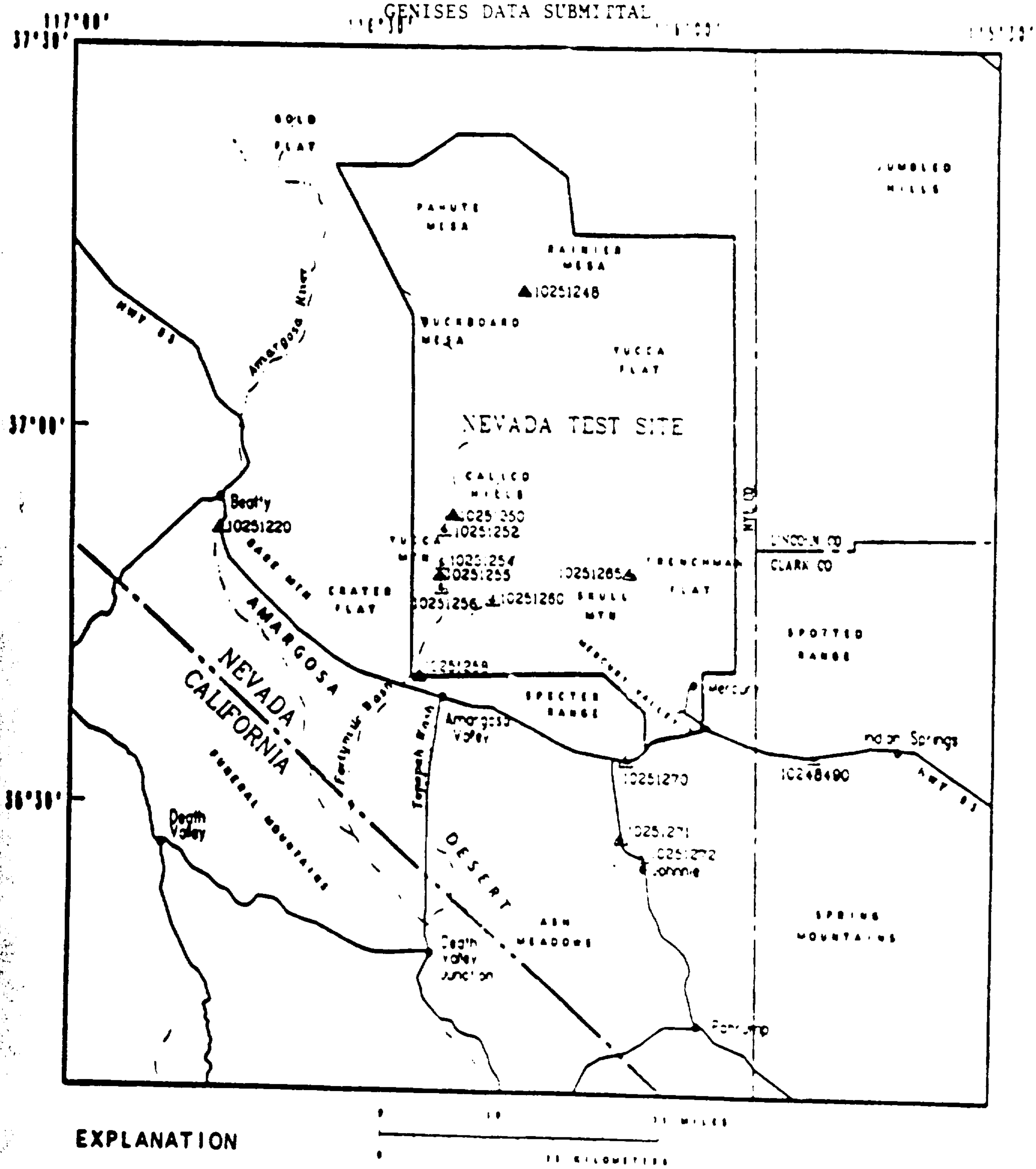
Please update the following maps with new position and monitoring identifiers. Please provide me with updates to these maps as soon as possible.

Thank you.

nss


NEVADA
FIGURE 2 LOCATION
NTS
0 50 100 150 200 MILES
0 100 200 KILOMETERS

YMP-90-058.1

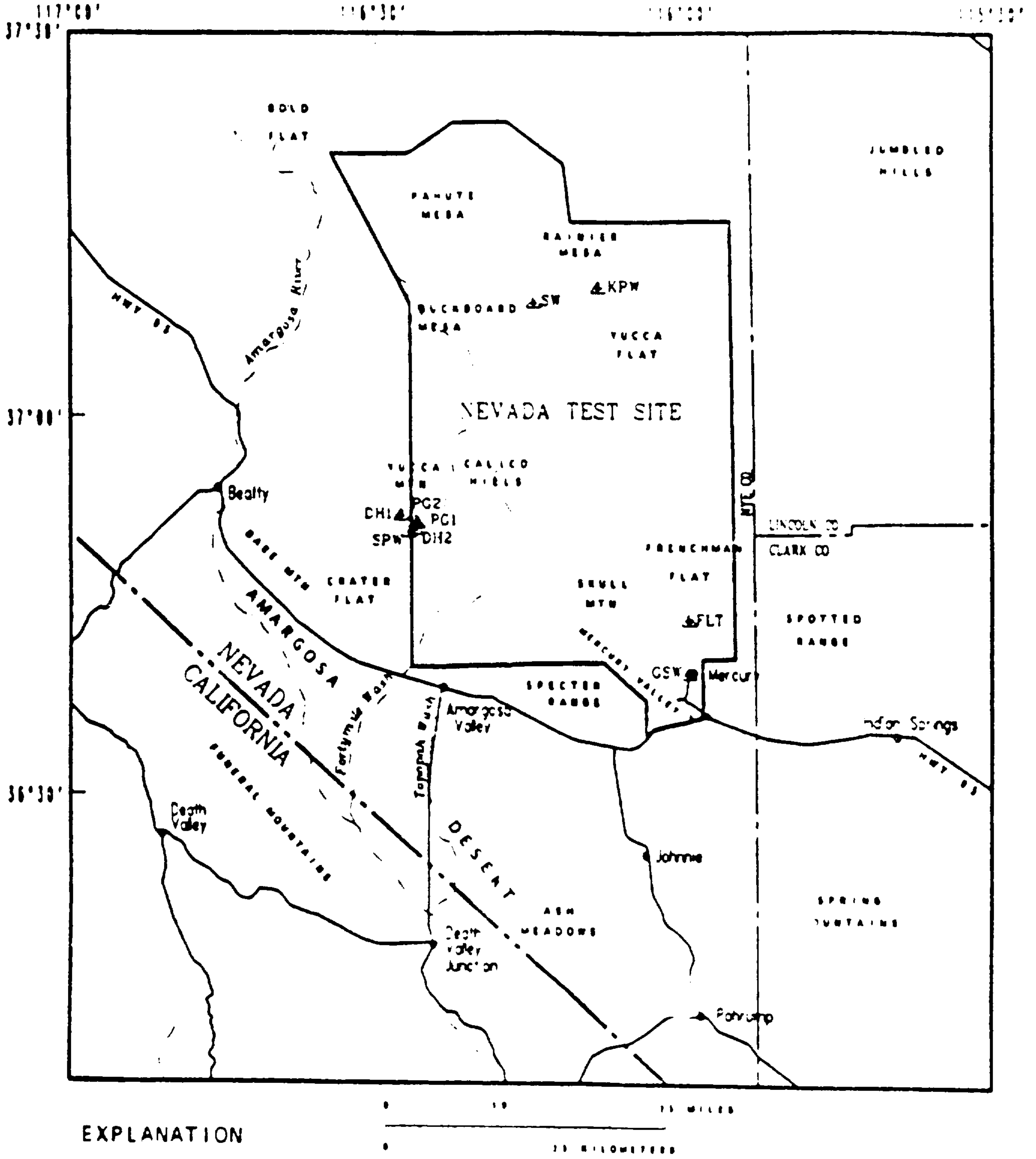

117°00'
116°30'
116°00'
115°30'
37°30'
37°00'
36°30'
GOLD FLAT
PAHUTE MESA
RAINIER MESA
10251248
BUCKBOARD MESA
YUCCA FLAT
JUMBLED HILLS
Amargosa River
HWY 95
NEVADA TEST SITE
CALICO HILLS
Beatty
10251220
10251250
10251252
YUCCA MTN
10251254
10251255
10251256
10251260
10251265
BARE MTN
CRATER FLAT
SKULL MTN
FRENCHMAN FLAT
NYE CO
LINCOLN CO
CLARK CO
SPOTTED RANGE
AMARGOSA
NEVADA
CALIFORNIA
10251258
SPECTER RANGE
Mercury
Fortymile Wash
Topopah Wash
Amargosa Valley
Indian Springs
10251270
10248490
HWY 95
FUNERAL MOUNTAINS
Death Valley
DESERT
10251271
10251272
Johnnie
SPRING MOUNTAINS
ASH MEADOWS
Death Valley Junction
Pahrump
0
10
20 MILES
20 KILOMETERS

