Environmental Restoration
University of California
Environmental Science and Waste Technology (E)
Environmental Restoration, MS M992
Los Alamos, New Mexico 87545
505-667-0808/FAX 505-665-4747

U.S. Department of Energy
Los Alamos Area Office, MS A316
Environmental Restoration Program
Los Alamos, New Mexico 87544
505-667-7203/FAX 505-665-4504

Date: February 14, 2001
Refer to: ER2001-0146

Mr. John Young, Corrective Action Project Leader
Permits Management Program
NMED – Hazardous Waste Bureau
2044 A Galisteo
Santa Fe, NM 87502

SUBJECT: DELIVERY OF INFORMATIONAL COPIES OF "CHARACTERIZATION WELL R-9 WELL COMPLETION REPORT," "CHARACTERIZATION WELL R-9i WELL COMPLETION REPORT," "CHARACTERIZATION WELL R-12 WELL COMPLETION REPORT," "CHARACTERIZATION WELL R-15 WELL COMPLETION REPORT," AND "CHARACTERIZATION WELL R-19 WELL COMPLETION REPORT"

Dear Mr. Young:

For your information, we are providing two copies each of the following documents:

- "Characterization Well R-9 Well Completion Report,"
- "Characterization Well R-9i Well Completion Report,"
- "Characterization Well R-12 Well Completion Report,"
- "Characterization Well R-15 Well Completion Report," and
- "Characterization Well R-19 Well Completion Report."

2001 FEB 27 PM 3:58
RCRA PERMITS PROGRAM

We also are providing a copy of each of these reports to Steve Yanicak and Michael Dale of the New Mexico Environment Department Oversight Bureau.

If you have questions about these documents, please contact Ted Ball, 665-3996

Sincerely,

Julie A. Canepa, Program Manager
Los Alamos National Laboratory
Environmental Restoration

Sincerely,

Theodore J. Taylor, Project Manager
Department of Energy
Los Alamos Area Office

3090

Enclosures:

1. Characterization Well R-9 Well Completion Report
2. Characterization Well R-9i Well Completion Report
3. "Characterization Well R-12 Well Completion Report
4. "Characterization Well R-15 Well Completion Report
5. "Characterization Well R-19 Well Completion Report

JC/TT/JT/vn

Cy (w/enc.):
M. Dale, NMED-DOE OB, MS J993
S. Yanicak, NMED-DOE OB, MS J993
J. Young, NMED-HWB (2 copies)
T. Taylor, LAAO, MS A316
RPF, MS M707

Cy (w/o enc.):
M. Buksa, E/ET, MS M992
J. Canepa, E/ER, MS M992
D. McInroy, E/ER, MS M992
D. Neleigh, US EPA (2 copies)
C. Nylander, ESH-18, MS K497
G. Turner, LAAO, MS A316
J. Davis, NMED-SWQB
M. Leavitt, NMED-GWQB
J. Parker, NMED-DOE OB
J. Bearzi, NMED-HWB
R. Dinwiddie, NMED-HWB
J. Kieling, NMED-HWB
E/ER File, MS M992

#66603

(122)

environmental restoration project

A Department of Energy
Environmental Cleanup Program

LA-UR-00-4085
September 2000
ER2000-0398

Characterization Well R-19 Completion Report

Los Alamos
NATIONAL LABORATORY
Los Alamos, NM 87545

Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the University of California for the United States Department of Energy under contract W-7405-ENG-36.

RECEIVED BY ER-RPM
JUL 05 2001

Produced by the Groundwater Investigations Focus Area

Authors: David Broxton, David Vaniman, William Stone, Steve McLin, Jon Marin, Richard Koch, Rick Warren, Patrick Longmire, David Rogers, and Neal Tapia

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the Regents of the University of California, the United States Government nor any agency thereof, nor any of their employees make any warranty, express or implied, or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represent that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the Regents of the University of California, the United States Government, or any agency thereof.

Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness. By acceptance of this article, the publisher recognizes that the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy.

ABSTRACT

Characterization well R-19 is located atop the mesa separating Threemile and Potrillo Canyons, east of firing site IJ at Technical Area (TA)-36, Los Alamos National Laboratory (the Laboratory). This characterization well is the sixth of approximately 32 wells being installed in the regional aquifer as part of the Laboratory's "Hydrogeologic Workplan" (LANL 1998, 59599). R-19 was funded by the Laboratory's Environmental Restoration Project and is primarily designed to provide water-quality and water-level data for potential intermediate-depth perched zones and for the regional aquifer downgradient of high-explosive contaminant-release sites at TA-16. The installation schedule for R-19 was accelerated after high-explosive contamination was found in groundwater from characterization well R-25, located 2 mi west of R-19. Data collected from R-19, in conjunction with data from other planned characterization boreholes and from other data sources, are being used to evaluate the nature and extent of high-explosive contamination originating at TA-16. Data from R-19 are also being used to increase understanding of the hydrogeology of a little-studied part of the Laboratory and to update the sitewide conceptual hydrogeologic model.

R-19 was drilled in two phases. Phase I was conducted during January 2000 and consisted of using a hollow-stem-auger method to drill to a depth of 126.5 ft within the Tshirege Member of the Bandelier Tuff. Phase II of drilling was conducted from January through April 2000 using rotary methods that involved a combination of casing-advance and open-hole techniques. During Phase II, R-19 was drilled to a depth of 1902.5 ft, and a multiscreen well containing seven screened intervals was installed.

Geologic units encountered in R-19 consisted of, in descending order, soil, the Tshirege Member of the Bandelier Tuff including the basal Tsankawi Pumice Bed; tephras and volcaniclastic sediments of the Cerro Toledo interval; the Otowi Member of the Bandelier Tuff, including the basal Guaje Pumice Bed; an upper subunit of the Puye Formation fanglomerate facies; basaltic rocks of the Cerros del Rio volcanic field; a lower subunit of Puye Formation fanglomerates; and a thick sequence of pumice-rich sedimentary deposits that are currently not assigned to a specific stratigraphic unit.

Three zones of saturation were anticipated at R-19; two were perched zones and one was the regional zone of saturation. In practice, the presence or absence of perched saturation at R-19 is unclear because drilling fluids masked any perched saturation. Two well screens were placed opposite possible perched zones based on indications of increased moisture content by geophysical logs. The regional water table was found at a depth of 1178 ft, 60 ft deeper than expected. This water appeared to be unconfined and saturation continued to total depth of the borehole (1902.5 ft). Five well screens were distributed through the regional zone of saturation. Straddle-packer/injection testing of materials in the lower two screens in unassigned pre-Puye Formation deposits yielded hydraulic conductivity values of 17.5 (screen #6) and 19.6 (screen #7) ft/day.

Extensive borehole geophysical data were obtained from support subcontractor personnel who conducted borehole video and natural gamma radiation surveys using the Laboratory's logging trailer and from Schlumberger Wire Line Services Company, who obtained a suite of borehole geophysical logs. These surveys were conducted in cased hole from the surface to a depth of 211 ft and in open hole below 211 ft. Open-hole geophysical logging included caliper, resistivity, natural gamma radiation, spontaneous potential, lithodensity, magnetic resonance, borehole color video, epithermal neutron, neutron porosity, spectral natural radiation (K, U, Th), formation microimager, and hole deviation.

Well R-19 will provide long-term data on groundwater properties. However, the installation of R-19 has already provided new knowledge on existing water levels, water composition, and hydrogeology. In addition, the unexpected thickness of the Cerro Toledo interval and the occurrence of a deep sequence of pumiceous sediments, where Santa Fe Group sediments were anticipated, add to the understanding of hydrogeologic units at the Laboratory.

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 SUMMARY OF DRILLING ACTIVITIES 1

2.1 Equipment 3

2.1.1 Phase I 3

2.1.2 Phase II 3

2.2 Schedule 3

2.2.1 Phase I 3

2.2.2 Phase II 5

2.3 Production 5

2.3.1 Phase I 5

2.3.2 Phase II 5

2.3.3 Casing Advancement 7

2.3.4 Open-Borehole Drilling 7

2.3.5 Core Drilling 7

2.3.6 Other Drilling Activities 7

3.0 GEOLOGY 7

3.1 Stratigraphy and Lithology 9

3.1.1 Mesa-Top Soil 9

3.1.2 Tshirege Member of the Bandelier Tuff 9

3.1.3 Tephras and Volcaniclastic Sediments of the Cerro Toledo Interval 12

3.1.4 Otowi Member of the Bandelier Tuff and Guaje Pumice Bed 14

3.1.5 Puye Formation 14

3.1.6 Cerros del Rio Basalt 15

3.1.7 Puye Formation 18

3.1.8 Pumiceous Sedimentary Deposits, Unassigned 21

3.2 Borehole Geophysics 25

3.2.1 Description of Borehole Logging Activities 25

3.2.2 Borehole Geophysical Methods 27

3.2.3 Results of Borehole Geophysical Surveys 29

4.0 HYDROLOGY 35

4.1 Unsaturated Zone 35

4.1.1 Soil-Water Occurrence 35

4.1.2 Soil-Water Movement 35

4.2 Saturated Zones 36

4.2.1 Groundwater Occurrence 38

4.2.2 Groundwater Movement 38

5.0 HYDROGEOCHEMISTRY 39

5.1 Geochemistry of Core and Cutting Samples Collected during Drilling 39

5.2 Hydrogeochemistry of Groundwater Samples 39

6.0 WASTE MANAGEMENT 40

7.0 SURVEY ACTIVITIES 41

7.1 Geodetic Survey 41

7.2 Surface Radiological Survey 41

8.0 WELL DESIGN, CONSTRUCTION, AND DEVELOPMENT 41
8.1 Well Design 41
8.2 Well Construction 42
8.3 Well Development 42
8.4 Geochemical Tests to Evaluate the Cleanup of Drilling Fluids During Well Development 44
8.5 Installation of Westbay's MP55 System® 46
8.6 Wellhead Protection 47
9.0 SITE RESTORATION 47
10.0 MODIFICATIONS TO WORK PLANS 51
11.0 IMPLICATIONS FOR CONCEPTUAL GEOLOGIC, HYDROGEOLOGIC, AND GEOCHEMICAL MODELS 56
12.0 ACKNOWLEDGEMENTS 56
13.0 REFERENCES 57

Appendixes

Appendix A Drilling Chronology
Appendix B Lithologic Log
Appendix C Moisture and Matric-Potential Results
Appendix D Westbay's MP55 Well Components Installed in R-19

List of Figures

Figure 1.0-1. Locations of well R-19 and line of section for Figure 3.0-2 2
Figure 2.0-1. R-19 borehole configuration at total depth 4
Figure 3.0-1. Comparison of actual and predicted geologic contacts in R-19 8
Figure 3.0-2. WNW-ESE cross section through the southern part of the Laboratory showing geology in the vicinity of R-19. 10
Figure 3.1-1. Variations in SiO_2, K_2O/P_2O_5, Sr, and Mg# [cation ratio of Mg/(Mg+Fe)] with stratigraphic depth in the sequence of Cerros del Rio basalts sampled at R-19 17
Figure 3.1-2. Variation in SiO_2, Fe_2O_3, Sr, and Sr/Rb with depth by size fractions from Cerro Toledo, Puye, and unassigned pumiceous sedimentary deposits in drill hole R-19. 20
Figure 3.1-3. Results of natural gamma radiation survey obtained March 14, 2000 22
Figure 3.1-4. Sr versus Rb systematics, defining fields of high Sr, low Rb for Puye deposits, low Sr, high Rb for the unassigned pumiceous deposits, and a distinctive low-Sr, low-Rb field for the <1-mm-sized fraction of the Cerro Toledo deposits 24
Figure 4.1-1. Gravimetric moisture and matric potential in borehole R-19 37
Figure 8.2-1. As-built well-completion diagram of well R-19 43

Figure 8.3-1. Results of final development (pumping) for screen #3 45
Figure 8.6-1. Well R-19 wellhead diagram 50

List of Plates

Open Hole Formation Evaluation Well Montage

List of Tables

Table 2.0-1. Drilling Shift Information 3
Table 2.3-1. Preliminary Performance Statistics, Characterization Well R-19 6
Table 2.3-2. Footage Intervals Drilled with Lubrication Slurry, Characterization Well R-19 6
Table 3.0-1. Weight Percentages of Size Fractions in Representative Cuttings from Drill Hole R-19 11
Table 3.1-1. Chemical Analyses of the Cerro Toledo Deposits and of the Guaje Pumice Bed from Drill Hole R-19 by Size Fractions 13
Table 3.1-2. Chemical Analyses of Cerros del Rio Basalts and of Pumice Beds and Hand-Picked Pumice from Drill Hole R-19 16
Table 3.1-3. Chemical Analyses of the Puye Fanglomerates from Drill Hole R-19 by Size Fractions 19
Table 3.1-4. Quantitative X-Ray Diffraction Analyses of 2- to 4-mm-Sized Fractions from the Puye Fanglomerate and from Unassigned Pumiceous Sedimentary Deposits in Drill Hole R-19 21
Table 3.1-5. Chemical Analyses of Unassigned Pumiceous Sedimentary Deposits from Drill Hole R-19 23
Table 3.2-1. Borehole Geophysics Surveys at R-19 26
Table 3.2-2. Summary of Natural Gamma Radiation at R-19 on March 14, 2000 29
Table 3.2-3. Average Borehole Geophysical Data for Each Formation, Geologic Summary 30
Table 3.2-4. Average Borehole Geophysical Data for Each Formation, Hydrologic Summary 31
Table 3.2-5. Average Borehole Geophysical Data for Each Screen Interval, Geologic Summary 34
Table 3.2-6. Average Borehole Geophysical Data for Each Screen Interval, Hydrologic Summary 34
Table 4.2-1. Summary of Data for Straddle-Packer/Injection Testing of Pre-Puye Deposits at R-19 39
Table 8.1-1. Planned and Actual Screen Placements in Well R-19 42
Table 8.3-1. Summary of Final (Pumping) Phase of Development at R-19 44
Table 8.5-1. Depths of Key Items Installed During R-19 MP55 Completion 48
Table 10.0-1. Activities Planned for R-19 Compared with Work Performed 52

