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DEC 31 1987

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HYDROLOGY DOCUMENT NUMBER 159

RESPONSE TO REQUESTS FOR COPIES OF THE NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS (NNWSI) DRAFT REFERENCE INFORMATION BASE (RIB) AND THE SITE AND ENGINEERING PROPERTIES DATA BASE (SEPDB) CATALOG

References: (1) Letter, Prestholt to Gertz, dtd. 10/14/87
(2) Letter, Prestholt to Sinnock, dtd. 10/14/87

Enclosed is the information in response to your request in reference letter 2 above. The document "Summary Report of the Current Contents and Capabilities of the NNWSI Technical Data Base," SLTR86-5012 (enclosed) gives a brief description of the SEPDB Catalog, the various types of products available from the SEPDB, and a listing of the products created to-date. The NNWSI Project wishes to emphasize the following Notice which appears throughout the enclosed document and indicates the status of the SEPDB information.

> "QA checks on data contained here have only been performed to determine that these data have been obtained and documented properly. The DOE cautions that any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly."

Relative to your request in reference letter 1 above, the NNWSI Project RIB is not yet ready for external release. Revision 03.001 of this document is currently in its final review process. Rather than transmit an earlier version, the project will transmit the current revision when its review process is complete. This will occur by February 1, 1988. It should be noted that once Revision 03.001 is released, there will be periodic changes to the document, and revisions will be issued as required.

Celebrating the U.S. Constitution Bicentennial — 1787-1987

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If you have any questions, please call Lester P. Skousen, 295-8929 at the Waste Management Project Office or David M. Dawson, 295-8657 at Science Applications International Corporation.

Carl P. Gertz, Project Manager
Waste Management Project Office

WMPO:LPS-778

Enclosure:
Summary Report of the Current
Contents and Capabilities of
the NNWSI Technical Data Base

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SLTR86-5012

Summary Report of the Current Contents and Capabilities of the NNWSI Technical Data Base

by

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INTRODUCTION AND SUMMARY

This document summarizes the current contents and capabilities of the Technical Data Base developed and maintained by the Geoscience Analysis Division of Sandia National Laboratories for the Nevada Nuclear Waste Storage Investigations (NNWSI) Project. The NNWSI Technical Data Base consists of two internal subdivisions: the Site and Engineering Properties Data Base and the Interactive Graphics Information System. The Site and Engineering Properties Data Base, or SEPDB, contains information describing properties of both the natural and engineered parts of the prospective nuclear waste repository at Yucca Mountain; this data is most easily thought of as "tabular" in form. The Interactive Graphics Information System, or IGIS, functions as a data base by storing information which is best represented in graphical form. The IGIS also possesses data manipulation abilities that allow it to function in a much broader sense as an analytical tool.

Included in this document are: (1) a brief description of both the SEPDB and the IGIS, (2) a description of the various types of products available from the SEPDB and from the IGIS, and (3) appendices containing example products from both systems and listings of products created to-date by each system.

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ENCLOSURE

SITE & ENGINEERING PROPERTIES DATA BASE

Description of the SEPDB

The Site & Engineering Properties Data Base historically has been maintained on a Cyber 855 mainframe computer using a data base management system known as System-2000. This collection of computerized data came to be known commonly as the Tuff Data Base, or TUFFDB.

System-2000 utilizes a hierarchical data structure, in which the data is represented according to a "tree-like" system. Essential "trunk" information forms the basis for the classification; subsidiary information can be thought of as residing on "branches" of the tree, each piece of which is related to the main "trunk" information. Additional supporting information related to the "branch" categories may be visualized as "leaves" (or at least as smaller-order "twigs"). A number of successive hierarchical levels are possible, however, the relationships become more and more complex in both internal and logical representation.

The TUFFDB portion of the Site & Engineering Properties Data Base contains some 40 record groups on 7 levels, collectively known as the data-base schema. Table 1 lists the schema that comprise the TUFFDB; Figure 1 illustrates the tree-like organization of the schema (the data-base "tree" is conventionally represented in a downward-expanding form). The TUFFDB is organized around samples obtained from drill holes.

The individual record groups contained within the schema comprise approximately 160 schema items; these are the "locations" within which data are entered. A collection of data entries for the same schema item is a record set. Record sets are identified by component numbers (C####) and title (Table 1). Examples are "Drill Hole Name" (record set C1), "Depth" (C84), "Measured Porosity" (C206), "Water Temperature" (C1004), and "Reference Number (C4004)." The data base also includes various types of auxiliary information on references, definitions of abbreviations, and units of measure for each value stored. There are approximately 84,000 individual data entries contained in the System-2000 data base.

Table 2 shows the number of data entries for specific drill holes at Yucca Mountain for the major record sets stored in the TUFF Data Base portion of the SEPDB. A brief description of the contents of each record group follows.

<u>Drill Hole Information (Schema Items C1-C10)</u> -- These records contain information on 194 drill holes (drilled or planned), including hole names, locations (as Nevada State plane coordinates), starting elevation (drilled holes only), survey status, survey location and survey date.

<u>Compressive Strength (Schema items C101-C115)</u> -- This record set contains information from 3 holes on Young's Modulus, Poisson's Ratio, strength,

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bulk modulus and P-wave velocity. These data are supported by information on the following test variables: drained or undrained state of the samples, temperature, confining pressure, pore pressure, strain rate, and displacement rate.

Hydraulic Conductivity (Schema items C131-C139) -- This record set contains information from 3 holes on reported hydraulic conductivity, and supporting information on the following test variables and calculations: driving pressure, confining pressure, effective pressure, flow-through fluid and residual saturation.

Bulk Properties (Schema items C201-C218) -- This record set contains information from 5 holes on natural state density, matrix dry bulk density, grain density, initial water content, calculated matrix porosity, measured porosity, saturated bulk density, saturation, P-wave velocity, lithophysal porosity and dry bulk density. These data are supported by information on the following test variables: mesh size and drying condition.

Tensile Strength (Schema items C301-C304) -- This record set contains information on tensile strength from 2 holes and supporting information about test displacement rate.

Thermal Conductivity (Schema items C401-C406) -- This record set contains information about thermal conductivity from 1 hole and includes supporting information on the following test variables: test temperature, confining pressure, pore pressure and test standards.

Sorption/Desorption (Schema items C601-C645) -- This record set contains information from 3 holes on sorption and desorption ratios for specific elements. These data are supported by information about the following test variables: concentration, particle size, test temperature, test atmosphere, tracer preparation, test duration, and initial and final pH.

Mineralogy (Schema items C701-C730) -- This record set contains information from 9 holes on mineralogy and mineral abundance including information on particle size.

Geologic Stratigraphy (Schema items C801-C807) -- This record set contains information from 5 holes including designators for brecciated or bedded zones, crystallized or altered zones, percent lithophysae, fault inclination, fault separation and thickness of each zone described.

Core Index (Schema items C901-C906) -- This record set contains information from 2 holes on core recovery, core loss, broken core, joints, core index interval and core index.

Water Chemistry (Schema items C1001-C1022) -- This record group contains information from 15 holes on water temperature, specific conductance (field and laboratory), sample pH (field and laboratory), delta deuterium, delta

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oxygen-18, delta carbon-13, modern carbon-14, tritium, calculated dissolved solids, dissolved solids-180°C, and individual species of dissolved constituents (Ca, Mg, Na, K, HCO_3 on-site, HCO_3 laboratory, Cl, SO_4, SiO_2, Li, Sr, and F). These data are supported by information on the following sampling variables: collection date, depth to water, and depth interval sampled.

Although the hierarchical organizational structure of the the System-2000-based TUFF Data Base has certain advantages for organizing particular types of information (such as drill-hole derived data), the expanding scope of the Site & Engineering Properties Data Base soon revealed certain limitations for dealing with diverse types of information. The rigid hierarchical structure originally developed for some data proved unsuitable for other data, and efforts to recast the new data into the old structure created additional problems. For an example, the "trunk" sample identification developed for core-sample data obtained at one fixed depth within a drill hole (schema item C84) is easily adapted to the "depth" (zero) of an outcrop sample relative to the northing, easting, and elevation (x, y, z; schema items C2, C3, and C4) of a drill-hole collar (or surface outcrop) location. However, adoption of the same schema item (drill-hole depth, C84) to the top and bottom of an interval from a hydrologic well test is not so obvious. Yet for lower order "branches" to exist in a hierarchical data base structure, the higher-order branch and trunk information must exist. In this case, the solution was to treat "depth" (C84) as the "depth-to-top-of-interval." A lower-order schema item ("interval sampled," C1003) was then added to contain the information of interest, a small distortion, but one representative of the problems encountered in merging various types of information into one rigid hierarchical structure.

The rigid structure of the hierarchical TUFF Data Base and the extreme difficulty of modifying this structure to reflect different types of relationships among data and between different types of data led to a decision to convert the Site & Engineering Properties Data Base to a more flexible relational data base system. The heart of a relational data base is a collection of tables. Some tables contain data; other tables contain relationships between data. Assuming that the data have been keyed properly, it is possible to add new relationships as well as to add new data.

The Technical Data Base staff at Sandia National Laboratories has begun the process of creating the new relational data base system for the Site & Engineering Properties Data Base during fiscal year 1987. The new system will utilize the data base management software package known as INGRES; the system will reside on a VAX 8200 minicomputer dedicated to Technical Data Base activities. Design of the relational data base system internal organization is currently in progress.

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The conversion from a hierarchical to a relational data base model comes at an opportune time for the NNWSI Project. Recent emphasis on Quality Assurance procedures require that all data residing in the TUFF Data Base be verified, authorized by the Technical Project Officer responsible for generating the data, and reentered into the system using QA Level I certified personnel and procedures. Sandia has recently implemented Department Operating Procedure 3-7, which specifies the activities necessary for operating a Quality Assurance Level I data base. All data, even that assigned lower quality assurance levels, will be treated with Level I procedures for purposes of the SEPDB. Accordingly, any data from the Site & Engineering Properties Data Base may be retrieved with the confidence necessary for using that data in license application to the Nuclear Regulatory Commission.

Products from the SEPDB

Retrieval of data from the Site & Engineering Properties Data Base is initiated in response to a request from a potential user of the data. A Work Request form, which may be obtained from Division 6315 at Sandia National Laboratories or which may be completed verbally by discussion with data base personnel over the telephone, specifies the specific needs of the requester. For data from the TUFFDB portion of the Site & Engineering Properties Data Base, data for particular schema items typically are retrieved for specific depth ranges in various drill holes. Appendix A contains a number of sample products that have been generated in the past, and which demonstrate common retrieval formats. Appendix C contains a listing of products generated to-date from data contained in the SEPDB (and the IGIS as well). Retrieval of data from the relational data base system currently being developed will be done using the same work request procedure once the new system is operational. The intent is to make the temporary subdivisions of the Site & Engineering Properties Data Base transparent to the end user of the information.

INTERACTIVE GRAPHICS INFORMATION SYSTEM

Description

The Interactive Graphics Information System (IGIS) consists of a dedicated VAX 11/750 minicomputer running Computer-Aided Design (CAD) software for the creation, storage, display, and manipulation of graphics objects. The software in use is oriented toward the application of three-dimensional CAD techniques to civil engineering problems, such as may be expressed on maps and cross sections. Specific software packages include DDM/DIMENSION III and Supertab. In addition to certain data-base functions, the IGIS possesses powerful analysis-type tools.

The IGIS portion of the Technical Data Base is used to store information that is more useful in graphical form than tabulated as a collection of

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"raw" numbers. For example, a map showing the location of civil land subdivisions (sections, townships, and ranges) can be represented by a collection of northing and easting values for each section corner. Such a tabulation is relatively useless to the average engineer, compared with a map displaying the section lines in relationship to one another and to other objects of interest (the location of the proposed repository Exploratory Shaft, for instance). A data-base program within one of several modeling subpackages is oriented toward storing and manipulating drill hole information efficiently for use in other analysis activities. Rather than simply reporting back input values for hole location, total depth, and so on, entry of information into the drill hole data base actually creates a three-dimensional representation or model of the drill hole that can be mapped to the surface location, projected to intersect subsurface contacts, attached to digital representations of geophysical logs, and otherwise manipulated as an item of geometry.

Interfaces between the graphics software and high-level programming languages such as FORTRAN allow such advanced analytical work as defining two- or three-dimensional finite-element grids, passing the grid locations to a complex computer code for modeling (for example) ground-water flow, passing the results back to the graphics software, and displaying the results of the calculations in graphic form.

Products of the IGIS

Many data-storage and analytical uses of the Interactive Graphics Information System are possible. Appendix B contains a number of examples of products that have been created in response to user requests. Appendix C contains a listing of products created to-date. As a general summary, products of the IGIS fall into three major categories.

1. Graphic displays of geometric design features and geographic boundaries. The civil land grid, the boundary of the "controlled area," the location of the Exploratory Shaft or drill hole USW G-1 are examples.

2. Geometric, three-dimensional representations of site-properties data. Examples include representations of the surface topography, the elevation of the contact between two stratigraphic units, the thickness of a particular unit in map view or in cross-sectional view, and the distribution of porosity in three dimensions.

3. Geometric, three-dimensional representations of performance assessment or design analysis results. An example is a map showing how ground-water travel time from the repository level to the water table varies in space.

As for the SEPDB, work requests are used to initiate use of the IGIS. However, because many of the IGIS products are "analytical" in nature, much more interaction occurs between the requester and the staff assigned to the work request.

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Table 1. Hierarchical Data Base Schema Organization for TUFFDB Portion of the Site & Engineering Properties Data Base (TUFFDB Definition No. 11)

C####	Record Set Title
1	HOLE-DS
2	Y-STATE-PLANE-COORDINATE
3	X-STATE-PLANE-COORDINATE
4	STARTING ELEVATION
5	SURVEY STATUS
6	SURVEY LOCATION
7	SURVEY DATE
8	ENTRY/MODIFY DATE
10	TEST CONDITIONS
51	TEST TYPE
52	SAMPLE LENGTH
53	L/D RATIO
54	SAMPLE HISTORY
55	SAMPLE STATE
56	NUMBER OF TESTS
57	QA VERIFY DATE
58	NUMBER CORRECTIONS
60	CONFIDENCE VALUE
61	SAMPLE ORIENTATION
70	TEST-COMMENT-DS
71	TEST-COMMENT
80	DEPTH-SAMPLE-DS
81	X-OFFSET
82	Y-OFFSET
83	TRUE-ELEVATION
84	DEPTH
85	SAMPLE NUMBER
86	LABORATORY ID
87	ELEVATION
100	COMPRESSIVE-STRENGTH-DS
101	YOUNG'S MODULUS
102	DELTA E
103	POISSON'S RATIO
104	DELTA MU
105	STRENGTH
106	DELTA STRENGTH
107	BULK MODULUS
108	P-WAVE VELOCITY
109	DRAINED/UNDRAINED
110	TEMPERATURE
111	CONFINING PRESSURE
112	PORE PRESSURE
113	STRAIN RATE
114	COMP-TEST DISP RATE
115	COMP-TEST-SAMPLE-NUM

Note: Indentation separates hierarchical levels of the TUFFDB

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Table 1, continued. Hierarchical TUFFDB Data Base Schema

C####	Record Set Title
116	EXPOSURE-COND DURATION
122	COMP-TEST-REF-DS
123	COMP-TEST-REF-PT
130	MATRIX-HYDRAULIC-CONDUCTIVITY-DS
131	REPORTED HYD-COND
132	LOWER HYD-COND
133	HIGHER HYD-COND
134	DRIVING PRESSURE
135	HYD-COND CONFINING PRESS
136	HYD-COND EFFECTIVE PRESS.
137	FLOWTHRU FLUID
138	HYD-COND SAMPLE NUMBER
139	RESIDUAL SATURATION
142	HYD-COND-REF-DS
143	HYD-COND-REF-PT
200	BULK-PROPERTIES-DS
201	NATURAL STATE DENSITY
202	MATRIX DRY BULK DENSITY
203	GRAIN DENSITY
204	INITIAL WATER CONTENT
205	CALC MATRIX POROSITY
206	MEASURED POROSITY
207	SATURATED BULK DENSITY
208	SATURATION
212	MESH SIZE
213	DRYING CONDITION
215	P WAVE VELOCITY
216	BULK-PROP-SAMPLE-NUM
217	LITHO POROSITY
218	SAMPLE DRY BULK DENSITY
222	BULK-PROP-REF-DS
223	BULK-PROP-REF-PT
300	TENSILE-STRENGTH-DS
301	TENSILE STRENGTH
302	DELTA TENSILE STRENGTH
303	TENSILE TEST DISP RATE
304	TENSILE TEST SAMPLE NUM
322	TENSILE-TEST-REF-DS
323	TENSILE-TEST-REF-PT
400	THERMAL-CONDUCTIVITY-DS
401	T-COND
402	T-COND TEST TEMPERATURE
403	T-COND TEST CONF PRESS
404	T-COND TEST PORE PRES
405	T-COND STANDARD
406	T-COND-TEST-SAMPLE-NUM
422	T-COND-TEST-REF-DS
423	T-COND-REF-PT
600	SORP/DESORP-VALUES-DS
601	ELEMENT
602	CONCENTRATION

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Table 1, continued. Hierarchical TUFFDB Data Base Schema

