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Yucca Mountain Site Characterization Project

Design and Implementation of the Site and Engineering Properties Database

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**DESIGN AND IMPLEMENTATION
OF THE SITE AND ENGINEERING PROPERTIES DATABASE**

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ABSTRACT

The Site and Engineering Properties Database is being developed to provide diverse users with scientific data collected by Yucca Mountain Site Characterization Project (YMP) participants. The need to accommodate multiple sources of data, different data reporting formats, and YMP Quality Assurance requirements has influenced table design. The resulting table structures and methods of user interaction provide YMP researchers with a centrally located, numeric database for use in geologic and engineering analyses and design.

EP
MASTER

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1.0 INTRODUCTION

The Yucca Mountain Site Characterization Project (YMP) is conducting studies to determine whether the Yucca Mountain site in southern Nevada will meet regulatory criteria for a potential mined geologic disposal system for high-level radioactive waste. Data gathered as part of these studies must be compiled and tabulated in a controlled manner for use in design and performance analyses. An integrated data management system has been developed to facilitate this process; this system relies on YMP participants to share in the development of the database and to ensure the integrity of the data.

The Site and Engineering Properties Database (SEPDB) is unique in that, unlike most databases where one data set is stored for use by one defined user, the SEPDB stores different sets of data which must be structured so that a variety of users can be given access to the information. All individuals responsible for activities supporting the license application should, to the extent possible, work with the same data and the same assumptions. For this reason, it is important that these data sets are readily accessible, comprehensive, and current.

The SEPDB contains scientific and engineering data for use in performance assessment and design activities. These data sets currently consist of geologic, hydrologic, and rock properties information from drill holes and field measurements. The users of the SEPDB include engineers and scientists from several government research laboratories (Lawrence Livermore National Laboratory, Los Alamos National Laboratory, and Sandia National Laboratories), the U.S. Geological Survey, and several government contractors.

This manuscript describes the detailed requirements, contents, design, and status of the SEPDB, the procedures for submitting data to and/or requesting data from the SEPDB, and a SEPDB data dictionary (Appendix A) for defining the present contents.

2.0 CONSIDERATIONS IN THE DESIGN OF THE SITE AND ENGINEERING PROPERTIES DATABASE FOR THE YUCCA MOUNTAIN PROJECT

2.1 Design Considerations

The requirements for the SEPDB have been defined largely by the diverse needs of the principal investigators (PI) and the necessity for maintaining a reliable controlled database as dictated by quality assurance (QA) considerations. The PI analyzing and interpreting the data for repository design and performance assessment is commonly associated with a participating organization different from that of the PI responsible for gathering data. As a result, it is essential that all supporting information (i.e., technical procedures, calibrations, conversion factors, etc.) is associated with each data entry in the SEPDB through the use of identifiers back to the original source. The design of the SEPDB must ensure that (1) the data are retained in the format and with the units submitted, (2) the specific site where the data (or the sample) were collected is precisely indicated, (3) references to all documentation describing how and when the data were generated are maintained, (4) the QA level of the data-gathering activity is indicated, and (5) the data are stored in such a way that they are available for further studies.

2.2 Quality Assurance Considerations

Criteria 1, 3, and 4 address specific QA requirements of the YMP and are not normally encountered in database design. Measurement units are not changed in order to avoid changing the data values in any way and thereby weakening direct numeric links to the documentation (test records, test descriptions, and lab notebooks) used to support tests. Documentation also includes titles of reports in which the data may have first been published and indicators of any supporting documents in the participant's local records center. The local records centers are used to store information regarding the experimental or technical procedures for collecting data. The QA level assigned to a test procedure (for gathering data) may be upgraded as experiment procedures are reevaluated for accuracy or as equipment calibration is verified. The YMP Quality Assurance Program Plan (1989) specifies that written experiment and technical procedures must be approved by the participating organization before any data are gathered for use in the license application. The current Plan was not in effect when most of the data in the SEPDB were collected; therefore, data to be used in licensing must be reevaluated.

2.3 Data Considerations

To characterize the Yucca Mountain site, data are collected by researchers in diverse engineering and scientific disciplines. Data measurements range from precise quantitative values taken at millisecond intervals, for example, to descriptive interpretations of changes over decades. This section describes the role of the SEPDB in support of the Yucca Mountain site characterization process. To do this the data provider, the data, and the level of data reduction with respect to the SEPDB and its users are defined.

2.4 Data Collection

The data provider, one of the PIs in the YMP, may collect data in a laboratory, at the Yucca Mountain site in Nevada, or somewhere else. For example, a single water sample can be measured in the field for temperature, pH, and oxides, then later measured in the lab for radiochemical constituents. Because the data are gathered in several different environments, there are several methods of recording the results. Measurements may be transcribed into lab or field notebooks, recalculated from digital recording equipment and documented, or entered automatically into computerized data acquisition systems. A PI will eventually reduce the information into a format that is suitable for analysis and publication.

Some measurements (such as porosity and bulk and grain density) are often calculated from the same test. Other measurements, which may later be used together in an analysis or combined to obtain other types of parameters (e.g., in situ saturation or hydraulic conductivity), may be made in totally different testing environments. Therefore, sufficient information about the testing and collection environment must be recorded for the researcher to be confident of the data used for subsequent analyses.

For some PIs a necessary data set is complete when the data they are collecting are available for their use. A PI can interpret information and publish results without data from other sources, but most PIs need access to several types of information. Groundwater travel time calculations, for example, require input from several different, but interrelated, studies to correctly define the system geometry, hydrologic and boundary conditions, and other information required to perform the calculation.

Evaluation of a drill pad location requires information on soils, rock strength, lithology, and drainage patterns. Therefore, the PI must know where he can access the interrelated data that are being collected and analyzed at different locations. The SEPDB provides a central source for tabular data for use in further analyses. The database also provides additional information on other YMP data management systems that document how the data were gathered and provide extensive information on data collection activities such as written experimental procedures, technical procedures, supporting analyses, and published references.

2.5 YMP Data Management

The integrated technical data management system consists of the SEPDB, the Interactive Graphics Information System (IGIS), the Reference Information Base (RIB), and the local Data Records Management System (DRMS). The SEPDB, IGIS, and RIB are Project-level databases being developed and managed by Sandia National Laboratories.

The IGIS (a database graphics system for storing, manipulating, and displaying geometric data) is a geometric modeling tool for representing and/or manipulating data that are usually presented in graphical form (stored in the SEPDB). For example, given the elevations of contact points of a unit, the IGIS can interpolate/extrapolate the input data (elevations) to generate a three-dimensional surface that graphically represents the input data.

The RIB contains the reference site, design, performance, socioeconomic, and environmental information about the proposed Mined Geologic Disposal System at Yucca Mountain. This information (supported by the SEPDB) is used within the YMP to support the analyses necessary for site characterization, environmental evaluation, design, and performance assessment. The RIB is the primary source of qualified technical data and information and will continually evolve through the time of license application through performance confirmation.