List of Acronyms and Abbreviations

AIT	array induction tool
API	American Petroleum Institute
APS	accelerator porosity sonde
APT	accelerator porosity tool
bgs	below ground surface
CMR	combinable magnetic resonance
cps	counts per second
DR	dual rotation
DX	Dynamic Experimentation (Division)
ER	environmental restoration
FMI	formation microimager
ft MSL	feet above mean sea level
GPS	global positioning system
HE	high explosive
HNGS	hostile environment natural gamma sonde
HPLC	high-performance liquid chromatography
HSA	hollow-stem auger
I.D.	inner diameter
LATA	Los Alamos Technical Associates, Inc.
LDT	lithodensity tool
NGR	natural gamma radiation
NMED	New Mexico Environment Department
NMR	nuclear magnetic resonance
NTU	nephelometric turbidity unit
O.D.	outer diameter
PPE	personal protection equipment
QA	quality assurance
RC	reverse circulation
RCT	radiological control technician
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine (research department explosive)
SAIC	Science Applications International Corporation
TA	technical area
TD	total depth
3-D	three-dimensional
TOC	total organic carbon
TNT	2,4,6-trinitrotoluene
WCSF	waste characterization strategy form

Metric to English Conversions

Multiply SI (Metric) Unit	by	To Obtain US Customary Unit
kilometers (km)	0.622	miles (mi)
kilometers (km)	3281	feet (ft)
meters (m)	3.281	feet (ft)
meters (m)	39.37	inches (in.)
centimeters (cm)	0.03281	feet (ft)
centimeters (cm)	0.394	inches (in.)
millimeters (mm)	0.0394	inches (in.)
micrometers or microns (µm)	0.0000394	inches (in.)
square kilometers (km^2)	0.3861	square miles (mi^2)
hectares (ha)	2.5	acres
square meters (m^2)	10.764	square feet (ft^2)
cubic meters (m^3)	35.31	cubic feet (ft^3)
kilograms (kg)	2.2046	pounds (lb)
grams (g)	0.0353	ounces (oz)
grams per cubic centimeter (g/cm^3)	62.422	pounds per cubic foot (lb/ft^3)
milligrams per kilogram (mg/kg)	1	parts per million (ppm)
micrograms per gram (µg/g)	1	parts per million (ppm)
liters (L)	0.26	gallons (gal.)
milligrams per liter (mg/L)	1	parts per million (ppm)
degrees Celsius (°C)	9/5 + 32	degrees Fahrenheit (°F)

1.0 INTRODUCTION

This report describes the drilling, well construction and development, and testing activities for characterization well R-19. R-19 is located atop the mesa separating Threemile and Potrillo Canyons, east of firing site IJ at Technical Area (TA) 36. R-19 was drilled to a depth of 1902.5 ft, and it was completed as a multiscreen well containing seven screened intervals that can be sampled individually. This well was installed for the Environmental Restoration (ER) Project by the Groundwater Investigations Focus Area. It is the sixth characterization well drilled to the regional aquifer as part of the "Hydrogeologic Workplan"(LANL 1998, 59599) in support of Los Alamos National Laboratory's (the Laboratory's) "Groundwater Protection Management Program Plan" (LANL 1995, 50124).

R-19 is primarily designed to provide water quality and water-level data for potential intermediate-depth perched zones and for the regional aquifer downgradient of high-explosive (HE)-contaminant release sites at TA-16. The schedule for installation of R-19 was accelerated after HE was found in groundwater during drilling of characterization well R-25, located 2 mi to the west of R-19. In the hydrogeologic work plan, R-19 was originally planned for installation in Pajarito Canyon, but its location was moved to the mesa top south of Threemile Canyon to provide early warning of contaminants approaching supply well PM-2, located about 1 mi to the east (Figure 1.0-1). The location for R-19 also provides new hydrologic and geologic data that contribute to the understanding of the vadose zone and regional aquifer in a little-studied part of the Laboratory. Data collected from R-19 will be used in conjunction with data from other planned characterization boreholes as well as from other data sources to evaluate and update the sitewide hydrologic conceptual model.

Preliminary interpretations are presented for some of the data collected, but discussion of other data is deferred until they can be evaluated in the context of sitewide information collected from other ER Project and hydrogeologic work plan wells. A future report will provide an integrated human health and ecological risk assessment and will include groundwater data from other nearby ER Project wells.

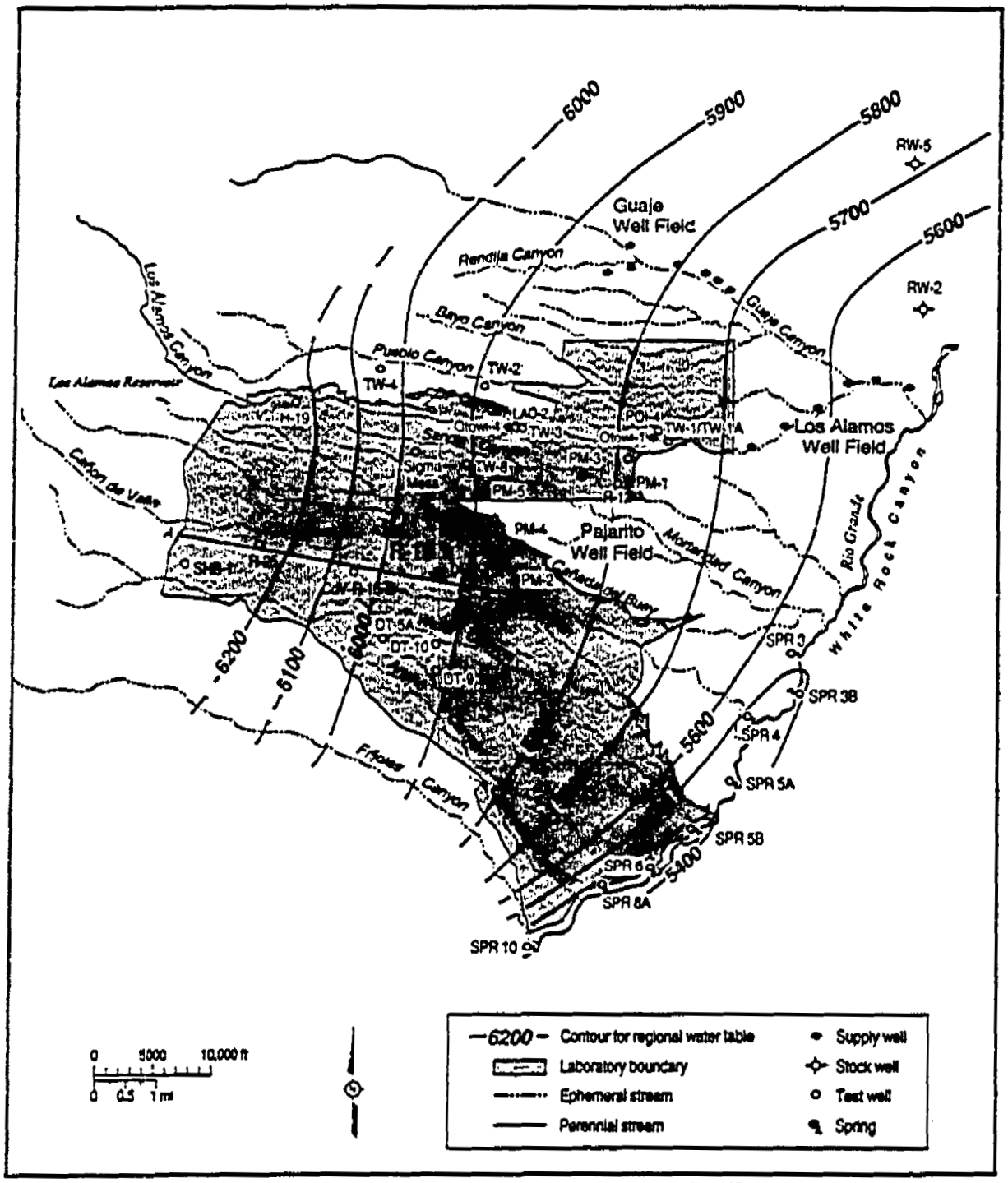
Although R-19 is primarily a characterization well, its design also meets the requirements of a monitoring well as defined in Module VIII of the Laboratory's Hazardous Waste Facility Permit. Incorporation of this well into a Laboratory-wide groundwater monitoring program will be evaluated at a later date when the results of this characterization activity are integrated with groundwater investigations in the hydrogeologic work plan (LANL 1998, 59599).

2.0 SUMMARY OF DRILLING ACTIVITIES

Drilling activities at R-19 are divided into the following categories: site preparation and Phase I drilling, Phase II drilling, well installation, and well development/testing. Los Alamos Technical Associates, Inc. (LATA) and Science Applications International Corporation (SAIC) provided field support during both phases of drilling. Table 2.0-1 compares the actual number of shifts for each category with the number of shifts projected for R-19 operations in the field implementation plan.

Phase I drilling at R-19 utilized the hollow-stem auger (HSA) drilling technique to drill to a depth of 126.5 ft below ground surface (bgs) and to install 18-in. steel surface conductor casing to 19.5 ft bgs. The HSA borehole below the surface casing was back-filled with cuttings and the 18-in. surface casing was cemented in place.

Phase II drilling at R-19 utilized an air-rotary drilling technique to drill to a depth of 1902.5 ft. A diagram showing the configuration of the R-19 borehole at total depth (TD) is shown in Figure 2.0-1. Following Phase II drilling, a permanent monitoring well was installed and completed with seven screened intervals.



Source: Purtymun 1984, 6513.

F1.0-1 / R-19 WELL COMPLETION RPT / 081200 / PTM

Figure 1.0-1. Locations of well R-19 and line of section for Figure 3.0-2

Table 2.0-1
Drilling Shift Information

Operations Category	Field Implementation Plan Number of Shifts	Actual Number of Shifts
Phase I drilling/site preparation	8 10-hr	5 10-hr
Phase II drilling	90 12-hr	77 12-hr
Well installation	55 12-hr	62 12-hr
Well development/testing	5 12-hr	39 12-hr
Total Shifts	8 10-hr and 150 12-hr	5 10-hr and 178 12-hr

Note: Shifts averaged 10 to 12 hr each, depending on production needs.

2.1 Equipment

2.1.1 Phase I

Phase I drilling at R-19 was conducted by Stewart Brothers Drilling Company using a CME-750 HSA drill rig with 4.25-in.-inside diameter (I.D.) Truspin™ HSAs to a depth of 126.5 ft bgs. The hole was overreamed using an 11-in.-I.D. HSA to a depth of 20 ft. A Moss™ wire line continuous-core retrieval system was used to core from the surface to 126.5 ft bgs.

2.1.2 Phase II

Phase II of R-19 was drilled by Dynatec Drilling Company, Inc. (formerly Tonto Drilling Company) using Foremost™ dual rotation (DR)-24 drill rigs. Dynatec provided a drilling supervisor, drilling crews, crew vehicles including 1-ton flatbed trucks, drilling rods, hammers, bits, 5000-gal. water truck, fuel truck, construction lights, auxiliary air compressor, and a 5-ton boom truck for handling casing, drill rods, and heavy support apparatus such as casing jacks.

The ER Project's field support facility provided drill casings, drilling bits, a small front-end loader (Bobcat™), dust suppression system, water containment tanks, depth-to-water meters, water sampling bailers, sample filtration trailer, diesel-powered electric generator, core boxes, chip trays, and an industrial sink for borehole material washing. The Sample Management Office provided sample and sample shipping containers. The ER Project provided escort vehicles, a laptop computer, cellular telephone, equipment to measure water sample field parameters, filtering apparatus, and a core-logging microscope. ESH-18 provided the borehole geophysics trailer and a downhole pressure transducer and electronic data logger.

The facility host (the Dynamic Experimentation Division [DX]) provided radio communication.

LATA/SAIC, as subcontractors to the ER Project, provided field team leaders, geologists, and site safety officers; rented a portable toilet and a combination sampling/office trailer; and procured field support supplies including deionized water for small-scale decontamination.

2.2 Schedule

2.2.1 Phase I

During Phase I, the CME-750 drill rig was mobilized to R-19 on January 7, 2000, and it was demobilized on January 13, 2000. Drilling operations required 5 drilling shifts, including equipment mobilization and demobilization. Operations were conducted in one 10-hr shift per day, Monday through Friday.