C####	Record Set Title
603	PARTICLE SIZE
604	SORP/DESORP-TEST TEMP
605	SORP/DESORP-TEST ATMOSPHERE
606	TRACER PREP
615	SORP/DESORP-RATIO-STRATIGRAPHY-DS
616	G1 DEPTH EQUIVALENT
617	AVE SORP RATIO
618	STDEV SORP RATIO
619	AVE DESORP RATIO
620	STDEV DESORP RATIO
624	SORP/DESORP-TEST-REF-DS
625	SORP/DESORP-TEST-REF-PT
630	SORP/DESORP-DS
631	SORP/DESORP
635	INDIVIDUAL-SORP/DESORP-RATIO-DS
636	SORP/DESORP RATIO
637	SORP/DESORP TIME
638	INITIAL SORP/DESORP PH
639	FINAL SORP/DESORP PH
645	SORP/DESORP-TEST-SAMPLE-NUM
646	IND-SORP/DESORP-TEST-REF-DS
647	IND-SORP/DESORP-REF-PT
700	MINERALOGY-DS
701	MINERAL
703	USWG1 DEPTH EQUIVALENT
725	INDIVIDUAL-MINERALOGY-DS
726	REPORTED MINERAL ABUNDANCE
727	LOWER BOUND MINERAL
728	UPPER BOUND MINERAL
729	MINERAL-SAMPLE-NUM
730	PARTICLE-SIZE
735	MINERAL-TEST-REF-DS
736	IND-MINERAL-REF-PT
800	GEOLOGIC-STRATIGRAPHY-DS
801	GEOLOGIC UNIT
802	THICKNESS
803	WELDED BRECCIA/BEDDED ZONES
804	CRYSTALLIZED/ALTERED ZONES
805	PERCENT LITHOPHYSAE
806	FAULT INCLINATION
807	FAULT SEPARATION
814	GEO-STRAT-REF-DS
815	GEO-STRAT-REF-PT
900	CORE-INDEX-DS
901	RECOVERY
902	CORE LOSS
903	BROKEN CORE
904	JOINTS
905	CORE INDEX INTERVAL
906	CORE INDEX
922	CORE-INDEX-REF-DS

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Table 1, continued. Hierarchical TUFFDB Data Base Schema

C####	Record Set Title
923	CORE-INDEX-REF-PT
1000	GROUNDWATER CHEMISTRY-DS
1001	SAMPLE COLLECTION DATE
1002	DEPTH TO WATER
1003	INTERVAL SAMPLED
1004	WATER TEMPERATURE
1005	SPECIFIC COND - FIELD
1006	SPECIFIC COND - LAB
1007	SAMPLE PH - FIELD
1008	SAMPLE PH - LAB
1009	DELTA DEUTERIUM
1010	DELTA OXYGEN-18
1011	DELTA CARBON-13
1012	MODERN CARBON-14 PERCENT
1013	CARBON-14 APPARENT AGE
1014	TRITIUM
1015	DISSOLVED SOLIDS-CALC
1016	DISSOLVED SOLIDS-180 DEG C
1020	WATER-SAMPLE-CHEMICAL-CONSTITUENTS
1021	DISSOLVED CONSTITUENT
1022	DISS-CONSTIT VALUE
1032	WATER-CHEMISTRY-REF-DS
1033	WATER-CHEMISTRY-REF-PT
4000	REFERENCES
4001	ACCESSION NUMBER
4002	AGENCY
4003	PUBLICATION STATUS
4004	REFERENCE NUMBER
4005	PUBLICATION DATE
4006	SORT-DATE
4008	QA PRC DOCKET NUMBER
4010	AUTHOR-DS
4011	AUTHOR
4012	TITLE-DS
4013	TITLE-LINE
4014	KEY-WORD-DS
4015	KEY-WORD
4020	GLOSSARY-DS
4021	ABBREVIATION
4022	DEFINITION
4026	GLOSSARY-KEYWORD-DS
4027	GLOSSARY-WORD
4030	UNITS-DS
4031	QUANTITY
4032	UNITS
4036	UNIT-KEYWORD-DS
4037	UNIT-KEYWORD

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Table 2. Current Number of Data Entries in TUFFDB Portion of the Site & Engineering Properties Data Base, Listed by Parameter and Drill Hole Identification

Parameter	Drill Holes				
	UE-25A#1	USW GU-3	USW G-4	USW G-1	USW H-1
C100 Compressive Strength					
Youngs Modulus	23	197	35		
Poissons Ratio	23	153	29		
Strength	54	212	35		
Bulk Modulus	9				
P-Wave Velocity	7				
C130 Hydraulic Conductivity					
Hydraulic Conductivity	41	69	54		
C200 Bulk Properties					
Natural State Density	65	231	46	15	66
Matrix Dry Bulk Density	102	240	46	228	66
Grain Density	103	240	46	233	48
Initial Water Content	65	240	46	215	66
Calc. Matrix Porosity	120	240	46	238	47
Measured Porosity		96	46		62
Saturated Bulk Density	102	240	46	228	47
Saturation	65	240	46	215	47
P-wave Velocity	61	92	46		
Lithophysal Velocity		9			
Sample Dry Bulk Density		9			19
C300 Tensile Strength					
Tensile Strength	30			13	
C400 Thermal Conductivity					
Thermal Conductivity				124	
C600 Sorption/Desorption					
Am	94	22	68		
Ba	135	112	154		
Ce	92	56	81		
Cs	135	114	154		
Eu	123	114	148		
I			6		
Mn		29			
Mo			3		
Na		30			
Np	48	6	6		
Pu	144	14	28		
Ru			6		
Sb			6		
Se		29			
Sn		29			
Sr	135	114	154		
Tc	60				
U	47		60		

Table 2 cont. Current Number of Data Entries in the TUFFDB

Parameter	Drill Holes									
	UE-25 A#1	USW GU-3	USW G-4	USW G-3	USW G-2	USW G-1	USW H-1	J-12	- J-13	UE-25 b#1
C701 Mineralogy										
Mineralogy	248	355		198	967	1491			74	304
C801 Geol. Strat.										
Geol. Strat.	60	4	96	35	188	125			48	
C906 Core Index										
Core Index	987					645				
C1000 Water Chemistry										
delta deuterium			1				2	1	1	3
delta oxygen-18			1				2	1	1	3
delta carbon-13			1				1	1	1	3
modern carbon-14			1				2	1	1	3
tritium							2	1	1	3
Sp.Conductance site			1				2	1	1	3
Sp.Conductance lab			1				2	1	1	3
Onsite pH			1				2	1	1	3
Laboratory pH			1				2	1	1	3
Water Temperature			1				2	1	1	3
Ca			1				2	1	1	3
Mg			1				2	1	1	3
Na			1				2	1	1	3
K			1				2	1	1	3
Bicarbonate, onsite			1					1	1	3
Bicarbonate, lab			1				2	1	1	3
Cl SO4			1				2	1	1	3
SiO2			1				2	1	1	3
Li			1				2	1	1	3
Sr			1				2	1	1	3
F			1				2	1	1	3
Diss. Solids Calc.			1				2	1	1	3
Diss. Solids			1				2	1	1	3

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Table 2 cont. Current Number of Data Entries in the TUFFDB

Parameter	UE-25 c#1	UE-25 c#2	UE-25 c#3	UE-25 p#1	UE-25 a#2	USW H-3	USW H-4	USW H-5	USW H-6	USW VH-1
C701 Mineralogy										
Mineralogy						51	27	76		
C801 Geol. Strat.										
Geol. Strat.							33	37	41	
C906 Core Index										
Core Index										
C1000 Water Chemistry										
delta deuterium	1	1	1	2	2	1	1	2	3	1
delta oxygen-18	1	1	1	2	2	1	1	2	3	1
delta carbon-13	1	1	1	2	2	1	1	2	3	1
modern carbon-14	1	1	1	2	2	1	1	2	3	1
tritium	1	1	1	2	2	1	1	2	3	1
Sp.Conductance site	1	1	1	2	2	1	1	2	3	3
Sp.Conductance lab	1	1	1	2	2	1	1	2	2	3
Onsite pH	1	1	1	2	2	1	1	2	3	3
Laboratory pH	1	1	1	2	2	1	1	2	3	3
Water Temperature	1	1	1	2	2	1	1	2	3	3
Ca	1	1	1	2	2	1	1	2	3	3
Mg	1	1	1	2	2	1	1	2	3	3
Na	1	1	1	2	2	1	1	2	3	3
K	1	1	1	2	2	1	1	2	3	3
Bicarbonate, site	1	1	1		2		1	2	3	3
Bicarbonate, lab	1	1	1	2	2	1	1	2	3	3
Cl SO4	1	1	1	2	2	1	1	2	3	3
SiO2	1	1	1	2	2	1	1	2	3	3
Sr	1	1	1	2	2	1	1	2	3	3
F	1	1	1	2	2	1	1	2	3	3
Diss. Solids Calc.	1	1	1	2	2	1	1	2	3	3
Diss. Solids	1	1	1	2	2	1	1	2	3	3

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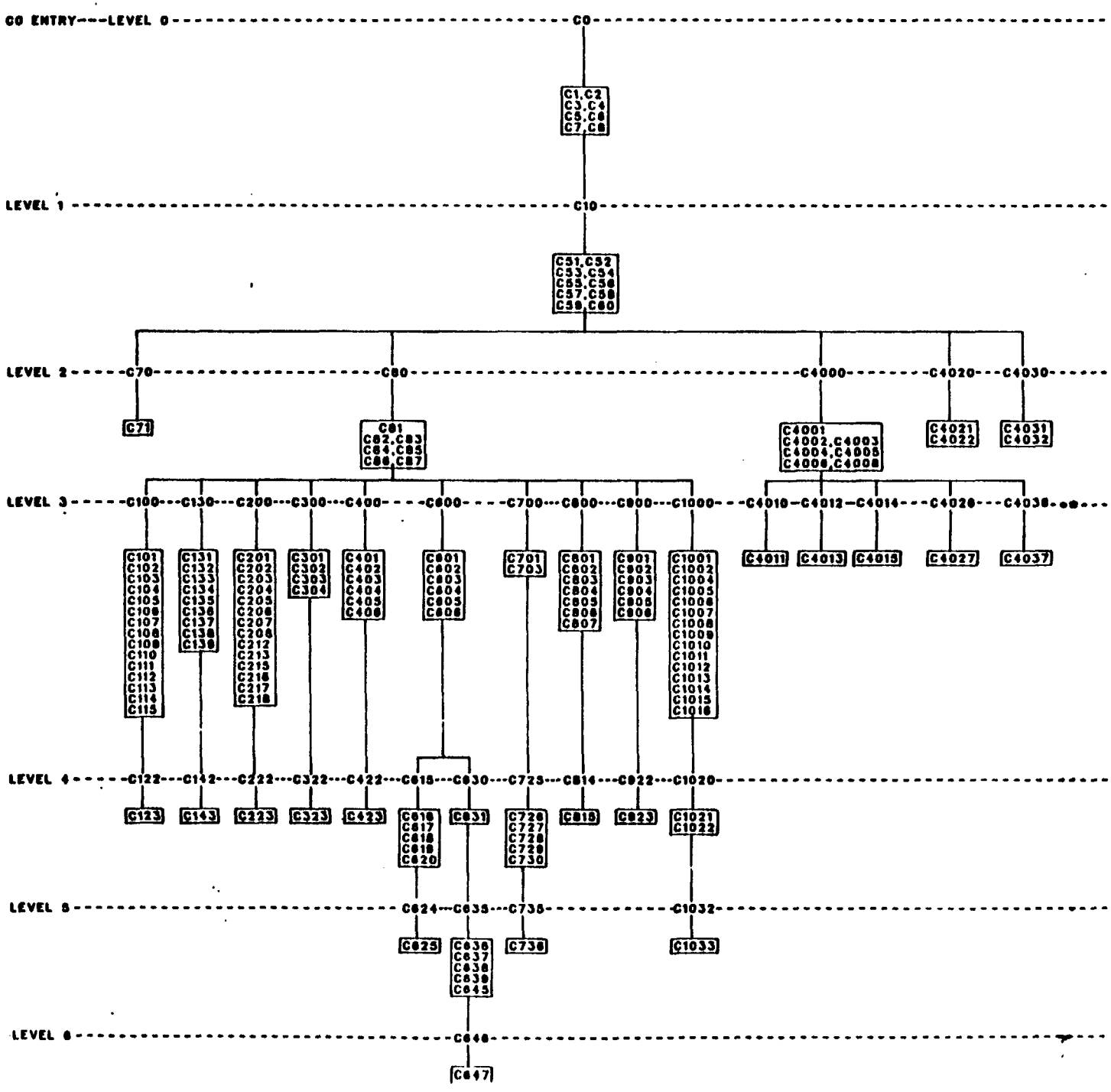
Figure 1. SEPDB Hierarchical Tree Structure



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APPENDIX A

EXAMPLE PRODUCTS FROM SEPDB

Example Product #1 Calculated Matrix Porosities for Drill Holes UE-25a#1, USW G-1, USW G-4, and USW GU-3, for Thermomechanical Unit TSw

Calculated matrix porosity and depth feet) data are listed for the requested depth ranges equivalent to thermomechanical unit TSw in each requested drill hole. Also included at the bottom of the data column for porosity are the mean, standard deviation, maximum and minimum values of the calculated matrix porosity for the TSw thermomechanical unit from these drill holes.

Example Product #2 Hydraulic Conductivity Test Results

This product tabulates hydraulic conductivities and test parameters from all holes where the data exist in the data base. Note that hydraulic conductivities can be stored in the data base as point-values or ranges; ranges are separated into upper and lower values, or only an upper value if it was originally reported as "less than" the given value. Only discrete values can be used in statistical calculations.

Example Product #3 Drill Hole Name and Location

This product tabulates the drill hole names, Nevada state plane coordinates and starting elevations for all drill holes named in the data base. Note that starting elevations are in feet above sea level, and are only available for drilled holes. The table headings have been modified in the retrieval command to allow a more readable format than the default retrieval.

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SEPDB EXAMPLE PRODUCT #1 - TSw Porosity

```
---
LI C1.C84.C205. OR C1.C84 WR ((C1 EQ UE-25A#1 AND (C84 GE 277.00  :
---
AND C84 LE 1317.00)) OR (C1 EQ USW G-1 AND (C84 GE 280.00 AND C84 LE  :
---
1342.00)) OR (C1 EQ USW G-4 AND (C84 GE 243.00 AND C84 LE 1345.00)) OR :
---
(C1 EQ USW GU-3 AND (C84 GE 430.00 AND C84 LE 1269.00))) AND C205 EXISTS:
```

HOLE-DS	DEPTH	POROSITY
* UE-25A#1	328.00	21.79
* UE-25A#1	360.00	33.33
* UE-25A#1	421.00	15.14
* UE-25A#1	524.00	17.41
* UE-25A#1	569.00	17.72
* UE-25A#1	623.00	18.29
* UE-25A#1	660.00	7.57
* UE-25A#1	680.25	10.20
* UE-25A#1	680.25	9.84
* UE-25A#1	681.35	10.32
* UE-25A#1	681.35	12.60
* UE-25A#1	696.85	11.90
* UE-25A#1	708.55	9.13
* UE-25A#1	708.55	8.00
* UE-25A#1	723.00	12.90
* UE-25A#1	730.60	9.06
* UE-25A#1	730.60	9.60
* UE-25A#1	733.00	11.42
* UE-25A#1	739.00	11.30
* UE-25A#1	772.00	13.23
* UE-25A#1	816.00	9.77
* UE-25A#1	866.00	8.56
* UE-25A#1	921.00	9.06
* UE-25A#1	969.00	9.06
* UE-25A#1	1010.00	11.51
* UE-25A#1	1040.00	11.07
* UE-25A#1	1090.00	11.67
* UE-25A#1	1090.00	11.02
* UE-25A#1	1091.60	24.90
* UE-25A#1	1101.10	12.20
* UE-25A#1	1101.10	7.39
* UE-25A#1	1101.85	10.55
* UE-25A#1	1106.30	8.98
* UE-25A#1	1106.30	10.62
* UE-25A#1	1112.00	8.70
* UE-25A#1	1183.00	8.17
* UE-25A#1	1249.00	8.27
* UE-25A#1	1253.00	9.41
* UE-25A#1	1266.00	12.90
* UE-25A#1	1283.55	2.16
* UE-25A#1	1283.80	1.28
* UE-25A#1	1304.00	6.36
* USW GU-3	435.20	17.19
* USW GU-3	435.80	22.87
* USW GU-3	452.50	19.61
* USW GU-3	461.10	18.06
* USW GU-3	475.80	16.60
* USW GU-3	490.40	20.16
* USW GU-3	492.20	17.32
* USW GU-3	519.80	16.00
* USW GU-3	542.70	20.48
* USW GU-3	543.60	18.97
* USW GU-3	552.30	14.06
* USW GU-3	561.00	12.43
* USW GU-3	574.00	17.27
* USW GU-3	586.50	20.63
* USW GU-3	600.10	21.43
* USW GU-3	600.30	17.86
* USW GU-3	610.30	14.46
* USW GU-3	631.10	12.35
* USW GU-3	652.00	16.86
* USW GU-3	660.30	17.44
* USW GU-3	669.40	15.14
* USW GU-3	670.40	18.43
* USW GU-3	693.70	11.65
* USW GU-3	712.40	7.57
* USW GU-3	713.18	9.09
* USW GU-3	753.00	11.95
* USW GU-3	753.40	12.00
* USW GU-3	765.00	13.20
* USW GU-3	770.00	13.94
* USW GU-3	795.00	10.36
* USW GU-3	825.60	6.75
* USW GU-3	826.30	6.43
* USW GU-3	837.30	10.16
* USW GU-3	841.00	8.70
* USW GU-3	857.10	12.26
* USW GU-3	873.60	14.62
* USW GU-3	884.10	10.00
* USW GU-3	921.50	15.18
* USW GU-3	923.70	15.08
* USW GU-3	925.00	11.07
* USW GU-3	938.40	18.08
* USW GU-3	953.80	14.62
* USW GU-3	957.70	10.59
* USW GU-3	986.60	16.54
* USW GU-3	1023.60	12.20
* USW GU-3	1055.80	9.65
* USW GU-3	1069.30	11.58
* USW GU-3	1069.80	12.16
* USW GU-3	1084.80	11.49
* USW GU-3	1104.40	9.34
* USW GU-3	1108.90	8.20
* USW GU-3	1124.40	10.77
* USW GU-3	1131.10	10.42
* USW GU-3	1149.20	10.59
* USW GU-3	1152.30	7.87
* USW GU-3	1165.90	8.56
* USW GU-3	1194.90	1.70
* USW GU-3	1196.00	3.33
* USW GU-3	1213.20	0.85
* USW GU-3	1214.10	3.80
* USW GU-3	1234.40	2.53
* USW GU-3	1247.00	2.11
* USW GU-3	1247.60	2.53
* USW GU-3	1261.80	2.93
* USW G-1	751.80	17.93
* USW G-1	795.00	10.71
* USW G-1	810.00	9.56
* USW G-1	810.00	10.36
* USW G-1	890.30	11.42
* USW G-1	939.00	15.83
* USW G-1	939.00	12.35
* USW G-1	959.40	11.90
* USW G-1	1017.60	13.39
* USW G-1	1047.10	11.37
* USW G-1	1100.10	14.57
* USW G-1	1151.10	15.63
* USW G-1	1210.70	11.42
* USW G-1	1245.00	9.69
* USW G-1	1288.40	3.73
* USW G-1	1330.00	2.94
* USW G-1	1330.00	3.36
* USW G-1	1330.00	3.77
* USW G-1	1332.80	3.73
* USW G-4	280.40	13.23
* USW G-4	332.30	15.63
* USW G-4	390.30	12.99
* USW G-4	548.60	20.32
* USW G-4	602.60	16.93
* USW G-4	668.60	11.86
* USW G-4	742.30	7.60
* USW G-4	821.20	11.46
* USW G-4	875.30	9.69
* USW G-4	937.60	10.94
* USW G-4	1064.30	14.12
* USW G-4	1239.20	9.65

```
---
PR AVG C205.SIGMA C205.MIN C205.MAX C205 WR SAME:
AVG 205* 11.681
SIG 205* 4.870
MIN 205*  0.85
MAX 205* 24.90
---
```