The Technical Records Center (TRC) is the entity within each Project participant where participant technical data and supporting documentation are managed. The TRC provides secure storage for information developed for each data acquisition activity. The TRC is the point of contact for releasing data, either through data reports or other reports, for incorporation into the Project's technical database. At SNL, the TRC is called the DRMS and records are kept in DRMS data-set notebooks divided into 13 sections: experiment and equipment-test procedures, sample custody records/photographs, DRMS data index and tracking sheets, correspondence, sample and/or site preparation records, technical procedures, data, calibration records, analysis of results, instrumentation/data acquisition records, quality assurance documents, supporting information, and reports.

2.6 Data Reduction

The SEPDB provides a level of data reduction between the RIB and the DRMS. It supplies data in a format that is suitable for use in engineering calculations, statistical analyses, and computer simulation modeling of a physical system. The analyst's use of SEPDB data defines the level of reduction of the data. For example, seismic velocity measurements are made in millisecond intervals, but the values with which most engineering analyses are concerned are epicenter, station location, and travel time. Because these latter values are those used in engineering problem solving, they represent the level of data reduction in the SEPDB. The previous measurements at millisecond intervals are stored in the DRMS; a regional seismic/tectonic map would be included in the RIB. If the PI needs this additional information, it is available from the other data management systems. In conclusion, the PI will want data available for use in graphic and numeric analyses and for computer simulation model input. That need determines the level of data reduction in the SEPDB.

3.0 DESIGN OF THE SITE AND ENGINEERING PROPERTIES DATABASE

The first step in database design is to define the uses and users of the data contained therein. Because the users of the SEPDB require diverse data parameters and data formats of the output, the design must be as flexible as possible. Defining the necessary level of data reduction for computer simulation models is determined by the specific numeric and format input requirements (Figure 1). The input parameters for statistical and engineering analyses are also fairly well defined but may cover a broader spectrum of measurements. Database use is not limited to YMP participants; it may be accessed by any interested party with proper authorization.

The Nuclear Regulatory Commission (NRC) is one of the potential users. The NRC typically requires more supporting information on the data than do the engineers and modelers. This is one of the reasons the QA program of the YMP has been a major factor in the database design. The necessity for being able to track every data value used in support of licensing activities to the measurement that produced the value and to the QA level of the technical procedure used to make that measurement has determined, in part, the database structure. Data tables are related, through common fields, to other data tables and also to several reference tables (Figure 2). The design of the SEPDB must remain flexible because of the above strict data-tracking requirements and because it must evolve with new or additional test qualifiers and supporting information reported by researchers from different organizations (all PIs have their own method of reporting).

The need to accommodate many different kinds of data, YMP QA requirements, and data input from various sources has also influenced the structure of the SEPDB data tables. A four-part structure (Appendix A) has been used in these tables; the four parts include (1) the data, (2) test conditions and analytical methods, (3) sample location and identification information, and (4) reference and bibliographic information.

The data section is the most important section in a table and includes (1) a numerical value for a measurement, (2) the units of measurement, (3) a reported range of values, and (4) any uncertainties (if reported).

Test conditions, the second section in SEPDB tables, influence the measurement and are included to discriminate between apparently like measurements of a particular property. The test condition section of the table may include fields for information about the temperature, pressure, saturation state, and measurement technique of the test. This information is essential to the investigator in analyzing the data set used for calculations. More importantly, only measurements taken under tightly controlled test techniques or procedures will be used in licensing decisions.

GEOCHEMISTRY

DEBYE-HUCKEL TERMS
VAN'T HOFF TERMS
pH
PE

HEAT TRANSPORT

THERMAL CONDUCTIVITY/DISPERSION
SPECIFIC HEAT
DENSITY (ROCK)
THERMAL DIFFUSIVITY
THERMAL EXPANSION

SOLUTE AND HEAT TRANSPORT

FRACTION OF SOLUBLES
DISSOLUTION RATE CONSTANT

SOLUTE TRANSPORT

VELOCITY
DISPERSION
DISTRIBUTION COEFFICIENT
ION EXCHANGE CAPACITY
DECAY CONSTANT
BRANCHING RATIOS

GEOMECHANICAL RESPONSE

VOID RATIO
COEFFICIENT OF COMPRESSIBILITY
SWELL INDEX
YOUNG'S MODULUS AND POISSON'S RATIO
SHEAR MODULUS
BULK MODULUS
CONSTRAINED MODULUS
LAME'S CONSTANTS
COEFFICIENT OF CONSOLIDATION

SATURATED FLOW

PERMEABILITY
HYDRAULIC CONDUCTIVITY
TRANSMISSIVITY
POROSITY
SPECIFIC STORAGE
SPECIFIC YIELD
STORAGE COEFFICIENT
LIQUID COMPRESSIBILITY COEFFICIENT
VERTICAL COMPRESSIBILITY
DENSITY
VISCOSITY
LEAKANCE

UNSATURATED FLOW

VOLUMETRIC WATER CONTENT
DEGREE OF WATER SATURATION
PARTICLE DENSITY
BULK DENSITY
PRESSURE POTENTIAL
RELATIVE PERMEABILITY
WATER CAPACITY
WATER DIFFUSIVITY

SURFACE WATER FLOW

BASIN AREA
CHANNEL SLOPE
BASIN SLOPE
CHANNEL SHAPE
MANNING'S ROUGHNESS COEFFICIENT
INTERCEPTION
DEPRESSION STORAGE
INFILTRATION
TIME OF CONCENTRATION
UNIT HYDROGRAPH
SYNTHETIC UNIT HYDROGRAPH
BASE FLOW

Figure 1. Selected Parameters and Variables Appearing in Repository Siting Models
(Mercer et al., 1982)

DATA TABLES

LOCATION TABLES

DOCUMENT TABLES

Figure 2. Data Tables Showing Relations Between Data Tables and Pointers to Reference Information (i.e., Location Tables and Document Tables) in the Site and Engineering Properties Database

The third section, sample location and identification, is used to pinpoint the specific site where the sample was obtained or the measurement was made. This section of the table must provide enough information to eliminate any uncertainty on the part of the user regarding the spatial correlation of two different measurements.

The final section, for reference and bibliographic information, provides information on published references, the location of the supporting procedure and test conditions, and contains ties to further documentation in the YMP's CRF.

In some cases data are reported with multiple measurements being conducted on one sample. This is the case with several properties including mineralogic/petrologic analyses, water chemistry analyses, and paleomagnetism. One rock or water sample is tested for several different chemical constituents. The SEPDB uses a two-table structure to store this information (Figure 3). One table contains the test and corresponding reference information (i.e., test conditions, sample location and identification, and bibliographic information); the second table has a column that indicates the related sample information (i.e., amount and units of measure of the constituents). Each row in the second table lists a constituent and has a numeric column for the measured amount. Paleomagnetic information is also presented in this two-table format. One sample is tested at several levels of applied demagnetization. The sample information is in one table and the test information is in another table.