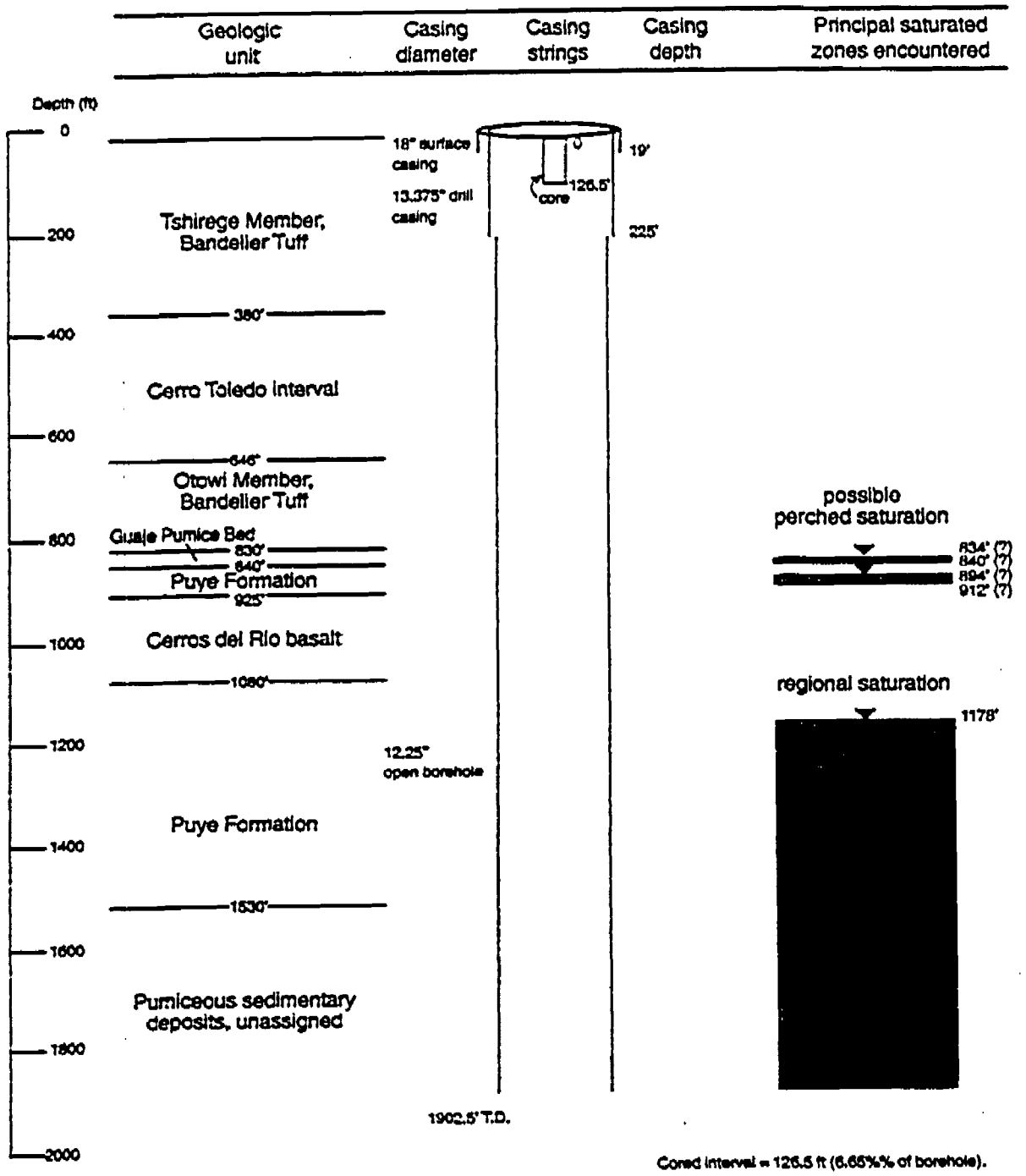


Figure 2.0-1. R-19 borehole configuration at total depth

Table 2.0-1 compares the actual number of shifts with the number of shifts projected for R-19 Phase I in the field implementation plan. Chronological operations for R-19 Phase I are summarized in Appendix A.

2.2.2 Phase II

During Phase II, the DR-24 drill rig was mobilized to R-19 on January 25, 2000 and demobilized on April 28, 2000. Drilling production at another deep borehole/well (CdV-R-15-3) required the switch out of the leased DR-24 drill rig at that site with the DR rig from R-19. Phase II drilling operations at R-19, including well development and testing, required 139.0 total shifts. Drilling and well-installation operations were typically conducted in two 12-hr shifts, seven days per week, but were periodically suspended due to facility work restrictions. Well development and testing activities were typically conducted during one 12-hr shift per day, five to seven days per week. Table 2.0-1 compares the actual number of shifts with the number of shifts projected for R-19 Phase II in the field implementation plan. Chronological operations for R-19 Phase II are summarized in Appendix A.

2.3 Production

2.3.1 Phase I

During Phase I, R-19 was continuously cored from the surface to refusal at 126.5 ft using 4.25-in.-I.D. Truspin™ HSAs with a Moss™ wire line continuous-core retrieval system. Using the in-place 4.25-in. HSA string as a guide, the borehole was reamed by 11-in.-I.D. HSAs from the surface to 20 ft. As the 4.25-in. auger string was withdrawn, the borehole was backfilled with cuttings from 126.5 to 19 ft.

The 11-in. HSAs were removed and one 18-in.-diameter, 20-ft-long steel casing joint was lowered to a depth of 19 ft bgs and a stickup of 1 ft above the ground surface. A cement slurry was tremied to 19 ft and rose approximately 3 ft inside and outside the casing. The casing was repeatedly raised and lowered to achieve a homogeneous cement seal. After curing overnight, the cement plug was a barrier to prevent more cement from flowing into the casing from below while the borehole annular space around the casing was cemented to approximately six ft below the ground surface.

The total footage drilled in Phase I by the HSA drilling technique was 146.5 ft. Phase I production statistics are summarized in Table 2.3-1.

2.3.2 Phase II

Drilling techniques used in Phase II of R-19 consisted of air-rotary under-reamer advance of one retractable casing string (13.375-in.) and open-borehole drilling using a 12.25-in. tricone carbide button bit. Phase II footage drilled by the 13.375-in. casing was 211 ft (does not include 16 ft of open hole inside 18-in. surface casing at that time); footage drilled by the open-borehole drilling system was 1695 ft. Implementing the open-borehole drilling technique to advance approximately 95% of the Phase II borehole footage was a significant operational modification. The total Phase II footage drilled by the different drilling techniques and casing sizes was 1906 ft. The total footage drilled does not include regular conditioning of the borehole or tripping drill systems to regain circulation and/or change bits. The total trip-in footage was 27,275.5 ft at an average rate of 520.7 ft/hr, and the total trip-out footage was 28,034.7 ft at an average rate of 310.7 ft/hr. Phase II production statistics are also summarized in Table 2.3-1.

Table 2.3-1
Preliminary Performance Statistics, Characterization Well R-19

Drilling Types	Phase I			Phase II		Total
	4.25-in.-I.D. HSA Core	11-in.-I.D. HSA	18-in. Surface Casing	12.25-in. Open-Hole System	13.375-in. Casing[a,f]	
Total footage drilled (ft)[b]	126.5	20		1676	211	2052.5
Total footage rate (ft/hr)[b]						18.3
Bandelier Tuff footage (ft)[c]	126.5	20.0		620	211.0	977.5
Bandelier Tuff rate (ft/hr)[c]	18.5	26.7		21.2	20.4	20.8
Basalt footage (ft)[d]				150.0		150.0
Basalt rate (ft/hr)[d]				7.5		7.5
Puye clastics footage (ft)[e]				925		925
Puye clastics rate (ft/hr)[e]				17.5		17.5
Trip-in footage (ft)						27,275.5
Trip-in rate (ft/hr)						520.7
Trip-out footage (ft)						28,034.7
Trip-out rate (ft/hr)						310.7
Life-of-hole casing TD (ft)			19		227.0	

[a] Holte 3-wing under-reamer for 13.375-in. casing use SD-12 hammer and 7-in. reverse circulation (RC) rods.

[b] Borehole TD is 1902.5 ft. Total cored footage (126.5 ft) is 6.6% of total borehole depth.

[c] Bandelier Tuff footage and rate include Tshirege Member, Cerro Toledo interval, and Otowi Member.

[d] Basalt footage and rate include various subunits of Cerros del Rio basalt (massive, vesicular, and scoriaceous).

[e] Puye footage and rate include various subunits of the fanglomerate facies (upper, lower, and unassigned pumiceous).

[f] First 16 ft of 13.375-in. casing was lowered into hole; not drilled.

TORKease® polymer, EZ-MUD® (polyacrylamide-polyacrylate copolymer), and QUIK-FOAM® slurries, mixed with community water obtained at the standpipe located adjacent to the Los Alamos County landfill, were utilized during drilling to lubricate the casing and open-borehole drill systems. Footage intervals for which lubricating slurry was used are indicated in Table 2.3-2.

Table 2.3-2
Footage Intervals Drilled with Lubrication Slurry, Characterization Well R-19

Drilling Technique/Tools	Dry Footage Intervals (ft)	Footage Intervals with Lubrication Slurry (ft)
HSA/4.25-in. I.D.	0–126.5	
HSA/11-in. I.D.	0–20	
Air rotary/13.375-in. casing	16–143	143–227
Air rotary/open-hole 12.25-in. Tricone		225–1902.5

2.3.3 Casing Advancement

During Phase II, 13.375-in. retractable casing was initially advanced using air as the drilling fluid. At 134 ft bgs, slow production prompted the use of lubrication slurries. Advancement of the 13.375-in. retractable casing was terminated at 227 ft bgs due to getting stuck in Qbt 2 of the Tshirege Member. Several drilling shifts were expended to free the casing using various extraction techniques. Dynatec had slowly pulled back the casing from 227 ft to 205 ft, at which depth the casing separated at 113 ft. The 13.375-in. casing from 113 ft to 205 ft was abandoned in the borehole prior to well installation. At R-19, the 13.375-in. retractable casing was used only within the Bandelier Tuff, at an average rate of 20.4 ft/hr (Table 2.3-1).

2.3.4 Open-Borehole Drilling

Open-borehole drilling using a 12.25-in. tricone bit was used to drill from 225 ft to TD at 1902.5 ft. Dynatec drilled 620 ft of open borehole in the Bandelier Tuff and volcaniclastic sediments of the Cerro Toledo interval at an average rate of 21.2 ft/hr; 150 ft of Cerros del Rio basalt at an average rate of 7.5 ft/hr; and 905 ft of the fanglomerate facies of the Puye Formation at an average rate of 17.5 ft/hr (Table 2.3-1).

2.3.5 Core Drilling

During Phase I, coring was accomplished using the Moss™ wire line retrieval system with the HSA drilling method. HSA core was attempted from the surface to auger refusal at 126.5 ft. Average recovery was 94.2%.

During Phase II, no coring was attempted.

2.3.6 Other Drilling Activities

Other drilling activities included conditioning and reaming the borehole wall to maintain fluid circulation and prevent locking the drill strings in place. Miscellaneous activities such as cleaning clay cake from drill bits, casing, and air-circulation equipment were minimized by injecting TORKease polymer, EZ-MUD, and QUIK-FOAM slurries during drilling.

3.0 GEOLOGY

Geologic units encountered in R-19 consist of, in descending order, soil, Tshirege Member of the Bandelier Tuff including the basal Tsankawi Pumice Bed, tephras and volcaniclastic sediments of the Cerro Toledo interval, the Otowi Member of the Bandelier Tuff including the basal Guaje Pumice Bed, an upper subunit of the Puye Formation fanglomerate facies, basaltic rocks of the Cerros del Rio volcanic field, a lower subunit of Puye Formation fanglomerates, and pumice-rich sedimentary deposits of a yet unassigned stratigraphic association. Depths and elevations of the contacts between these units are shown in Figure 3.0-1, with a comparison to the predicted stratigraphy based on the three-dimensional (3-D) geologic model available at the time drilling began. Notable differences between the predicted and as-drilled stratigraphy are the greater thickness of the Cerro Toledo interval, the lesser thickness of the Otowi Member of the Bandelier Tuff, the thinner sequence of Cerros del Rio basalts, the absence of axial facies river gravels (Totavi) at the base of the Puye Formation, and the occurrence of unassigned pumiceous sedimentary deposits in lieu of Santa Fe Group sedimentary deposits.

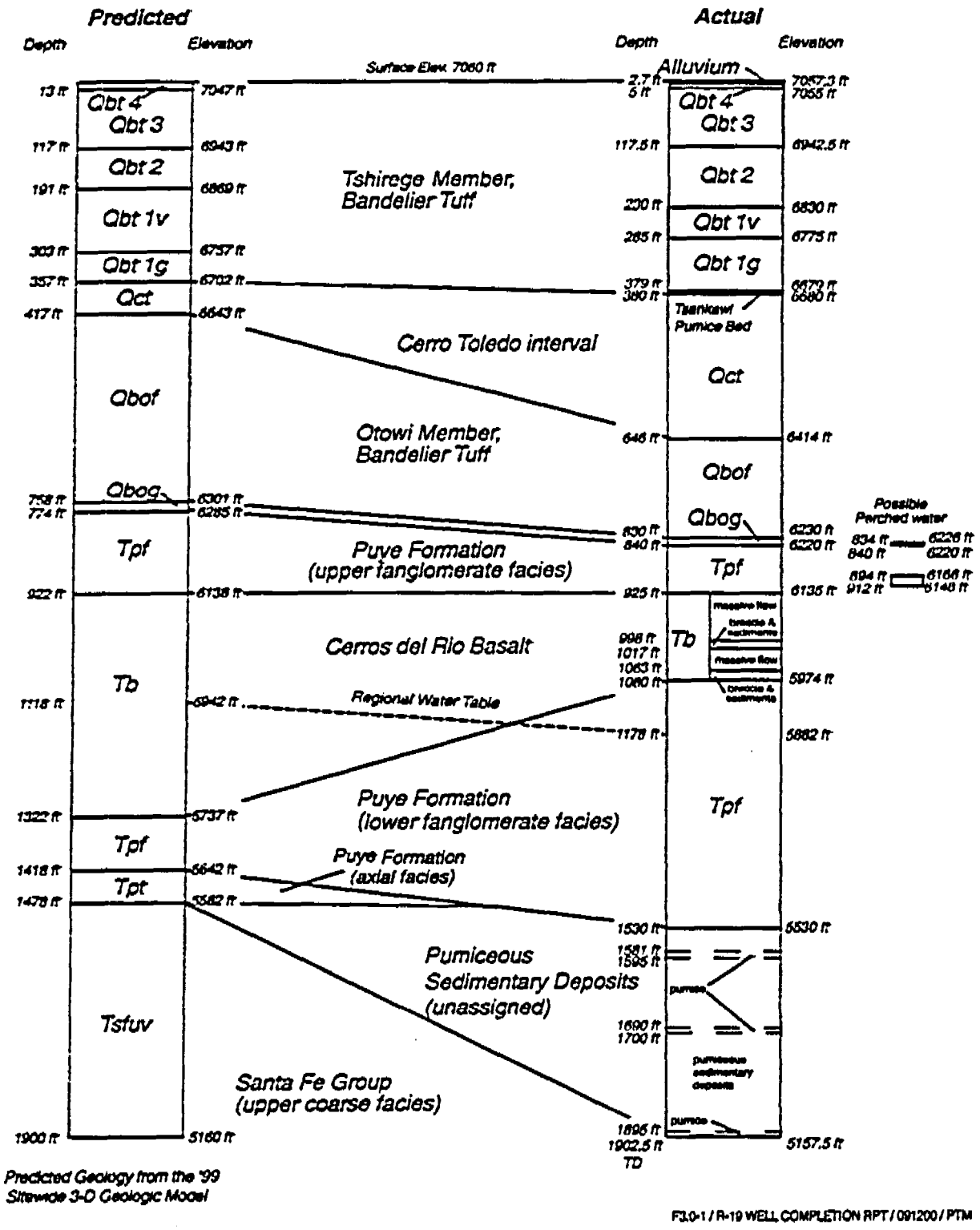


Figure 3.0-1. Comparison of actual and predicted geologic contacts in R-19

A brief summary of unit characteristics is given in the following sections, and a lithologic log is provided in Appendix B. An interpretive east-west cross section incorporating results from recent drilling at CdV-R-15-3 is given in Figure 3.0-2. Descriptions of geologic units are based on examination of cuttings, geophysical logs, drilling information, and laboratory examination of borehole materials. All studies of deeper borehole materials for petrography, mineralogy, and geochemistry were based on cuttings. Cuttings were collected by reverse circulation, minimizing the admixture of materials from upper portions of the borehole. Table 3.0-1 summarizes the weight proportions of different-sized-fractions for cuttings representative of several stratigraphic units in R-19. Disaggregation during drilling and concentration of lithic fragments was particularly prominent in nonwelded portions of the Bandelier Tuff. However, fragments of the basalt flows were collected unmixed with other lithologies from higher units, providing an indication of how effective the reverse-circulation system is in lifting cuttings solely from the zone where the bit is active. In the sedimentary units (Cerro Toledo, Puye, and unassigned pumiceous sedimentary deposits) the analysis of size fractions in Table 3.0-1 provides information related to in situ grain sizes, with the caveats that cobbles significantly larger than the inner diameter of the drill rods must be disaggregated to be carried to the surface and the fine-sand to clay fraction may be largely lost when cuttings are caught at the surface.