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SEPDB EXAMPLE PRODUCT - 2 HYDRAULIC CONDUCTIVITY

```
---
LIST/TITLE L(8)=HOLE,L(8)=DEPTH,L(20)HYDRAULIC=CONDUCTIVITY,L(10)LOWER=BTD COND
---
,L(10)UPPER=BTD COND,L(5)DRIVE=PRESS,L(7)COMP=PRESS,:
---
L(3)SAMP=RUN,L(7)RESIDUAL=SATURATION/C1,C84,C131,C132,C133,C134,:
---
C133,C138,C139,OR C1,C84 OR C143 EXISTS;
```

HOLE	DEPTH	HYDRAULIC CONDUCTIVITY	LOWER BTD COND	UPPER BTD COND	DRIVE PRESS	COMP PRESS	SAMP RUN	RESIDUAL SATURATION
***								
* UE-25A#1	58.00	1.90E-10	1.900E-10	1.900E-10	0.34	0.69	01	
* UE-25A#1	102.00	2.96E-09	2.960E-09	2.960E-09	0.34	0.69	01	
* UE-25A#1	133.00	2.63E-9 TO 3.52E-9	2.630E-09	3.520E-09	0.34	0.69	02	
* UE-25A#1	133.00	2.54E-09 TO 3.62E-09	2.540E-09	3.620E-09	0.34	0.69	01	
* UE-25A#1	187.00	5.1E-08	5.100E-08	5.100E-08	0.34	0.69	01	
* UE-25A#1	202.00	1.42E-09	1.420E-09	1.420E-09	0.34	0.69	01	
* UE-25A#1	326.00	2.6E-08 TO 5.4E-08	2.600E-08	5.400E-08	0.34	0.69	01	
* UE-25A#1	421.00	1.60E-09 TO 1.95E-09	1.600E-09	1.950E-09	0.34	0.69	01	
* UE-25A#1	671.00	1.1E-08 TO 1.5E-08	1.100E-08	1.500E-08	0.34	0.69	01	
* UE-25A#1	526.00	5.E-7 TO 6.E-7	5.000E-07	6.000E-07	0.34	0.69	01	
* UE-25A#1	600.00	3.7E-09 TO 5.6E-09	3.700E-09	5.600E-09	0.34	0.69	01	
* UE-25A#1	733.00	1.25E-09 TO 3.45E-09	1.250E-09	3.450E-09	0.34	0.69	01	
* UE-25A#1	772.00	5.2E-08 TO 1.0E-07	5.200E-08	1.000E-07	0.34	0.69	01	
* UE-25A#1	816.00	8.16E-10	8.160E-10	8.160E-10	0.34	0.69	01	
* UE-25A#1	866.00	1.70E-09	1.700E-09	1.700E-09	0.34	0.69	01	
* UE-25A#1	921.00	1.17E-09	1.170E-09	1.170E-09	0.34	0.69	01	
* UE-25A#1	1010.00	1.35E-09	1.350E-09	1.350E-09	0.34	0.69	01	
* UE-25A#1	1040.00	1.4E-08 TO 1.4E-08	1.400E-08	1.400E-08	0.34	0.69	01	
* UE-25A#1	1112.00	2.53E-09 TO 3.90E-09	2.530E-09	3.900E-09	0.34	0.69	01	
* UE-25A#1	1183.00	3.4E-09 TO 1.3E-08	3.400E-09	1.300E-08	0.34	0.69	01	
* UE-25A#1	1249.00	3.0E-09	3.000E-09	3.000E-09	0.34	0.69	01	
* UE-25A#1	1266.00	2.7E-08 TO 2.8E-07	2.700E-08	2.800E-07	0.34	0.69	01	
* UE-25A#1	1304.00	3.65E-09 TO 8.3E-09	3.650E-09	8.300E-09	0.34	0.69	01	
* UE-25A#1	1361.00	4.1E-08 TO 5.3E-08	4.100E-08	5.300E-08	0.34	0.69	01	
* UE-25A#1	1516.00	1.3E-08 TO 1.8E-08	1.300E-08	1.800E-08	0.34	0.69	01	
* UE-25A#1	1568.00	2.E-07	2.000E-07	2.000E-07	0.34	0.69	01	
* UE-25A#1	1630.00	4.E-07	4.000E-07	4.000E-07	0.34	0.69	01	
* UE-25A#1	1741.00	5.3E-08	5.300E-08	5.300E-08	0.34	0.69	01	
* UE-25A#1	1791.00	4.61E-09	4.610E-09	4.610E-09	0.34	0.69	01	
* UE-25A#1	1842.00	6.3E-08	6.300E-08	6.300E-08	0.34	0.69	01	
* UE-25A#1	1888.00	2.E-06 TO 2.E-06	2.000E-06	2.000E-06	0.34	0.69	01	
* UE-25A#1	1942.00	7.E-08 TO 8.E-08	7.000E-08	8.000E-08	0.34	0.69	01	
* UE-25A#1	1988.00	1.E-07 TO 2.E-07	1.000E-07	2.000E-07	0.34	0.69	01	
* UE-25A#1	2032.00	2.9E-08 TO 6.2E-08	2.900E-08	6.200E-08	0.34	0.69	01	
* UE-25A#1	2078.00	5.E-08 TO 1.E-07	5.000E-08	1.000E-07	0.34	0.69	01	
* UE-25A#1	2108.00	3.E-07 TO 3.E-07	3.000E-07	3.000E-07	0.34	0.69	01	
* UE-25A#1	2159.00	1.E-07 TO 1.E-07	1.000E-07	1.000E-07	0.34	0.69	01	
* UE-25A#1	2201.00	1.E-06 TO 1.E-06	1.000E-06	1.000E-06	0.34	0.69	01	
* UE-25A#1	2377.00	2.E-06 TO 2.E-06	2.000E-06	2.000E-06	0.34	0.69	01	
* UE-25A#1	2440.00	2.E-07 TO 2.E-07	2.000E-07	2.000E-07	0.34	0.69	01	
* UE-25A#1	2493.00	5.E-07 TO 5.E-07	5.000E-07	5.000E-07	0.34	0.69	01	
* USW GU-3	82.00			1.300E-10	0.30		01	0.0535
* USW GU-3	121.00	7.00E-11	7.000E-11	7.000E-11	0.30		01	0.0139
* USW GU-3	121.00	2.24E-08	2.240E-08	2.240E-08	1.62	10.00	09	0.0139
* USW GU-3	121.00	2.14E-08	2.140E-08	2.140E-08	1.72	20.00	08	0.0139
* USW GU-3	121.00	2.14E-08	2.140E-08	2.140E-08	1.76	40.00	07	0.0139
* USW GU-3	121.00	2.04E-08	2.040E-08	2.040E-08	1.80	70.00	06	0.0139
* USW GU-3	121.00	2.04E-08	2.040E-08	2.040E-08	1.63	96.00	05	0.0139
* USW GU-3	121.00	2.35E-08	2.350E-08	2.350E-08	1.61	70.00	04	0.0139
* USW GU-3	121.00	2.45E-08	2.450E-08	2.450E-08	1.50	40.00	03	0.0139
* USW GU-3	121.00	2.73E-08	2.730E-08	2.730E-08	1.35	20.00	02	0.0139
* USW GU-3	121.00	3.16E-08	3.160E-08	3.160E-08	1.19	10.00	01	0.0139
* USW GU-3	155.00	2.86E-08	2.860E-08	2.860E-08	0.90	20.00	19	0.1600
* USW GU-3	155.00	2.35E-08	2.350E-08	2.350E-08	1.08	30.00	18	0.1600
* USW GU-3	155.00	2.04E-08	2.040E-08	2.040E-08	1.24	40.00	17	0.1600
* USW GU-3	155.00	3.35E-08	3.350E-08	3.350E-08	1.42	40.00	16	0.1600
* USW GU-3	155.00	3.47E-08	3.470E-08	3.470E-08	1.01	30.00	15	0.1600
* USW GU-3	155.00	2.65E-08	2.650E-08	2.650E-08	1.04	30.00	20	0.1600
* USW GU-3	155.00	6.73E-08	6.730E-08	6.730E-08	0.83	10.00	13	0.1600
* USW GU-3	155.00	3.57E-08	3.570E-08	3.570E-08	1.54	30.00	14	0.1600
* USW GU-3	155.00	1.22E-08	1.220E-08	1.220E-08	2.01	50.00	31	0.1600
* USW GU-3	155.00	2.66E-10	2.660E-10	2.660E-10	0.30		01	0.1600
* USW GU-3	155.00	1.02E-08	1.020E-08	1.020E-08	1.48	50.00	23	0.1600
* USW GU-3	155.00	1.43E-08	1.430E-08	1.430E-08	1.24	30.00	24	0.1600
* USW GU-3	155.00	1.02E-09	1.020E-09	1.020E-09	3.67	60.00	32	0.1600
* USW GU-3	155.00	5.10E-09	5.100E-09	5.100E-09	0.15	60.00	33	0.1600
* USW GU-3	155.00	9.18E-09	9.180E-09	9.180E-09	0.82	50.00	30	0.1600
* USW GU-3	155.00	1.12E-08	1.120E-08	1.120E-08	1.39	50.00	29	0.1600
* USW GU-3	155.00	2.04E-08	2.040E-08	2.040E-08	0.77	30.00	28	0.1600
* USW GU-3	155.00	3.37E-08	3.370E-08	3.370E-07	0.43	10.00	27	0.1600
* USW GU-3	155.00	4.49E-08	4.490E-08	4.490E-08	0.77	30.00	26	0.1600
* USW GU-3	155.00	1.12E-08	1.120E-08	1.120E-08	1.66	50.00	22	0.1600
* USW GU-3	155.00	4.03E-07	4.030E-07	4.030E-07	1.39	30.00	11	0.1600
* USW GU-3	155.00	4.18E-08	4.180E-08	4.180E-08	1.32	30.00	10	0.1600
* USW GU-3	155.00	4.49E-08	4.490E-08	4.490E-08	1.63	30.00	09	0.1600
* USW GU-3	155.00	5.10E-08	5.100E-08	5.100E-08	2.66	30.00	08	0.1600
* USW GU-3	155.00	1.00E-07	1.000E-07	1.000E-07	1.29	20.00	07	0.1600
* USW GU-3	155.00	1.58E-07	1.580E-07	1.580E-07	1.37	10.00	06	0.1600
* USW GU-3	155.00	1.63E-07	1.630E-07	1.630E-07	0.70	10.00	05	0.1600
* USW GU-3	155.00	1.22E-07	1.220E-07	1.220E-07	1.06	20.00	04	0.1600
* USW GU-3	155.00	5.51E-08	5.510E-08	5.510E-08	1.67	20.00	03	0.1600
* USW GU-3	155.00	3.40E-07	3.400E-07	3.400E-07	0.72	10.00	02	0.1600
* USW GU-3	155.00	3.92E-07	3.920E-07	3.920E-07	0.89	10.00	01	0.1600
* USW GU-3	155.00	2.86E-08	2.860E-08	2.860E-08	0.55	30.00	25	0.1600
* USW GU-3	155.00	4.69E-08	4.690E-08	4.690E-08	1.19	20.00	12	0.1600
* USW GU-3	257.00	4.83E-07	4.830E-07	4.830E-07	0.30		01	0.0200
* USW GU-3	316.00			1.500E-10	0.30		01	0.0180
* USW GU-3	376.00	1.63E-04	1.630E-04	1.630E-04	0.30		01	0.0835
* USW GU-3	378.00	3.00E-05	3.000E-05	3.000E-05	0.30		01	0.1001
* USW GU-3	397.00	3.32E-05	3.320E-05	3.320E-05	0.30		01	0.1145

SEPDB EXAMPLE PRODUCT - 2 HYDRAULIC CONDUCTIVITY (Cont.)