The PI providing the information is aware of test conditions that have influenced the result but may not be aware of what potential users of his results may require in the way of supporting information. Some users, for example the NRC, may use the information not only in evaluating codes but also in evaluating the methods used to gather the information. Thus, even though the primary user may be interested in only a small subset of information about the testing conditions, other users may require a larger subset including ties to other data management systems in the YMP.

The wide variety of users dictates that extensive information be associated with each entry in the SEPDB. Sample and testing information are stored with the numeric data in each database table. This approach does not conform to most relational database design theory, i.e., separating out values, such as test conditions, that may be representative of several measurements; but it does eliminate the need to join several tables simply to provide associated information. Software limits on the number of tables that can be joined would quickly be exceeded when relating various parameters such as hydraulic conductivity, porosity, and lithology, along with all the separate test conditions.

A final influence on database design is that the primary use of information in the system is for numerical analysis and that the database is primarily a numeric database as opposed to a textual database. In an attempt to eliminate long text descriptions of the testing environment, PIs and database personnel work together, preferably when data

TABLE I
TEST, SAMPLE, AND DRILLHOLE INFORMATION

*WTRPK	27	28
HOLE ID	USW VH-1	UE-16d
W DATE	2/11/81	5/23/77
INT TOP	0.0	24.700
INT BOT	762.300	253.000
TEST TYPE		JETTED WITH AIR
WTR TEMP	35.5 C	17.4 C
DISCHG RATE	15.0 l/s	
DISCHG PERIOD	1140 min	
QA LEVEL	TBD	TBD
HOLEFK	183	254

***WTRPK:** (Table I) points to "WTRFK" (Table II) and associated chemical information.
See Appendix A for definitions of terms.

TABLE II
CHEMICAL INFORMATION

*WTRFK	Constituent	Amount	Units	Comments
27	calcium (cations)	0.494	meqv/l	
27	carbon-14	17000.0	years	± 170 years
27	chloride, dissolved	10.0	mg/l	
27	deuterium	-108.0	ppt	relative to smow
27	fluoride (anions)	0.142	meqv/l	
27	silica, dissolved	49.0	mg/l	
27	sodium	84.0	%	
27	tritium	20.0	pCi/l	maximum
28	calcium	60.0	mg/l	
28	carbon-13/carbon-12	-6.7	ppt	relative to pdb
28	carbon-14	14000.0	years	
28	iron	180.0	mcrg/l	
28	magnesium	30.0	mg/l	
28	silica	18.0	mg/l	
28	fluids, dissolved	309.0	mg/l	residue, 180 C
28	strontium	610.0	mcrg/l	

Figure 3. Example of Two-Table Structure for Water Chemistry Data Showing Test, Sample, and Reference Information

studies are first defined, to set up separate table columns that describe specific aspects of the test. Separate (quantitative) fields for test temperature and test pressure are used to avoid long (qualitative) comment fields that describe both temperature and pressure. Because the text is short, limits can be enforced on the spelling and format of the field contents. This method of storing information also allows direct sorting of associated information based on the testing conditions.

4.0 STATUS AND CURRENT CONTENTS

The user's needs are being met by the currently operational, prototype SEPDB. The prototype is small (approximately 18,000 records) compared to its eventual size after QA Level I studies in the exploratory shaft facility and the drilling program are complete. These planned tests are designed to acquire data on geologic, hydrologic, geomechanical, geochemical, and waste package environment characteristics (DOE, 1988). The following discussions outline the hardware and software being used and the current database contents. Submittals and retrievals of information to and from the SEPDB are also described.

4.1 Hardware and Software

The hardware for the SEPDB consists of a Digital Equipment Corporation (DEC) VAX 8200 minicomputer. The current computer configuration has twelve Mb of memory, two DEC RA-81 disk drives (451 Mb capacity each), and a DEC TU-81 magnetic tape unit. This unit is used to transfer large data sets to users as requested. A DEC RA-60 removable-media disk drive may be attached to the system to produce back-up files. The Sandia Terminal Switching Network provides access to the system for database personnel. Outside lines for on-line access to the SEPDB will soon be available.

The relational database management software, which runs the SEPDB, is INGRES (Version 5.05). INGRES is a product of Relational Technology, Inc. (Alameda, CA), and provides database indexing, forms management, and reporting tools. Applications development with INGRES uses C programming language. Commercial packages are available for interfaces between INGRES and statistical packages.

The VAX 8200 operates under the standard VAX/VMS operating system (Version 4.7). General purpose programming is accomplished through DEC's Vax-11 Fortran Compiler (Version 4.6) and DEC's VAX-"C" compiler (Version 2.4). Data can be downloaded to a PC, in order to provide data to users on floppies, using VTERM. The RS/1 (Version 4.0) statistical and graphical software is also installed on the VAX 8200. Two applications have been written for accessing and tracking information about the SEPDB data submittals and products.

The first application is used to track the status of data submittals to the database. The second provides the user with information about the types of data available in the database and also allows the user access to several of the data tables through reports.

4.2 Database Contents

Current contents of the SEPDB are displayed by data type in Figure 4. This view of the database contents also shows the number of records for each data type. The number is automatically updated as new data records are added to the database.

The SEPDB data dictionary (Appendix A) provides information on the structure of each database table. The length of each column, the data type of the field (integer, text), and the ties to other database tables are specified in the dictionary. The INGRES data types used for the SEPDB include text(XX)--textual entry and length of field; i(X)--integer, X refers to number of bytes required to store the value; f(X)--real, X refers to the precision; and date stores a date which may be used in chronological sorting. Any column name that includes "pk" (primary key) or "fk" (foreign key) indicates a relation to another table. The names of fields and the size of fields are kept consistent from table to table for ease in writing reports using the database contents.

4.3 Data Submittals

The data dictionary provides information on the SEPDB to anyone required to submit data to the SEPDB. It outlines the supporting information and the format for that information expected for data submittals. The best method for handling data submittals is through interaction between the database administrator (DBA) and the PI before final documentation of research results (Figure 5).

Through this interaction, the numerical results of tests and those test conditions that determine the outcome are identified before undertaking database table design. Also, the PI can suggest to the DBA how study results will be used in further analyses. This helps the DBA in designing the tables for the SEPDB so that information is easily accessible in a format that is readily usable. This interaction benefits the PI in that he is made aware of the information that must be reported. He can then make sure that all associated information, such as aspects of the testing environment, are maintained in data reports. This eliminates the need to go back to lab notes (for example) for additional information that may need to be submitted.