Table 3.0-1 also shows the locations of well screens at R-19 in relation to the intervals sampled for lithologic analysis. These samples are particularly important for relating geochemistry, petrology, mineralogy, and sedimentology to the interpretation of waters sampled in long-term monitoring. The preliminary data for evaluating these relations are provided in this report; other analyses may be appropriate in evaluating data to be obtained in the future under the long-term monitoring program.

3.1 Stratigraphy and Lithology

3.1.1 Mesa-Top Soil (0- to 2.7-ft depth)

Mesa-top soil was penetrated from the surface to a depth of 2.7 ft (Appendix B). The soil is sandy, dry, and contains abundant 1- to 2-mm crystals of quartz and chatoyant sanidine derived principally from Qbt 4 of the Tshirege Member of the Bandelier Tuff.

3.1.2 Tshirege Member of the Bandelier Tuff

The Pleistocene Tshirege Member of the Bandelier Tuff consists of multiple cooling units, designated downsection as units Qbt 4, 3, 2, 1v, and 1g. Nomenclature and definition of these units follows the usage of Broxton and Reneau (1995, 49726).

Qbt 4 (2.7- to 5-ft depth)

A thin sequence of Qbt 4 of the Tshirege Member was encountered below the soil. Qbt 4 consists of massive, moderately welded, devitrified, ash-flow tuff. Compared to the underlying units of the Tshirege Member, Qbt 4 is poorer in silica and more Ti, Fe, and Ba-rich (Broxton et al. 1995, 54709).

Qbt 3 (5- to 117.5-ft depth)

Qbt 3 of the Tshirege Member was encountered between the depths of 5 and 117. 5 ft. Qbt 3 consists of massive, poorly consolidated, vitric, nonwelded ash-flow tuff. This unit is more typical in composition of the lower Tshirege ash flows, which are distinctly less mafic than Qbt 4.

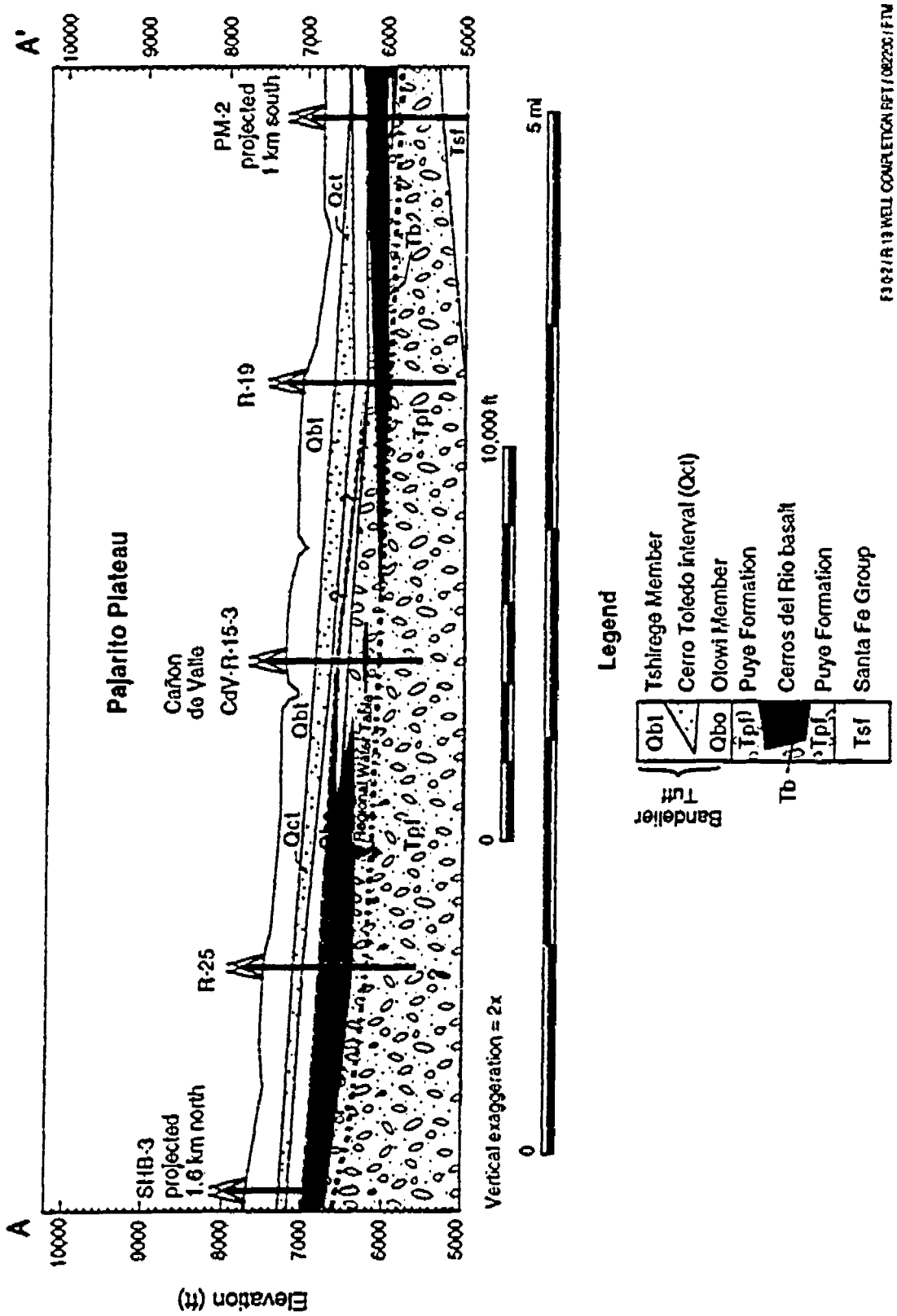


Figure 3.0-2. WNW-ESE cross section through the southern part of the Laboratory showing geology in the vicinity of R-19. See Figure 1.0-1 for location of cross section.

Table 3.0-1
Weight Percentages of Size Fractions in Representative Cuttings from Drill Hole R-19

Sample Top (Depth in ft)	Sample Bottom (Depth in ft)	Screen Locations	Unit	Notes	% >4 mm	% 2–4 mm	% 1–2 mm	% <1 mm
380	382		Cerro Toledo		69.3	29.1	1.3	0.2
510	515		Cerro Toledo		29.4	34.1	19.9	16.7
635	640		Cerro Toledo		19.0	12.5	13.4	55.1
834	835	screen #1	Guaje		9.2	11.9	32.7	46.1
900	905	screen #2	Puye		25.6	25.3	21.6	27.5
960	965		Cerros del Rio	tholeiitic flow	42.5	48.8	6.2	2.5
995	1000		Cerros del Rio	tholeiitic flow	39.2	16.0	13.3	31.5
1025	1030		Cerros del Rio	alkalic flow	7.9	1.7	28.6	61.8
1055	1060		Cerros del Rio	alkalic flow	11.0	19.6	32.1	37.3
1075	1080		basaltic sand		12.9	34.6	18.2	34.3
1095	1100		Puye		11.6	22.0	22.6	43.7
1170	1175	screen #3	Puye		19.9	39.2	19.1	21.8
1205	1210	screen #3	Puye	clay/gravel	40.9	22.8	8.6	27.7
1330	1335		Puye	rounded cobbles	83.9	15.4	0.4	0.3
1380	1385		Puye	clay/sand	7.4	5.0	8.3	79.4
1410	1415	screen #4	Puye		51.7	21.5	11.8	15.0
1515	1520		Puye		42.3	29.9	8.1	19.6
1555	1560		unassigned		1.9	4.0	6.1	88.0
1585	1590	screen #5	unassigned	pumice bed	22.4	54.5	0.7	22.4
1590	1595		unassigned	pumice bed	35.7	59.7	0.6	4.1
1720	1725		unassigned	clay/sand	0.6	4.1	15.7	79.6
1730	1735	screen #6	unassigned		10.6	28.0	14.6	46.7
1735	1740		unassigned		14.0	20.2	15.2	50.5
1830	1835		unassigned		83.3	10.1	3.4	3.2
1835	1840	screen #7	unassigned		22.2	31.6	12.7	33.5
1895	1900		unassigned	pumice bed	87.3	7.1	0.1	5.5

Qbt 2 (117.5- to 230-ft depth)

Qbt 2 of the Tshirege Member was encountered between depths of 117.5 and 230 ft. This unit consists of massive, slightly to moderately welded, devitrified, ash-flow tuff. Even though completely vapor-phase altered, in most locales Qbt 2 differs from the upper parts of the Tshirege in having a silica-phase assemblage of mostly tridymite and phenocrystic quartz that is common in the higher zones of vapor-phase alteration (Broxton et al. 1995, 54709).

Caliper logging of the open borehole at R-19 indicates significant washout near the base of Qbt 2, to ~226 ft depth. This zone of washout may correspond to a decrease in welding at the Qbt 2/Qbt 1v contact.

Qbt 1v (230- to 285-ft depth)

Qbt 1v of the Tshirege Member was encountered between depths of 230 and 285 ft. This unit consists of massive, poorly consolidated, devitrified, nonwelded ash-flow tuff. The use of "v" in the unit symbol refers to the extensive vapor-phase alteration in this upper part of Qbt 1, in contrast to the lower part, Qbt 1g, in which primary glass is largely preserved with little vapor-phase alteration.

Geophysical logs indicate a steady rise in the abundance of bound water and particularly in capillary water from top to bottom in Qbt 1v. This increase in water content, most notably in capillary water, may reflect increasing matrix porosity of Qbt 1v with depth.

Qbt 1g (285- to 379-ft depth) and Tsankawi Pumice Bed (379- to 380-ft depth)

Qbt 1g of the Tshirege Member, including the basal Tsankawi Pumice Bed, was encountered between depths of 285 and 380 ft. This unit consists of massive, poorly consolidated, vitric, nonwelded ash-flow tuff. A thin deposit of the Tsankawi Pumice Bed occurs from 379 to 380 ft.

At ~300-ft depth the abundance of capillary water in Qbt 1g begins to rise above the highest value measured in Qbt 1v, and the content of capillary water in Qbt 1g continues to rise to the base of the unit. The values of capillary water content attained are comparable to those in the Otowi Member and may reflect the high matrix porosity typical of vitric nonwelded tuff.

3.1.3 Tephras and Volcaniclastic Sediments of the Cerro Toledo Interval (380- to 646-ft depth)

The Pleistocene Cerro Toledo interval is exceptionally thick at R-19, extending from depths of 380 to 646 ft (Appendix B). The thickness of this unit, 266 ft, is much greater than the thickness predicted from the 3-D geologic model at the time of drilling (60 ft; Figure 3.0-1). Revisions to the 3-D geologic model are needed in view of the unexpected magnitude of Cerro Toledo deposition in this part of the Laboratory site. The correspondingly less-than-expected thickness of the Otowi Member indicates an erosional low, developed on the Otowi Member, in which Cerro Toledo sedimentary deposits accumulated. The thickness of the Cerro Toledo deposits and the erosional thinning of the Otowi Member at R-19 are consistent with the SSW-draining pre-Tshirege valley proposed in this area by Broxton and Reneau (1996, 55429). Further drilling in the central, southern, and southwestern parts of the Laboratory site should provide the information necessary to revise the geometry of the erosional and depositional relations between the Cerro Toledo and the underlying Otowi Member.

The Cerro Toledo interval at R-19 consists predominantly of moist red-brown clayey silt and moist fine- to medium-grained, well sorted, clean sand. Somewhat coarser sandy gravels are also present at the top of the sequence (380 to 390 ft) and in the lower sedimentary deposits (520 to 646 ft). Grain-size analysis of representative cuttings (Table 3.0-1) indicates considerable variability in sediment size, ranging from gravels composed of >98 wt % clasts >2 mm (380- to 382-ft depth), to fine sands with >55 wt % clasts of <1 mm (510- to 515-ft depth), to deposits with fine sand (<1 mm), coarse sand (1 to 2 mm), fine gravel (2 to 4 mm), and coarser clasts (>4 mm) in subequal abundance (635- to 640-ft depth).

Petrographic analysis of the 2- to 4-mm clasts from three Cerro Toledo horizons (380 to 382 ft, 510 to 515 ft, and 635 to 640 ft) shows a common occurrence of aphyric vitric pumice related to rhyolitic sources active between the two episodes of Bandelier ash-flow eruption. However, the abundance of these pumices is greatest in the sample from the central portion of the Cerro Toledo interval and relatively minor in the samples from near the top and the bottom of the sequence. In these latter samples, clasts derived from the Tschicoma Formation predominate. The uppermost sample includes one clast of meta-arkose, probably a trace xenolith reworked from a deposit of rhyolitic tephra.