EXPLANATION

▲ 10251250 CONTINUOUS RECORD STREAM GAGING STATION

▲ 10251254 PARTIAL RECORD STREAM GAGING STATION

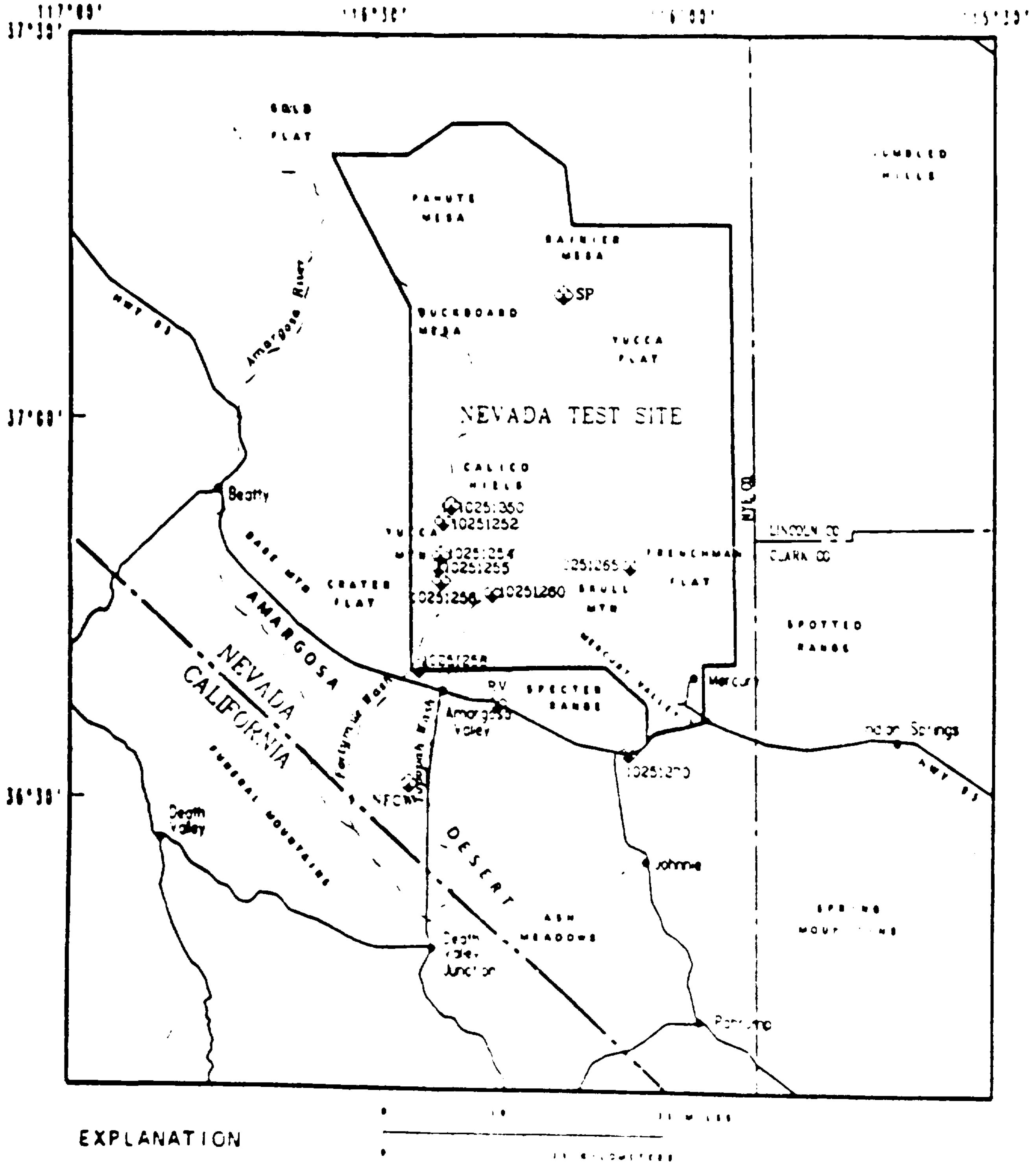
YMP-93-145.2


117°00'
116°30'
116°00'
115°30'
37°30'
37°00'
36°30'
GOLD FLAT
PAHUTE MESA
RAINIER MESA
JUMBLED HILLS
KPW
SW
BUCKBOARD MESA
YUCCA FLAT
Amargosa River
HWY 95
NEVADA TEST SITE
YUCCA MTN
CALICO HILLS
NYE CO
Beatty
DH1
PC2
PC1
SPW
DH2
LINCOLN CO
CLARK CO
FRENCHMAN FLAT
BARE MTN
CRATER FLAT
SKULL MTN
FLT
SPOTTED RANGE
AMARGOSA
NEVADA
CALIFORNIA
Fortymile Wash
Topopah Wash
SPECTER RANGE
MERCURY VALLEY
CSW
Mercury
Amargosa Valley
Indian Springs
HWY 95
FUNERAL MOUNTAINS
Death Valley
DESERT
Johnnie
ASH MEADOWS
SPRING MOUNTAINS
Death Valley Junction
Pahrump
0
10
15 MILES
0
15 KILOMETERS

EXPLANATION

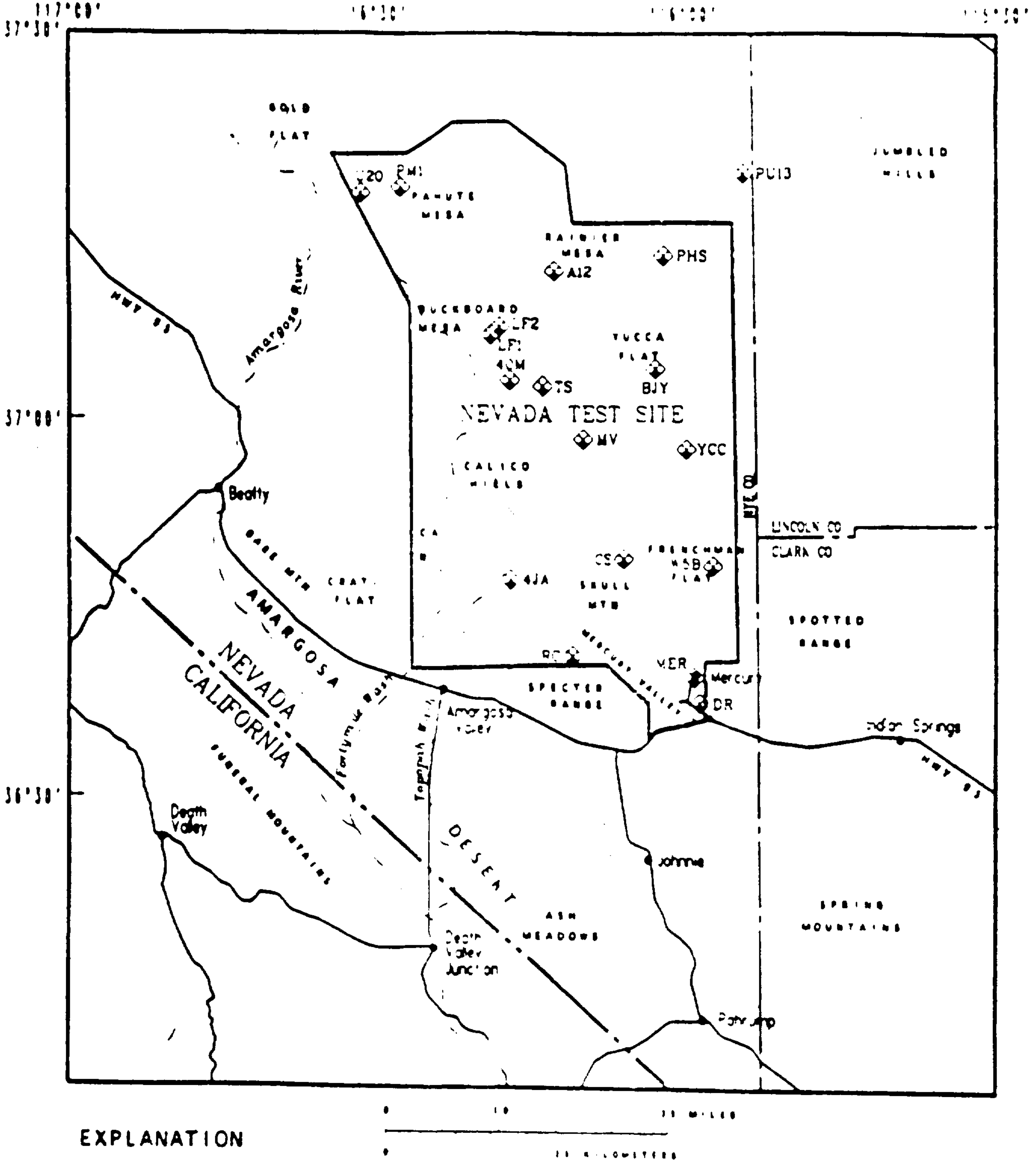
▲ FLT MISCELLANEOUS STREAMFLOW MEASUREMENT STATIONS

YMP-90-059.1


117°00'
116°30'
116°00'
115°30'
37°30'
37°00'
36°30'
GOLD FLAT
PAHUTE MESA
RAINIER MESA
SP
BUCKBOARD MESA
YUCCA FLAT
NEVADA TEST SITE
CALICO HILLS
10251350
10251252
YUCCA MTN
10251254
10251255
10251256
10251260
10251265
10251258
10251270
FRENCHMAN FLAT
SKULL MTN
CRATER FLAT
BARE MTN
SPOTTED RANGE
SPECTER RANGE
MERCURY VALLEY
Mercury
Indian Springs
HWY 95
Amargosa River
Beatty
AMARGOSA
NEVADA
CALIFORNIA
Fortymile Wash
Amargosa Valley
RV
DESERT
FUNERAL MOUNTAINS
Death Valley
Death Valley Junction
ASH MEADOWS
Johnnie
Pahrump
NYE CO
LINCOLN CO
CLARK CO
TIMBERED HILLS
SPRING MOUNTAINS
MILES
KILOMETERS

EXPLANATION

◆ SP PRECIPITATION GAGING STATION


117°00'
116°30'
116°00'
115°30'
37°30'
37°00'
36°30'
GOLD FLAT
PAHUTE MESA
X20
PM1
PU13
JUMBLED HILLS
RAINIER MESA
A12
PHS
BUCKBOARD MESA
LF2
LF1
4CM
TS
YUCCA FLAT
BJY
NEVADA TEST SITE
MV
YCC
CALICO HILLS
NYE CO
LINCOLN CO
CLARK CO
Amargosa River
HWY 95
Beatty
BARE MTN
CRATER FLAT
4JA
CS
SKULL MTN
FRENCHMAN FLAT
W5B
SPOTTED RANGE
AMARGOSA
NEVADA
CALIFORNIA
Fortymile Wash
Topopah Wash
RC
MER
Mercury
DR
SPECTER RANGE
Mercury Valley
Amargosa Valley
Indian Springs
HWY 95
FUNERAL MOUNTAINS
Death Valley
DESERT
Johnnie
ASH MEADOWS
SPRING MOUNTAINS
Death Valley Junction
Pahrump
0
10
25 MILES
0
25 KILOMETERS

EXPLANATION

◆ MV WEATHER SERVICE NUCLEAR SUPPORT OFFICE
PRECIPITATION GAGING STATION

YMP-90-060.1

APPENDIX B

EXAMPLES OF DATA REQUESTS

SEPDB WORK REQUEST

WORK REQUEST

YMP SITE & ENGINEERING PROPERTIES DATA BASE (SEPDB)

Send to:
SEPDB Data Base Administrator
Sandia National Laboratories
Technical Projects Division, 6316
P. O. Box 5800
Albuquerque, NM 87185
Telephone: (505 or FTS) 846-0304 or 846-8178

Request Number: 252
Date Received: 5/24/91
Product QA Level: 6
Data QA Level: TBD

TO BE COMPLETED BY REQUESTOR:

Name: Stephen J Bauer
Signature:
Organization: SNL - 6313
Date: 5/24/91
Address: SNL
Telephone: 846 9645

Work Requested - Attach additional explanations, sketches, and example listing, if appropriate:
Requested Data QA Level: NA

uniaxial and triaxial strength data
with elastic properties

For all units at Yucca Mtn

please provide test conditions, sample descriptions - depth, hole ID etc
also any other information such as porosity.

TO BE COMPLETED BY DATA BASE PERSONNEL

Type: Data Entry ____ Product Request ✓ Other ____

Accepted By: Gary Lupton
Assigned To:
Date: 5/24/91
Verified By: Gary Lupton
Date: 5/24/91
Approved By: Gary Lupton
Date: 6/7/91
Date: 6/7/91

Product Numbers, or Accession Numbers:

SEP0093

File - 6310 41/12131/1.4/NQ

Number of attachments: 1

WORK:1/90

EG&G ENERGY MEASUREMENTS

YMP GENISES WORK REQUEST

SEND TO:
GENISES Technical Database Administrator
RSL YMP Support Office
EG&G Energy Measurements, Inc.
P.O. Box 1912, M/S V-02
Las Vegas, Nevada 89125
Telephone: FTS 544-7448 FAX: FTS 544-7469

To be completed by GENISES Database Personnel:
Request No: T91092501
Job No: V-710-44
Date requested: 9/25/91

TO BE COMPLETED BY THE REQUESTOR:

DATE 9/25/91

NAME John Doe SIGNATURE John Doe

ORGANIZATION DOE TELEPHONE 4-7516

ADDRESS 101 CONVENTION CENTER, LAS VEGAS, NV 89125 M/S 210

PURPOSE OF REQUESTED DATA BRIEFING

Will the product be used in quality affecting work? NO DATE DUE 9/26/91

COMMENTS If the request is for copies of existing maps or reports, the requestor should provide the EG&G/EM map reference number located in the lower right corner of all map products. If this is a request for a new product or modification to an existing product, please describe desired product or modification and include any QA requirements, drawings, maps, or listings as appropriate.