HOLE	DEPTH	HYDRAULIC CONDUCTIVITY	LOWER STD COND	UPPER STD COND	DRIVE PRESS	COND PRESS	SAMP NUM	RESIDUAL SATURATION
* USW G4-3	1132.00			1.500E-10	0.30		01	0.0075
* USW G4-3	1197.00	1.460E-09	1.460E-09	1.460E-09	0.30		01	0.3737
* USW G4-3	1266.00	1.520E-10	1.520E-10	1.520E-10	0.30		01	0.0806
* USW G4-3	1311.00	3.150E-07	3.150E-07	3.150E-07	0.30		01	0.0497
* USW G4-3	1331.00	2.920E-05	2.920E-05	2.920E-05	0.30		01	0.0479
* USW G4-3	1640.00	2.680E-05	2.680E-05	2.680E-05	0.30		01	0.0405
* USW G4-3	1499.00	6.880E-07	6.880E-07	6.880E-07	0.27	60.00	09	0.0200
* USW G4-3	1499.00	2.570E-06	2.570E-06	2.570E-06	0.30		01	0.0200
* USW G4-3	1499.00	6.120E-07	6.120E-07	6.120E-07	0.16	20.00	12	0.0200
* USW G4-3	1499.00	5.100E-07	5.100E-07	5.100E-07	0.20	20.00	11	0.0200
* USW G4-3	1499.00	6.080E-07	6.080E-07	6.080E-07	0.26	40.00	10	0.0200
* USW G4-3	1499.00	2.060E-05	2.060E-05	2.060E-05	0.02	10.00	01	0.0200
* USW G4-3	1499.00	3.060E-07	3.060E-07	3.060E-07	0.28	80.00	08	0.0200
* USW G4-3	1499.00	3.060E-07	3.060E-07	3.060E-07	0.28	100.00	07	0.0200
* USW G4-3	1499.00	1.020E-06	1.020E-06	1.020E-06	0.50	80.00	06	0.0200
* USW G4-3	1499.00	2.140E-06	2.140E-06	2.140E-06	0.23	60.00	05	0.0200
* USW G4-3	1499.00	6.530E-06	6.530E-06	6.530E-06	0.08	40.00	04	0.0200
* USW G4-3	1499.00	1.000E-05	1.000E-05	1.000E-05	0.04	30.00	03	0.0200
* USW G4-3	1499.00	2.000E-05	2.000E-05	2.000E-05	0.03	20.00	02	0.0200
* USW G4-3	1553.00	7.900E-06	7.900E-06	7.900E-06	0.30		01	0.1892
* USW G4-3	1628.00	6.920E-07	6.920E-07	6.920E-07	0.30		01	0.0180
* USW G4-3	1680.00	1.280E-07	1.280E-07	1.280E-07	0.30		01	0.0665
* USW G4-3	1730.00	1.180E-07	1.180E-07	1.180E-07	0.30		01	0.1239
* USW G-4	63.00	9.680E-10	9.680E-10	9.680E-10	0.20		01	0.0020
* USW G-4	124.00	2.630E-09	2.630E-09	2.630E-09	0.20		01	0.0411
* USW G-4	124.00	2.860E-10	2.860E-10	2.860E-10	0.20		02	0.0444
* USW G-4	209.00	2.350E-04	2.350E-04	2.350E-04	0.20		01	0.1053
* USW G-4	247.00	8.600E-11	8.600E-11	8.600E-11	0.20		01	0.0007
* USW G-4	864.00	3.900E-09	3.900E-09	3.900E-09	0.20		01	0.0438
* USW G-4	864.00	2.170E-09	2.170E-09	2.170E-09	0.30		04	0.0442
* USW G-4	864.00	1.970E-09	1.970E-09	1.970E-09	0.20		03	0.0442
* USW G-4	864.00	1.310E-09	1.310E-09	1.310E-09	0.20		02	0.0442
* USW G-4	864.00	2.170E-09	2.170E-09	2.170E-09	0.20		01	0.0442
* USW G-4	1158.00	1.860E-09	1.860E-09	1.860E-09	0.20		01	0.0801
* USW G-4	1215.00	3.770E-10	3.770E-10	3.770E-10	0.20		01	0.1199
* USW G-4	1215.00	7.110E-10	7.110E-10	7.110E-10	0.20		02	0.1199
* USW G-4	1215.00	9.190E-10	9.190E-10	9.190E-10	0.20		03	0.1199
* USW G-4	1256.00			1.310E-09	0.20		01	0.0704
* USW G-4	1270.00	8.500E-10	8.500E-10	8.500E-10	0.20		01	0.1198
* USW G-4	1270.00	1.340E-10	1.340E-10	1.340E-10	0.20		02	0.1198
* USW G-4	1270.00	1.680E-09	1.680E-09	1.680E-09	0.20		03	0.1198
* USW G-4	1299.00	4.470E-08	4.470E-08	4.470E-08	0.20		01	0.0517
* USW G-4	1326.00	3.020E-10	3.020E-10	3.020E-10	0.20		01	0.0026
* USW G-4	1359.00	3.250E-09	3.250E-09	3.250E-09	0.20		01	0.1638
* USW G-4	1359.00	1.990E-09	1.990E-09	1.990E-09	0.20		02	0.1638
* USW G-4	1359.00	8.030E-09	8.030E-09	8.030E-09	0.20		03	0.1638
* USW G-4	1403.00	2.990E-10	2.990E-10	2.990E-10	0.20		01	0.0100
* USW G-4	1548.00			1.310E-09	0.20		01	0.1095
* USW G-4	1548.00	5.900E-10	5.900E-10	5.900E-10	0.20		02	0.1095
* USW G-4	1548.00	1.970E-09	1.970E-09	1.970E-09	0.20		03	0.1095
* USW G-4	1548.00	2.370E-12	2.370E-12	2.370E-12	0.30		04	0.1095
* USW G-4	1551.00	1.330E-09	1.330E-09	1.330E-09	0.20		03	0.2017
* USW G-4	1551.00	1.880E-09	1.880E-09	1.880E-09	0.20		02	0.2017
* USW G-4	1551.00	5.060E-09	5.060E-09	5.060E-09	0.20		01	0.2017
* USW G-4	1686.00	4.260E-10	4.260E-10	4.260E-10	0.20		01	0.0980
* USW G-4	1728.00	1.860E-09	1.860E-09	1.860E-09	0.20		01	0.1530
* USW G-4	1728.00	2.650E-09	2.650E-09	2.650E-09	0.20		02	0.1530
* USW G-4	1728.00	1.970E-09	1.970E-09	1.970E-09	0.20		03	0.1530
* USW G-4	1728.00	4.690E-12	4.690E-12	4.690E-12	0.30		04	0.1500
* USW G-4	1737.00	1.590E-10	1.590E-10	1.590E-10	0.30		04	0.1800
* USW G-4	1737.00	2.680E-09	2.680E-09	2.680E-09	0.20		03	0.1800
* USW G-4	1737.00	4.590E-11	4.590E-11	4.590E-11	0.20		02	0.1800
* USW G-4	1737.00			1.310E-09	0.20		01	0.1000
* USW G-4	1769.00	2.300E-10	2.300E-10	2.300E-10	0.20		01	0.2154
* USW G-4	1778.00	6.670E-10	6.670E-10	6.670E-10	0.20		01	0.1330
* USW G-4	1778.00	6.890E-10	6.890E-10	6.890E-10	0.20		01	0.1939
* USW G-4	1778.00	1.830E-09	1.890E-09	1.890E-09	0.20		02	0.1939
* USW G-4	1778.00	2.250E-09	2.250E-09	2.250E-09	0.20		03	0.1939
* USW G-4	1787.00	1.680E-10	1.680E-10	1.680E-10	0.30		04	0.0370
* USW G-4	1787.00	1.360E-08	1.360E-08	1.360E-08	0.20		03	0.0376
* USW G-4	1787.00	1.970E-09	1.970E-09	1.970E-09	0.20		02	0.0370
* USW G-4	1787.00	1.610E-08	1.610E-08	1.610E-08	0.20		01	0.0370
* USW G-4	1899.00	2.360E-07	2.360E-07	2.360E-07	0.20		01	0.0658
* USW G-4	1899.00	1.380E-06	1.380E-06	1.380E-06	0.20		02	0.0658
* USW G-4	1899.00	1.580E-07	1.580E-07	1.580E-07	0.20		03	0.0658
* USW G-4	1899.00	4.460E-07	4.470E-07	4.470E-07	0.30		04	0.0658
* USW G-4	2006.00	2.030E-09	2.030E-09	2.030E-09	0.20		01	0.1346
* USW G-4	2101.00	4.360E-08	4.360E-08	4.360E-08	0.20		01	0.3217
* USW G-4	2401.00	2.310E-07	2.310E-07	2.310E-07	0.20		01	0.0608
* USW G-4	2407.00	6.260E-07	6.260E-07	6.260E-07	0.20		01	0.0559

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86/07/31. 14.17.34. 500 SYSTEM 2000 RELEASE 32KR30