Chemical data for splits of the 2- to 4-mm clasts from the same three representative horizons in the Cerro Toledo are provided in Table 3.1-1. The higher silica content of the 2- to 4-mm clasts at 510- to 515-ft depth reflects the greater abundance of rhyolitic pumice in this sample, compared to the 2-4 mm clasts from the top and bottom of the Cerro Toledo unit. The data in Table 3.1-1 include analyses of <1-mm clasts from the horizons at 510- to 515-ft and 635- to 640-ft depth. Compared to the 2- to 4-mm fractions from the same horizons, the finer fractions are significantly higher in SiO_2 and lower in most other constituents, suggesting concentration of detrital silica minerals (probably quartz) in the sand fraction. Further analysis of Cerro Toledo samples from this and future boreholes in the region will help in interpreting the sedimentology of this unit. These interpretations can be used to construct a more realistic representation of the Cerro Toledo deposits in the 3-D geologic model.

Table 3.1-1
Chemical Analyses of the Cerro Toledo Deposits and of the Guaje Pumice Bed from Drill Hole R-19 by Size Fractions

Sample Number[a]	R-19 380–382	R-19 510–515	R-19 510–515	R-19 635–640	R-19 635–640	R-19 834–835	R-19 834–835	R-19 834–835
Stratigraphic Unit	Cerro Toledo	Cerro Toledo	Cerro Toledo	Cerro Toledo	Cerro Toledo	Guaje Pumice Bed	Guaje Pumice Bed	Guaje Pumice Bed
Sample type	Cuttings (2–4 mm)	Cuttings (2–4 mm)	Cuttings (<1 mm)	Cuttings (2–4 mm)	Cuttings (<1 mm)	Cuttings (2–4 mm)	Cuttings (1–2 mm)	Cuttings (<1 mm)
SiO_2 %	68.95	70.26	77.49	64.15	74.87	70.85	88.95	80.39
TiO_2 %	0.49	0.28	0.11	0.72	0.23	0.47	0.10	0.11
Al_2O_3 %	16.22	15.41	12.74	17.08	13.42	13.97	6.01	10.80
Fe_2O_3 %	3.58	2.74	1.15	4.39	1.84	2.97	0.74	1.37
MnO %	0.07	0.08	0.03	0.09	0.05	0.09	0.02	0.05
MgO %	1.27	0.69	0.17	1.45	0.40	0.85	0.17	0.14
CaO %	2.46	1.49	0.52	3.00	0.83	1.83	0.33	0.43
Na_2O %	3.63	4.16	3.59	4.51	3.63	3.47	1.39	2.69
K_2O %	2.92	3.38	3.51	2.39	3.15	3.12	1.35	2.66
P_2O_5 %	0.14	0.08	0.02	0.23	0.06	0.15	0.03	0.02
Total %	99.73	98.57	99.33	98.02	98.47	97.76	99.08	98.66
LOI[b] %	1.32	1.40	0.64	1.28	0.68	1.14	0.46	0.55
V ppm	49	19	<10	52	24	35	<10	<10
Cr ppm	37	26	<8	29	21	23	22	10
Ni ppm	14	11	<11	<12	<11	14	<12	<11
Zn ppm	89	57	23	187	38	75	24	49
Rb ppm	74	80	48	54	57	110	51	89
Sr ppm	393	206	63	477	124	269	42	29
Y ppm	29	27	<7	35	<7	29	<7	26
Zr ppm	187	167	86	217	99	211	59	84
Nb ppm	34	46	20	35	22	55	22	28
Ba ppm	902	593	154	1170	219	629	143	62

Note: Values reported in percent or parts per million by weight. Analytical errors (2σ) are SiO_2, 0.7; TiO_2, 0.01; Al_2O_3, 0.2; Fe_2O_3, 0.06; MnO, 0.01; MgO, 0.08; CaO, 0.1; Na_2O, 0.1; K_2O, 0.05; P_2O_5, 0.01; V, 10; Cr, 8; Ni, 10; Zn, 12, Rb, 5, Sr, 25; Y, 6; Zr, 30; Nb, 7; and Ba, 50.

[a] Number ranges indicate depth ranges of cuttings in ft.

[b] LOI = loss on ignition.

Despite the variability in clast sizes and clast lithologies, the deposits of the Cerro Toledo interval in R-19 show little variability in properties measured by borehole logging. Caliper-measured borehole dimensions, gamma signals, capillary and bound water, and neutron measures of water residence environment are all strikingly homogeneous. This homogeneity contrasts with the highly heterogeneous nature of all of these properties within the deeper Puye sedimentary deposits.

There is a modest but measurable rise in capillary water content within the lower Cerro Toledo sedimentary deposits (520- to 646-ft depth). This rise is likely associated with a small increase in porosity. The most significant differences between the Cerro Toledo sedimentary deposits and the bounding tuffs are a lower gamma signal (attributable principally to lower U and Th content) and much lower abundances of capillary water (less available porosity).

3.1.4 Otowi Member of the Bandelier Tuff (646- to 830-ft depth) and Guaje Pumice Bed (830- to 840-ft depth)

Tuffs of the Pleistocene Otowi Member, including ash flows (Qbof) and the basal Guaje Pumice Bed (Qbog), were encountered between depths of 645 and 840 ft. At R-19, the Otowi Member consists of massive, poorly consolidated, vitric, nonwelded ash-flow tuff. The Guaje Pumice Bed occurs from 830 to 840 ft.

Petrographic analysis of the 2- to 4-mm clasts from the Guaje Pumice Bed at 834- to 835-ft depth shows that this size fraction consists mostly of dacitic lithic fragments. Pumices in this size range from the Guaje have been almost completely crushed during drilling. The chemical data from the 2- to 4-mm, 1- to 2-mm, and <1-mm-sized fractions of the Guaje Pumice Bed (Table 3.1-1) indicate significant chemical fractionation with grain size. The 2- to 4-mm-sized fraction is dominated by dacitic lithic fragments and thus has relatively low SiO_2 content (~71%); the 1- to 2-mm-sized fraction has anomalously high SiO_2 content (~89%) reflecting concentration of quartz grains; and the <1-mm-sized fraction has more ash and comes closer to the composition of the Bandelier ash flows. The large compositional differences between grain sizes, with the likelihood of ash loss when cuttings are collected, make reconstruction of reliable bulk composition from cuttings difficult in this unit.

Borehole logs for the Otowi Member indicate properties comparable to Qbt 1g of the Tshirege Member, which is also a vitric nonwelded tuff. The Guaje Pumice Bed is an interval with considerably larger pore structure and greater water content than the overlying ash flows.

Drill hole R-19 was located in a portion of the Laboratory where the Bandelier Tuff is postulated to fill a SSW draining paleovalley (Broxton and Reneau 1996, 55429). In their approximation of the paleovalley topography, the base of the Otowi Member in the vicinity of R-19 was placed at approximately 6350 ft elevation. This is 130 ft higher than this contact was encountered. The predicted contact in the 1999 3-D sitewide geologic model is also higher than the actual contact (Figure 3.0-1). The new information from R-19 reinforces the concept of the paleovalley and helps to define the topology of this feature.

3.1.5 Puye Formation (upper fanglomerate facies; 840- to 925-ft depth)

A subunit of the Pliocene fanglomerate facies of the Puye Formation extends from depths of 840 to 925 ft (Appendix B). This unit consists of coarse volcaniclastic sedimentary deposits as described by Griggs (1964, 8795) and by Waresback (1986, 58715). The volcaniclastic sedimentary deposits are dominated by rounded clasts of various lavas. Size analysis of cuttings from 900- to 905-ft depth, representative of the sedimentary deposits at screen #2, indicates a distribution of fine sand (<1 mm), coarse sand (1 to 2 mm), fine gravel (2 to 4 mm), and coarser clasts (>4 mm) in subequal abundance (Table 3.0-1). Clasts

in the 2- to 4-mm-sized fraction consist predominantly of Tschicoma Formation dacites and rhyodacites with lesser amounts of basalt. Chemical analyses of the 2- to 4-mm, 1- to 2-mm, and <1-mm-sized fractions of the 900- to 905-ft sample show a strong similarity to the upper section of the lower Puye deposits, beneath the Cerros del Rio basalts (see discussion of Puye chemical analyses, Section 3.1.7 of this document). This similarity in Puye composition above and below the basalt unit indicates continuity in Puye sources across the episode of basalt emplacement, although the occurrence of basalt detritus in the upper fanglomerate is distinctive.

Borehole logs indicate that the sedimentary deposits from 900- to 912-ft depth, in the vicinity of screen #2, are of relatively high porosity and lower in bulk density, and contain more mobile water than other sedimentary deposits in this portion of the Puye Formation at R-19 (see Section 3.2 of this document).

3.1.6 Cerros del Rio Basalt (925- to 1080-ft depth)

Late Pliocene basaltic rocks of the Cerros del Rio volcanic field occur from a depth of 925 to 1088 ft (Appendix B). The basaltic rocks consist of vesicular to massive flows with intercalated scoriaceous and clay-rich intervals. Drilling properties of lavas in this interval vary considerably; an upper lava, 925- to 998-ft depth, produces mostly coarse fragments of >4 mm whereas a lower lava (1017- to 1063-ft depth) produces finer fragments (Table 3.0-1). The easier fragmentation of the lower lava may be composition-related, since similar fine fragmentation was observed in a lower alkalic basalt, relative to upper tholeiitic basalt, in a similar association at drill hole R-9i (Broxton et al. 2000, 66600).

Cuttings and borehole logs indicate two principal basalt flows in R-19. The upper flow (925- to 998-ft depth) is uniformly dense with essentially no available porosity. Two samples from this flow were collected for more detailed analysis, one sample from 960- to 965-ft depth and another from 995- to 1000-ft depth. This flow is tholeiitic with abundant olivine phenocrysts; the sample from 995 to 1000 ft includes less abundant glomerocrystic associations of plagioclase and clinopyroxene. Results of chemical analyses are summarized in Table 3.1-2. Based on these data, Figure 3.1-1 compares four parameters of basalt composition for the upper and lower Cerros del Rio basaltic lavas at R-19: parameters of silica content, K_2O/P_2O_5 ratio, Mg# [representing the cation ratio Mg/(Mg+Fe)], and Sr content. Increasing SiO_2 content and decreasing Mg# are indices of magma evolution through olivine fractionation. Higher K_2O/P_2O_5 values reflect increasing basalt contamination by assimilation of high-K, low-P crustal rocks. Higher Sr contents are characteristic of more alkalic basalt compositions. All four of these parameters are smaller in the tholeiitic upper flow than they are in the alkalic lower flow. In borehole logging, the tholeiitic upper flow also has a gamma signal indicating significantly lower K abundance than the lower basalt flow; this is corroborated by the difference in K_2O content measured by XRF (~0.9% K_2O in the upper flow versus 2.3% K_2O in the lower flow; Table 3.1-2). The samples analyzed from the tholeiitic flow were hand-picked and unaltered, but there is a zone of flow-base rubble (998- to 1006-ft depth) below the upper flow, overlying massive poorly-bedded scoria (1006- to 1017-ft depth). Borehole logging indicates abundant bound water in the rubble and scoria, a sign of significant clay alteration (see Section 3.2).

The lower basalt flow (1017- to 1063-ft depth) is highly vesicular with relatively low density, determined by borehole logging, in the upper portion (1017 to 1040 ft). As noted above, this lower basalt flow is more fragmented throughout than is the upper flow, producing generally finer cuttings and providing evidence in borehole logging of small but measurable porosity. Two samples were collected from the lower flow for more detailed analysis, one sample from 1025- to 1030-ft depth and another from 1055- to 1060-ft depth. Both samples have abundant fresh olivine phenocrysts; the lower sample (1055- to 1060-ft depth) also contains phenocrysts of corroded and sieved plagioclase. The high K_2O content (Table 3.1-2) and in particular the high Sr content (Table 3.1-2 and Figure 3.1-1) of this lower flow distinguish it as part of the Cerros del Rio alkalic series.

Table 3.1-2
Chemical Analyses of Cerros del Rio Basalts and of Pumice Beds and Hand-Picked Pumice from Drill Hole R-19

Sample Number[a]	R-19 960–965	R-19 995–1000	R-19 1025–1030	R-19 1055–1060	R-19 1585–1590	R-19 1585–1590	R-19 1590–1595	R-19 1895–1900
Stratigraphic Unit	Cerros del Rio	Cerros del Rio	Cerros del Rio	Cerros del Rio	Unassigned pumice bed	Unassigned pumice bed	Unassigned pumice	Unassigned pumice
Sample Type	Hand-picked	Hand-picked	Hand-picked	Hand-picked	Cuttings (2–4 mm)	Cuttings (<1 mm)	Hand-picked (>2 mm)	Hand-picked (>2 mm)
SiO_2 %	49.04	49.49	51.82	52.01	69.62	65.85	69.63	69.07
TiO_2 %	1.43	1.41	1.33	1.36	0.14	0.36	0.13	0.113
Al_2O_3 %	16.71	16.73	17.87	17.22	16.71	18.53	19.07	17.10
FeO %[b]	6.05	6.47	2.20	4.55	NA[c]	NA	NA	NA
Fe_2O_3 %[b]	4.42	4.08	5.47	2.98	0.82	2.56	0.73	0.78
MnO %	0.15	0.15	0.14	0.14	0.058	0.046	0.056	0.076
MgO %	6.61	6.88	5.94	6.37	0.15	1.09	-0.11	0.14
CaO %	8.78	8.79	7.23	7.21	0.44	2.40	0.36	0.50
Na_2O %	3.29	3.26	3.94	4.18	2.54	3.60	2.47	2.33
K_2O %	0.89	0.91	2.28	2.29	5.18	3.33	5.04	5.19
P_2O_5 %	0.35	0.34	0.65	0.68	0.02	0.11	0.01	0.016
Total %	97.72	98.50	98.87	98.99	95.66	97.87	97.49	95.32
LOI %[d]	0.91	0.52	0.20	-0.15	3.60	1.03	3.46	4.32
V ppm	184	173	149	138	<10	40	<10	<10
Cr ppm	183	207	179	168	<8	30	<8	13
Ni ppm	74	88	105	119	<11	<11	<11	<11
Zn ppm	94	92	63	67	<13	39	22	19
Rb ppm	14	11	39	46	128	68	125	102
Sr ppm	470	456	690	893	39	354	25	49
Y ppm	25	27	26	12	19	9	23	28
Zr ppm	144	145	219	213	88	143	87	103
Nb ppm	10	19	28	39	23	18	27	32
Ba ppm	419	450	1207	1231	453	1094	461	578

Note: Values reported in percent or parts per million by weight. Analytical errors (2σ) are SiO_2, 0.7; TiO_2, 0.01; Al_2O_3, 0.2; Fe_2O_3, 0.06; MnO, 0.01; MgO, 0.08; CaO, 0.1; Na_2O, 0.1; K_2O, 0.05; P_2O_5, 0.01; V, 10; Cr, 8; Ni, 10; Zn, 12, Rb, 5, Sr, 25; Y, 6; Zr, 30; Nb, 7; and Ba, 50.