Because much of the currently available site data was collected before the SEPDB existed, it was not possible to work with the PIs in designing the format for reporting data. A large percentage of current SEPDB information is taken from previously published reports. Although these data provide valuable information on the Yucca Mountain site, they do not have the supporting documentation required by the YMP. These early data values are available for any user but may not be used in any activities supporting license application unless the QA level (of the data-gathering activity) is upgraded from TBD (to be determined) to Level I.

4.4 Data Retrievals

Requests for off output from the SEPDB must be handled on an individual basis because of documentation of information products required by the YMP. However, requests can be initiated by a phone call to the DBA. The product is transmitted but is not considered official until documentation of the data transfer is in place. The data transmittals can be on paper, downloaded to personal computers, or copied onto another

<u>DATA TABLE DESCRIPTION</u>	<u>TABLE NAME</u>	<u>ENTRIES</u>
PHYSICAL/MECHANICAL ROCK PROPERTIES		
Bulk Density Values and Test Conditions	bdensity	1426
Bulk Modulus Data and Test Conditions	bmodulus	15
Grain Density Values and Test Conditions	gdensity	584
Porosity Values and Test Conditions	porosity	610
Compressive Strength Data and Test Conditions	compstreng	79
Elastic Properties (Poisson's Ratio and Young's Mod.)	elasticprp	72
Thermal Conductivity Data and Test Conditions	thermalcond	244
Laboratory Sonic Velocity Measurements	sonicvel	220
ASSOCIATED DOCUMENT INFORMATION		
Author's Names and Order on SEPDB References	authors	135
Information on Data Types of Data Authorizations	dandata	247
Information Related to TPO Data Authorizations	danum	67
Original References for SEPDB Data	references	67
GEOLOGIC INFORMATION		
Supporting Paleomagnetic Data for pmagsumm	pmagdata	686
Summary of Paleomagnetic Measurements	pmagsumm	92
Rock and Mineral Constituent Table, see mineraldat	mineraldat	5198
Supporting Information for mineraldat Table	mineralsmp	420
Lithologic Unit Depths in Drillholes	lithounit	177
Thermal-Stratigraphic Unit Depths in Drillholes	thermstrat	161
DRILLHOLE/LOCATION INFORMATION		
Total Depths and Bottom Hole Surveys	btmholes	131
Core Information, Intervals and Percent Recovery	coreinfo	4852
Drill Hole Locations, Surveys, and Status	holeinfo	254
Sample Location Date (non-core samples)	sampleinfo	220
HYDROLOGIC INFORMATION		
Water Chemical Constituent Values, see waterdata	constituent	749
Flood Measurements and Drainage Basin Information	flooddata	5
Cross Section Data for Flood Predictions (floodpred)	floodloc	32
Interval Flood Predictions and Methods, see floodloc	floodpred	108
Hydraulic Conductivity Values and Test Conditions	hydconduc	84
Matrix Potential Data	matricpot	19
Supporting Information for the matricpot Table	matricsumm	19
Percent Water Production from Drill Hole Interval	perwatprod	19
Pore Saturation and Test Conditions	poresatur	83
Natural-State Pore-Water Content Percentages	porewater	169
Relative Hydraulic Conductivity Values	relhydcond	8
Storage Coefficient Values for Well Tests	storagecoef	10
Transmissivity Data and Pumping Conditions	transmissiv	181
Supporting Information for Water Constituent Table	waterdata	32
Well Test Hydraulic Conductivity Measurements	wellconduc	108
Water Elevations and Depths, Dates of Measurement	wtrlevel	235

Figure 4. Current Contents of the Site and Engineering Properties Database

Figure 5. Diagram of Data Flow To and From the Site and Engineering Properties Database

for SEPDB products by other than YMP participants must go through the YMP Manager. Interactions with the SEPDB are outlined in YMP Administrative Procedure 5.2Q (Technical Information Flow to and from the Yucca Mountain Project Technical Data Base).

Information on the current contents of the SEPDB is available in the Site and Engineering Properties Database Quarterly Report. This report provides information on the types of data available and the locations (drill holes) for which the categories of data are available. The Quarterly Report will also be available through on-line access. The user is encouraged to call the database personnel at Sandia National Laboratories to get information on the database contents or to be added to the quarterly mailing list.

Most requests for data are handled using the INGRES Report Writer. This tool provides information from as many as ten database tables, and output can be customized for each user. Figure 6 shows two examples of database output. The information in Figure 6a was used for input to a geostatistical program. Five tables (porosity, density, hydraulic conductivity, hole location, and bottom hole coordinates) were joined using the INGRES Report Writer. Another part of the product (not shown) consists of the raw information for values that were averaged and the references to the document where the data were originally published. Figure 6b shows how information can be transferred in what is simply a report-style format.

6a. STATISTICAL PROGRAM INPUT

UE-25b #1		566416.40	765243.40	3939.00	0.0	-90.0	13
566416.40	765243.40	3198.25	740.747	11.700	2.250	0.0000012150	
566416.40	765243.40	2365.94	1573.063	26.650	1.750	0.0001035000	
566416.40	765243.40	1885.12	2053.876	24.500	1.730	0.0000420000	
566416.40	765243.40	1708.88	2230.119	11.850	2.090	0.0000012650	
566416.40	765243.40	1468.64	2470.361	23.150	2.010	0.0005800000	
566416.40	765243.40	1349.83	2589.170	21.450	2.060	0.0000695000	
566416.40	765243.40	1267.12	2671.876	22.200	2.040	0.0000500000	
566416.40	765243.40	1170.63	2768.367	22.900	2.020	0.0000050000	
566416.40	765243.40	906.76	3032.240	19.400	2.110	0.0000305000	
566416.40	765243.40	825.04	3113.962	18.550	2.140	0.0000190000	
566416.40	765243.40	192.93	3746.075	14.800	2.240	0.0003100000	
566416.40	765243.40	95.78	3843.222	12.400	2.320	0.0002250000	
566416.40	765243.40	-5.31	3944.308	10.850	2.420	0.0000785000	

Explanation of Output: First Row - Drillhole, E and N Nevada State Plane Coordinates, Collar Elevation, Drillhole Inclination, Number of Output Rows;
Second Row - Nevada State Plane Coordinates, Collar Elevation, Depth to Measurement, Porosity, Bulk Density, Hydraulic Conductivity

Figure 6a. Example of Output from the Site and Engineering Properties Database for Use in a Geostatistical Program