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SEPDB EXAMPLE PRODUCT - 3
DRILL HOLE LOCATIONS

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LIST/REPEAT SUPPRESS TITLE L(15)+HOLE,L(12)   NEVADA+STATE PLANE+X-COORDINATE,
L(12)   NEVADA+STATE PLANE+Y-COORDINATE,L(10)STARTING+ELEVATION/
C1,C2,C3,C4,OB C1 WH C1 EXISTS:
```

HOLE	NEVADA STATE PLANE X-COORDINATE	NEVADA STATE PLANE Y-COORDINATE	STARTING ELEVATION
J-11	740968.21	611764.17	3445.00
J-12	733508.20	581011.70	3129.80
J-13	749209.32	579650.59	3317.70
PS CAROLYN	752689.10	558514.00	4856.70
PS SANDY	771853.90	558845.80	4862.70
TEST PIT#3	764850.00	570940.00	3640.60
TEST PIT#6	759308.00	570698.00	3641.10
UE25 G-5	773131.00	568384.00	3983.70
UE25 PH-1A	756200.00	571200.00	3655.80
UE25 PH-1B	755000.00	570600.00	3653.20
UE25 P#1	756171.20	571484.52	3654.63
UE25 R.F.#1	762189.70	570889.90	3688.50
UE25 R.F.#10	765307.70	570229.90	3672.20
UE25 R.F.#11	765621.50	570434.60	3668.60
UE25 R.F.#2	758800.00	570334.80	3656.80
UE25 R.F.#3	765575.10	571100.00	3657.70
UE25 R.F.#3B	765695.30	571065.60	3661.10
UE25 R.F.#4	762090.80	572063.20	3636.80
UE25 R.F.#5	759198.70	568097.70	3813.70
UE25 R.F.#6	759200.00	570835.00	3633.30
UE25 R.F.#7	768804.00	571170.90	3756.10
UE25 R.F.#7A	768767.80	570268.80	3755.90
UE25 R.F.#8	765630.80	568789.90	3787.90
UE25 R.F.#9	765945.00	570643.30	3674.40
UE25 UZ4	768715.60	566139.30	3938.50
UE25 UZ5	768591.00	566135.20	3951.60
UE25 UZ-NC1	764670.60	566158.90	3928.50
UE25 UZ-NC2	764668.40	566157.50	3928.40
UE25 UZ-N1	769328.90	565224.30	3995.10
UE25 UZ-N10	769868.60	564744.10	4038.30
UE25 UZ-N12	768650.90	566695.20	3906.80
UE25 UZ-N13	768024.60	568255.10	3821.30
UE25 UZ-N14	767967.20	568232.90	3823.90
UE25 UZ-N18	766472.40	565246.50	4018.50
UE25 UZ-N19	763688.90	564570.60	4024.90
UE25 UZ-N2	768605.50	566113.60	3947.20
UE25 UZ-N20	763759.90	564579.30	4027.20
UE25 UZ-N21	763806.10	564591.00	4027.50
UE25 UZ-N22	763880.30	564604.50	4028.80
UE25 UZ-N23	763973.10	564545.40	4043.10
UE25 UZ-N28	763091.20	565319.70	3958.10
UE25 UZ-N29	762613.10	565173.30	3972.90
UE25 UZ-N3	768630.40	566119.40	3940.80
UE25 UZ-N30	762047.60	565232.80	3958.80
UE25 UZ-N4	768663.40	566127.10	3942.40
UE25 UZ-N5	768689.40	566133.80	3942.90
UE25 UZ-N56	760393.50	565480.00	3959.80
UE25 UZ-N6	768705.60	566136.60	3938.00
UE25 UZ-N60	759756.90	566567.00	3892.10
UE25 UZ-N7	768724.10	566141.20	3938.80
UE25 UZ-N8	768743.00	566146.50	3938.90
UE25 UZ-N85	750715.80	577567.80	3337.10
UE25 UZ-N9	768781.50	566155.90	3941.20

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SEPDB EXAMPLE PRODUCT - 3

DRILL HOLE LOCATIONS (Cont.)

UE25 UZ-N97	763093.80	565320.60	3958.10
UE25 W.T.#12	739725.90	567011.00	3526.60
UE25 W.T.#13	756715.00	578756.70	3386.00
UE25 W.T.#14	761650.60	575210.10	3529.90
UE25 W.T.#15	766116.60	579805.70	3552.50
UE25 W.T.#16	774419.66	570394.88	3971.40
UE25 W.T.#17	748419.60	566211.90	3688.50
UE25 W.T.#18	771167.10	564855.00	4383.00
UE25 W.T.#19	747978.00	589973.00	3335.50
UE25 W.T.#20	728303.00	565143.00	3146.00
UE25 W.T.#3	745995.09	573384.41	3379.52
UE25 W.T.#4	768511.75	568040.15	3829.10
UE25 W.T.#5	761826.00	574249.70	3559.00
UE25 W.T.#6	780575.80	564523.90	4306.90
UE25A#1	764900.15	566349.98	3934.40
UE25A#2	769200.00	606670.00	
UE25A#3	769321.10	602938.80	4545.80
UE25A#4	767971.92	564471.64	4100.70
UE25A#5	766956.36	564755.11	4056.50
UE25A#6	765899.48	564500.73	4052.90
UE25A#7	766249.86	565468.51	4004.60
UE25B#1(H)	765243.37	566416.39	3939.00
UE25B#2(H)	764986.00	566585.00	3925.30
UE25C#1	757095.85	569680.44	3708.70
UE25C#2	756848.80	569633.80	3714.10
UE25C#3	756909.90	569554.90	3714.20
UE29 UZ-N91	797275.00	585340.90	3946.90
UE29 UZ-N92	778009.50	583558.50	3669.20
UE29A#1	797729.01	585574.86	3986.70
UE29A#2	797744.95	585546.92	3987.40
UE-25H#1	748353.08	574461.38	3409.38
U25 T.C.1-1	756778.00	613450.10	3789.90
U25 T.C.1-2	756775.80	613451.70	3789.80
U25 T.C.1-3	756781.80	613435.40	3789.70
U25 T.C.1-4	756783.10	613437.60	3789.70
U25 T.C.-1	756482.70	612896.70	3753.60
U25 T.C.-2	756485.10	612898.20	3753.60
U25 T.C.-3	756806.00	613079.10	3762.90
U25 T.C.-4	756860.00	613094.60	3764.30
U-25 SH#20	747172.50	593171.20	3357.00
U-25 SH#21	746904.20	569427.40	3526.10
U-25 SH#22	718334.30	581267.80	2948.60
U-25 SH#23	741125.80	580246.10	3215.30
U-25 SH#24	769056.80	580906.90	3554.80
U-26 SH#1	746150.30	629834.40	3848.40
U-29 SH#1	791868.40	585139.50	3878.00
U-30 SH#1	837370.00	604819.30	4753.00
U-30 SH#2	837376.90	604800.10	4753.70
U-5 SH#1	749607.00	668098.70	3868.70
U-5 SH#2	749623.00	668121.70	3867.70
U.S.W. ES-1	765995.00	563265.00	4149.10
U.S.W. ES-2	765875.00	563015.00	4168.00
U.S.W. GA-1	779365.42	559246.98	5186.80
U.S.W. GU-3	752690.10	558501.32	4856.60
U.S.W. GX	759673.00	558335.00	4916.40
U.S.W. GY	759291.00	560266.00	4643.80
U.S.W. G-1	770500.20	561000.48	4348.60
U.S.W. G-2	778824.18	560503.88	5098.40
U.S.W. G-3	752779.84	558483.12	4856.50

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SEPDB EXAMPLE PRODUCT - 3

DRILL HOLE LOCATIONS (Cont.)

U.S.W. G-4	765807.07	563081.62	4166.90
U.S.W. H-WEST	765561.00	557591.00	4337.40
U.S.W. H-1	770254.32	562387.96	4274.40
U.S.W. H-3	756542.10	558451.65	4866.40
U.S.W. H-4	761643.62	563911.11	4096.50
U.S.W. H-5	766634.27	558908.72	4850.80
U.S.W. H-6	763298.86	554074.94	4270.60
U.S.W. S.P. 5-A	751454.90	538653.40	3368.90
U.S.W. S.P. 5-B	751426.90	538763.90	3366.10
U.S.W. UZN-1	769270.00	563524.00	4196.10
U.S.W. UZN-3	769142.00	563303.00	4189.80
U.S.W. UZ4	769157.00	563328.00	4188.50
U.S.W. UZ4N-2	769173.00	563355.00	4190.70
U.S.W. UZ4N-4	769091.00	563219.00	4185.80
U.S.W. UZ4N-5	769040.00	563134.00	4185.40
U.S.W. UZ5	768913.00	562925.00	4219.80
U.S.W. UZ-N24	768005.40	562054.20	4226.50
U.S.W. UZ-N25	768430.40	561218.90	4334.70
U.S.W. UZ-N26	768757.20	561022.90	4384.10
U.S.W. UZ-N40	766175.80	564221.30	4079.40
U.S.W. UZ-N41	765867.20	563520.90	4117.50
U.S.W. UZ-N42	765728.60	562858.50	4179.10
U.S.W. UZ-N43	765997.00	563263.60	4149.40
U.S.W. UZ-N44	766192.50	563139.60	4161.50
U.S.W. UZ-N45	765976.70	563429.20	4129.90
U.S.W. UZ-N46	772262.30	559747.70	4500.50
U.S.W. UZ-N47	771967.50	559783.50	4480.40
U.S.W. UZ-N48	760834.90	562413.60	4211.10
U.S.W. UZ-N49	760860.40	562321.80	4228.50
U.S.W. UZ-N50	760775.90	562911.70	4173.20
U.S.W. UZ-N51	760860.80	562909.40	4169.00
U.S.W. UZ-N52	760893.80	562908.80	4172.20
U.S.W. UZ-N65	758627.10	562537.10	4371.90
U.S.W. UZ-N66	758433.50	561881.10	4355.50
U.S.W. UZ-N67	753634.20	563799.00	3920.20
U.S.W. UZ-N68	753962.40	564005.80	3924.70
U.S.W. UZ-N69	754460.90	564401.70	3918.20
U.S.W. UZ-N70	769250.70	560164.70	4542.10
U.S.W. UZ-N71	761025.90	558405.60	4924.90