[a] Number ranges indicate depth ranges of cuttings in ft.

[b] All iron reported as Fe_2O_3 unless ferrous/ferric ratio was determined by digestion/titration.

[c] NA = not analyzed.

[d] LOI = loss on ignition; negative values indicate oxidation of ferrous iron during ignition.

The base of the lower basalt flow, at 1063- to 1067-ft depth, is a zone of flow-base rubble overlying a zone of scoria and layered basaltic sedimentary deposits from 1067- to 1074-ft depth and basaltic sands from 1074- to 1080-ft depth. A sample from the basaltic sands (1075- to 1080-ft depth) contains grains of olivine, sieved clinopyroxene, and plagioclase derived from basaltic sources, as well as quartz from other sources. The interval of flow-base scoria and basaltic sedimentary deposits has a high clay content, similar to the zone of rubble and scoria between the flows at 998- to 1017-ft depth.

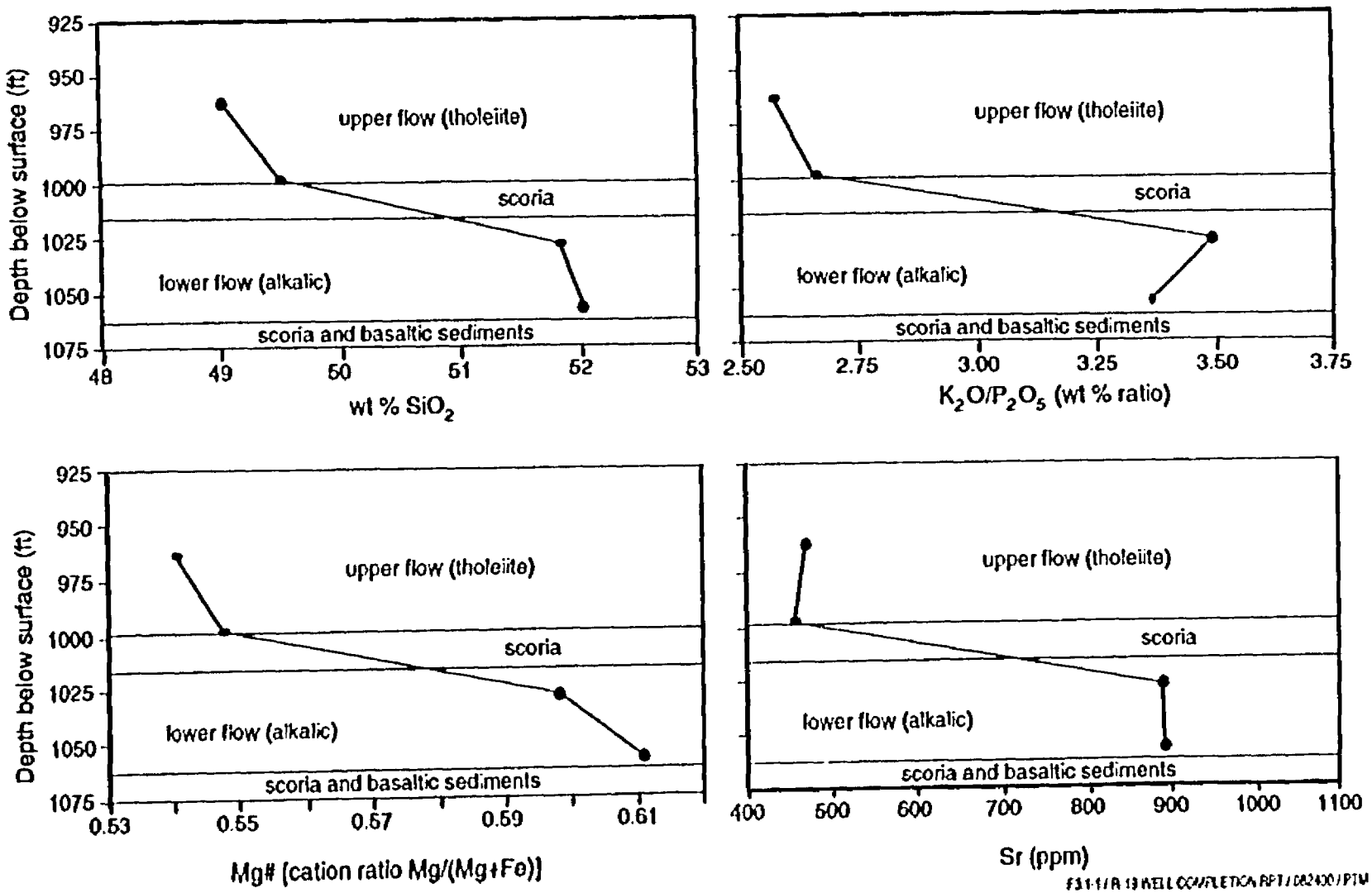


Figure 3.1-1. Variations in SiO_2, K_2O/P_2O_5, Sr, and Mg# (cation ratio of Mg/(Mg+Fe)) with stratigraphic depth in the sequence of Cerros del Rio basalts sampled at R-19 (data from Table 3.1-2)

The occurrence of tholeiitic lava overlying an alkalic lava in the Cerros del Rio basalts of R-19 is superficially similar to the tholeiitic-over-alkalic flow series documented in drill holes to the northeast (R-15, R-12, R-9, and R-9i). However, the trends shown in Figure 3.1-1 differ in two respects from the compositions of Cerros del Rio basalts in these drill holes to the northeast. The Cerros del Rio basalts in these other drill holes have higher SiO_2 and higher K_2O/P_2O_5 ratios in the upper, tholeiitic lavas, whereas these parameters are both lower in the tholeiitic lava at R-19. The decline in silica content and in K_2O/P_2O_5 in the younger lava at R-19 makes it less likely that the lava series at R-19 is derived by olivine fractionation and increased crustal assimilation with evolution in a single magma chamber, a scenario that is plausible for the lavas to the northeast. The differences at R-19 also make it unlikely that the same Cerros del Rio lava flows found beneath the midreaches of Los Alamos, Sandia, and Mortandad Canyons extend as far to the southwest as R-19.

3.1.7 Puye Formation (lower fanglomerate facies; 1080- to 1530-ft depth)

Beneath the basalts, a lower sequence of Pliocene fanglomerates of the Puye Formation extends from 1080 to 1530 ft (Appendix B) and consists of coarse volcaniclastic sedimentary deposits. Grain-size analysis of cuttings within this interval indicates great variability in clast-size distributions (Table 3.0-1); this is supported by borehole neutron data indicating polymodal distribution of pore size, although the pore sizes are generally smaller than in the underlying pumiceous sedimentary deposits. There are exceptions to this distinction, however, particularly in the vicinity of the water-table screen (screen #3). Sedimentary deposits at 1330- to 1335-ft depth, just below screen #3, are among the coarsest of the fanglomerates in this unit, containing 84 wt % of clasts >4 mm in size. These clasts consist of varied dacites and are more rounded than typical for this section of fanglomerate. This sample has <1 wt % sand component (<2-mm clasts). More typical fanglomerates in this section have ~40 wt % clasts >4 mm and 20 to 50 wt % sand particles of <2 mm.

Petrographic analysis shows that most of the clastic materials in the 2- to 4-mm-sized range are derived from intermediate-composition volcanic rocks, dacites and rhyodacites typical of the Tschicoma Formation. However, the deepest sample analyzed from the fanglomerate (1515- to 1520-ft depth) includes some clasts of well-cemented sandstone and coarse quartz grains. Chemical data for size fractions from the Puye fanglomerates, both the upper fanglomerate (above the Cerros del Rio basalt) and the lower fanglomerate (below the Cerros del Rio basalt), are summarized in Table 3.1-3. Analyses of the 2- to 4-mm, 1- to 2-mm, and <1-mm-sized fractions were collected for samples from 900- to 905-ft depth (upper fanglomerate) and from 1170 to 1175 ft, 1205 to 1210 ft, and 1410 to 1415 ft (lower fanglomerate). Three defining constituents (SiO_2, Fe_2O_3, and Sr) and one ratio (Sr/Rb) are plotted against depth in Figure 3.1-2. The data indicate coherence between the upper and lower fanglomerates, with systematic increase in SiO_2 and decrease in Fe_2O_3 and Sr with depth. Gamma logs indicate a relatively abrupt transition to higher K plus Th content at ~1360 ft depth within the lower fanglomerate. The K_2O values for the 2- to 4-mm and 1- to 2-mm-sized fractions of the sample at 1410- to 1415-ft depth are higher than those in the samples above 1360 ft, but the principle cause of the higher gamma signal may be in Th content, which was not determined by XRF analysis.

Differences between the 2- to 4-mm, 1- to 2-mm, and <1-mm-sized fractions at each horizon in the fanglomerates are minimal, a strong indication that selective disaggregation or borehole mixing of finer fragments is not a concern in Puye deposits with the drilling method used at R-19. In terms of source detritus, the similarity between all three size fractions also indicates a single or well-mixed source for all deposits within the fanglomerates, without significant contributions from other sources in the finer detritus. This contrasts markedly with the situation in the Cerro Toledo deposits, where admixture of coarse Tschicoma detritus and finer Otowi detritus leads to significant chemical differences between the 2- to 4-mm and <1-mm-sized fractions (Table 3.1-1 and Figure 3.1-2).

Table 3.1-3
Chemical Analyses of the Puye Fanglomerates from Drill Hole R-19 by Size Fractions

Sample Number[a]	R-19 900-905	R-19 900-905	R-19 900-905	R-19 1170-1175	R-19 1170-1175	R-19 1170-1175	R-19 1205-1210	R-19 1205-1210	R-19 1205-1210	R-19 1410-1415	R-19 1410-1415	R-19 1410-1415
Stratigraphic Unit	Guaje	Guaje	Guaje	Guaje	Guaje	Guaje	Guaje	Guaje	Guaje	Guaje	Guaje	Guaje
Sample Type	Cuttings (2-4 mm)	Cuttings (1-2 mm)	Cuttings (<1 mm)	Cuttings (2-4 mm)	Cuttings (1-2 mm)	Cuttings (<1 mm)	Cuttings (2-4 mm)	Cuttings (1-2 mm)	Cuttings (<1 mm)	Cuttings (2-4 mm)	Cuttings (1-2 mm)	Cuttings (<1 mm)
SiO_2 %	66.60	66.26	65.29	67.42	65.33	65.66	67.08	67.64	67.85	68.41	69.17	70.07
TiO_2 %	0.53	0.52	0.61	0.50	0.53	0.55	0.48	0.46	0.51	0.41	0.38	0.39
Al_2O_3 %	15.63	15.91	15.66	15.33	16.41	15.82	15.98	15.58	15.01	15.63	16.10	15.54
Fe_2O_3 %	3.83	3.78	4.57	3.74	3.96	4.33	3.55	3.33	4.09	2.98	2.77	2.73
MnO %	0.06	0.05	0.07	0.06	0.07	0.07	0.06	0.05	0.07	0.05	0.05	0.05
MgO %	1.37	1.28	1.76	1.59	1.69	2.04	1.62	1.43	1.88	1.22	1.19	1.12
CaO %	3.01	2.92	3.09	3.10	3.27	3.36	2.99	2.79	3.21	2.21	2.09	2.12
Na_2O %	3.93	3.95	3.85	3.90	3.77	3.72	3.90	3.80	3.79	3.83	3.79	3.34
K_2O %	3.28	3.21	2.95	3.37	3.23	3.09	3.30	3.40	3.10	3.83	3.69	3.15
P_2O_5 %	0.20	0.20	0.17	0.22	0.25	0.22	0.20	0.17	0.17	0.11	0.10	0.08
Total %	98.50	98.06	98.03	99.22	98.50	98.87	99.18	98.64	99.68	98.73	99.33	98.58
LOI %[b]	0.72	0.72	0.67	0.59	0.55	0.54	0.43	0.55	0.70	0.70	0.68	0.98
V ppm	52	55	65	49	61	63	53	47	55	35	30	31
Cr ppm	46	39	62	29	36	59	34	33	48	39	42	46
Ni ppm	25	29	30	27	15	21	24	15	34	32	29	27
Zn ppm	51	47	64	51	47	47	52	39	63	48	32	35
Rb ppm	72	68	58	74	61	58	72	72	67	99	95	75
Sr ppm	455	444	487	455	513	509	437	402	444	315	305	317
Y ppm	21	16	12	20	24	17	<7	15	<7	29	20	17
Zr ppm	179	174	178	169	171	172	165	172	167	154	147	188
Nb ppm	14	30	16	28	24	30	23	24	15	34	15	15
Ba ppm	1200	1141	1069	1169	1114	1128	1149	1152	1093	786	776	763

Note: Values reported in percent or parts per million by weight. Analytical errors (2σ) are SiO_2, 0.7; TiO_2, 0.01; Al_2O_3, 0.2, Fe_2O_3, 0.06; MnO, 0.01; MgO, 0.08, CaO, 0.1; Na_2O, 0.1; K_2O, 0.05; P_2O_5, 0.01; V, 10; Cr, 8, Ni, 10, Zn, 12, Rb, 5, Sr, 25; Y, 6; Zr, 30, Nb, 7; and Ba, 50.

[a] Number ranges indicate depth ranges of cuttings in ft.

[b] LOI = loss on ignition.