6b. THERMAL-MECHANICAL STRATIGRAPHIC UNITS FOR DRILL HOLE USW H-5

<u>Top of</u> <u>Interval</u>	<u>Bottom of</u> <u>Interval</u>	<u>Units</u>	<u>Thermostratigraphic</u> <u>Unit</u>	<u>Elevation</u> <u>(unit top)</u>
0.000	410.000 ft	TCw		4850.800
410.000	570.000 ft	PTn		4440.800
570.000	1582.000 ft	TSw2		4280.800
1582.000	1655.000 ft	TSw3		3268.800
1655.000	1880.000 ft	CHn1v		3195.800
1880.000	1896.000 ft	CHn2v		2970.800
1896.000	1945.000 ft	CHn2z		2954.800
1945.000	2015.000 ft	CHn3z		2905.800
2015.000	2125.000 ft	PPw		2835.800
2125.000	2345.000 ft	CFUn		2725.800
2345.000	2710.000 ft	BFw		2505.800
2710.000	2713.000 ft	CFMn1		2140.800
2713.000	2742.000 ft	CFMn2		2137.800
2742.000	2847.000 ft	CFMn3		2108.800
2847.000	3144.000 ft	TRw		2003.800

Data QA Level = NQ

REFERENCE INFORMATION

SAND84-1076

A Three-Dimensional Model of Thermal/Mechanical and Hydrologic
Stratigraphy at Yucca Mountain, Southern Nevada

Figure 6b. Report Style Output from the Site and Engineering Properties Database

5.0 CONCLUSIONS

The Site and Engineering Properties Database provides the scientists and engineers working on the Yucca Mountain Project a centralized system for collecting and accessing data. By using this system, the responsible individuals work with the same data and the same assumptions, thus ensuring greater accuracy, consistency, and continuity across the various activities supporting license applications.

The database is a very flexible system. It produces the many different report outputs required by the various participants. This flexibility is a primary strength and a direct result of the SEPDB being responsive to its many data providers and users. In addition, the volume of user interactions has clearly indicated a need for interrelated, readily accessible data in a convenient format, which the SEPDB provides.

6.0 REFERENCES

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Mercer, J. W., S. D. Thomas, and B. Ross, 1982. "Parameters and Variables Appearing in Repository Siting Models," NUREG/CR-3066, Geo Trans, Inc., Reston, VA. (NNA.891108.0051)

APPENDIX A

SITE AND ENGINEERING PROPERTIES DATABASE DATA DICTIONARY

Bulk Density Values and Test Conditions

Table Name: **BDENSITY**

Data Base: **SEP01**

PARAMETERS

bdensity	Bulk density value for the sample	f8
dens_unit	Unit of measure for bulk density data (g/cc,...)	text(8)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
test_press	Sample pressure and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)
samp_mass	Sample mass and units of measure of sample tested	text(15)
sat_state	Saturation state of sample during test	text(15)

ASSOCIATED REFERENCE INFORMATION

bdenpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Bulk Modulus Data and Test Conditions

Table Name: BMODULUS

Data Base: SEP01

PARAMETERS

bmodulus	Numerical value for bulk modulus	f8
mod_unit	Unit of measure for bulkmodulus field (MPa, ...)	text(6)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
strain_rate	Strain rate during test (per sec,...)	text(10)
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
conf_press	Confining pressure of sample during test	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)
drain_state	Drainage condition of sample during test	text(10)
pore_press	Pore pressure conditions of sample during test	text(10)
sat_state	Saturation state of sample during test	text(15)

ASSOCIATED REFERENCE INFORMATION

bmodpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Total Depths and Bottom Hole Surveys

Table Name: BTMHOLES

Data Base: SEP01

PARAMETERS

td	Total depth of hole in feet	f8
tvd	Total vertical depth of hole in feet	f8

LOCATION INFORMATION

bothole_x	Nevada plane coordinates for bottom of hole or sample	f8
bothole_y	Nevada plane coordinates for bottom of hole or sample	f8

TEST CONDITIONS

dhsurv_date	Date of survey	date
dhsurv_ref	Bottom hole survey type	text(10)

ASSOCIATED REFERENCE INFORMATION

holefk	Cross reference to drill hole information	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
danfk	Cross reference to TPO's data authorization	i2

Compressive Strength Data and Test Conditions

Table Name: **COMPSTRENG**

Data Base: **SEP01**

PARAMETERS

compstrength	Numerical value for compressive strength	f8
comp_unit	Unit of measure for compstrength field (MPa,)	text(6)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
strain_rate	Strain rate during test (per sec,...)	text(10)
strain_unit	Unit of measure for failure_str field (milli,)	text(6)
sat_state	Saturation state of sample during test	text(15)
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)
conf_press	Confining pressure of sample during test	text(10)
pore_press	Pore pressure conditions of sample during test	text(10)
drain_state	Drainage condition of sample during test	text(10)
failure_str	Axial strain at which sample failed	f8

ASSOCIATED REFERENCE INFORMATION

comppk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Water Chemical Constituent Values, see waterdata

Table Name: CONSTITUENT
Associate Table: WATERDATA

Data Base: SEP01

PARAMETERS

constituent	Name of the chemical constituent being reported	text(20)
amount	Numerical amount of the constituent	f8
con_unit	Unit that constituent is reported in (mg/l, pCu/l)	text(8)

TEST CONDITIONS

comments	Comments related to reported constituent or units	text(40)
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ASSOCIATED REFERENCE INFORMATION

wtrfk	Points to supporting information in the waterdata table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
reffk	Cross reference to reference information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Core Information, Intervals, and Percent Recovery

Table Name: COREINFO

Data Base: SEP01

PARAMETERS

cored	Length of cored interval	f8
core_unit	Units for cored, recovered, and interval fields	text(3)
rcvd_pct	Percent of recovered core to cored length (%)	f8
recovered	Length of actual recovery of core in interval	f8

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
int_top	Location of top of cored interval	f8
int_bot	Location of bottom of core interval	f8

TEST CONDITIONS

core_no	Identification number for section of core	text(5)
oriented	Indicates core is oriented when field contains a "X"	text(4)

ASSOCIATED REFERENCE INFORMATION

corepk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Information on Data Types of Data Authorizations

Table Name: **DANDATA**

Data Base: **SEP01**

PARAMETERS

dan	Data authorization number assigned each TPO data submittal	text(8)
data_type	Type of data referenced in the DA	text(12)
dt_stat	Date of the latest status	date

TEST CONDITIONS

status	Type of table or current status of data	text(10)
job	Job # under which the work was performed	i2
verify1	Initials & job # of individual who performed the first verification prior to the data going into the SEPDB	text(12)
verify2	Initials & job # of individual who performed the second verification prior to the data going into the SEPDB	text(12)

ASSOCIATED REFERENCE INFORMATION

pg_loc	Page location in the source report of each type of data	text(11)
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Information Related to TPO Data Authorizations

Table Name: DANUM

Data Base: SEP01

PARAMETERS

dan	Data authorization number assigned each TPO data submittal	text(8)
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TEST CONDITIONS

dan_date	Date on data authorization form	date
authorizer	Classification of person authorizing submittal	text(8)
dt_recd	Date DA received	date
dt_closed	Date DA is closed	date