1 Copy YMP-91-031.1

Please Add Topography at 500 m

PRODUCT FORMAT

HARDCOPY ✓ NUMBER OF COPIES 1 MAP SIZE OR SCALE 8.5' 11

DIGITAL — OS — FILE FORMAT — MEDIA

To be completed by GENISES Database Personnel

RECEIVED BY: JIM BECKETT **DATE:** 9/25/91
ASSIGNED TO: SUE RAHDE **DATE:** 9/25/91
VERIFIED BY: STEVE KOTOSKEE **DATE:** 9/26/91
APPROVED BY: J Beckett **DATE:** 9/26/91

PRODUCT OR ACCESSION NUMBERS.

YMSO-001 WHITE Original YELLOW MRSD Copy PINK Analyst Copy GOLDENROD Originator Record Copy

APPENDIX C

EXAMPLES OF TDB PRODUCTS

SEPDB PRODUCT

UNIAXIAL AND TRIAXIAL STRENGTH DATA FOR DRILL HOLE USW G-2

DEPTH (ft)	CE SAMPLE ID	COMPRESSIVE STRENGTH (MPa)	(C) AXIAL STRENGTH (milli)	POISSONS RATIO	YOUNG'S MODULUS (GPa)	(E) AXIAL STRENGTH (milli)	PBD SAMPLE ID	POROSITY (%)	DRY BULK DENSITY (g/cm**3)	SATURATED BULK DENSITY (g/cm**3)	NATURAL BULK DENSITY (g/cm**3)	GRAIN DENSITY (g/cm**3)	GEOLOGIC STRATIGRAPHY	THERMAL-MECHANICAL UNIT
797.00	G2-797 0-1	143.0	2.7	0.20	57.1	2.7	1	2.00	2.350	2.370	-	2.400	TSM	TSw1
797.00	G2-797 0-2	125.0	2.2	0.31	59.9	2.2	2	4.00	2.330	2.370	-	2.430	TSM	TSw1
797.00	G2-797 0-A	162.0	3.0	0.25	43.3	3.0	A	4.00	2.340	2.380	-	2.440	TSM	TSw1
797.00	G2-797 0-B	133.0	3.6	0.26	39.6	3.6	B	3.00	2.360	2.390	-	2.430	TSM	TSw1
818.40	G2-818.4-A	160.0	5.3	0.24	37.0	5.3	A	1.40	2.360	2.390	-	2.430	TSM	TSw1
948.40	G2-948 4-C	157.0	3.3	0.24	49.0	3.3		-	-	-	-	-	TSM	TSw1
948.40	G2-948.4-A	167.0	4.6	0.30	42.0	4.6	A	8.00	2.310	2.390	-	2.510	TSM	TSw1
948.40	G2-948.4-B	115.0	3.0	0.26	41.9	3.0	B	10.00	2.280	2.380	-	2.530	TSM	TSw1
948.40	G2-948.4-D	11[illegible].0	3.2	0.26	42.1	3.2	D	8.00	2.290	2.370	-	2.490	TSM	TSw1
949.60	G2-949.6-C	220.0	6.2	0.19	38.6	6.2	C	7.00	2.300	2.370	-	2.470	TSM	TSw1
969.00	G2-969 0-A	130.0	2.6	-	60.3	2.6	A	7.00	2.330	2.400	-	2.510	TSM	TSw1
969.00	G2-969 0-B	210.0	4.8	0.21	46.3	4.8	B	8.00	2.31[illegible]	2.390	-	2.510	TSM	TSw1
969.00	G2-969 0-D	157.0	3.1	0.34	54.7	3.1	D	8.00	2.300	2.380	-	2.500	TSM	TSw1
1297.60	G2-1297 6-A	3.0	1.4	-	-	-	A	22.00	1.940	2.160	-	2.490	TSM	TSw1
1297.60	G2-1297 6-B	7.0	2.4	-	-	-	B	24.00	1.900	2.140	-	2.500	TSM	TSw1
1524.30		-	-	-	-	-		11.46	2.240	-	2.330	2.530	TSM	TSw2
1559.00		-	-	-	-	-		16.21	2.120	-	2.200	2.530	TSM	TSw2
1561.30	G2-1561 3-A	83.0	4.7	0.11	22.1	4.7	A	10.00	2.240	2.340	-	2.490	TSM	TSw2
1561.30	G2-1561 3-C	73.0	4.1	0.17	22.0	4.1	C	10.00	2.260	2.360	-	2.510	TSM	TSw2
1561.30	G2-1561 3-D	86.0	4.1	-	22.7	4.1	D	10.00	2.260	2.360	-	2.510	TSM	TSw2
1561.30	G2-1561 3-E	61.0	3.7	-	[illegible]	3.7	E	12.00	2.210	2.330	-	2.250	TSM	TSw2
1579.10	G2-1579 1-A	170.0	5.6	0.17	33.9	5.6	A	9.00	2.300	2.390	-	2.530	TSM	TSw2
1579.10	G2-1579 1-C	97.0	6.3	0.18	18.0	6.3	C	14.00	2.150	2.290	-	2.500	TSM	TSw2
1579.10	G2-1579 1-D	173.0	6.1	0.17	31.8	6.1	D	9.00	2.280	2.370	-	2.510	TSM	TSw2
1579.10	G2-1579 1-E	96.0	5.8	0.19	30.5	5.8	E	12.00	2.230	2.350	-	2.530	TSM	TSw2
1580.60		-	-	-	-	-	24	19.10	2.106	2.284	-	2.602	TSM	TSw2
1582.60		-	-	-	-	-	25	11.60	2.294	2.390	-	2.594	TSM	TSw2
1587.80	G2-1587 8-B	165.0	6.1	0.20	35.9	6.1	B	9.00	2.300	2.390	-	2.530	TSM	TSw2
1587.90	G2-1587 8-D	155.0	5.5	0.16	35.5	5.5	D	7.00	2.330	2.400	-	2.510	TSM	TSw2
1600.00		-	-	-	-	-	26	16.70	2.107	2.270	-	2.520	TSM	TSw2
1608.70		-	-		-	-	27B	15.20	2.134	2.304	-	2.542	TSM	TSw2
1608.70		-	-	-	-	-	27A	14.28	2.191	2.324	-	2.553	TSM	TSw2
1613.90		-	-	-	-	-	28	11.10	2.301	2.402	-	2.587	TSM	TSw2
1624.10		-	-	-	-	-	29	11.10	2.236	2.319	-	2.515	TSM	TSw2
1628.30		-	-	-	-	-	30	16.00	2.206	2.355	-	2.627	TSM	TSw2
1646.00	G2-1646 0-B	32.0	3.8	-	-	-		-	-	-	-	-	TSM	TSw3
1646.00	G2-1646.0-C	27.0	5.0	-	-	-		-	-	-	-	-	TSM	TSw3
1659.20	G2-1659 2-B	53.0	4.6	-	-	-		-	-	-	-	-	TSM	TSw3
1659.20	G2-1659 2-A	60.0	5.3	-	-	-	A	4.00	2.270	2.310	-	2.360	TSM	TSw3
1725.05	G2-1725 05-A	22.0	3.9	0.24	6.3	3.9		-	-	-	-	-	Bedded Tuff below TSM	CHn1z
1725.05	G2-1725 05-C	29.0	4.0	0.10	8.5	4.0		-	-	-	-	-	Bedded Tuff below TSM	CHn1z
1748.00	G2-1748 0-A	28.0	2.5	0.10	14.2	2.5		-	-	-	-	-	Bedded Tuff below TSM	CHn1z
1748.00	G2-1748 0-D	27.0	3.2	-	11.2	3.2		-	-	-	-	-	Bedded Tuff below TSM	CHn1z
1748.00	G2-1748 0-C	23.0	3.4	0.22	11.0	3.4		-	-	-	-	-	Bedded Tuff below TSM	CHn1z
1748.00	G2-1748 0-E	35.0	3.5	0.23	11.2	3.5		-	-	-	-	-	Bedded Tuff below TSM	CHn1v
1748.00	G2-1748.0-F	26.0	4.3	0.11	11.1	4.3		-	-	-	-	-	Bedded Tuff below TSM	CHn1z

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NOTES. CE SAMPLE ID are the sample identifications associated with the compressive strength, poissons ratio and young's modulus fields
PBD SAMPLE ID are the sample identifications associated with the porosity, bulk density and grain density fields.
(C) AXIAL STRENGTH is the axial strength for compressive strength. (E) AXIAL STRENGTH is the axial strength for poissons ratio and young's modulus
- indicates no data was submitted. TSM in Geologic Stratigraphy field stands for Topopah Spring Member.

SUPPORTING COMPRESSIVE STRENGTH DATA FOR DRILL HOLE USW G-2

DATA AUTHORIZATION NUMBER DADL 8
SUBMITTAL CITATION NUMBER SAND85-0703
SUBMITTAL TITLE: Uniaxial and Triaxial Compression Test Series on the Topopah Spring Member from USW G-2, Yucca Mountain, Nevada
DATA QA LEVEL. NQ