U.S.W. UZ-N72	761067.90	558626.10	4889.20
U.S.W. UZ-N73	761049.10	558926.00	4866.60
U.S.W. UZ-N74	761362.20	558559.90	4903.70
U.S.W. UZ-N75	761462.40	559075.90	4799.00
U.S.W. UZ-N76	761353.20	559047.70	4958.00
U.S.W. UZ-N77	755526.10	554397.20	3900.50
U.S.W. UZ-N78	757557.80	556262.30	4182.20
U.S.W. UZ-N79	757733.20	556333.90	4154.90
U.S.W. UZ-N80	757634.30	557201.10	4332.20
U.S.W. UZ-N81	757807.10	555595.10	4065.20
U.S.W. UZ-N82	757498.10	554689.70	3974.80
U.S.W. UZ-N83	760624.20	556349.00	4157.40
U.S.W. UZ-N84	760717.00	555887.80	4111.80
U.S.W. UZ-N86	760614.50	556460.30	4171.90
U.S.W. UZ-N87	760714.10	555887.10	4111.60
U.S.W. UZ-N88	760796.90	556551.20	4201.70
U.S.W. UZ-N89	760610.40	555588.70	4089.60

SEPDB EXAMPLE PRODUCT - 3

DRILL HOLE LOCATIONS (Cont.)

U.S.W. UZ-N90	760608.40	555587.20	4089.60
U.S.W. UZ-N93	759584.30	558320.70	4924.00
U.S.W. UZ-N94	759723.50	558236.20	4926.10
U.S.W. UZ-N95	759899.00	558172.30	4929.00
U.S.W. UZ-N96	759445.80	558403.10	4893.40
U.S.W. UZ-N98	767996.20	562083.50	4223.10
U.S.W. UZ-1	771275.82	560220.80	4426.24
U.S.W. UZ-13	751953.20	558488.70	4815.80
U.S.W. UZ-2	759769.00	558180.00	
U.S.W. UZ-3	759625.00	558220.00	
U.S.W. UZ-6	759731.00	558325.00	4924.50
U.S.W. UZ-6S	759909.30	558050.40	4949.20
U.S.W. UZ-7	760836.10	562911.30	4169.30
U.S.W. UZ-8	760762.20	562293.50	4227.00
U.S.W. VH-1	743355.50	533625.96	3161.00
U.S.W. VH-2	748319.43	526264.21	3197.10
U.S.W. VH-3	751222.00	519284.00	
U.S.W. W.T.-1	753940.57	563739.18	3942.46
U.S.W. W.T.-10	748770.90	553302.10	3686.00
U.S.W. W.T.-11	739070.40	558376.80	3590.50
U.S.W. W.T.-2	760660.54	561923.56	4269.68
U.S.W. W.T.-21	760086.00	550328.00	4079.30
U.S.W. W.T.-22	778858.00	528373.00	3755.80
U.S.W. W.T.-7	755569.80	553891.30	3927.20
U.S.W. W.T.-8	762283.00	557049.00	4254.00
U.S.W. W.T.-9	769477.00	557642.00	4450.00

— NOTICE —

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APPENDIX B

EXAMPLE PRODUCTS FROM THE IGIS

Product CAL0001 - Section L-L': Detailed Geologic cross-section running from N767022, E556949 thru H-5 thru USW G-4 to UE-25a #1. (Fig. 1)

Product CAL0148 - Simplified section L-L' with 45 meter slab and target horizon. (Fig. 2)

Product CAL0113 - Plan view of the design repository layout showing section locations, sections A-A' thru E-E', and a 3-D cut-a-way view of Yucca Mountain. (Fig. 3)

Product CAL0135 - Spatial relationships between Operations area, Controlled area, and Accessible Environment. (Fig. 4)

Product CAL0120 - Geologic Repository Operations area at Yucca Mountain. (Fig. 5)

Product CAL0015 - Contour map of the top of the Zeolitized Zone. (Fig. 6)

Product CAL0126A - Contour map of the top of the Topopah Spring welded member. (Fig.7)

Product CAL0027 - Contour map of the base of the Topopah Spring welded member. (Fig. 8)

Product CAL0084 - Isopach map of the thickness of the Tiva Canyon welded member. (Fig. 9)

Product CAL0087 - Isopach map of the thickness of the Topopah Spring welded member. (Fig. 10)

Product CAL0156 - Isopach map of the overburden to the floor of the Design Repository. (Fig. 11)

Product CAL0108 - Contours of the average water flow times, flux = 0.5 mm/yr. (Fig. 12)

Product CAL0044 - Contour of Ground water travel times from a 50m disturbed zone to the water table, 0.5 mm/yr. (Fig. 13)

= NOTICE =

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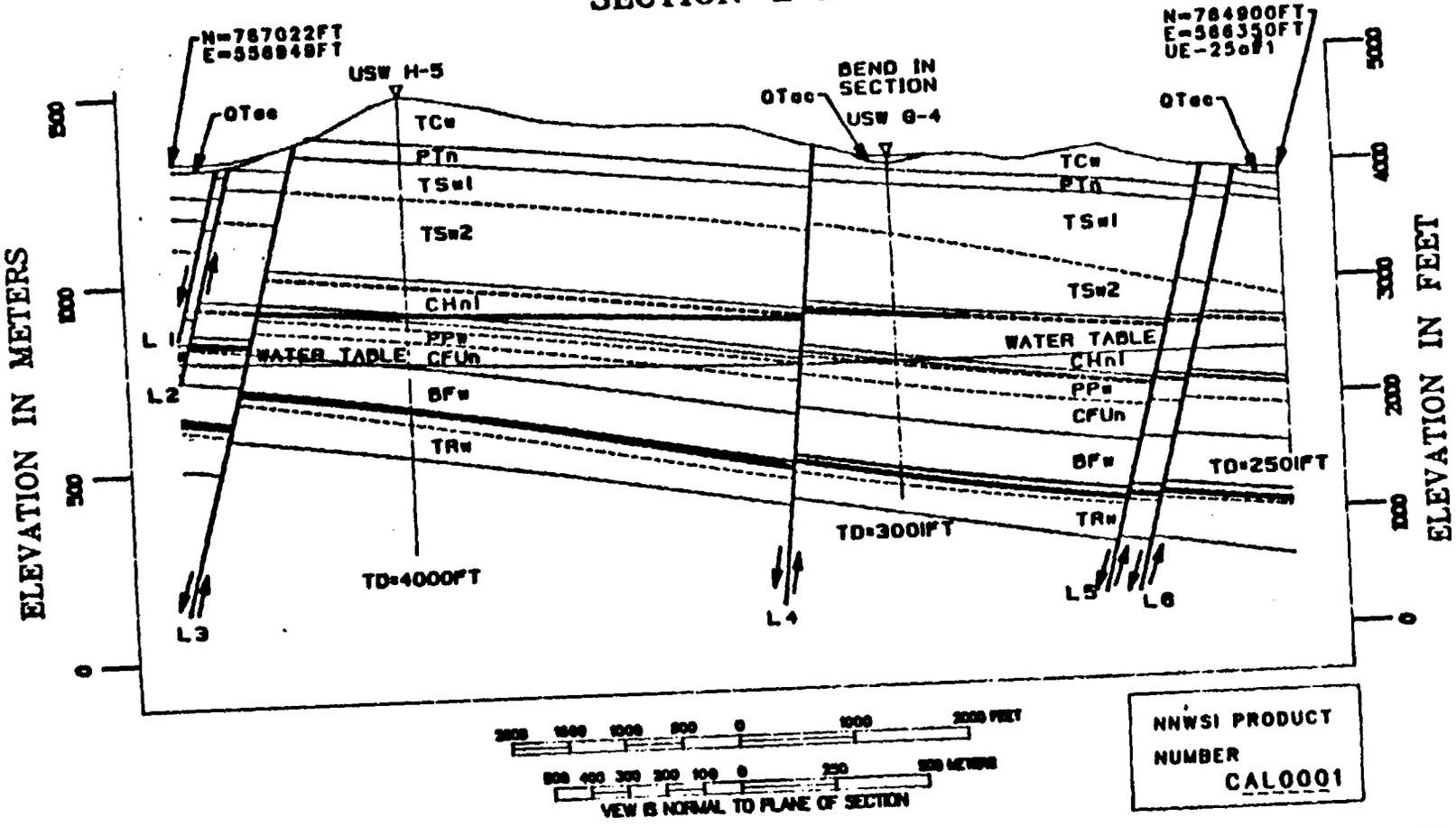
SECTION L-L'



NNWSI PRODUCT NUMBER CAL0001

LINE SYMBOL *	LINE ID **
	TOP OF PREVALENT ZEOLITES
	TCw
	PTn
	TSw1
	TSw2
	TSw3
	CHn1
	CHn2
	CHn3
	PPw
	CFUn
	BFw
	CFMn1
	CFMn2
	CFMn3
	TRw

NORMAL FAULT — ARROWS SHOW DIRECTION OF RELATIVE DISPLACEMENT

STRIKE-SLIP FAULT — ⊕ INDICATES DISPLACEMENT OUT OF THE PAGE; ⊖ INDICATES DISPLACEMENT INTO THE PAGE

TD — TOTAL DEPTH

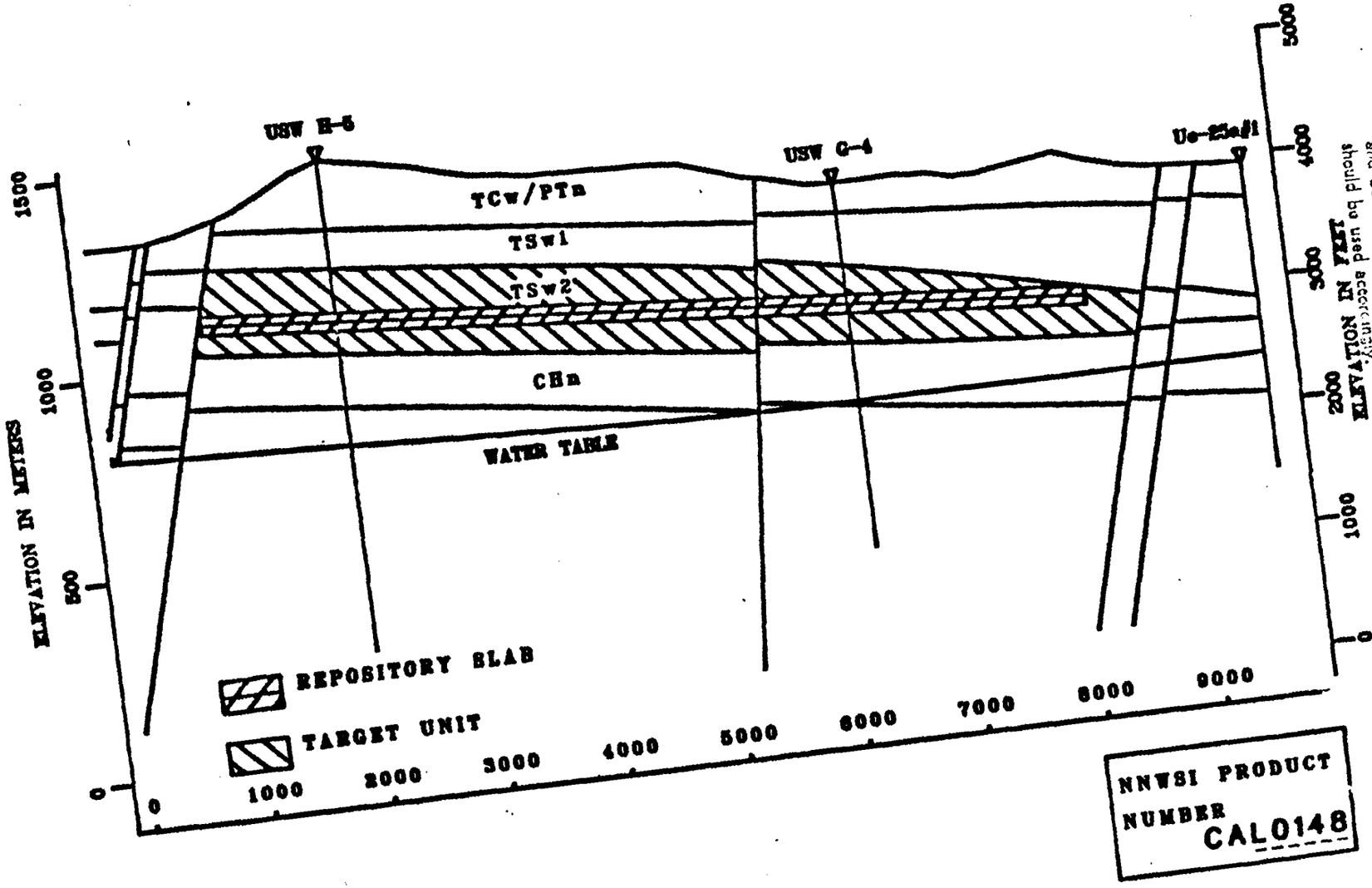
FEBRUARY 1985

* LINE SYMBOL REPRESENTS BASE OF UNIT EXCEPT FOR ZONE OF PREVALENT ZEOLITES.

** SEE TEXT FOR DESCRIPTION OF UNITS.

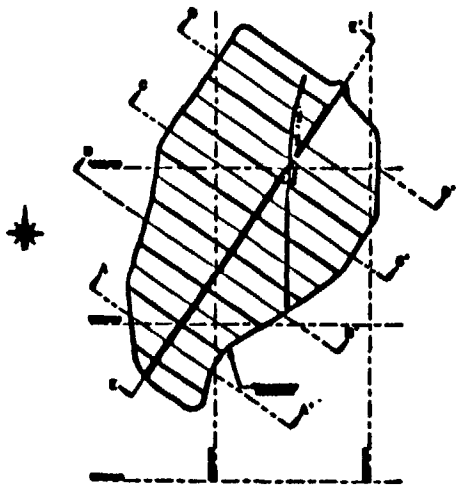
— NOTICE —

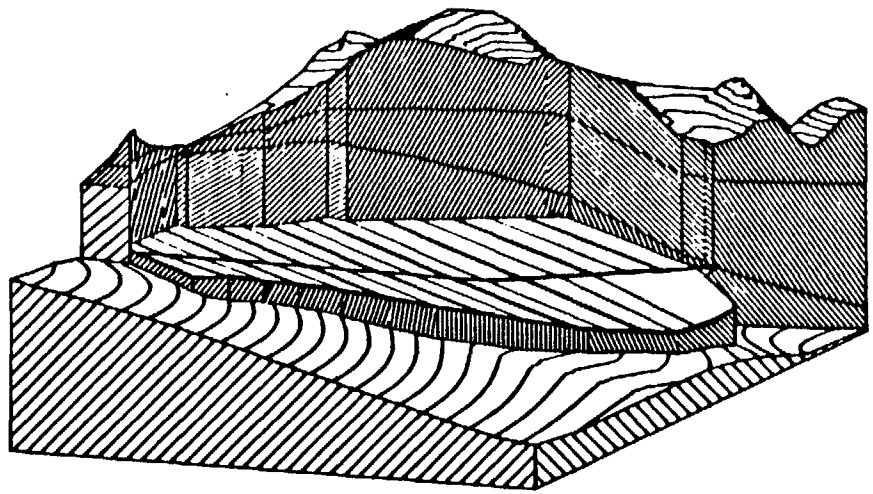
QA checks on data contained here have only been performed to determine that these data have been obtained and documented properly. The DOE cautions that any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.



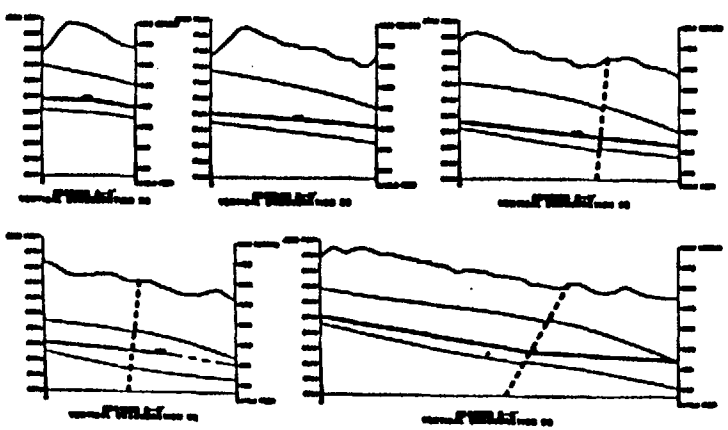
QA checks on data contained here have only been performed to determine that these data have been transcribed and documented properly. [illegible] any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.

NOT USEFUL IN ISOLATION





SCALE 2:1



NNWSI

Nuclear Waste Repository in Tuff
Subsurface Facility
(SF/UNesol)

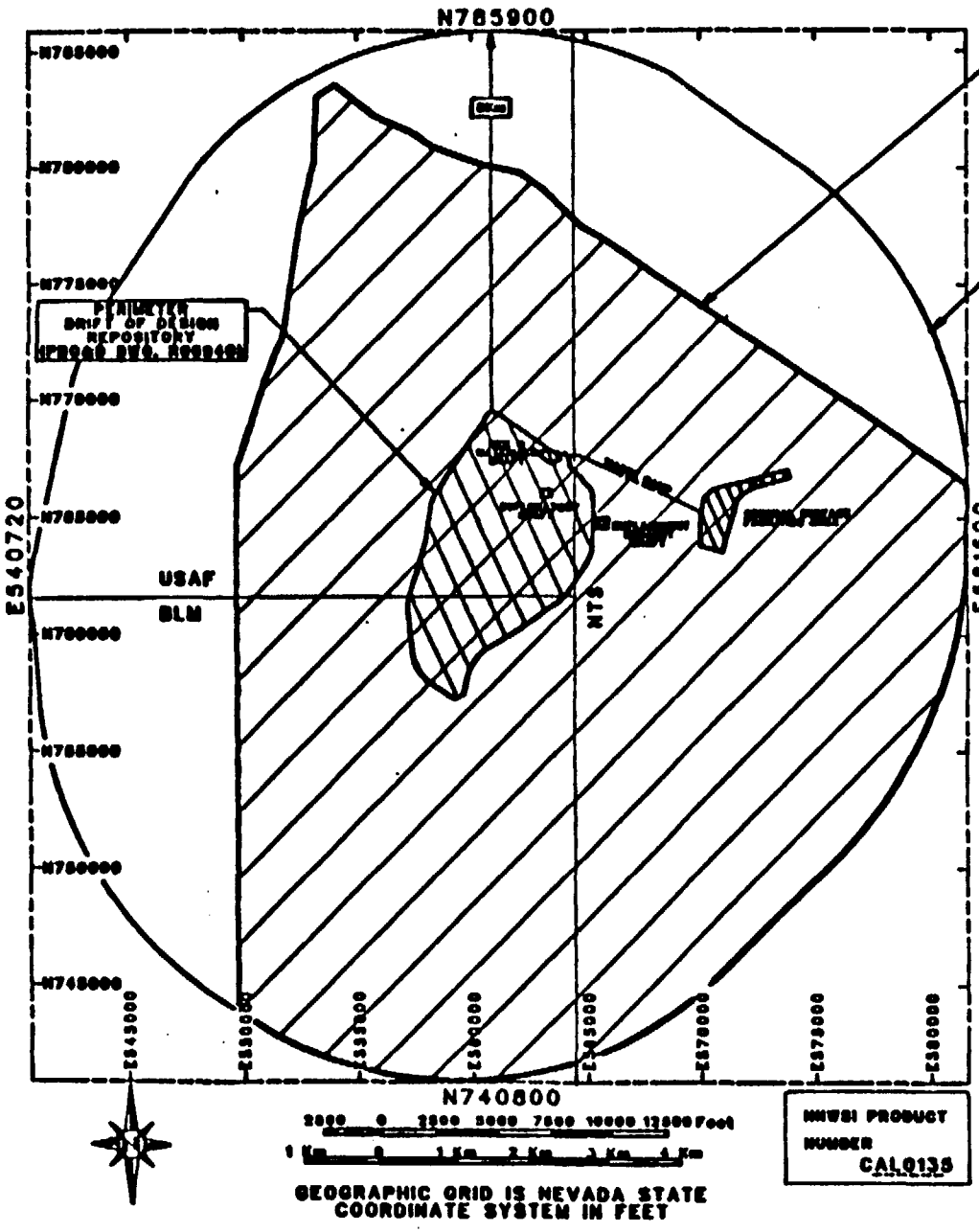
CAL0113

1:24000

07 May 1986

= NOTICE =

QA checks on data contained here have only been performed to determine that these data have been obtained and documented properly. The DOE cautions that any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.



PROPOSED BOUNDARY BETWEEN CONTROLLED AREA AND ACCESSIBLE ENVIRONMENT TO BE MARKED WITH PERMANENT MONUMENTS (Based on topography, saturated zone flow directions, and maximum allowable extent of controlled boundary area.

Note: Land withdrawal boundaries need not be coincident but must include entire controlled area.

MAXIMUM ALLOWABLE EXTENT OF CONTROLLED AREA BOUNDARY BASED ON 40CFR191.
Total enclosed area within 8Km radial extent = 32829.3 Acres 131.69 Sq.Km.

Maximum area allowed = 100 Sq.Km.

Note: Subject to change upon revision of reference location of the repository perimeter drift.

GEOLOGIC REPOSITORY OPERATIONS AREA

CONTROLLED AREA

ACCESSIBLE ENVIRONMENT
Unlimited Surface and Subsurface Area Outside Controlled Area plus the Atmosphere, Land Surfaces and Surface Waters within the Controlled Area.

- NOTICE -

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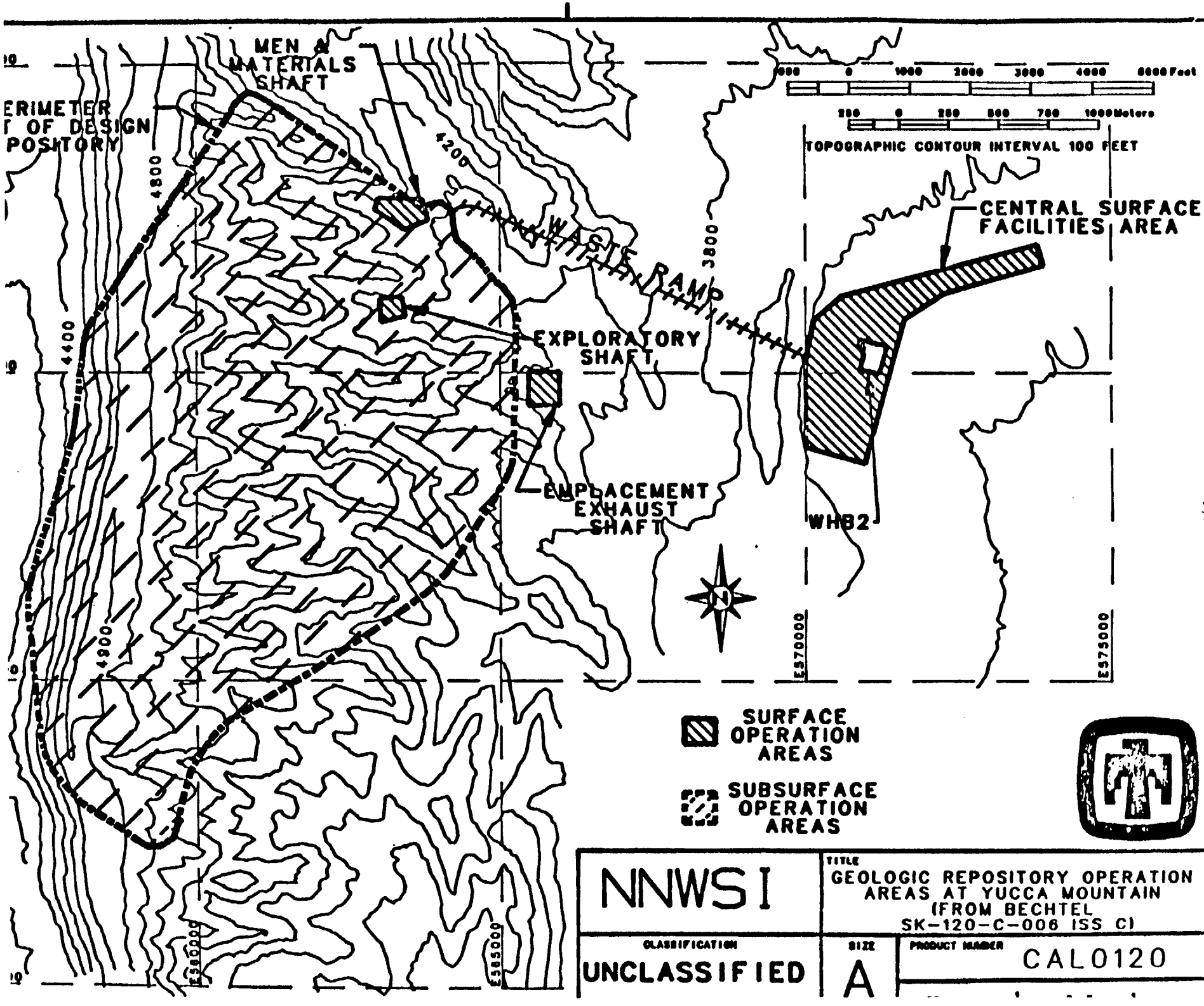
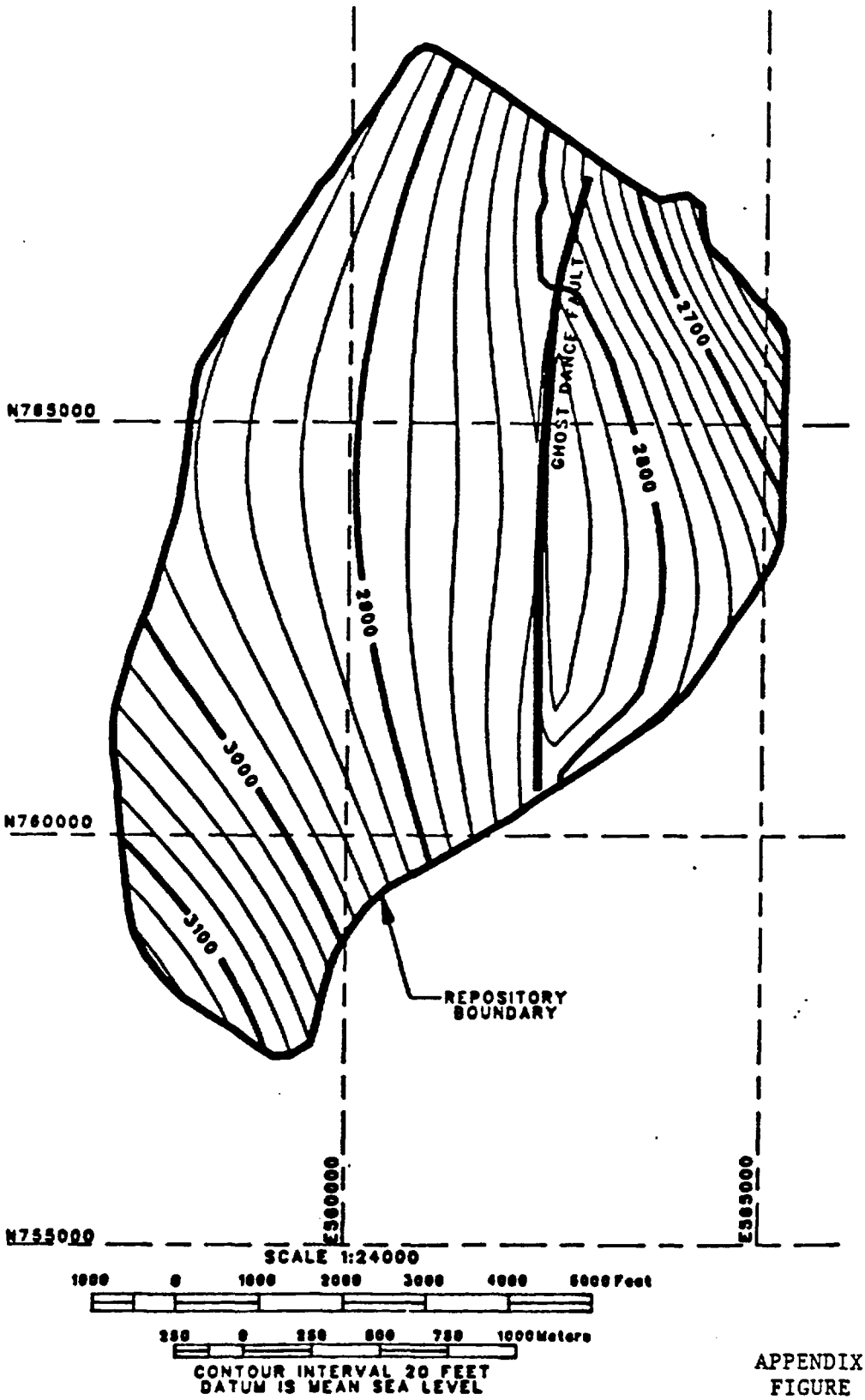


QA checks on data contained here have only been performed to determine that these data have been obtained and documented properly. The DOE cautions that this information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.

FIGURE 1

— NOTICE —

QA checks on data contained here have only been performed to determine that these data have been obtained and documented properly. The DOE cautions that any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is established. These data and interpretations should be used accordingly.



APPENDIX B
FIGURE 6

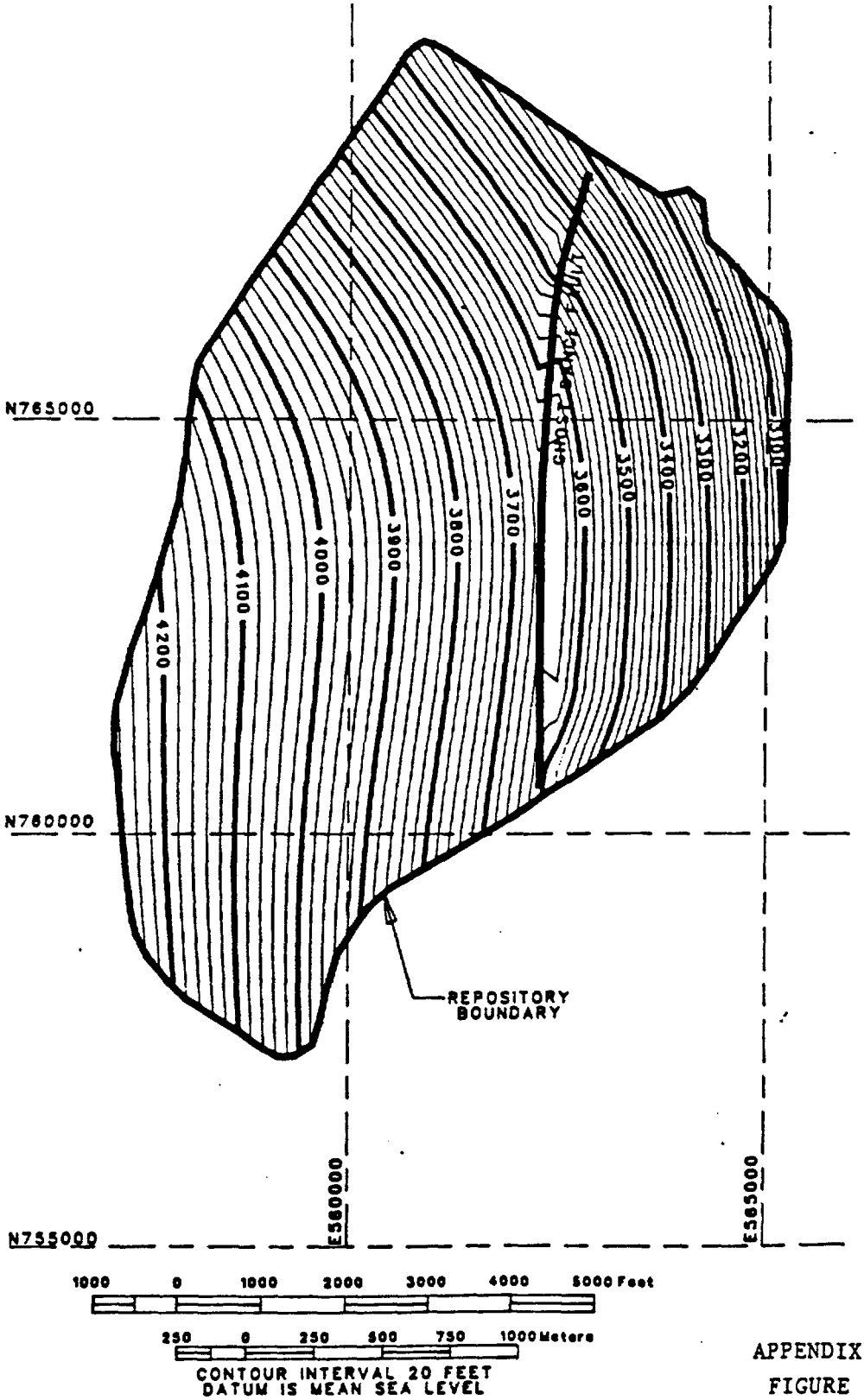
NNWSI

TITLE

Top of the Zeolotized Zone (TZZ)

= NOTICE =