ASSOCIATED REFERENCE INFORMATION

comments	Comments about a DA	text(70)
danpk	Unique number assigned to each entry in the table	i2
reffk	Cross reference to reference information	i2

Elastic Properties (Poisson's Ratio/ Young's Modulus)

Table Name: ELASTICPRP

Data Base: SEP01

PARAMETERS

poissons	Poisson's ratio for the sample (no units)	f8
youngs_mod	Numerical value for Young's modulus	f8
young_unit	Unit of measure for youngs_mod field (Pa, lb/sq ft, ..)	text(6)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sampTe_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
strain_unit	Unit of measure for failure_str field (/sec)	text(6)
strain_rate	Strain rate during test (per sec,...)	text(10)
sat_state	Saturation state of sample during test	text(15)
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)
conf_press	Confining pressure of sample during test	text(10)
pore_press	Pore pressure conditions of sample during test	text(10)
drain_state	Drainage condition of sample during test	text(10)
failure_str	Axial strain at which sample failed	f8

ASSOCIATED REFERENCE INFORMATION

elaspk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants	text(20)

LRC

Flood Measurements and Drainage Basin Information

Table Name: FLOODDATA

Data Base: SEP01

PARAMETERS

q_max	maximum discharge of water	f8
q_unit	unit of measure for q_max (ex. cfs for cubic feet per second)	text(8)

LOCATION INFORMATION

location	location of flood event measurement	text(50)
lat	latitude of x_section (ex. 36 deg 3 min)	text(15)
long	longitude of x_section (ex. 116 deg 24 min)	text(15)

TEST CONDITIONS

f_date	date of actual flood event	date
alt_range	range in altitude of drainage basin, usually the feet above sea level (ex. 3000 - 6080 ft)	text(15)
drainarea	drainage basin area above location	f8
area_unit	unit of measure for drainarea (ex. mi**2 for square miles)	text(8)

ASSOCIATED REFERENCE INFORMATION

flop_k	unique number assigned to each entry in the table	12
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	12
danfk	Cross reference to TPO's data authorization	12
drms_id	Specifies location of reference in participants LRC	text(20)

Cross Section Data for Flood Predictions (floodpred)

Table Name: FLOODLOC
Associate Table: FLOODPRED

Data Base: SEP01

LOCATION INFORMATION

x_section	unique name for each cross section location	text(15)
wash	name of river bed or wash	text(30)
lat	latitude of x_section (ex. 36 deg 3 min)	text(15)
long	longitude of x_section (ex. 116 deg 24 min)	text(15)
basin_e	mean elevation of contributing drainage basin	text(15)

ASSOCIATED REFERENCE INFORMATION

flop	unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Interval Flood Predictions and Methods (floodloc)

Table Name: FLOODPRED
Associate Table: FLOODLOC

Data Base: SEP01

PARAMETERS

q	estimated peak discharge	f8
q_unit	unit of measure for Q (ex. cfs for cubic feet per second)	text(8)
vel_mean	mean velocity of flood event (ex. 7.2 ft/sec	text(15)

LOCATION INFORMATION

x_section	unique name for each cross section location	text(15)
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TEST CONDITIONS

flood_type	type of flood (100 yr, 500 yr, regional max, ...)	text(15)
xs_area	cross-sectional area below water surface (ex. 11,000 sq. ft)	text(15)
xs_width	cross-sectional distance between channel banks at water surface (ex. 1,530 ft)	text(15)
max_depth	vertical distance from water surface to deepest point in cross section (ex. 4.1 ft)	text(15)
drainarea	contributing drainage basin area above cross section (ex. 256 mi**2 for square miles)	text(15)
analy_type	analysis method for calculating predictions (ex. fortymile wash study, statewide relations, SCS method, 482 x (drainarea**0.565), 2200 x (drainarea**0.571), Crippen & Bue boundary curve, ...)	text(30)

ASSOCIATED REFERENCE INFORMATION

flopck	unique number assigned to each entry in the table	12
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	12
danfk	Cross reference to TPO's data authorization	12
drms_id	Specifies location of reference in participants LRC	text(20)

Grain Density Values and Test Conditions

Table Name: GDENSITY

Data Base: SEP01

PARAMETERS

gdensity	Grain Density value for the sample	f8
dens_unit	Unit of measure for grain density data (g/cc,...)	text(8)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
test_press	Sample pressure and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)
samp_mass	Sample mass and units of measure of sample tested	text(15)

ASSOCIATED REFERENCE INFORMATION

gdenpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Drill Hole Locations, Surveys, and Status

Table Name: HOLEINFO

Data Base: SEP01

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
collar_x	Nevada plane coordinates for top of hole or sample.	f8
collar_y	Nevada plane coordinates for top of hole or sample.	f8
collar_e	Elevation above sea level of drill-hole or sample location	f8

TEST CONDITIONS

surv_date	Date of survey	date
surv_stat	Status of drillhole's construction	text(10)

ASSOCIATED REFERENCE INFORMATION

holepk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
danfk	Cross reference to TPO's data authorization	i2

Hydraulic Conductivity Values and Test Conditions

Table Name: HYDCONDOC

Data Base: SEP01

PARAMETERS

hydcond	Hydraulic Conductivity Value for the sample	f8
hyd_unit	Unit of measure for hydraulic conductivity data	text(6)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
test_press	Sample pressure and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)
test_dir	Direction of measurement (horizontal, vertical)	text(10)

ASSOCIATED REFERENCE INFORMATION

hydpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Lithologic Unit Depths in Drillholes

Table Name: **LITHOUNIT**

Data Base: **SEP01**

PARAMETERS

lithunit	stratigraphic unit name or rock type with the name of the stratigraphic unit above it for the interval described (ex. Bedded Tuff below Prow Pass Member)	text(60)
int_top	Depth in hole to top of lithologic-unit interval	f8
int_bot	Depth in hole to bottom of lithologic-unit interval	f8
int_unit	Unit of measure for int_top and int_bot	text(3)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
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ASSOCIATED REFERENCE INFORMATION

lithpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Matrix Potential Data

Table Name: MATRICPOT
Associate Table: MATRICSUMM

Data Base: SEP01

PARAMETERS

matricpot	Matric Potential Value for the sample	f8
mat_unit	Unit of measure for matric potential data	text(6)
pot_range	Range of the amount, such as >, <, trace or interval top, if amount is given as a range of values, for the matricpot value	text(8)

TEST CONDITIONS

water_sat	Quantity of water present in the voids	f8
wat_unit	Unit of measure for quantity of water present in voids - (d for dimensionless)	text(6)
sat_range	Range of the amount, such as >, <, trace or interval top, if amount is given as a range of values, for the water_sat value	text(8)