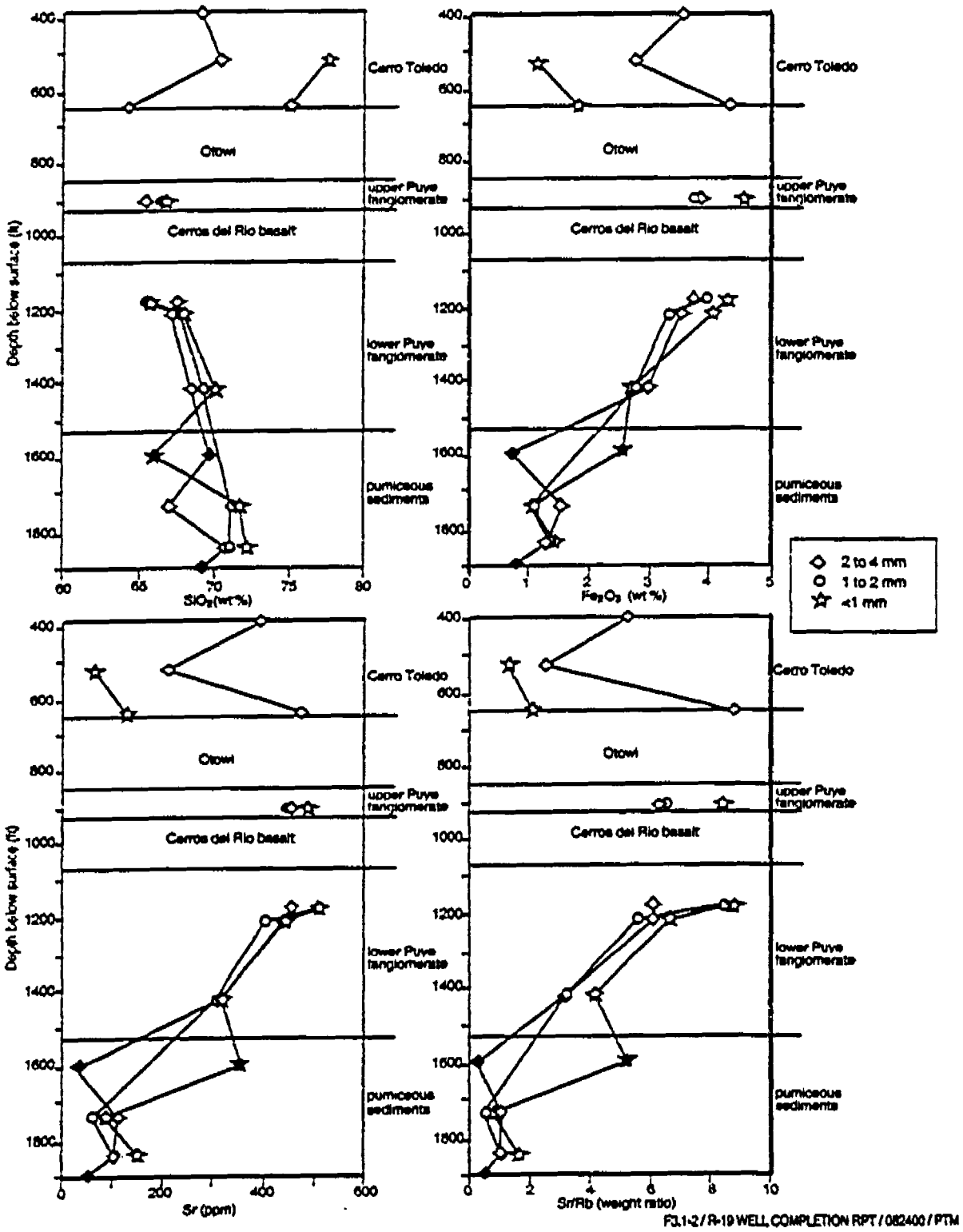


Figure 3.1-2. Variation in SiO_2, Fe_2O_3, Sr, and Sr/Rb with depth by size fractions from Cerro Toledo, Puye, and unassigned pumiceous sedimentary deposits in drill hole R-19. Filled symbols indicate data from pumice beds; open symbols indicate all other deposits.

Quantitative XRD data from 2- to 4-mm-sized fractions of other representative samples from the Puye fanglomerates are summarized in Table 3.1-4. Some clay alteration occurs, but is limited to ~1% to 2% smectite. Appreciable amounts of glass (~13% to 14%) remain in all of the fanglomerate samples, evidence of only limited alteration. Clays were separated from fanglomerate samples at 1205- to 1210-ft depth and 1380- to 1385-ft depth. These clays are poorly ordered smectites with ~4% to 6% kaolinite, common to most alteration typical of the Puye Formation. The significant amounts of remnant glass attest to the very incomplete alteration of these sedimentary deposits.

Table 3.1-4
Quantitative X-Ray Diffraction Analyses of 2- to 4-mm-Sized Fractions from the Puye Fanglomerate and from Unassigned Pumiceous Sedimentary Deposits in Drill Hole R-19

Sample[a]	Smectite	Mica	Quartz	Cristobalite	Tridymite	Opal-CT	Feldspar	Glass	Hematite	Magnetite	Total
R-19 1095–1100 Puye fanglomerate	3.6	0.1	0.9	7.1	10.9	—[b]	60.3	13.2	0.3	—	96.4
R-19 1330–1335 Puye fanglomerate	—	—	—	5.0	18.1	—	58.7	12.6	—	3.1	97.5
R-19 1380–1385 Puye fanglomerate	2.9	3.0	2.6	9.1	9.0	—	52.6	14.2	0.8	2.1	96.3
R-19 1515–1520 Puye fanglomerate	0.9	3.0	1.2	12.3	8.9	—	53.8	13.2	0.8	2.2	96.3
R-19 1555–1560 Unassigned pumiceous sedimentary deposit	1.3	0.8	—	6.5	3.7	12.1	46.4	26.2	0.6	2.3	99.9
R-19 1735–1740 Unassigned pumiceous sedimentary deposit	1.8	0.5	0.6	2.0	1.1	—	15.3	78.1	—	—	99.4
R-19 1830–1835 Unassigned pumiceous sedimentary deposit	0.6	0.8	3.1	5.5	4.1	—	45.2	37.6	0.7	2.3	100.1

Notes: 1. Analytical errors (2σ) are ~5% of the amount reported for abundances >10% and ~10% of the amount reported for abundances <10%.

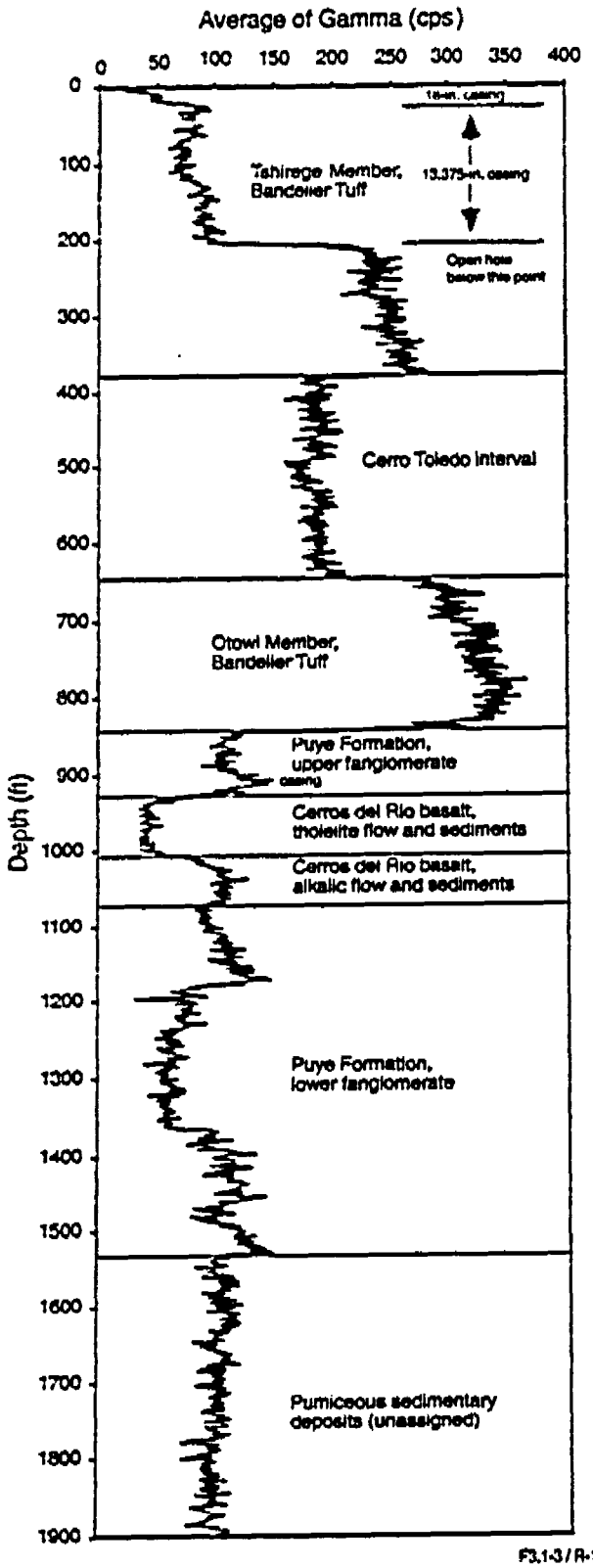
2. All values reported in weight percent.

[a] Number ranges indicate depth ranges of cuttings in ft.

[b] A dash in the table indicates that the phase was not detected; detection limits ~0.1%.

3.1.8 Pumiceous Sedimentary Deposits, Unassigned (1530-ft depth to TD at 1902.5 ft)

From the depth of 1530 ft to TD at 1902.5 ft, the sedimentary deposits are distinctively pumice-rich, in contrast to the overlying fanglomerates. The transition into this unit from the fanglomerate is marked by a notable decrease in the natural gamma signal recorded with the Laboratory NGR tool (Figure 3.1-3). In general the pumiceous sedimentary deposits are finer-grained than the fanglomerates, with <25 wt % clasts of >4 mm and >60 wt % sands of <2 mm (Table 3.0-1). However, an exception to this occurs above screen #7, where >4-mm clasts comprise >80 wt % of the deposit at 1830- to 1835-ft depth. The typical pumiceous sedimentary deposits of this interval contain variable clast admixtures of mostly aphyric to poorly porphyritic pumice plus intermediate volcanic rocks, with rare fragments of lavas with andesitic to basaltic composition.



F3.1-3 / R-19 WELL COMPLETION RPT / 082400 / PTM

Figure 3.1-3. Results of natural gamma radiation survey obtained March 14, 2000

Chemical data from the 2- to 4-mm, 1- to 2-mm, and <1-mm-sized fractions were collected for two representative samples of the unassigned pumiceous sedimentary deposits, at 1730- to 1735-ft depth and 1835- to 1840-ft depth (Table 3.1-5). Data for these deposits are also plotted in Figure 3.1-2, for comparison with the overlying Puye fanglomerates. The pumiceous deposits have geochemical indicators of rhyolitic sources, unlike the intermediate-composition Tschicoma sources that characterize the Puye fanglomerates. The differences between the Puye fanglomerates and the underlying pumiceous deposits are clearly seen in Figure 3.1-4, where a plot of Sr versus Rb content defines a distinctive high Sr, low Rb field for the fanglomerates and a low Sr, high Rb field for the unassigned pumiceous sedimentary deposits. Also shown on this plot is the very distinctive low-Rb, low-Sr field for the <1-mm-sized fraction from the Cerro Toledo deposits, contrasted with the Tschicoma-like compositions for the 2- to 4-mm-sized fractions in the Cerro Toledo.

Table 3.1-5

Chemical Analyses of Unassigned Pumiceous Sedimentary Deposits from Drill Hole R-19

Sample Number[a]	R-19 1730–1735	R-19 1730–1735	R-19 1730–1735	R-19 1835–1840	R-19 1835–1840	R-19 1835–1840
Stratigraphic Unit	Unassigned pumiceous sedimentary deposits	Unassigned pumiceous sedimentary deposits	Unassigned pumiceous sedimentary deposits	Unassigned pumiceous sedimentary deposits	Unassigned pumiceous sedimentary deposits	Unassigned pumiceous sedimentary deposits
Sample Type	Cuttings (2–4 mm)	Cuttings (1–2 mm)	Cuttings (<1 mm)	Cuttings (2–4 mm)	Cuttings (1–2 mm)	Cuttings (<1 mm)
SiO_2 %	66.87	71.07	71.69	70.68	70.93	72.16
TiO_2 %	0.25	0.17	0.17	0.21	0.22	0.23
Al_2O_3 %	19.10	14.48	13.79	15.21	13.84	13.88
Fe_2O_3 %	1.56	1.06	1.04	1.31	1.34	1.43
MnO %	0.06	0.06	0.07	0.07	0.07	0.06
MgO %	0.59	0.35	0.26	0.43	0.43	0.38
CaO %	1.07	0.63	0.65	0.81	0.84	0.90
Na_2O %	2.57	2.49	3.01	2.97	2.83	2.96
K_2O %	4.40	4.89	4.59	4.53	4.61	4.19
P_2O_5 %	0.06	0.02	0.02	0.05	0.05	0.04
Total %	96.53	95.24	95.29	96.26	95.15	96.23
LOI %[b]	3.25	4.30	3.75	3.13	3.63	3.53
V ppm	23	26	<10	13	18	21
Cr ppm	16	<8	10	15	14	18
Ni ppm	<11	<11	<11	<11	<11	<12
Zn ppm	33	27	40	33	33	34
Rb ppm	106	113	106	103	98	91
Sr ppm	114	58	86	105	106	152
Y ppm	20	24	30	28	27	18
Zr ppm	97	97	99	103	100	145
Nb ppm	28	26	26	36	32	24
Ba ppm	545	519	702	982	943	1008

Note: Values reported in percent or parts per million by weight. Analytical errors (2σ) are SiO_2, 0.7; TiO_2, 0.01; Al_2O_3, 0.2; Fe_2O_3, 0.06; MnO, 0.01; MgO, 0.08; CaO, 0.1; Na_2O, 0.1; K_2O, 0.05; P_2O_5, 0.01; V, 10; Cr, 8; Ni, 10; Zn, 12, Rb, 5, Sr, 25; Y, 6; Zr, 30; Nb, 7; and Ba, 50.

[a] Number ranges indicate depth ranges of cuttings in ft.