QA checks on the contained here have not been performed to assure that the data have been validated and documented accurately. The DCS employs this information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.



APPENDIX B
FIGURE 7

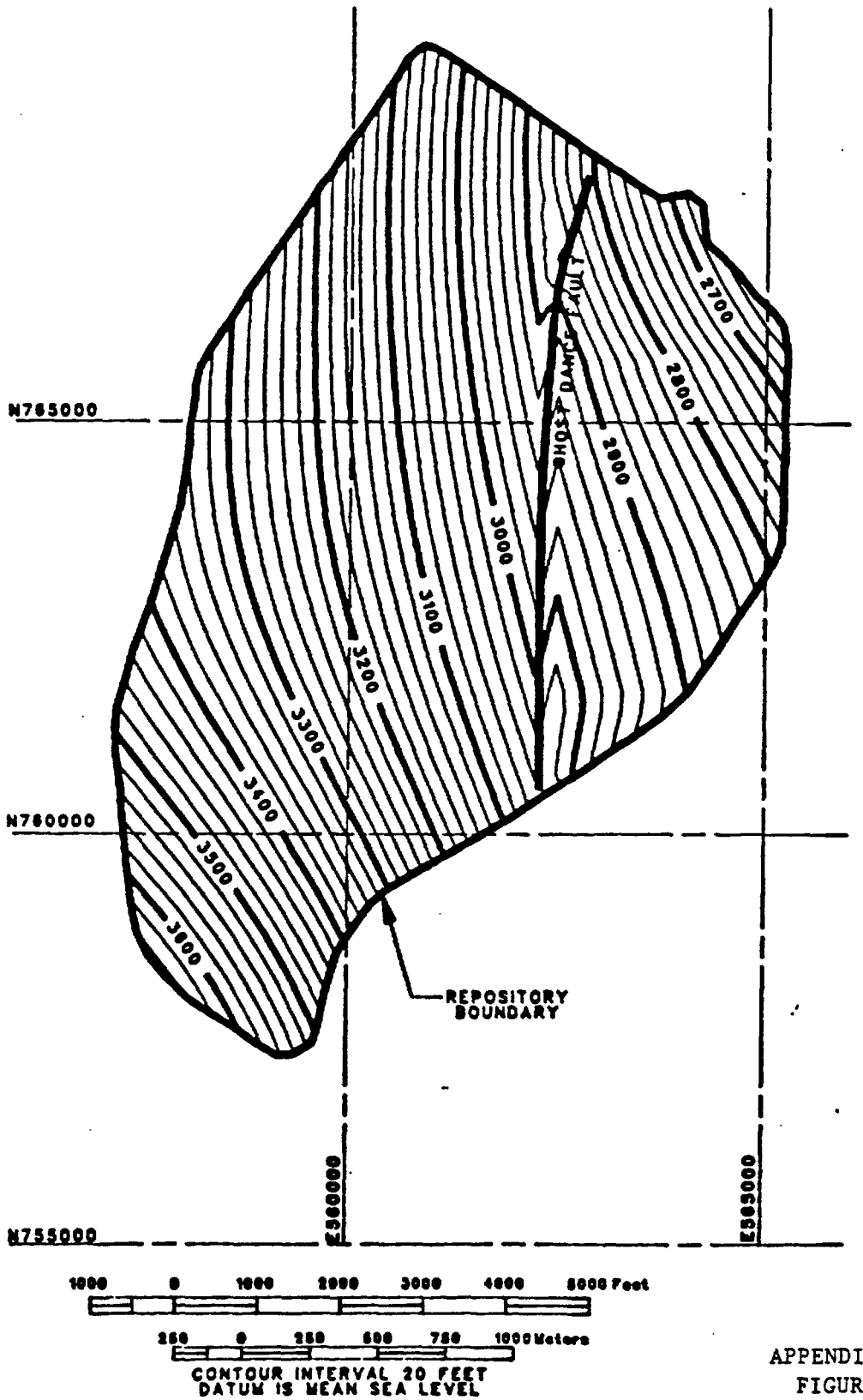
NNWSI

TITLE

Top of the Topopah Spring welded (TSw2)

— NOTICE —

QA checks on data contained herein have only been performed to determine that these data [illegible] and [illegible] properly. The DOE cautions that any information is [illegible] and [illegible] analyses are performed or as an enlarged [illegible] these data and interpretations should [illegible] and [illegible]



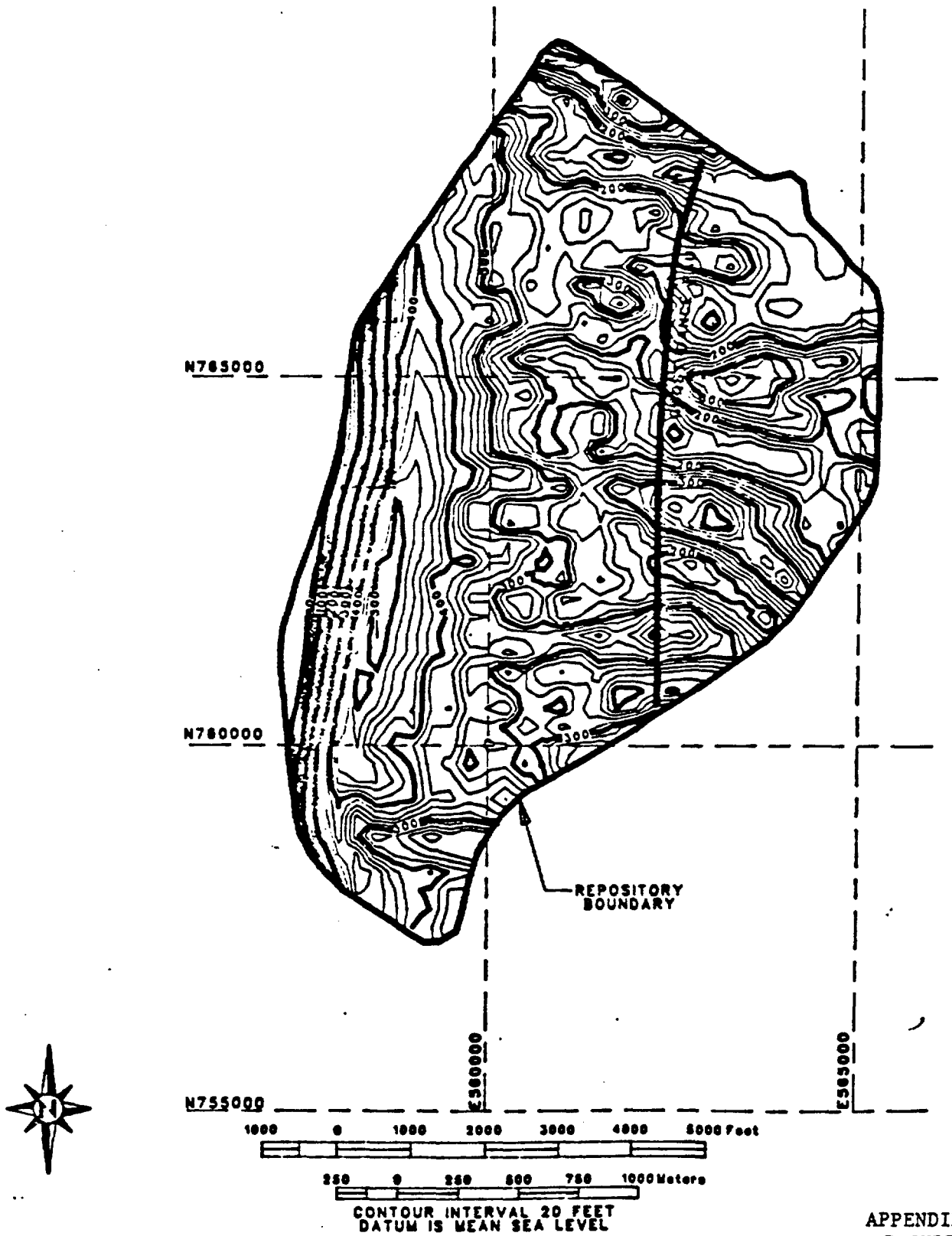
APPENDIX B
FIGURE 8

NNWSI

TITLE
Base of the Topopah Spring welded (TSw2)

NOTICE

QA checks on data contained here have only been performed to determine that these data have been obtained and documented properly. The DOE cautions that any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.



APPENDIX B
FIGURE 9

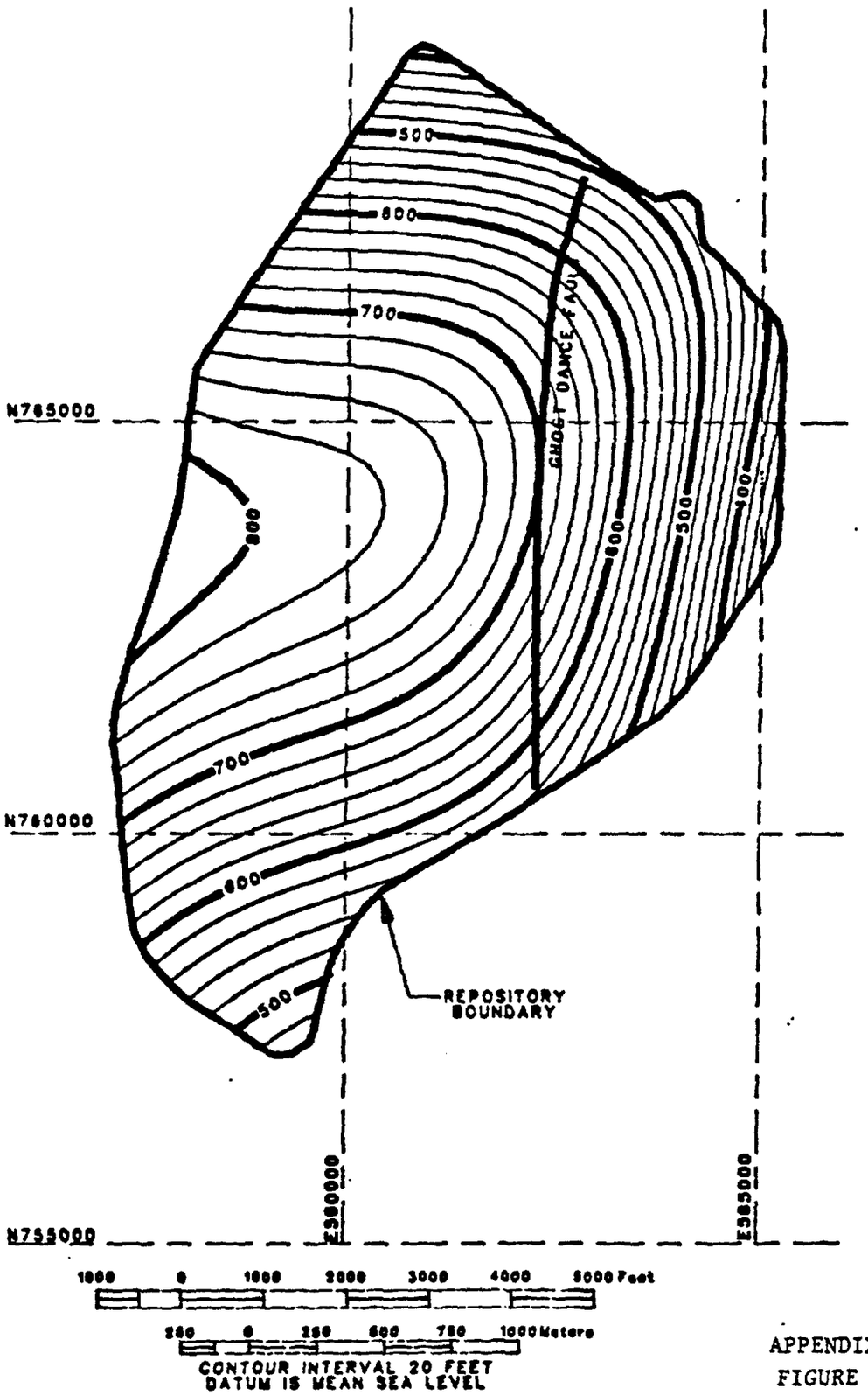
NNWSI

TITLE

Thickness of the Welded Tiva Canyon (TCw)

NOTICE

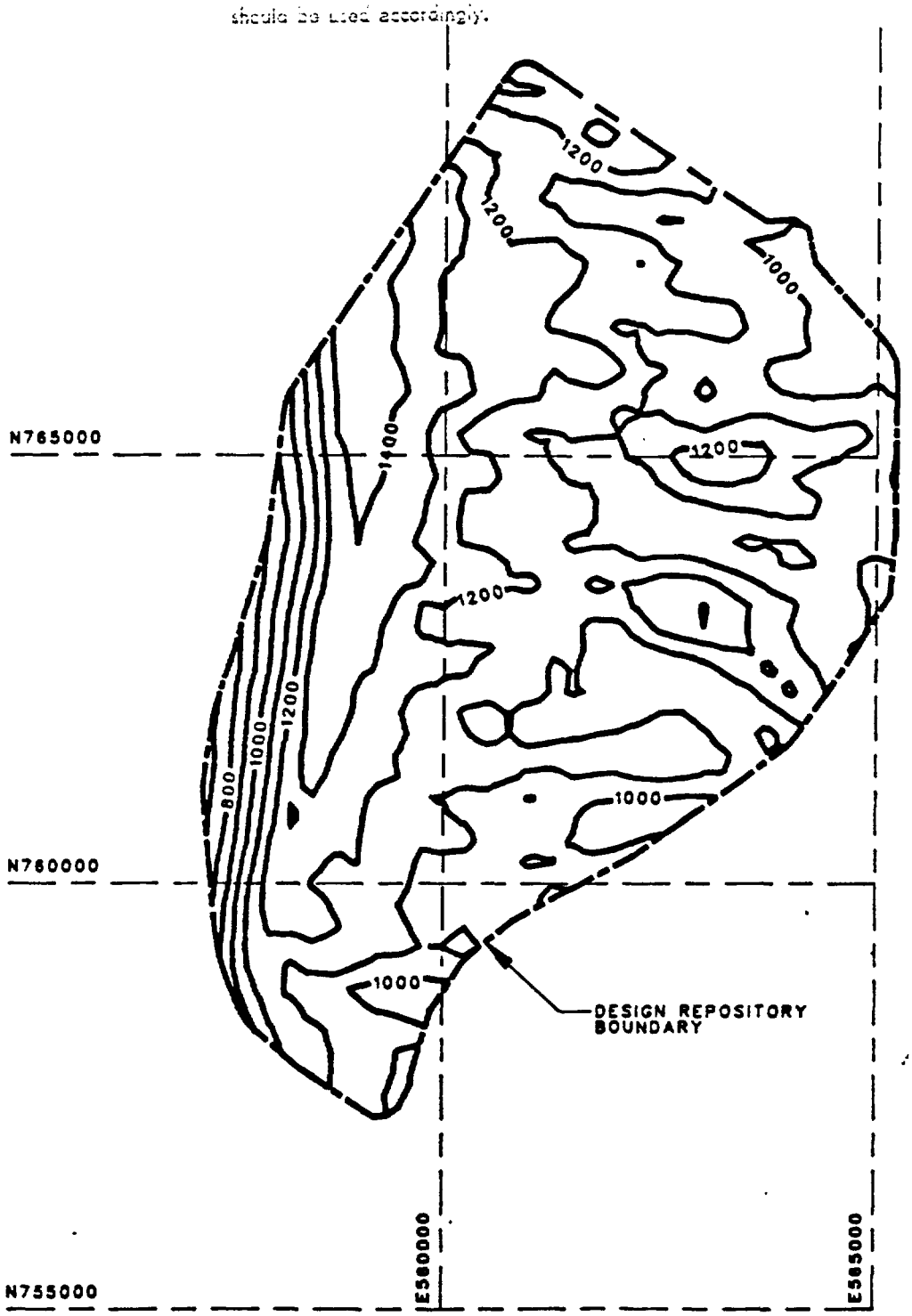
QA checks on data contained here have only been performed to determine that these data have been obtained and documented properly. The DOE cautions that any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.



APPENDIX B
FIGURE 10

NNWSI

TITLE
Thickness of the Welded Topopah Spring Member (TSw2)



1000 0 1000 2000 3000 4000 5000 Feet

250 0 250 500 750 1000 Meters

CONTOUR INTERVAL 100 FEET

APPENDIX B
FIGURE 11

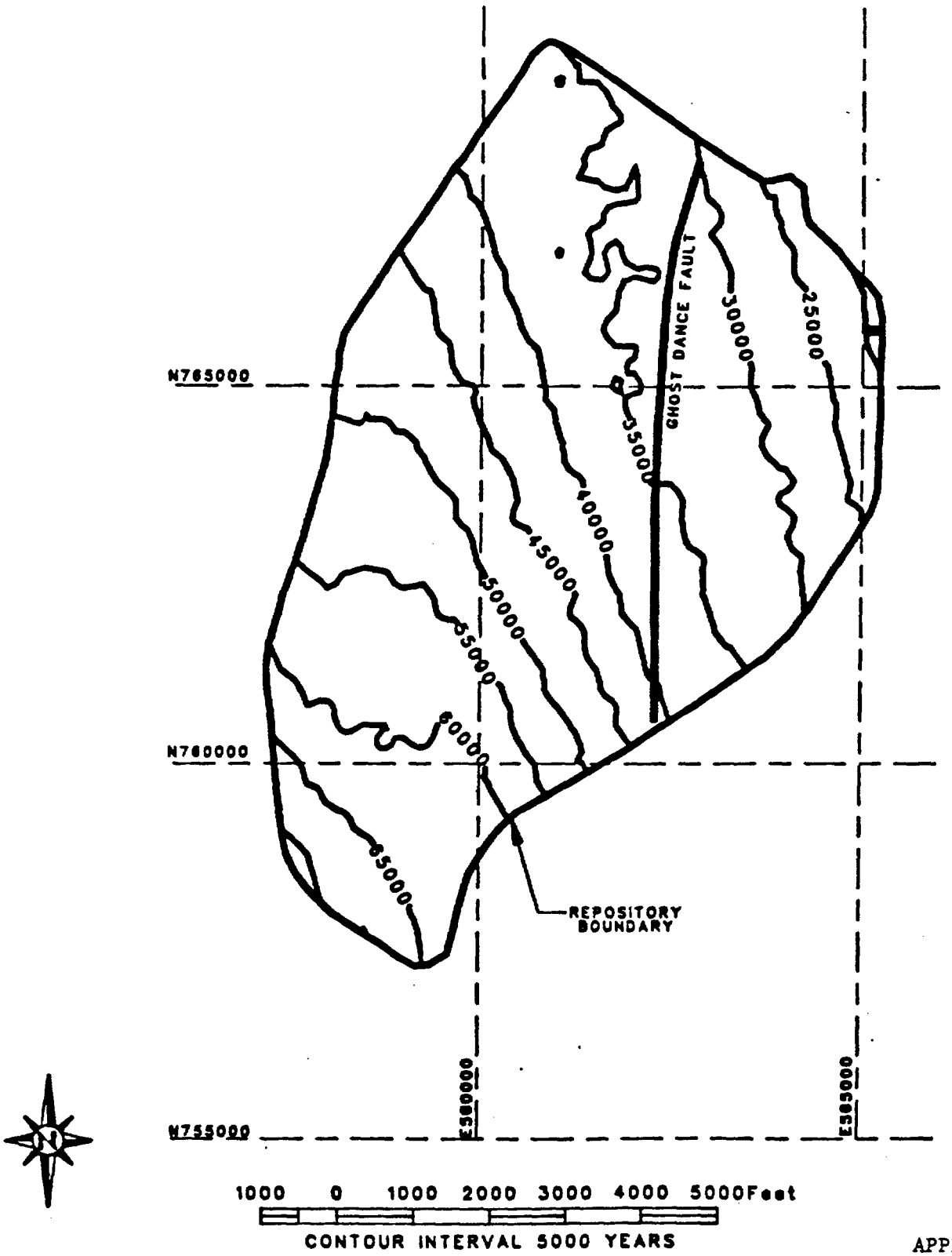
NNWSI

TITLE

Overdurden to the 3-D Design Repository within the Reference Boundary

— NOTICE —

QA checks on data contained here have only been performed to determine that these data have been [illegible] and documented properly. The [illegible] cautions that any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.



APPENDIX B
FIGURE 12

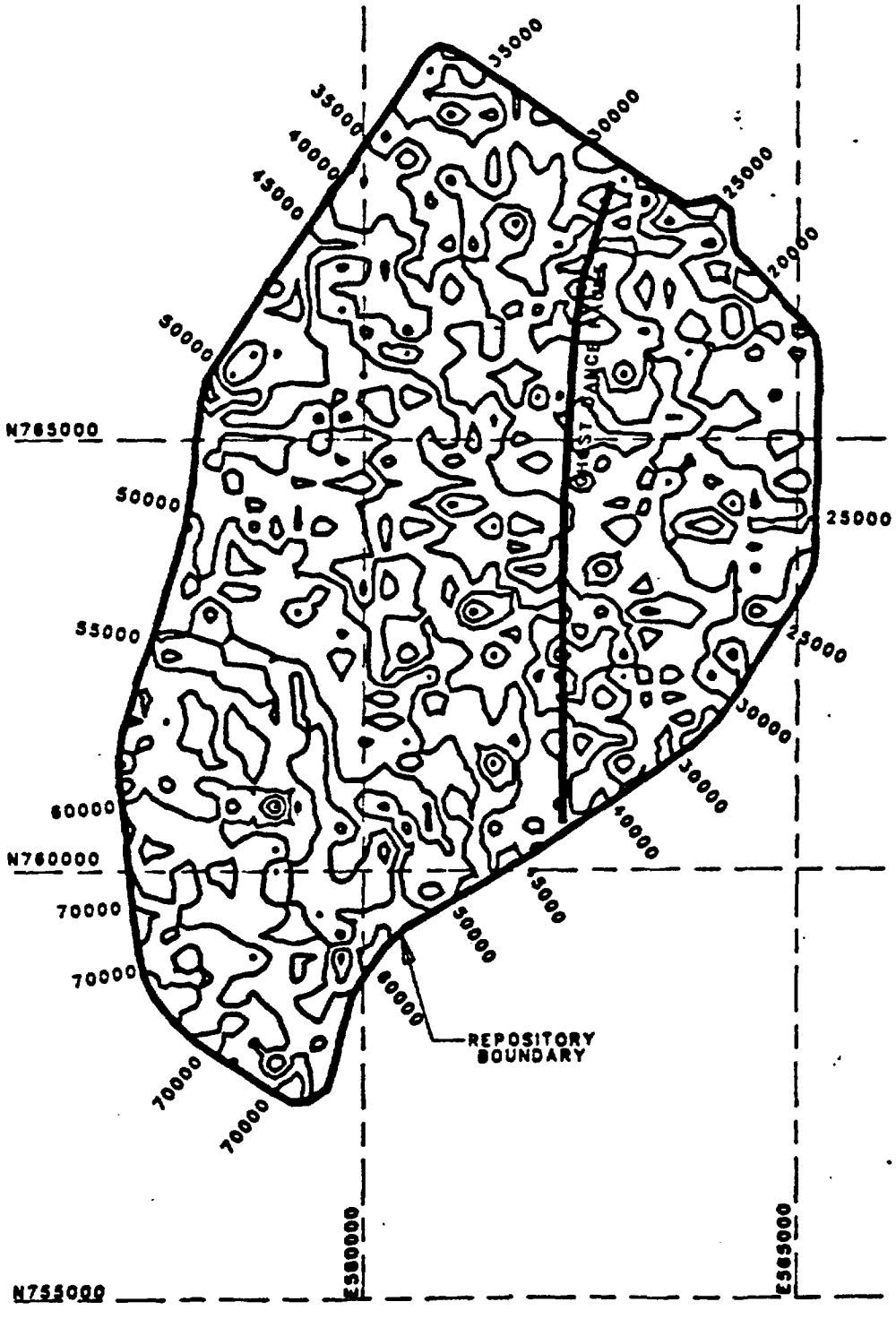
NNWSI

TITLE

AVERAGE FLOW TIMES FROM 100 ITERATIONS (FLUX=0.5 MM/YR)

= NOTICE =

QA checks on data contained here have only been performed to determine that these data have been obtained and documented properly. The DOE notions that our information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.



1000 0 1000 2000 3000 4000 5000 Feet

250 0 250 500 750 1000 Meters

CONTOUR INTERVAL 5000 YEARS

APPENDIX B
FIGURE 13

NNWSI

TITLE
GROUND WATER TRAVEL TIME FROM THE DISTURBED ZONE TO THE WATER TABLE (FLUX=0.5 MM/YR)

— NOTICE —

QA checks on data contained here have only been performed to determine that these [illegible] obtained and documented properly. The DOE cautions that any information is pr[illegible] and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.

APPENDIX C

LIST OF CURRENT PRODUCTS

SEPDB Products

SEPDB Product #1	Calculated Matrix Porosity-by thermomechanical units (includes mean and standard deviation for each unit)
SEPDB Product #2	Hydraulic Conductivity and Residual Saturation-by thermomechanical units (includes natural logs and means and standard deviations of the logs)
SEPDB Product #3	Porosity and Hydraulic Conductivity-by hole and depth
SEPDB Product #4	Hole Name, Location and Starting Elevation for all holes; Hydraulic Concuctivity and associated parameters-by thermomechanical units
SEPDB Product #5	Hole Name, Location and Starting Elevation for all holes; Bulk Properties by thermomechanical units
SEPDB Product #6	Calculated Porosity for UE-25a#1, USW GU-3, USW G-1 and USW G-4-by thermomechanical units
SEPDB Product #7	Calculated Matrix Porosity-by hole, depth and thermomechanical unit
SEPDB Product #8	Number of Data Items in Data Base; Number of Values for each Schema Item; Number of Measurements for Each Element for Sorption/Desorption-by hole
SEPDB Product #9	All Porosity Values-by stratigraphic unit and measuring organization
SEPDB Product #10	Calculated Matrix Porosity for UE-25a#1-by hole and depth; includes source reference and which lab performed the experiments
SEPDB Product #11	Strength Data for Topopah Springs, Dates of Collection or Publication, Measuring Agency, Sponsoring Organization, and References
SEPDB Product #12	Sorption Values, Means and Standard Deviations for Hydrogeologic Units Between the Ground Surface and the Base of the Tram Unit for Elements Ba, Pu, Am, Eu, U, Tc, Cs, and Sr.
SEPDB Product #13	Plots of Thermal Conductivity as a Function of Depth for USW G-1, USW G-2, USW G-3, USW GU-3 and UE-25a#1; geologic units superimposed, plus means and standard deviations for each thermomechanical unit
SEPDB Product #14	Calculated Porosity Values for all Holes except USW H-1; excludes abnormal sample conditions-by hole, depth and sample number
SEPDB Product #15	All Data from LANL Reports-by record group, lab identifier, hole, depth and reference
SEPDB Product #16	Hydraulic Conductivity-by hole, depth, sampling agency, and abnormal conditions
SEPDB Product #17	Hydraulic Conductivity and Associated Parameters; Measured and Calculated Porosities; Geologic Stratigraphy-by depth and hole

= NOTICE =

QA checks on data contained here have only [illegible] data have been [illegible] and documented properly [illegible] is preliminary [illegible] and perhaps more representative data base is accumulated. These data and interpretations should be [illegible]

DGGS PRODUCT LIST

Product Number	Description	Job# Number	Date
CAL0001	Cross Section L-L'	J095	08OCT85
CAL0002	Cross Section M-M'	J095	10OCT85
CAL0003	Cross Section N-N'	J095	23OCT85
CAL0004	Cross Section P-P'	J095	23OCT85
CAL0005	Break-out Zones for ES Shaft	J096	10OCT85
CAL0006	Cross Section L-L' With Repository Zone	J097	23OCT85
CAL0013	Contours of the Base of TSw3	J121	30JAN86
CAL0014	Contours of the Base of CHn3	J121	30JAN86
CAL0015	Contours of the Base of TZZ	J121	30JAN86
CAL0016	Contours of the Base of PPw	J121	30JAN86
CAL0017	Contours of the Base of CFUn	J121	30JAN86
CAL0018	Contours of the Base of BFw	J121	30JAN86
CAL0019	Contours of the Base of CFMn3	J121	30JAN86
CAL0020	Contours of the Base of CHn1	J121	11Feb86
CAL0021	Contours of the Base of CHN2	J121	30JAN86
CAL0022	Contours of the Base of CFMn1	J121	30JAN86
CAL0023	Contours of the Base of CFMn2	J121	30JAN86
CAL0024	Contours of the Base of TCw	J121	30JAN86
CAL0025	Contours of the Base of PTn	J121	30JAN86
CAL0026	Contours of the Base of TSw1	J121	30JAN86
CAL0027	Contours of the Base of TSw2	J121	30JAN86
CAL0028	Contours of the Base of TRw	J121	30JAN86
CAL0035	Isopach of TSw3	J152	28Aug86
CAL0036	Isopach of UNDIS.ZONE to TSw3	J099	24SEP85
CAL0037	Isopach Contours of CHnV to H20	J099	24SEP85