ASSOCIATED REFERENCE INFORMATION

matfk	Points to supporting information in the matricsumm table	i2
page_no	Page number where value appears in reference document	text(6)

Supporting Information for the matricpot Table

Table Name: MATRICSUMM
Associate Table: MATRICPOT

Data Base: SEP01

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
test_press	Sample pressure and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)

ASSOCIATED REFERENCE INFORMATION

matpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Rock and Mineral Constituent Table, see mineralsmp

Table Name: MINERALDAT
Associate Table: MINERALSMP

Data Base: SEP01

PARAMETERS

constituent	Name of the mineral, oxide or constituent reported	text(30)
amount	Numerical amount of the constituent	f8
con_unit	Unit that constituent is reported in (%)	text(8)
a_range	Range of the amount, such as >, <, trace or interval top if amount is given as a range of values	text(8)
uncertain	Uncertainty in reported data value	text(15)

TEST CONDITIONS

analy_type	Type of analysis	text(35)
comm	Cross reference to the comments in the mineralsmp table	text(6)

ASSOCIATED REFERENCE INFORMATION

minfk	Points to supporting information in the mineralsmp table	i2
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Supporting Information for mineraldat Table

Table Name: MINERALSMP
Associate Table: MINERALDAT

Data Base: SEP01

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
test_type	Testing method used to determine parameter value	text(25)
material	Type of material tested (mineral, whole rock, ...)	text(40)
comments	Comments on material or various tests	text(150)

ASSOCIATED REFERENCE INFORMATION

minpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Percent Water Production from Drill Hole Interval

Table Name: PERWATPROD

Data Base: SEP01

PARAMETERS

percent_prod	Percent water production value for the interval	f8
pwp_unit	Unit of measure for percent water production value	text(8)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
int_top	Top of depth interval which measurement represents	f8
int_bot	Bottom of depth interval which measurement represents	f8
int_unit	Unit of measure for int_top and int_bot	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
test_type	Testing method used to determine parameter value	text(25)
p_date	Date measurement was performed	date
deviation	Amount of deviation from best fit of test analysis	text(10)
wtr_pumped	Amount of water pumped for the test	text(10)
pump_rate	Rate at which water was pumped from the test well	text(15)

ASSOCIATED REFERENCE INFORMATION

pwp_pk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Supporting Paleomagnetic Data for pmagsumm

Table Name: PMAGDATA
Associate Table: PMAGSUMM

Data Base: SEP01

PARAMETERS

intens	Numerical value for intensity of remanence	f8
inclin	Inclination of remanence relative to reference mark	f8
i_unit	Unit of measure for intens field (Amp/m, ..)	text(6)
declin	Declination of remanence relative to reference mark	f8
d_unit	Unit of measure for declin/inclin field (degrees,...)	text(8)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
test_type	Testing method used to determine parameter value	text(25)
demag_lev	Alternating field demagnetization prior to test	text(10)

ASSOCIATED REFERENCE INFORMATION

pmagpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Summary of Paleomagnetic Measurements

Table Name: PMAGSUMM
Associate Table: PMAGDATA

Data Base: SEP01

PARAMETERS

avg_decl	Average declination of remanence (wrt.reference mark)	f8
avg_incl	Average inclination of remanence (wrt.reference mark)	f8
d_unit	Unit of measure for avg_decl/avg_incl field (degrees,...)	text(8)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

core_mark	Declination of the reference mark	f8
core_orient	Paleomagnetic orientation of the reference mark	f8
samp_count	Number of samples used to obtain average values	text(5)
angle95	Half angle of the cone of 95% confidence	text(5)
demag_lvls	Alternating field demagnetization levels used	text(25)
fish_param	Fisher precision parameter	text(10)

ASSOCIATED REFERENCE INFORMATION

pmagpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Pore Saturation and Test Conditions

Table Name: PORESATUR

Data Base: SEPO1

PARAMETERS

saturation	Value for the natural state pore saturation of the sample	f8
sat_unit	Unit of measure for saturation field (% , vol %)	text(6)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
test_press	Sample pressure and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)

ASSOCIATED REFERENCE INFORMATION

porepk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Natural-State Pore-Water Content Percentages

Table Name: POREWATER

Data Base: SEP01

PARAMETERS

porewater	Natural-state water content for total sample	f8
pore_unit	Unit of measure for porewater (cc/cc, vol %, wt %)	text(6)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
test_press	Sample pressure and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)

ASSOCIATED REFERENCE INFORMATION

porepk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Porosity Values and Test Conditions

Table Name: POROSITY

Data Base: SEP01

PARAMETERS

porosity	Porosity value for the sample	f8
por_unit	Unit of measure for porosity data (%,)	text(6)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	11
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
test_press	Sample pressure and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)
samp_mass	Sample mass and units of measure of sample tested	text(15)

ASSOCIATED REFERENCE INFORMATION

porpk	Unique number assigned to each entry in the table	12
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	12
holefk	Cross reference to drill hole information	12
danfk	Cross reference to TPO's data authorization	12
drms_id	Specifies location of reference in participants LRC	text(20)

Original References for SEPDB Data

Table Name: REFERENCES
Associate Table: AUTHORS

Data Base: SEP01

PARAMETERS

title	Complete title of the reference or document	
text(225)		
short_title	Short title of the reference or document	text(60)
citation	Full document citation, as in SAND84-2641	text(20)

ASSOCIATED REFERENCE INFORMATION

refpk	Unique number assigned to each SEPDB reference	12
participant	Name of YMP participant that generated document	text(6)
ref_date	Date reference was published	date
sepdata	Indicates (y or n) if data are in official SEPDB tables	text(3)

Relative Hydraulic Conductivity Values and Test Conditions

Table Name: RELHYDCOND

Data Base: SEP01

PARAMETERS

relhydcond	Relative Hydraulic Conductivity Value for the sample	f8
hyd_unit	Unit of measure for relative hydraulic conductivity data	text(3)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(20)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
test_press	Sample pressure and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)
test_dir	Direction of measurement (horizontal, vertical)	text(10)

ASSOCIATED REFERENCE INFORMATION

hydpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Sample Location Data (non-core samples)

Table Name: **SAMPLEINFO**

Data Base: **SEP01**

LOCATION INFORMATION

location	Location of sample	text(20)
sample_id	Sample identification number	text(20)
collar_x	Nevada plane coordinates for top of hole or sample.	f8
collar_y	Nevada plane coordinates for top of hole or sample.	f8
collar_e	Elevation above sea level of drill-hole or sample location	f8

TEST CONDITIONS

surv_date	Date sample was taken	date
surv_stat	Method of obtaining the sample's location	text(10)

ASSOCIATED REFERENCE INFORMATION

sampk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
danfk	Cross reference to TPO's data authorization	i2