DEPTH (ft)	SAMPLE ID	COMPRESSIVE STRENGTH (MPa)	AXIAL STRENGTH (milli)	CONFINING PRESSURE	STRAIN RATE DURING TEST	SAMPLE LENGTH	SAMPLE DIAMETER	PAGE NO	LOCAL RECORD CENTER NUMBER
797.00	G2-797.0-1	143.0	3.1	0	1e-05 /sec	101.7 mm	50.8 mm	9,17	S1/L02-3/30/84
797.00	G2-797.0-2	125.0	2.2	0	1e-05 /sec	101.7 mm	50.8 mm	9,17	S1/L02-3/30/84
797.00	G2-797.0-A	162.0	3.0	0	1e-05 /sec	50.9 mm	25.3 mm	9,17	S1/L02-3/30/84
797.00	G2-797.0-B	130.0	3.6	0	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
810.60	G2-810.6-A	168.0	5.3	0	1e-05 /sec	50.9 mm	25.3 mm	9,17	S1/L02-3/30/84
948.60	G2-948.6-A	167.0	4.4	0	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
948.60	G2-948.6-B	113.0	3.0	0	1e-07 /sec	50.8 mm	25.2 mm	9,17	S1/L02-3/30/84
948.60	G2-948.6-C	157.0	3.3	0	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
948.60	G2-948.6-D	117.0	3.2	0	1e-07 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
949.60	G2-949.6-C	229.0	6.2	0	1e-05 /sec	50.7 mm	25.3 mm	9,17	S1/L02-3/30/84
969.00	G2-969.0-A	130.0	2.6	0	1e-05 /sec	50.8 mm	25.3 mm		S1/L02-3/30/84
969.00	G2-969.0-B	210.0	4.8	0	1e-05 /sec	50.8 mm	25.3 mm		S1/L02-3/30/84
969.00	G2-969.0-D	137.0	3.3	0	1e-05 /sec	101.7 mm	50.9 mm	9,17	S1/L02-3/30/84
1297.60	G2-1297.6-A	3.0	1.4	0	1e-05 /sec	50.8 mm	25.2 mm	9,17	S1/L02-3/30/84
1297.60	G2-1297.6-B	7.0	2.4	0	1e-05 /sec	50.9 mm	25.3 mm	9,17	S1/L02-3/30/84
1561.30	G2-1561.3-A	85.0	4.7	0	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
1561.30	G2-1561.3-C	73.0	4.1	0	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
1561.30	G2-1561.3-D	86.0	4.1	0	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
1561.30	G2-1561.3-E	61.0	3.7	0	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
1579.10	G2-1579.1-A	170.0	5.6	0	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
1579.10	G2-1579.1-C	97.0	6.3	0	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
1579.10	G2-1579.1-D	175.0	6.1	0	1e-05 /sec	50.9 mm	25.2 mm		S1/L02-3/30/84
1579.10	G2-1579.1-E	94.0	5.0	0	1e-05 /sec	50.8 mm	25.3 mm		S1/L02-3/30/84
1587.00	G2-1587.0-B	163.0	6.1	0	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
1587.00	G2-1587.0-D	155.0	5.5	0	1e-05 /sec	50.9 mm	25.3 mm	9,17	S1/L02-3/30/84
1646.00	G2-1646.0-B	32.0	3.0	10	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
1646.00	G2-1646.0-C	27.0	5.0	10	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
1650.20	G2-1650.2-A	68.0	5.3	10	1e-05 /sec	50.9 mm	25.3 mm	9,17	S1/L02-3/30/84
1650.20	G2-1650.2-B	53.6	4.6	10	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
1725.05	G2-1725.05-A	22.0	3.9	0	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
1725.05	G2-1725.05-C	29.0	4.8	0	1e-05 /sec	50.9 mm	25.3 mm	9,17	S1/L02-3/30/84
1748.00	G2-1748.0-A	20.0	3.5	0	1e-07 /sec	50.6 mm	25.3 mm	9,17	S1/L02-3/30/84
1748.00	G2-1748.0-C	23.0	3.4	0	1e-05 /sec	50.9 mm	25.3 mm	9,17	S1/L02-3/30/84
1748.00	G2-1748.0-D	27.0	3.2		1e-07 /sec	50.9 mm	25.3 mm	9,17	S1/L02-3/30/84
1748.00	G2-1748.0-E	35.0	3.5	0	1e-05 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84
1748.00	G2-1748.0-F	28.0	4.3	0	1e-07 /sec	50.8 mm	25.3 mm	9,17	S1/L02-3/30/84

NOTE: The following are global values for the entire report:
TEST TYPE: constant strain rate
TEST TEMPERATURE: ambient
PORE PRESSURE: ambient
DRAINAGE CONDITION: drained
SATURATION STATE: saturated

SUPPORTING ELASTIC PROPERTIES DATA FOR DRILL HOLE USW G-2

DATA AUTHORIZATION NUMBER DA0008
SUBMITTAL CITATION NUMBER. SAND85-0703
SUBMITTAL TITLE. Uniaxial and Triaxial Compression Test Series on the Topopah Spring Member from USW G-2, Yucca Mountain, Nevada
DATA QA LEVEL NQ

DEPTH (ft)	SAMPLE ID	YOUNG'S MODULUS (GPa)	POISSONS RATIO	AXIAL STRENGTH (milli)	STRAIN RATE DURING TEST	SAMPLE LENGTH	SAMPLE DIAMETER	PAGE NO	LOCAL RECORD CENTER NUMBER
797.00	G2-797 0-1	57.1	0.28	2.7	1e-05 /sec	101.7 mm	50.8 mm	9,17	51/L02-3/30/84
797.00	G2-797 0-2	59.9	0.31	2.2	1e-05 /sec	101.7 mm	50.9 mm	9,17	51/L02-3/30/84
797.00	G2-797 0-A	63.5	0.25	3.0	1e-05 /sec	50.9 mm	25.3 mm	9,17	51/L02-3/30/84
797.00	G2-797 0-B	59.6	0.26	3.6	1e-05 /sec	50.0 mm	25.3 mm	9,17	51/L02-3/30/84
818.40	G2-818 4-A	37.0	0.24	3.3	1e-05 /sec	50.9 mm	25.2 mm	9,17	51/L02-3/30/84
948.40	G2-948 4-A	42.0	0.30	4.6	1e-05 /sec	50.0 mm	25.3 mm	9,17	51/L02-3/30/84
948.40	G2-948.4 B	41.9	0.26	3.8	1e-07 /sec	50.0 mm	25.2 mm	9,17	51/L02-3/30/84
948.40	G2-948 4-C	49.6	0.26	3.3	1e-05 /sec	50.6 mm	25.3 mm	9,17	51/L02-3/30/84
948.40	G2-948 4-F	42.1	0.26	3.2	1e-07 /sec	50.6 mm	25.3 mm	9,17	51/L02-3/30/84
949.60	G2-949 6-C	30.6	0.19	6.2	1e-05 /sec	50.7 mm	25.3 mm	9,17	51/L02-3/30/84
969.00	G2-969 0-A	68.3	-	2.6	1e-05 /sec	50.6 mm	25.3 mm	9,17	51/L02-3/30/84
969.00	G2-969 0-D	66.3	0.21	4.8	1e-05 /sec	50.8 mm	25.3 mm	9,17	51/L02-3/30/84
969.00	G2-969 0-F	54.7	0.36	3.1	1e-05 /sec	101.7 mm	50.9 mm	9,17	51/L02-3/30/84
1561.30	G2-1561 3-A	22.1	0.11	4.7	1e-05 /sec	50.0 mm	25.3 mm	9,17	51/L02-3/30/84
1561.30	G2-1561 3 C	22.0	0.17	4.1	1e-05 /sec	50.8 mm	25.3 mm	9,17	51/L02-3/30/84
1561.30	G2-1561 3-D	22.7	-	4.1	1e-05 /sec	50.0 mm	25.3 mm	9,17	51/L02-3/30/84
1561.30	G2-1561 3-E	23.6	-	3.7	1e-05 /sec	50.6 mm	25.3 mm	9,17	51/L02-3/30/84
1579.10	G2-1579 1-A	33.9	0.17	5.6	1e-05 /sec	50.8 mm	25.3 mm	9,17	51/L02-3/30/84
1579.10	G2-1579 1-C	18.8	0.18	6.3	1e-05 /sec	50.0 mm	25.3 mm	9,17	51/L02-3/30/84
1579.10	G2-1579 1-D	31.8	0.17	6.1	1e-05 /sec	50.9 mm	25.2 mm	9,17	51/L02-3/30/84
1579.10	G2-1579 1-E	20.5	0.19	5.8	1e-05 /sec	50.8 mm	25.3 mm	9,17	51/L02-3/30/84
1587.00	G2-1587 0-B	35.9	0.20	4.1	1e-05 /sec	50.8 mm	25.3 mm	9,17	51/L02-3/30/84
1587.00	G2-1587 0-D	35.5	0.16	3.5	1e-05 /sec	50.9 mm	25.3 mm	9,17	51/L02-3/30/84
1725.05	G2-1725 05-A	6.3	0.24	3.9	1e-05 /sec	50.8 mm	25.3 mm	9,17	51/L02-3/30/84
1725.05	G2-1725 05 C	8.5	0.10	4.8	1e-05 /sec	50.9 mm	25.3 mm	9,17	51/L02-3/30/84
1748.00	G2-1748 0-A	14.2	0.10	2.3	1e-07 /sec	50.8 mm	25.3 mm	9,17	51/L02-3/30/84
1748.00	G2-1748 0-C	11.6	0.22	3.6	1e-05 /sec	50.9 mm	25.3 mm	9,17	51/L02-3/30/84
1748.00	G2-1748 0-D	11.2	-	3.2	1e-07 /sec	50.9 mm	25.3 mm	9,17	51/L02-3/30/84
1748.00	G2-1748 0-E	11.3	0.23	2.5	1e-05 /sec	50.6 mm	25.3 mm	9,17	51/L02-3/30/84
1748.00	G2-1748 0-F	11.1	0.11	4.3	1e-07 /sec	50.8 mm	25.3 mm	9,17	51/L02-3/30/84

NOTE. The following are global values for the entire report.
TEST TYPE: constant strain rate
TEST TEMPERATURE. ambient
CONFINING PRESSURE. 0
PORE PRESSURE: ambient
DRAINAGE CONDITION. drained
SATURATION STATE. saturated

SUPPORTING POROSITY DATA FOR DRILL HOLE USW G-2

DATA AUTHORIZATION NUMBER. SA0042
SUBMITTAL CITATION NUMBER. SAT000-0011
SUBMITTAL TITLE Density and Porosity Data for Tuffs from the Unsaturated Zone at Yucca Mountain, Nevada
DATA QA LEVEL. TBD

DEPTH (ft)	SAMPLE ID	POROSITY (%)	TEST TYPE	TEST TEMPERATURE	TEST PRESSURE	PAGE NO	LOCAL RECORD CENTER NUMBER
797.0	1	2.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-4	51/L02-3/30/84
797.0	2	4.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-4	51/L02-3/30/84
797.0	A	4.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-5	51/L02-3/30/84
798.3	B	3.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-5	51/L02-3/30/84
818.4	A	3.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-5	51/L02-3/30/84
940.0	A	8.30	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-5	51/L02-3/30/84
948.4	B	10.30	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-6	51/L02-3/30/84
948.4	D	6.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-6	51/L02-3/30/84
949.6	C	7.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-7	51/L02-3/30/84
969.0	A	7.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-7	51/L02-3/30/84
969.0	B	8.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-8	51/L02-3/30/84
969.0	D	8.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-8	51/L02-3/30/84
1297.6	A	22.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-9	51/L02-3/30/84
1297.6	B	24.00	matrix 100(SBD-DBD)/WD	ambient	ambient	C-9	51/L02-3/30/84
1526.3		11.46	matrix, 100[1-(DBD/GD)]	ambient	ambient	C-10	51.L03-9/7/82
1559.0		16.21	matrix, 100[1-(DBD/GD)]	ambient	ambient	C-10	51/L03-9/7/82
1561.3	A	18.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-11	51/L02-3/30/84
1561.3	C	18.00	matrix, 100(SBD DBD)/WD	ambient	ambient	C-11	51/L02-3/30/84
1561.3	D	18.00	matrix, 100(SBD DBD) WD	ambient	ambient	C-12	51/L02-3/30/84
1561.3	E	12.00	matrix, 100(SBD D	ambient	ambient	C-12	51/L02-3/30/84
1579.1	A	9.00	matrix, 100(SBD DBD)/WD	ambient	ambient	C-13	51/L02-3/30/84
1579.1	C	14.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-13	51/L02-3/30/84
1579.1	D	9.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-14	51/L02-3/30/84
1579.1	E	12.00	matrix, 100(SBD DBD)/WD	ambient	ambient	C-14	51/L02-3/30/84
1580.4	24	19.10	matrix, 100[1-(DBD/GD)]	ambient	ambient	C-15	51/L03-1/18/85
1582.6	25	11.66	matrix, 100[1-(D	ambient	ambient	C-15	51/L03-1/18/85
1587.0	B	9.00	matrix, 100(SBD DBD)/WD	ambient	ambient	C-16	51/L02-3/30/84
1587.0	D	7.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-16	51/L02-3/30/84
1600.0	26	16.70	matrix, 100[1-(DBD/GD)]	ambient	ambient	C-17	51/L03-1/18/85
1600.7	27A	14.20	matrix, 100[1-(DBD/GD)]	ambient	ambient	C-17	51/L03-1/18/85
1600.7	27B	15.20	matrix, 100[1-(D	ambient	ambient	C-18	51/L03-1/18/85
1612.9	28	11.10	matrix, 100[1-(DBD/GD)]	ambient	ambient	C-18	51/L03-1/18/85
1626.	29	11.10	matrix, 100[1-(DBD/GD)]	ambient	ambient	C-19	51/L03-1/18/85
1628.5	30	16.00	matrix, 100[1-(DBD/GD)]	ambient	ambient	C-19	51/L03-1/18/85
1639.3	A	4.00	matrix, 100(SBD-DBD)/WD	ambient	ambient	C-20	51/L02-3/30/84

NOTE: Sample Length, Sample Mass and Sample Diameter not given for USW G-2.