CAL0038	Isopach Contours of CHnZ to H20	J099	24SEP85
CAL0039	Isopach Contours of PPw to H20	J099	26SEP85
CAL0040	Isopach Contours of CFu to H20	J099	26SEP85
CAL0041	Isopach Contours of BFw to H20	J099	26SEP85
CAL0043	Contours of UNDIS.ZONE to H20	J099	26SEP85
CAL0044	Traveltime Contours Flux=0.5mm/Yr	J099	26SEP85
CAL0045	Isopach Contours of CFMn to H20	J099	26SEP85
CAL0046	Traveltime Contours Flux=1.0mm/Yr	J099	26SEP85
CAL0047	Isopach of the Undisturbed TSw3	J099	06Jan86
CAL0048	Isopach of CHnV	J099	03Feb86
CAL0049	Isopach of CHnZ to H20	J099	03Feb86
CAL0050	Isopach of PPw to H20	J099	03Feb86
CAL0051	Isopach of CFUn to H20	J099	03Feb86
CAL0052	Isopach of BFw to H20	J099	03Feb86
CAL0053	Isopach of CFMn to H20	J099	03Feb86
CAL0054	Travel Time Output File .5mm	J099	01Oct85
CAL0055	Travel Time Summary File .5mm	J099	01Oct85
CAL0056	Travel Time Iteration File .5mm	J099	01Oct85
CAL0057	Travel Time Output File 1mm	J099	01Oct85
CAL0058	Traval Time Summary File 1mm	J099	01Oct85
CAL0059	Travel Time Iteration File 1mm	J099	01Oct85
CAL0060	Isopach of Undis.Zone to H20	J099	03Feb86
CAL0061	Contours of the Water Table	J099	29Oct85
CAL0062	Cross Section M-M' with 45 meter Slab	J096	10Feb86
CAL0063	Accessible Environment (5K)	J103	21Jan86
CAL0064	Primary Exploration Area	J103	23Oct85
CAL0065	Primary Exploration Area (1/2)	J013	23Oct85
CAL0066	Cross Section Locations plan view	J106	20Jan86
CAL0067	Travel Time Contours of TSw2 to H20 .5mm	J099	20Feb86
CAL0068	Travel Time Contours CHnV .5mm	J099	20Feb86
CAL0069	Travel Time Contours CHnZ to H20 .5mm	J099	24Feb86
CAL0070	Travel Time Contours PPw to H20 .5mm	J099	11Feb86
CAL0071	Travel Time Contours CFUn to H20 .5mm	J099	11Feb86
CAL0072	Travel Time Contours BFw to H20 .5mm	J099	11Feb86
CAL0073	Travel Time Contours CFMn to H20 .5mm	J099	12Feb86
CAL0074	Travel Time Contours Undisturbed TSw 1mm	J099	12Feb86
CAL0075	Travel Time Contours CHnV 1.0mm	J099	12Feb86
CAL0076	Travel Time Contours CHnZ to H20 1.0mm	J099	12Feb86
CAL0077	Travel Time Contours PPw to H20 1.0mm	J099	12Feb86
CAL0078	Travel Time Contours CFUn to H20 1.0mm	J099	12Feb86
CAL0079	Travel Time Contours BFw to H20 1.0mm	J099	12Feb86
CAL0080	Water Table Contours (AGS transfer)	J104	14Nov86
CAL0081	Travel Time Contours CFMn to H20 1.0mm	J099	12Feb86
CAL0082	Travel Time Contours Average 10 ITT .5mm	J108	31Mar86
CAL0083	Travel Time Contours Std.Dev.10 ITT .5mm	J108	6Dec86

IGIS PRODUCT LIST (con't.)

CAL0084	Isopach of the TCw	J105	16Dec85
CAL0085	Isopach of the PTn	J105	16Dec85
CAL0086	Isopach of the TSw1	J105	16Dec85
CAL0087	Isopach of the TSw2	J105	16Dec85
CAL0088	Contours of In Situ Stress TSw1	J105	16Dec85
CAL0089	Contours of In Situ Stress Midslab	J105	16Dec85
CAL0090	Contours of In Situ Stress TSw2	J105	16Dec85
CAL0091	Isopach of CHn to H2O	J119	13Jan86
CAL0092	Area Calculations 1K to 5K East	J115	31Jan86
CAL0093	Area Calculations 1K to 5K 45SE	J115	31Jan86
CAL0094	Area Calculations 1K to 5K 45NE	J115	31Jan86
CAL0095	Area Calculations 1K to 5K NE-S	J115	31Jan86
CAL0096	Area Calculations 1K to 5K Total	J115	31Jan86
CAL0097	Accesible Environment Boundary	J112	27Jan86
CAL0098	Withdrawal Areas	J112	27Jan86
CAL0099	ES Facility/Repo Interface	J123	10Feb86
CAL0100	Controlled Area	J112	7Feb86
CAL0101	Controlled Area w/Water Conts.	J112	7Feb86
CAL0102	Simplified L-L w/45m Slab	J125	7Feb86
CAL0103	View Graph Overlays	J114	27Mar86
CAL0104	Point Data LANL	J126	13Feb86
CAL0105	Isopach of TSw2 Below Midslab	J129	12Mar86
CAL0106	CAL0105 Plus Drill Holes	J129	12Mar86
CAL0107	Travel Time Contours Average 50ITT.5mm	J128	24Mar86
CAL0108	Travel Time Contours Average 100ITT.5mm	J128	24Mar86
CAL0109	Travel Time Contours Mean .5mm	J128	20Mar86
CAL0110	Figure For Travel Time Report	J110	17Mar86
CAL0111	3-D Repository Outline	J130	31Mar86
CAL0112	Contour of Depth to Water Table	J133	20Mar86
CAL0113	Pictorial Section of Yucca Mt.	J130	31Mar86
CAL0114	Perimeter Drift/Primary Exploation Area	J128	02Apr86
CAL0115	Cross Section A-A'(East-West)	J128	02Apr86
CAL0116	Grid Accented Within Repo Area	J128	02Apr86
CAL0117	Total Columns % Frac Flow .5mm	J128	02Apr86
CAL0118	Travel Time Standard Deviation,100IT,.5mm	J128	02Apr86
CAL0119	Location of Cross Section A-A'	J128	02Apr86
CAL0120	Surface Facilities, Ramps & Shafts	J112	17Apr86
CAL0121	Site Plan with 5 mile radius	J112	17Apr86
CAL0122	Boundary,Land withdrawal,5mi R	J112	17Jun86
CAL0123	Area Cal.(1km-5km)of Repo 45NE	J138	30Apr86
CAL0124	Area Cal.(1km-5km)Horiz to 45NE	J138	30Apr86
CAL0125	Exploatory Area, Repository Drift, Ramps & Topo	J112	09May86
CAL0126	Under Ground Facilities/Exp.Area	J112	09May86
CAL0127	Isometric Cutaway of Repo	J130	16May86
CAL0128	Repo Sects.for Prod#CAL0129.131	J112	08May86
CAL0129	Sect. of Dist.Zone C-C' & E-E'	J112	12May86
CAL0130	Overburden to Middle of Slab	J141	23May86
CAL0131	Sections A-E of Design Repo.	J114	17Jun86
CAL0132	Drill Holes + CAL0126	J140	30Jun86
CAL0133	Coordinate Data of CAL0115	J145	02Jul86
CAL0134	Area Calc.(Repo,E13330'& E13130)	J144	03Jul86
CAL0135	Operations Facilities + CAL0097	J146	17Jul86
CAL0136	Thickness Contours of the Repository to the Water Table	J148	14Aug86
CAL0137	Thickness Contours of the Repository to TSw2	J148	14Aug86
CAL0138	Thickness Contours CHn3/WT	J148	14Aug86
CAL0139	Disturbed Zone(100m)/TSw3	J153	19Aug86
CAL0140	Disturbed Zone(100m)/CHnV	J153	19Aug86
CAL0141	Useable Areas with Faults	J147	25Aug86
CAL0142	Useable Area with Shading	J147	25Aug86
CAL0143	Contours TSw Units	J151	04Sep86
CAL0144	Contours CHn Units	J151	04Sep86
CAL0145	Revised Exp Shaft/Interface	J123	06Sep86
CAL0146	Repo Area+Topo+Tuff/Waste Ramp	J138	10Sep86
CAL0147	Thickness contours of TSw3	J153	12Sep86
CAL0148	Simplified Section w/Repo Slab	J155	24Oct86
CAL0149	Topographic Contours(20met/int)	J157	24Oct86
CAL0150	Areas 1-6 with Faults	J147	04Nov86
CAL0151	Thickness Contours TSw2/WT	J159	18Nov86
CAL0152	Thickness Contours TSw2	J159	18Nov86
CAL0153	Thickness Contours GndSurf/TSw1	J159	18Nov86

APPENDIX D

Information from the Reference Information Base Used in this Report

This report used no information from the NNWSI Reference Information Base.

Candidate Information for the Reference Information Base

This report contains no candidate information for the NNWSI Reference Information Base.

Candidate Information for the Site & Engineering Properties Data Base

This report contains no candidate information for the Site and Engineering

— NOTICE —

QA checks on data contained here have only been performed to determine that these data have been obtained and documented properly. The DOE cautions that any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.