Laboratory Sonic Velocity Measurements

Table Name: SONICVEL

Data Base: SEP01

PARAMETERS

sonicvel	Sonic Velocity Value for the sample	f8
sonic_unit	Unit of measure for sonic velocity data	text(6)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
test_press	Sample pressure and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)
test_dir	Direction of measurement (horizontal, vertical)	text(12)

ASSOCIATED REFERENCE INFORMATION

sonpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Storage Coefficient Values for Well Tests

Table Name: **STORAGECOEF**

Data Base: **SEP01**

PARAMETERS

storagecoef	Storage coefficient value for the interval (unitless)	f8
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LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
int_top	Top of depth interval which measurement represents	f8
int_bot	Bottom of depth interval which measurement represents	f8
int_unit	Unit of measure for int_top and int_bot	text(3)

TEST CONDITIONS

test_type	Testing method used to determine parameter value	text(25)
test_analys	Method of analysis for storage coefficient value	text(20)

ASSOCIATED REFERENCE INFORMATION

storp_k	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submission	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Thermal Conductivity Data and Test Conditions

Table Name: THERMALCOND

Data Base: SEP01

PARAMETERS

thermalcond	Numerical value for thermal conductivity	f8
ther_unit	Unit of measure for thermalcond field (W/mK, ..)	text(6)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
depth	Depth in hole from which sample comes	f8
depth_unit	Unit of measure for depth (ft, m)	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
sat_state	Saturation state of sample during test	text(10)
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
samp_leng	Sample length and units of measure of sample tested	text(10)
samp_diam	Sample diameter and units of measure of sample tested	text(10)
pore_press	Pore pressure conditions of sample during test	text(10)
pore_fluid	Pore fluid used for sample saturation	text(15)
conf_press	Confining pressure of sample during test	text(10)

ASSOCIATED REFERENCE INFORMATION

therpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Thermal-Stratigraphic Unit Depths in Drillholes

Table Name: THERMSTRAT

Data Base: SEP01

PARAMETERS

tmunit	stratigraphic unit name or rock type with the name of the stratigraphic unit above it for the interval described (ex. U0, TCw, PTn)	text(30)
int_top	Depth in hole to top of thermal/mechanical stratigraphic-unit interval	f8
int_bot	Depth in hole to bottom of thermal/mechanical stratigraphic-unit interval	f8
int_unit	Unit of measure for int_top and int_bot	text(3)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
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ASSOCIATED REFERENCE INFORMATION

stratpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants	text(20)

LRC

Transmissivity Data and Pumping Conditions

Table Name: TRANSMISSIV

Data Base: SEP01

PARAMETERS

transmissiv	Transmissivity value for the interval	f8
tran_unit	Unit of measure for transmissivity value	text(8)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
int_top	Top of depth interval which measurement represents	f8
int_bot	Bottom of depth interval which measurement represents	f8
int_unit	Unit of measure for int_top and int_bot	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	text(6)
test_type	Testing method used to determine parameter value	text(25)
test_analys	Method of analysis for transmissivity value	text(20)
test_episode	Test episode if several tests are grouped into episodes	text(6)
t_date	Date water sample was collected	date
t_range	Indicator and value for any ranges in parameter	text(8)
pump_rate	Rate at which water was pumped from the test well	text(15)
wtr_pumped	Amount of water pumped for the test	text(10)
deviation	Amount of deviation from best fit of test analysis	text(10)

ASSOCIATED REFERENCE INFORMATION

tranpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Supporting Information for Water Constituent Table

Table Name: **WATERDATA**
Associate Table: **CONSTITUENT**

Data Base: **SEP01**

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sampTe_id	Sample identification number	text(15)
int_top	Top of depth interval which sample represents	f8
int_bot	Bottom of depth interval which sample represents	f8
int_unit	Unit of measure for int_top and int_bot	text(3)

TEST CONDITIONS

w_date	Date water sample was collected	date
test_type	Testing method used to determine parameter value	text(25)
test_temp	Sample temperature and units of measure during test	text(10)
wtr_quantity	Quantity of water pumped before sample was taken	text(10)
wtr_temp	Well interval temperature when sample was collected	text(10)
dischg_per	Length of pre-sample pumping in units of time	text(10)
dischg_rate	Discharge rate of pre-sample pumping	text(10)

ASSOCIATED REFERENCE INFORMATION

wtrpk	Unique number assigned to each entry in the table	i2
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
holefk	Cross reference to drill hole information	i2

Well Test Hydraulic Conductivity Measurements

Table Name: WELLCONDUC

Data Base: SEP01

PARAMETERS

wellconduc	Well test conductivity value for the interval	f8
well_unit	Unit of measure for conductivity value	text(6)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
sample_id	Sample identification number	text(15)
int_top	Top of depth interval which measurement represents	f8
int_bot	Bottom of depth interval which measurement represents	f8
int_unit	Unit of measure for int_top and int_bot	text(3)

TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	text(6)
test_type	Testing method used to determine parameter value	text(25)
test_analys	Method of analysis for conductivity value	text(20)
test_episode	Test episode if several tests are grouped into episodes	text(6)
w_date	Date water sample was collected	date
pump_rate	Rate at which water was pumped from the test well	text(15)
wtr_pumped	Amount of water pumped for the test	text(10)

ASSOCIATED REFERENCE INFORMATION

wellpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

Water Elevations and Depths, Dates of Measurement

Table Name: WTRLEVEL

Data Base: SEP01

PARAMETERS

w_date	Date of water level measurement	date
depth_corr	Value used to correct down-hole run to true run	f8
depth	Depth to water, true vertical if depth_corr is specified	f8
int_top	Top of interval that the level represents	f8
int_bot	Bottom of interval that the level represents	f8
depth_unit	Unit of measure for depth or elevation (ft, m)	text(3)

LOCATION INFORMATION

hole_id	Drill hole name for the data	text(20)
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TEST CONDITIONS

test_no	Test number of multiple tests on the same interval or sample	i1
test_type	Testing method used to determine parameter value	text(25)
composite	"y" entered if level is represents the composite hole	text(3)

ASSOCIATED REFERENCE INFORMATION

wtrpk	Unique number assigned to each entry in the table	i2
dan	Data authorization number assigned each TPO data submittal	text(8)
page_no	Page number where value appears in reference document	text(6)
qa_level	QA level of the data-gathering activity under approved YMP/QAPP (I, II, III or NQ). TBD indicates no QAPP was in place.	text(3)
reffk	Cross reference to reference information	i2
holefk	Cross reference to drill hole information	i2
danfk	Cross reference to TPO's data authorization	i2
drms_id	Specifies location of reference in participants LRC	text(20)

APPENDIX B

CANDIDATE INFORMATION FOR THE REFERENCE INFORMATION BASE AND THE SITE AND ENGINEERING PROPERTIES DATABASE

This report contains no information for inclusion in the Reference Information Base or the Site and Engineering Properties Database.

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