SUPPORTING BULK DENSITY DATA FOR DRILL HOLE USW G-2

DATA AUTHORIZATION NUMBER. DA0042
SUBMITTAL CITATION NUMBER. SAND00-0011
SUBMITTAL TITLE. Density and Porosity Data for Tuffs from the Unsaturated Zone at Yucca Mountain, Nevada
DATA QA LEVEL. TBD

DEPTH (ft)	SAMPLE ID	BULK DENSITY (g/cm**3)	SATURATION STATE	TEST TYPE	TEST TEMPERATURE	TEST PRESSURE	SAMPLE MASS	PAGE NO	LOCAL RECORD CENTER NUMBER
797.0	1	2.350	dry	caliper	ambient	ambient	483.69 g	C-4	51/L02-3/30/84
797.0	1	2.370	saturated	caliper	ambient	ambient	489.22 g	C-4	51/L02-3/30/84
797.0	2	2.330	dry	caliper	ambient	ambient	481.50 g	C-4	51/L02-3/30/84
797.0	2	2.370	saturated	caliper	ambient	ambient	489.95 g	C-4	51/L02-3/30/84
797.0	A	2.340	dry	caliper	ambient	ambient	59.67 g	C-3	51/L02-3/30/84
797.0	A	2.380	saturated	caliper	ambient	ambient	60.71 g	C-3	51/L02 3/30/84
797.0	B	2.360	dry	caliper	ambient	ambient	60.12 g	C-3	51/L02-3/30/84
797.0	B	2.390	saturated	caliper	ambient	ambient	60.87 g	C-3	51/L02-3/30/84
818.4	A	2.360	dry	caliper	ambient	ambient	59.89 g	C-5	51/L02-3/30/84
818.4	A	2.390	saturated	caliper	ambient	ambient	60.80 g	C-5	51/L02-3/30/84
948.4	A	2.310	dry	caliper	ambient	ambient	58.89 g	C-5	51/L02-3/30/84
948.4	A	2.390	saturated	caliper	ambient	ambient	60.84 g	C-5	51/L02-3/30/84
948.4	B	2.280	dry	caliper	ambient	ambient	57.90 g	C-6	51/L02 3/30/84
948.4	B	2.380	saturated	caliper	ambient	ambient	60.30 g	C-6	51/L02-3/30/84
948.4	D	2.290	dry	caliper	ambient	ambient	58.60 g	C-6	51/L02 3/30/84
948.4	D	2.370	saturated	caliper	ambient	ambient	60.41 g	C-6	51/L02 3/30/84
949.6	C	2.300	dry	caliper	ambient	ambient	58.33 g	C-7	51/L02 3/30/84
949.6	C	2.370	saturated	caliper	ambient	ambient	60.36 g	C-7	51/L02 3/30/84
969.0	A	2.330	dry	caliper	ambient	ambient	59.33 g	C-7	51/L02-3/30/84
969.0	A	2.400	saturated	caliper	ambient	ambient	61.10 g	C-7	51/L02-3/30/84
969.0	B	2.310	dry	caliper	ambient	ambient	58.86 g	C-8	51/L02-3/30/84
969.0	B	2.390	saturated	caliper	ambient	ambient	60.85 g	C-8	51/L02-3/30/84
969.0	D	2.300	dry	caliper	ambient	ambient	475.61 g	C-8	51/L02-3/30/84
969.0	D	2.380	saturated	caliper	ambient	ambient	492.82 g	C-8	51/L02-3/30/84
1297.6	A	1.940	dry	caliper	ambient	ambient	49.28 g	C-9	51/L02-3/30/84
1297.6	A	2.160	saturated	caliper	ambient	ambient	54.85 g	C-9	51/L02-3/30/84
1297.6	B	1.900	dry	caliper	ambient	ambient	48.66 g	C-9	51/L02-3/30/84
1297.6	B	2.160	saturated	caliper	ambient	ambient	54.76 g	C-9	51/L02-3/30/84
1526.3		2.240	dry	immersion	ambient	ambient	73.996 g	C-10	51/L03-9/7/82
1526.3		2.350	natural	immersion	ambient	ambient	77.628 g	C-10	51/L03-9/7/82
1559.0		2.120	dry	immersion	ambient	ambient	43.016 g	C-10	51/L03-9/7/82
1559.0		2.200	natural	immersion	ambient	ambient	46.268 g	C-10	51/L03-9/7/82
1561.3	A	2.240	dry	caliper	ambient	ambient	57.01 g	C-11	51/L02-3/30/84
1561.3	A	2.340	saturated	caliper	ambient	ambient	59.72 g	C-11	51/L02-3/30/84
1561.3	C	2.260	dry	caliper	ambient	ambient	57.59 g	C-11	51/L02-3/30/84
1561.3	C	2.360	saturated	caliper	ambient	ambient	60.12 g	C-11	51/L02-3/30/84
1561.3	D	2.260	dry	caliper	ambient	ambient	57.67 g	C-12	51/L02-3/30/84
1561.3	D	2.360	saturated	caliper	ambient	ambient	60.11 g	C-12	51/L02-3/30/84
1561.3	E	2.210	dry	caliper	ambient	ambient	56.76 g	C-12	51/L02-3/30/84
1561.3	E	2.330	saturated	caliper	ambient	ambient	59.63 g	C-12	51/L02-3/30/84
1579.1	A	2.300	dry	caliper	ambient	ambient	58.59 g	C-13	51/L02-3/30/84
1579.1	A	2.390	saturated	caliper	ambient	ambient	60.81 g	C-13	51/L02-3/30/84
1579.1	C	2.150	dry	caliper	ambient	ambient	55.15 g	C-13	51/L02-3/30/84

NOTE: Sample Length and Sample Diameter not given for USW G-2

SUPPORTING BULK DENSITY DATA FOR DRILL HOLE USW G-2

DEPTH (ft)	SAMPLE ID	BULK DENSITY (g/cm**3)	SATURATION STATE	TEST TYPE	TEST TEMPERATURE	TEST PRESSURE	SAMPLE MASS	PAGE NO	LOCAL RECORD CENTER NUMBER
1[illegible]	C	2.290	saturated	caliper	ambient	ambient	58.88 g	C-13	51/L82-3/30/84
1577.[illegible]	D	2.280	dry	caliper	ambient	ambient	57.88 g	C-14	51/L82-3/30/84
1579.1	D	2.378	saturated	caliper	ambient	ambient	60.19 g	C-14	51/L82-3/30/84
1579.1	E	2.230	dry	caliper	ambient	ambient	56.92 g	C-14	51/L82-3/30/84
1579.1	E	2.350	saturated	caliper	ambient	ambient	59.83 g	C-14	51/L82-3/30/84
1580.4	24	2.184	dry	immersion	ambient	ambient	47.882 g	C-15	51/L83-1/18/85
1580.4	24	2.284	saturated	immersion	ambient	ambient	51.067 g	C-15	51/L83-1/18/85
1582.6	25	2.294	dry	immersion	ambient	ambient	152.967 g	C-15	51/L83-1/18/85
1582.6	25	2.390	saturated	immersion	ambient	ambient	159.434 g	C-15	51/L83-1/18/85
1587.8	B	2.300	dry	caliper	ambient	ambient	58.70 g	C-16	51/L82-3/30/84
1587.8	D	2.390	saturated	caliper	ambient	ambient	60.00 g	C-16	51/L82-3/30/84
1587.8	D	2.330	dry	caliper	ambient	ambient	59.35 g	C-16	51/L82-3/30/84
1587.8	[illegible]	2.400	saturated	caliper	ambient	ambient	61.28 g	C-16	51/L82-3/30/84
1600.[illegible]	26	2.107	dry	immersion	ambient	ambient	161.117 g	C-17	51/L83-1/18/85
1600.0	[illegible]	2.270	saturated	immersion	ambient	ambient	173.375 g	C-17	51/L83-1/18/85
1600.7	27A	2.191	dry	immersion	ambient	ambient	70.809 g	C-17	51/L83-1/18/85
1600.7	27A	2.324	saturated	immersion	ambient	ambient	73.123 g	C-17	51/L83-1/18/85
1600.7	27B	2.154	dry	immersion	ambient	ambient	66.377 g	C-18	51/L83-1/18/85
1600.7	27B	2.304	saturated	immersion	ambient	ambient	70.914 g	C-18	51/L83-1/18/85
1613.9	28	2.301	dry	immersion	ambient	ambient	74.829 g	C-18	51/L83-1/18/85
1613.9	28	2.402	saturated	immersion	ambient	ambient	82.404 g	C-18	51/L83-1/18/85
1626.1	29	2.236	dry	immersion	ambient	ambient	109.724 g	C-19	51/L83-1/18/85
1626.1	29	2.319	saturated	immersion	ambient	ambient	113.799 g	C-19	51/L83-1/18/85
1628.5	30	2.206	dry	immersion	ambient	ambient	131.335 g	C-19	51/L83-1/18/85
1628.5	30	2.355	saturated	immersion	ambient	ambient	140.170 g	C-19	51/L83-1/18/85
1639.2	A	2.270	dry	caliper	ambient	ambient	57.76 g	C-20	51/L82-3/30/84
1639.2	A	2.310	saturated	caliper	ambient	ambient	58.83 g	C-20	51/L82-3/30/84

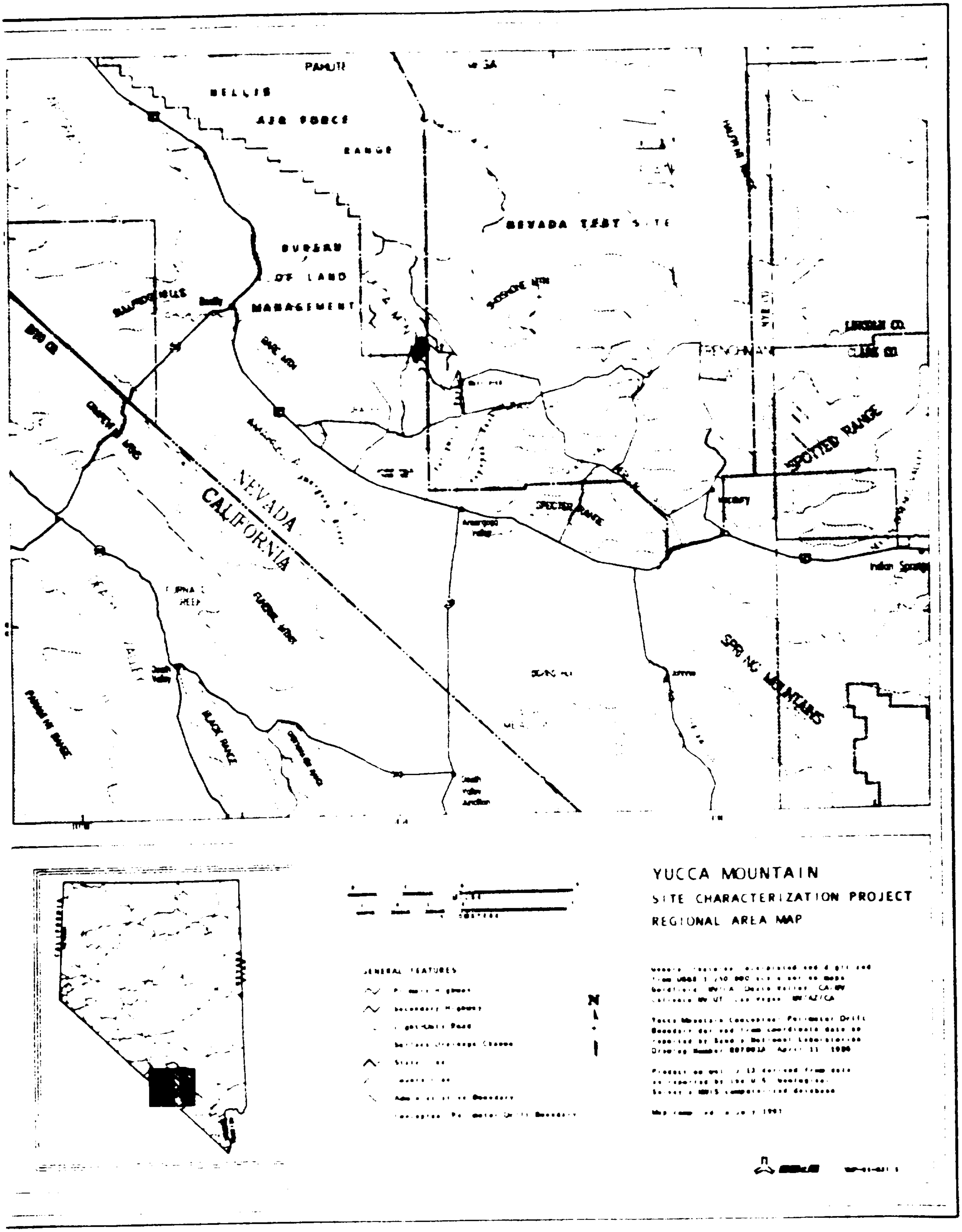
NOTE Sample Length and Sample Diameter not given for USW G-2

SUPPORTING GRAIN DENSITY DATA FOR DRILL HOLE USW G-2

DATA AUTHORIZATION NUMBER. DA0042
SUBMITTAL CITATION NUMBER: SAND88-0811
SUBMITTAL TITLE: Density and Porosity Data for Tuffs from the Unsaturated Zone at Yucca Mountain, Nevada
DATA QA LEVEL. TBD

DEPTH (ft)	SAMPLE ID	GRAIN DENSITY (g/cm**3)	TEST TYPE	TEST TEMPERATURE	TEST PRESSURE	SAMPLE MASS	PAGE NO	LOCAL RECORD ENTER NUMBER
797.0	1	2.400	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-4	51/L02-3/30/84
797.0	2	2.430	GD = DBD/(+ DBD - SBD)	ambient	ambient		C-4	51/L02-3/30/84
797.0	A	2.440	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-5	51/L02-3/30/84
797.0	B	2.430	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-5	51/L02-3/30/84
818.4	A	2.430	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-5	51/L02-3/30/84
948.4	A	2.310	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-5	51/L02-3/30/84
946.4	B	2.330	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-6	51/L02-3/30/84
948.4	D	2.490	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-6	51/L02-3/30/84
949.6	C	2.470	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-7	51/L02-3/30/84
969.0	A	2.510	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-7	51/L02-3/30/84
969.8	B	2.510	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-8	51/L02-3/30/84
969.0	D	2.500	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-8	51/L02-3/30/84
1297.6	A	2.490	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-9	51/L02-3/30/84
1297.6	B	2.500	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-9	51/L02-3/30/84
1526.7		2.530	water pycnometer	ambient	ambient	44.672 g	C-10	51/L03-9/7/82
1559.0		2.330	water pycnometer	ambient	ambient	44.833 g	C-10	51/L03-9/7/82
1561.3	A	2.470	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-11	51/L02-3/30/84
1561.3	C	2.510	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-11	51/L02-3/30/84
1561.3	D	2.510	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-12	51/L02-3/30/84
1561.3	E	2.250	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-12	51/L02-3/30/84
1579.1	A	2.530	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-13	51/L02-3/30/84
1579.1	C	2.500	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-13	51/L02-3/30/84
1579.1	D	2.510	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-14	51/L02-3/30/84
1579.1	E	2.550	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-14	51/L02-3/30/84
1580.4	24	2.602	water pycnometer	ambient	ambient	26.398 g	C-15	51/L03-1/18/85
1582.6	25	2.494	water pycnometer	ambient	ambient	29.897 g	C-15	51/L03-1/18/85
1587.8	B	2.530	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-16	51/L02-3/30/84
1587.8	D	2.510	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-16	51/L02-3/30/84
1600.0	26	2.520	water pycnometer	ambient	ambient	29.131 g	C-17	51/L03-1/18/85
1600.7	27A	2.553	water pycnometer	ambient	ambient	26.809 g	C-17	51/L03-1/18/85
1600.7	27B	2.542	water pycnometer	ambient	ambient	27.154 g	C-18	51/L03-1/18/85
1613.9	28	2.507	water pycnometer	ambient	ambient	27.204 g	C-18	51/L03-1/18/85
1624.1	29	2.515	water pycnometer	ambient	ambient	28.031 g	C-19	51/L03-1/18/85
1628.5	30	2.627	water pycnometer	ambient	ambient	28.514 g	C-19	51/L03-1/18/85
1659.2	A	2.360	GD = DBD/(1 + DBD - SBD)	ambient	ambient		C-20	51/L02-3/30/84

NOTE: Sample Length and Sample Diameter not given for USW G-2


PAHUTE
NELLIS AIR FORCE RANGE
NEVADA TEST SITE
BUREAU OF LAND MANAGEMENT
SHOSHONE MTN
BARE MTN
NEVADA
CALIFORNIA
SPECTER RANGE
SPOTTED RANGE
SPRING MOUNTAINS
Beatty
Amargosa Valley
Death Valley Junction
Indian Springs
BLACK RANGE
FUNERAL MTNS
LINCOLN CO.
CLARK CO.
GENERAL FEATURES
Secondary Highway
N

YUCCA MOUNTAIN

SITE CHARACTERIZATION PROJECT

REGIONAL AREA MAP

APPENDIX D

WORK REQUEST FORMS

WORK REQUEST

YMP SITE & ENGINEERING PROPERTIES DATA BASE (SEPDB)

Send to:
SEPDB Data Base Administrator
Sandia National Laboratories
Technical Projects Division, 6316
P. O. Box 5800
Albuquerque, NM 87185
Telephone: (505 or FTS) 846-0304 or 846-8178

Request Number: ______
Date Received: ______
Product QA Level: ______
Data QA Level: ______

TO BE COMPLETED BY REQUESTOR:

Name: ______ Signature: ______

Organization: ______ Date: ______

Address: ______ Telephone: ______

Work Requested - Attach additional explanations, sketches, and example listing, if appropriate: Requested Data QA Level: ______

TO BE COMPLETED BY DATA BASE PERSONNEL

Type: Data Entry ____ Product Request ____ Other ______

Accepted By: ______ Date: ______
Assigned To: ______ Date: ______
Verified By: ______ Date: ______
Approved By: ______ Date: ______

Product Numbers, or Accession Numbers:

File - 6310 41/12131/1.4/ Number of attachments: ____

WORK:1/90

EG&G ENERGY MEASUREMENTS

YMP GENISES WORK REQUEST

SEND TO:
GENISES Technical Database Administrator
RSL YMP Support Office
EG&G Energy Measurements, Inc.
P.O. Box 1912, M/S V-02
Las Vegas, Nevada 89125
Telephone: FTS 544-7448 FAX: FTS 544-7469

To be completed by GENISES Database Personnel
Request No: ____________
Job No: ____________
Date requested: ____________

TO BE COMPLETED BY THE REQUESTOR

DATE ____________

NAME ____________ SIGNATURE ____________

ORGANIZATION ____________ TELEPHONE ____________

ADDRESS ____________

PURPOSE OF REQUESTED DATA ____________

Will the product be used in quality affecting work? ____________ DATE DUE ____________

COMMENTS: If the request is for copies of existing maps or reports, the requestor should provide the EG&G/EM map reference number located in the lower right corner of all map products. If this is a request for a new product or modification of an existing product, please describe desired product or modification and include any QA requirements, drawings, maps, or listings as appropriate.

PRODUCT FORMAT
HARDCOPY ______ NUMBER OF COPIES ____________ MAP SIZE OR SCALE ____________
DIGITAL ____________ OS ____________ FILE FORMAT ____________ MEDIA ____________

To be completed by GENISES Database Personnel

RECEIVED BY: ____________ DATE: ____________
ASSIGNED TO: ____________ DATE: ____________
VERIFIED BY: ____________ DATE: ____________
APPROVED BY: ____________ DATE: ____________

PRODUCT OR ACCESSION NUMBERS: ____________

YMSO-001 WHITE Original YELLOW MRSD Copy PINK Analyst Copy GOLDENROD Originator Record Copy

APPENDIX E

TECHNICAL DATA INFORMATION FORM

YMP-023-R0
10/21/91

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
TECHNICAL DATA INFORMATION FORM

Page 1 of _____

(Check one or more):

☐ DATA RESULTING FROM DATA ACQUISITION *(complete Parts I and II)*
Data Tracking Number (DTN): ______________

☐ DEVELOPED DATA *(complete Parts I, II, and III)*
Data Tracking Number: ______________

☐ DATA TRANSFER *(complete Parts III and IV)*

PART I Identification of Data and Source

Submittal Date: ______________ (MM / DD / YY) WBS Number: ______________ Is Data Qualified? ______

Preparer: ______________ (Last Name, First, Initial) PDA Org.: ______________

Principal Investigator: ______________ (Last Name, First, Initial) PI Org.: ______________

Participating Organization Generating Data: ______________

Automated Recording System Data Source: ______________

Parameter: ______________ Parameter No.: ______________

Parameter Category: ______________ Parameter Category No.: ______________

Report Number: ______________

Title/Description of Data: ______________

____

____

____

Activity Number: ______________ Governing Plan: ______________ (Acronym)

Comments: ______________

____

____

____

____

AP5.1Q
AP5.2Q

INSTRUCTIONS FOR PREPARATION OF PARTS I, II, AND III OF THE YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT TECHNICAL DATA INFORMATION FORM

YMP-023

If data is being transferred to a TDB component or to fill a request and has yet to be submitted as acquired or developed data, check both the data transfer box and the box corresponding to the [illegible] of data being transferred. Complete all parts of this form and submit the data and copies of this form, in accordance with this procedure, to the Participant Data Archive (PDA) and the requestor or TDB component

Part I

Submittal Date: Today's date.

WBS Number: WBS number of technical data described by this form

Is Data Qualified: Were data acquired or developed under a fully qualified QA program or qualified in accordance w appropriate Project procedures? Answer Yes or No as appropriate

Preparer Name and Organization: Name of individual providing data for this form and his/her organization.

Principal Investigator: Person responsible for this activity

Participating Organization Generating Data: For example, LANL, SNL, LLNL, etc.

Communal Recording System Data Source: If submittal is for data resulting from data acquisition and data was originally recorded by a communal recording system, identify original tape or disc.

Title/Description of Data: Provide descriptive data in no more than 480 characters

Activity Number: Provide the Site Characterization Plan Activity Number and governing plan(s) under which this data was produced (Not the TDMP)

Comments: Provide comments (i.e. any constraints, limitations, or assumptions concerning the data) or write "N/A the Comments field.

PART II

Development/Collection Method: Briefly describe the overall development/collection approach followed or identify procedure under which work was done

Parameter, Parameter Number, and Parameter Category: Provide the appropriate information from the Technical Data Parameter Dictionary.

Identification Number of Test: Provide the Identification Number of the test that was performed to produce this data (no more than 26 characters long) or write "N/A" if not applicable

Sample Number: Provide the Sample Identification Number or write "N/A" if not applicable

Collection Location: Provide, as appropriate, the borehole identification number, the latitude/longitude coordinates, etc., or write "N/A" if not applicable

Period of Data Acquisition: Provide the date (mm/dd/yy) or range of dates (mm/dd/yy [illegible] m/dd/yy format) over which data was acquired or write "N/A" if not applicable.

YMP-023-R0
10/21/91

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
TECHNICAL DATA INFORMATION FORM

Page 2 of ____

PART II Data Acquisition and Development Information

Acquisition/Development Method: ____

Identification Number of Test: ____ Sample Number: ____

Acquisition/Development Location: ____

Period of Data Acquisition/Development: ____ MM / DD / YY ____ MM / DD / YY

PART III Source Data

A. If ALL data identified by a previous TDIF(s) was transferred or used to generate developed data, identify the DTN(s) assigned to the TDIF(s):

B. If only a portion of the data identified by a previous TDIF(s) were transferred or used to generate developed data, identify the DTN(s) assigned to to the TDIF(s):

INSTRUCTIONS FOR PREPARATION OF PARTS I, II, AND III OF THE YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT TECHNICAL DATA INFORMATION FORM (Continued)

YMP-023

PART III (Must be completed for developed or transferred data)

For transferred data, record the DTN(s)* assigned to previous TDIFs used to initially identify this data.

For developed data, record the DTN(s)* of the acquired or other developed data used in the development of this data.

If all of the data within a previous segment identified by a DTN was not used or transferred, identify the DTN(s) and specifically describe the portion of data used or transferred. If unable to do this, the specific data must be submitted with a new TDIF and the DTN assigned to the new TDIF referenced on this TDIF

*If TDIF was assigned an accession number, record the accession number instead of the DTN

YMP-023-R0 **YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT** Page 3 of ____
10/21/91 **TECHNICAL DATA INFORMATION FORM**

PART IV Transfer of Data ***(Use this page only if data were transferred.)***

Date of Transfer:
MM / DD / YY

A Complete one of the following:

TDB Component:

Other Recipient:
Last Name First Name Initial

Recipient Organization: ____

B Technical Data Base Submittal Supplementary Information:

1. Format of document containing submitted data (e.g., magnet tape, floppy disc, etc.). Attach any remarks regarding special storage format or data organization that might be required.

2. Number of attached pages containing data:

3. Identification number(s) (other than DTNs) on each submitted document:

4. Are submitted data published? ☐ Yes ☐ No

   Published reference:

5. If submittal includes a modification (addition, correction, etc.) to a previous submittal, indicate reference to previous submittal. Also indicate which data is to be removed or superceded, the data and information as it should be in the TDB, and the reason for the modification (include attachments if necessary)

6. The attached data was collected for the Yucca Mountain Site Characterization Project and it is hereby authorized for inclusion in the TDB. All appropriate reviews and quality assurance requirements have been met.

TPO Signature/Organization MM / DD / YY

7. TDB Administrator Use:

Acceptance Date:
MM / DD / YY

Rejection Date
MM / DD / YY

AP5.1Q

APPENDIX F

TECHNICAL DATA BASE CRITERIA

APPENDIX F

Appendix F establishes criteria to be used by the Yucca Mountain Project to assist in identifying technical data to be submitted to the Project Technical Data Base (TDB) and to identify the component of the TDB the data should be submitted. The criteria should be used as guidance by the Yucca Mountain Project and includes both general and specific criteria. The TDB Administrators may also assist in identifying technical data for the TDB and the appropriate TDB component.

The general criteria provides high-level guidance · the identification of TDB data and the appropriate TDB component. It should be used to initially identify data for the TDB when the parameters have not been included in the specific criteria. The specific criteria provide more detailed guidance for these identifications. The specific criteria are based upon parameter categories extracted from ParaTrac, and parameters included in the Technical Planning Basis.

There are currently three components of the TDB: The Site and Engineering Properties Data Base (SEPDB), which is administered by SNL; the Geographic Nodal Information Study and Evaluation System (GENISES), which is administered by EG&G; and the Geologic and Engineering Properties: Bibliography of Chemical Species (GEMBOCHS), which is administered by LLNL. If other participant-level databases are identified as components of the TDB, this appendix will be revised to incorporate them.

GENERAL CRITERIA

1. Datasets best characterized by their locational or map-oriented features should be identified for inclusion to the GENISES. These include environmental, socioeconomic, transportation, administrative units, surficial geology and hydrology, and seismic line data.

2. Datasets from geotechnical and related studies at the Yucca Mountain Site best characterized by data that are in tabular form should be identified for inclusion in the SEPDB.

3. Thermochemical and thermodynamic data collected by the Yucca Mountain Project should be identified for inclusion in GEMBOCHS.

SPECIFIC CRITERIA

PARAMETER CATEGORY	TDB COMPONENT
Rock-unit Contact Location and Configuration o Hydrostratigraphic Units o Stratigraphic Contacts o Geohydrologic Units Contact Altitudes o Lithology o Depth to hydrogeologic contacts o Attitude o Color Lithostratigraphic Units o Depth o Key Marker Beds o Geophysical Signature Lithostratigraphic Markers o Lateral Continuity of Horizons o Magnetic Property Changes o Petrographic Changes o Seismic Velocities o Stratigraphic Sequence o Thickness	GENISES
Rock-unit Lateral and Vertical Variability o Soil and Alluvium Thickness o Rock-unit Surficial Slope and Aspect o Soil Texture o Stratigraphic Variation of Hydraulic Properties o Acoustic Velocity o Age, Potassium-Argon, Lithostratigraphic Units o Areal Extent, Exposed Bedrock o Density o Depositional Characteristics o Electrical Conductivity	SEPDB-Specific Point Sample Measurements GENISES-Map Oriented Data

PARAMETER CATEGORY	TDB COMPONENT
o Electrical Resistivity	
o Electromagnetic Properties	
o Gravitational Field	
o Hydraulic Conductivity	
o Induced Polarization	
o Lateral Continuity	
o Lateral Extent	
o Lithic Fragments, Concentration, Variation, Subunit Contacts	
o Lithophysal Zone Concentrations	
o Magnetic Field Intensity, Variations	
o Magnetic Susceptibility	
o Porosity	
o Pumice Characteristics	
o Pumice Clasts	
o Rock Characteristics	
o Seismic Velocity	
o Rock-unit Thickness	
o Transport History	
Fracture Distribution	GENISES
o Fracture Density	
o Fracture Spacing	
o Fracture Frequency	
o Fracture Networks	
o Seismic Properties Relation to Fracture Properties	
Fracture Orientation	GENISES
Fracture Aperture	GENISES
Fracture Length	GENISES
Fault Location	GENISES
o Fault Trends	
o Structural Domains	
o Tectonic Style	
o Structural Rotations	
Fault Orientation	GENISES
o Fault and Fault-zone Attitude	
o Structural Rotations	
Fault Length and Width	GENISES
Fault Displacement	GENISES
o Strike-slip Faults	
o Structural Domains	
o Tectonic Styles	
o Slip Rate and Recurrence Interval	
o Rate of Tilting	
o Strain Rates and Strain Changes Due to Faulting	

PARAMETER CATEGORY	TDB COMPONENT
Seismicity - Historical and Current	GENISES
o Earthquake Location	
o Earthquake Magnitude	
Uplift and Subsidence	GENISES
Lateral Crustal Movement	GENISES
Folding	GENISES
Volcanic-center Distribution and Characteristics	GENISES-Map Oriented Data SEPDB - Specific Point Sample Measurements
o Map of Magma Bodies	
o Map of Topographic Changes Caused by an Eruption	
o Map of Volcanic Centers	
o Age Dates of Volcanic Centers	
o Petrology and Chemistry of Volcanic Centers	
o Volcanic Center Geomorphic Data	
o Magma Body Characteristics	
o Eruption Characteristics of Volcanic Center	
Geography Data	GENISES
Topographic Characteristics	GENISES
o Topographic Contour Maps	
o Isopach Maps of Overburden Thickness Above Repository Horizon	
Rock-unit Physical Properties	SEPDB
o Porosity	
o Grain Size Distribution	
o Grain Density	
o Bulk Density	
o Dry Bulk Density	
o Depositional Environment	
o Lithologies	
o Pore Size Distribution	
o Curie [illegible]erature	
o Demagn[illegible]ation	
o Gamma-[illegible]ation Intensity	
o Induced Polarization	
o Magnetization	
Rock-unit Mineralogy/Petrology and Rock Chemistry	SEPDB
o Mineral Phase Identification	
o Mineral Phase Petrology	
o Mineral Phase Chemistry	
o Mineral Phase Stability	
Fracture Physical Properties	SEPDB
o Unstressed Aperture	
o Radon Emanation Rate	
o Half Closure Stress	
o Normal and Shear Stiffness	
o Joint Cohesion	
o Friction Coefficient	

PARAMETER CATEGORY	TDB COMPONENT
o Joint Wall Compressive Strength	
o Residual Wall Roughness Coefficient	
o Residual Friction Angle	
o Fracture Surface Profile	
o Shear Stress at Onset of Slip	
Fracture-filling Mineralogy/Petrology and Rock Chemistry	SEPDB
o Mineral Phase Identification	
o Mineral Phase Petrology	
o Mineral Phase Chemistry	
o Mineral Phase Stability	
Fault-zone Mineralogy and Physical Properties	SEPDB
o Unstressed Aperture	
o Half closure Stress	
o Shear Stiffness	
o Joint Cohesion	
o Friction Coefficient	
o Joint Wall Roughness Coefficient	
o Joint Wall Compressive Strength	
o Residual Friction Angle	
Surface-water Flood and Runoff Characteristics	GENISES
o Magnitude	
o Location	
o Duration	
o Frequency	
o Volumetric Flow of Surface Water to Water Bodies	
Surface-water Debris-transport Characteristics	GENISES
Surface-water Drainage-basin and Channel Characteristics	GENISES
o Hillslope and Channel Erosion, timing	
o Drainage-basin and Channel Geometry and Morphology	
o Surficial Deposits, Distribution, and characteristics	
o Seepage Rates, Percolation Rates, and Transmissivity of Near-surface and Subsurface Materials	
Surface-water Chemistry and Temperature	SEPDB-Specific Point Sample Measurements GENISES-Map Oriented Data

PARAMETER CATEGORY	TDB COMPONENT
Unsaturated-zone Transmissive Properties	SEPDB
o Recharge Locations, RAtes, and History	
o Hydraulic Conductivity	
o Permeability	
o Fracture Connectivity	
o Pneumatic Conductivity	
o Transmissivity	
Unsaturated-zone Storage Properties	SEPDB
o Porosity	
o Moisture Retention	
o Pore-size Distribution	
o Storage Coefficients	
o Storage Properties, Gas Phase	
o Storativity, gas	
o Flux-related, Matrix Hydrologic Properties of Geologic Samples	
Unsaturated-zone Dispersive Properties, Aqueous and Gas	SEPDB
o Dispersivity	
o Tortuosity	
o Fracture Constrictivity	
Unsaturated-zone Diffusive Properties	
o Diffusion Coefficients	
Unsaturated-zone Fluid Characteristics	SEPDB
o Temperature	
o Water Quality	
o Pore-Gas Composition	
o Composition of Formation Gases	
o Thermal Potential	
o Radioactive-isotope Activity	
o Stable-isotope Activity	
o Stable-isotope Ratio Analyses	
o Water-Rock Chemical Interaction and Geochemical Evolution of Water	
o Fracture Water Hydrochemical Properties	
o Pore Water Hydrochemical Properties	
o Perched Water Hydrochemical Properties	
Unsaturated-zone Moisture Conditions	SEPDB-Specific Point Sample Measurements
o Moisture Loss	
o Soil Moisture Content	
o Moisture Content	
o Water content	GENISES-Map Oriented Data
o Water-Vapor Content	
o Pressure Head, Profiles	
o Hydraulic Head	

PARAMETER CATEGORY	TDB COMPONENT
Unsaturated-zone Fluid Flux	GENISES
o Infiltration Locations, RAtes	
o Recharge Locations, Rates, and History	
o Vegetative Cover, Type, and Density	
o Evapotranspiration Rates	
o Flow Velocities	
o Water Flow Direction, Flux, and Travel Times	
o Vapor Flux	
o Hydrogeologic Unit Definition	
o Fracture and Fracture-Set Densities and Spacings	
o Discharge	
o Flow Paths	
o Fluid Flow	
o Gas-Flow Field	
o Moisture Flux	
o Gas Flow Direction, Flux, and Travel Time	
Saturated-zone Transmissive Properties	SEPDB-Specific Point Sample Measurements GENISES-Map Oriented Data
o Hydraulic Conductivity	
o Transmissivity	
o Permeability	
o Storativity	
o Porosity	
o Average Linear Velocity	
o Hydraulic Gradient	
o Hydraulic Head	
Saturated-zone Storage Properties	SEPDB
o Porosity	
o Storage Coefficient	
o Aquifer Compressibility	
o Barometric Efficiency	
o Dilatational Efficiency	
o Specific Storage	
Saturated-zone Dispersive Prope	SEPDB
o Dispersion Coefficients	
o Dispersivity	
Saturated-zone Water Characteristics	SEPDB
o Water Temperature	
o Radioactive-Isotope Activity	
o Stable-isotope Activity	
o Radiometric Ages	
o Hydrochemistry	
o Stable-isotope Ratios	

PARAMETER CATEGORY	TDB COMPONENT
Saturated-zone Groundwater Flux	GENISES
o Discharge Locations and Rates	
o Recharge Locations and Rates	
o Evapotranspiration Rates and Areal Distribution	
o Groundwater Flux	
o Hydrologic Boundary Conditions	
o Average Linear Velocity	
o Ground-water flow Path Directions and Gradients	
Geometry and Lithology of Quaternary Deposits and Soils	GENISES
o Lithostratigraphy of Marsh, Lake and Playa Deposits	
Paleontology of Quaternary Deposits and Soils	SEPDB-Specific Point Sample Measurements
o Paleontology in Marsh, Lake, and Playa Deposits	
o Soil Morphology and Distribution	
o Soil Physical Properties	GENISES-Map Oriented Data
o Dust Physical Properties	
o Morphology of Calcite-Silica Deposits	
o Paleontology of Calcite-Silica Deposits	
Mineralogy and Geochemistry of Quaternary Deposits and Soils	SEPDB
o Clastic Sedimentology of Marsh, Lake, and Playa Deposits	
o Chemical Sedimentology of Marsh, Lake, and Playa Deposits	
o Major Element Analyses of Bulk Sediments	
o Carbonate and Non-Carbonate Mineralogy of Bulk Sediments	
o Stable Isotope Analyses of Bulk Sediments	
o Soil Chemical Properties	
o Dust Chemical Properties	
o Trace Element Geochemistry in Eolian and Alluvium Deposits	
o Mineralogy of Calcite-Silica Deposits	
o Chemistry of Calcite-Silica Deposits	
o Petrology and Petrography of Calcite-Silica Deposits	
o Isotopic Concentrations of Calcite-Silica Deposits	
Age of Quaternary Deposits and Soils	SEPDB
o Ages of Playa, Lake, and Marsh Deposits	
o Ages of Soils and Surficial Deposits	
o Ages of Eolian Deposits	
o Ages of Calcite-Silica Deposits	

PARAMETER CATEGORY	TDB COMPONENT
Paleohydrologic Characteristics - Infiltration and Recharge o Soil Water Holding Capacity o Soil Partial Pressure of CO_2 o Movement of Soil Solutions o Rates of Carbonate Translocation in Soils o Paleoprecipitation Distributions and Intensities o Occurrence of High Paleosnowmelt o Paleoflood Magnitudes and Frequencies o Paleoflood Hydraulic Characteristics o Paleoflood Debris Movement Quantity and Characteristics o Analog Infiltration Rate o Analog Recharge Rate o Analog Site Effective Moisture	SEPDB-Specific Point Sample Managment GENISES-Map Oriented Data
Paleohydrologic Characteristics - Groundwater Levels and Discharge o Paleoevaporation Rates o Paleotemperature Patterns o Past Evapotranspiration Rate o Past Potentiometric Head o Transmissivity	SEPDB-Specific Point Sample Measurements GENISES-Map Oriented Data
Biological Characteristics - Paleosprings/Paleoseeps o Discharge of Paleoseeps and Paleosprings o Locations of Paleoseeps and Paleosprings o Pack-rat Midden Compositions, Distributions, and Ages o Pollen and Spore Compositions, Distributions, and Ages	GENISES
Meteorological Characteristics o Temperature o Precipitation o Humidity o Pressure o Wind Velocity/Direction o Mixing Layer Depth o Atmospheric Stability o Lightening Strikes and Frequency	GENISES
Rock Deformation Properties	SEPDB
Rock Strength o Allowable Foundation Bearing Capacity in Rock o Active and Passive Rock Pressure on a Wall o Factor of Safety of Slope (Rock) o Rock Mass Classification o Density o Percent Saturation	SEPDB

PARAMETER CATEGORY	TDB COMPONENT
o Porosity	
o Specific Gravity	
o Peak and Residual Failure Envelopes	
o Discontinuity Shear Strength	
o Young's Modulus	
o Compressive Wave Velocities vs. Depth	
o Shear Wave Velocities vs. Depth	
o Deformation Modulus	
o Compressive Strength	
Rock In-situ Stress, Site Area and Regional	SEPDB
Rock Dissolution Rates	SEPDB
Past and Present Erosion	GENISES
o Erosional Rates	
o Depositional Rates	
o Weathering Rates	
Heat Flow	GENISES
Population data	GENISES
o Population of Towns, Counties, and Communities	
o Distance to Population Centers	
o Population Served by Local Drinking Water	
Agricultural Data	GENISES
o Area of Irrigation, Crop Cultivation, Quantity of Water Used for Irrigation Based on Quantity of Water Available	
o Infiltration Rate	
o Percolation Rate	
o Quantity of Irrigation Withdrawals	
o Types and Amounts of Crops Raised	
o Types and Amounts of Crops Consumed	
o Types and Amounts of Animals Raised	
o Types and Amounts of Animals Consumed	
o Animal Consumption of Forage	
o Forage Storage Time	
o Grazing yield and Period	
o Radius of Crop and Animal Area	
Land Ownership and Mineral Rights	GENISES
o Location and Holders of Mineral Rights	
o Owners of Water Rights	
o Landownership Status	
o Quantity, Tonnages, and Grades of resources	
o Quantity, Rates, Well Locations, and Hydrostratigraphic Source of Groundwater Withdrawals	

PARAMETER CATEGORY	TDB COMPONENT
Surface Geotechnical Characteristics	SEPDB
o Porosity	
o Grain Density	
o Soil Classification	
o Bulk Density	
o Dry Bulk Density	
o Young's Modulus	
o Poisson's Ratio	
o Modulus of Subgrade Reaction	
o Cohesion	
o Angle of Internal Friction	
o Allowable Bearing Pressure	
o In Situ Density	
o Relative Density	
o Moisture Content	
o Percent Saturation	
o Specific Gravity	
o Compaction Characteristics	
o Compressive Wave Velocity	
o Shear Wave Velocity	
o Shear Modulus	
o Plate Load Bearing Pressure vs. Settlement	
o Alluvial Stratigraphy	
o Active and Passive Soil Pressure	
o Factor of Safety of Slope (Soil)	
Waste Package Material Properties	SEPDB
o Corrosion Rate of Container Components	
o Container Surface Radiation	
o Container Decay Properties	
Radiological Environment	GENISES
o Concentrations of Radioactive Material in Repository Airstreams	
o Dose Reduction Factor Attributable to Host Rock Shielding Properties	
o Contamination Levels Outside Contamination Area	
o Pressure Differentials Between Radiation Zones	
o Decontamination Factor	
o Number of Filter Banks	
o Keff of Fissile Materials	
o Dust and Particle Size Distribution	
o Radon Emanation Rate From Tuff	
o Bioaccumulation of Radionuclides in Terrestrial Flora	
o Bioaccumulation of Radionuclides in Terrestrial Fauna	
o Location of Nearby Uranium Fuel cycle Facilities	

PARAMETER CATEGORY	TDB COMPONENT
o Doses From Nearby Uranium Fuel Cycle Facilities	
o Release Rates and Concentrations of Naturally Occurring Radionuclides	
o Direct Radiation and Contamination Levels from Miscellaneous Sources	
o Effective Attenuation of Direct Radiation Levels	
Themochemical/Thermodynamic Data on Mineral Reactions	GEMBOCHS
Radionuclide Transport	
o Themodynamic Data on Solubility of Radionuclides	GEMBOCHS
o Speciation of Radionuclides	GEMBOCHS
o Radionuclide Sorption Coefficients	SEPDB
o Radionuclide Diffusion	SEPDB
o Radionuclide Dispersion	SEPDB
o Radiocolloids Characteristics	SEPDB
Rock In-situ Temperature	SEPDB
Rock Thermal Conductivity	SEPDB
Rock Thermal Expansion	SEPDB
Rock Heat Capacity	SEPDB