[b] LOI = loss on ignition.

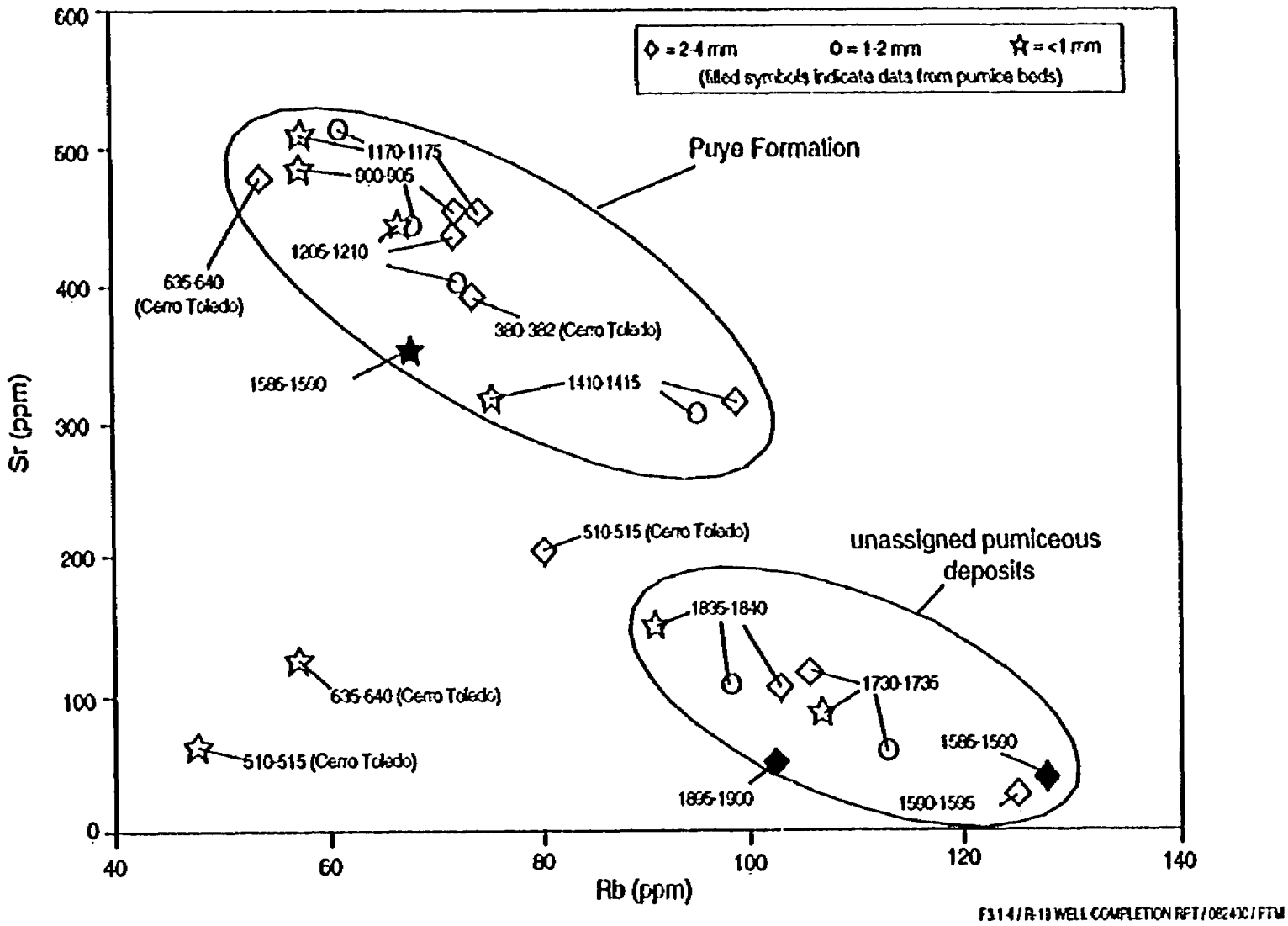


Figure 3.1-4. Sr versus Rb systematics, defining fields of high Sr, low Rb for Puye deposits, low Sr, high Rb for the unassigned pumiceous deposits, and a distinctive low-Sr, low-Rb field for the <1-mm-sized fraction of the Cerro Toledo deposits

Quantitative XRD data from 2- to 4-mm-sized fractions of other representative samples from the unassigned sedimentary deposits are summarized in Table 3.1-4. As in the Puye fanglomerates, some clay alteration occurs but is limited to ~1% to 2% smectite. Greater amounts of glass occur in the pumiceous deposits than in the fanglomerates (~26% to 78%, versus ~13% to 14%). The almost complete preservation of all glass to maximum borehole depth at R-19 is evidence of very limited alteration. Clay was separated from the pumiceous sediment at 1720- to 1725-ft depth and analyzed by XRD. As in the Puye deposits, this clay is a poorly ordered smectite with ~1% kaolinite.

Intercalated within the pumiceous sedimentary deposits are relatively homogeneous pumice beds at 1581- to 1595-ft depth, 1690- to 1700-ft depth, and 1895- to 1902.5-ft depth. The pumices in these deposits are poorly porphyritic, with <1% quartz, sanidine, and albite phenocrysts. Pumices in the upper two beds are mostly 2 to 4 mm in diameter, but the deepest bed contains 87 wt % of pumices >4 mm in size. Chemical compositions for samples from the pumice beds are listed in Table 3.1-2, including the 2- to 4-mm-sized fraction and the <1-mm-sized fraction of the pumice bed at 1585- to 1590-ft depth, a hand-picked sample of pure pumice from the lower part of that pumice bed (1590- to 1595-ft depth), and a hand-picked sample of pure pumice from the lowest pumice bed (1895- to 1900-ft depth). The composition of the <1-mm-sized fraction of the pumice bed at 1585- to 1590-ft depth is considerably more mafic than the coarser (2 to 4 mm) pumice-dominated size fraction. The finer fraction has lower SiO_2 and higher Fe_2O_3, MgO, V, Cr, Sr, and Ba. The differences in SiO_2, Fe_2O_3, Sr, and Sr/Rb in the two size fractions from this pumice bed are illustrated in Figure 3.1-2. These differences may indicate a fine-sand source with different origins than the pumices that comprise the bulk of the deposit. In terms of potential water-rock interactions, the higher surface area of the finer fraction and its higher Fe content may dictate interactions with contaminants that are very different from those that would occur if the coarser pumices alone comprised the deposit. The pumices in all beds are slightly rounded and slightly to moderately clay-coated, indicating minor amounts of reworking. None of the pumice beds appear to be undisturbed primary falls. However, the preservation of original glass is extensive. Screen #5 is located within the pumice bed at 1581- to 1595-ft depth and is thus situated to sample waters from an exceptionally glass-rich horizon with Fe-rich fines.

3.2 Borehole Geophysics

Borehole geophysical logs were obtained from the R-19 borehole after completion of drilling activities. This section describes the borehole geophysical methods that were employed and describes the results obtained from the borehole geophysical logging.

3.2.1 Description of Borehole Logging Activities

Borehole geophysical data were obtained from two sources: (1) Laboratory and support subcontractor personnel obtained borehole video and NGR surveys using Laboratory geophysical logging equipment, and (2) Schlumberger Wireline Services Company personnel obtained a suite of borehole geophysical logs. Table 3.2-1 lists the borehole video and geophysical surveys that were obtained from each source. Borehole geophysical surveys were obtained from the open borehole that extended from the base of drill casing which was located at about 205 ft bgs to near the total depth of the well, which was found to be at 1886 bgs at the time of the Schlumberger borehole surveys.

On March 13, 2000, after completion of drilling the borehole to a total depth of 1902.5 ft, two borehole video log surveys were obtained of the open borehole from 205 ft downward. On March 14, 2000, an NGR survey was obtained to total depth. Laboratory borehole logging equipment was used to obtain the video and NGR surveys. Initially, the 1 3/4-in.-diameter slim-hole borehole video log was used to obtain the video survey to a depth of approximately 1600 ft where the water in the borehole became too cloudy

to see the walls of the borehole. The slim-hole camera was used initially because the condition of the borehole walls was not known and there existed the possibility of collapse of the open borehole and potential loss of the video equipment. The slim-hole camera showed that the walls of the borehole appeared to be stable throughout the borehole to at least the 1600-ft depth.

Table 3.2-1
Borehole Geophysics Surveys at R-19

Operator	Date	Depth (ft)[a]	Survey
Laboratory and support contract personnel using Laboratory equipment	03/13/2000	0–1600	Borehole video survey (slim hole)
	03/13/2000	0–1400	Borehole video survey (side-looking)
	03/14/2000	0–1900	Natural gamma radiation (NGR)
Schlumberger Wireline Services Company	03/16/2000	204–1886	Survey #1:
			Array induction tool (AIT) (Resistivity), 20, 30, 60, 90-inch array induction
			Spontaneous potential (SP)
			Natural gamma radiation (NGR)
			Triple lithodensity tool (LDT): bulk density, grain density, density porosity
			Caliper - 2-arm
	03/16/2000	130–1886	Survey #2:
			Epithermal neutron (APT), neutron porosity
			Spectral natural gamma radiation (K, U, Th)
			Hostile natural gamma radiation (HNGR)
	03/16/2000	230–1886	Survey #3:
			Combinable magnetic resonance (CMR)
			NGR
			Caliper - 1-arm
	03/16/2000	110–1886	Survey #4
			Formation microimager (FMI)- 16 button
			Caliper - 4-arm
			Deviation
			NGR

[a] Depth range for logging run.

Subsequently, the 4-in.-diameter side-looking video camera was used to obtain a supplemental video log survey to thoroughly document the walls of the borehole. The second video log survey was obtained to a depth of 1400 ft where the water in the borehole became too cloudy to see details of the borehole walls. The borehole walls were observed to be dry from surface to 900 ft and damp-to-wet from 900 ft to the water level. The second borehole video survey provided an excellent video log of Puye Formation fanglomerate to the 1400-ft depth.

On March 14, 2000, an NGR survey was obtained of the open borehole from surface to total depth at 1902.5 ft. The tool was run into the borehole to total depth of 1900 ft. NGR data were obtained while logging the tool up-hole at 20 ft/min except at times when the wireline fouled on the draw-works and the tool had to be lowered into the borehole to fix the cable problems. This occurred at 1870 ft, 1865 ft,

1705 ft, 1469 ft, 1433 ft, 1147 ft, 827 ft, and 818 ft. Figure 3.1-3 shows the results of the open-borehole NGR survey obtained on March 14, 2000.

Schlumberger Wireline Services Company obtained geophysical logs at R-19 on March 16, 2000, finishing early in the morning on March 17, 2000. Four separate logging runs through the borehole were obtained; the geophysical logs obtained during each run are listed in Table 3.2-1. The Schlumberger logging tools tagged the bottom of the borehole at 1885 to 1886 ft bgs and the water level in the borehole was at 1178 ft. The following section describes the different borehole geophysical surveys that were obtained.

3.2.2 Borehole Geophysical Methods

3.2.2.1 Natural Gamma Radiation

The NGR survey employs a scintillation detector to measure the gross gamma radiation activity of the formation; the information is used for determination of lithology and for depth correlation between different geophysical surveys. Naturally occurring gamma radiation comes from the decay of K plus the U and Th decay series. Typically, these elements occur in higher concentrations within clay minerals; hence, NGR is used to estimate lithology; higher NGR values are usually observed in finer-grained siltstones and shales when compared with sandstones and conglomerates. The gross gamma signatures of each formation are also used for depth correlation between geophysical logging runs to ensure proper depth profiles for each geophysical log.

3.2.2.2 Array Induction Tool

The induction logging tool is used to measure formation resistivity. The array induction tool (AIT) measures formation resistivity at five depths of investigation simultaneously, at 10, 20, 30, 60, and 90 in., with a vertical resolution of 1, 2, or 4 ft. These measurements permit the quantification of invasion of borehole fluids, including water and associated drilling fluids, into the formation, from which permeability and lithology can be inferred. The results are very useful for stratigraphic correlation and in unsaturated formations may provide an estimate of invasion by borehole fluids.

3.2.2.3 Lithodensity Tool

The lithodensity tool (LDT) provides information about the density porosity in the unsaturated zone and porosity in the saturated zone. The LDT is a gamma-gamma density log that is primarily used to provide a measure of formation electron density. A 1.5-Ci cesium-137 gamma source is used to provide the excitation energy for the tool, which is calibrated to provide measurements in an air- or liquid-filled open hole and also in an uncemented steel casing. In addition to providing density measurements, the tool also measures the photoelectric absorption index of the formation in open boreholes. Photoelectric absorption is a measure of the average atomic number of the formation, which corresponds to formation chemistry and lithology. The electron density measurement is converted to formation bulk density, which corresponds primarily to porosity and secondarily to rock matrix and pore fluid.

In the unsaturated zone the LDT will provide a continuous log of formation porosity (liquid- and air-filled porosity). This measurement requires an estimation of formation grain density to provide accurate porosity estimates. The porosity estimate from the LDT is used with moisture content data (from the combinable magnetic resonance [CMR] and neutron surveys) to provide a continuous log of water saturation. The LDT has a 2.5-in. depth of investigation and a 6-in. vertical resolution.

3.2.2.4 Epithermal Neutron (CNT-G or APT)

The epithermal neutron tool provides information about moisture content in the unsaturated zone and porosity in the saturated zone. The epithermal neutron-neutron logging tool measures the amount of hydrogen in the formation in either a water- or air-filled borehole. The hydrogen content typically provides a good measure of moisture content in the unsaturated zone and porosity in the saturated zone. However the tool can overestimate either value if there is a significant amount of hydrogen in the matrix minerals (e.g., clay).

The CNT-G neutron tool uses a 16-Ci source of americium-beryllium to generate neutrons and has a lateral depth of investigation of 9 in. with a vertical resolution of 18 in. The accelerator porosity tool (APT) uses thermal excitation of tritium as an neutron source and provides a calibrated moisture content with similar parameters as those for the CNT-G tool. In addition the APT tool provides uncalibrated moisture measurement (slowing-down time) with both a 3-in. vertical resolution and depth of investigation. Due to problems associated with transporting a 16-Ci source of the CNT-G neutron tool onto Laboratory property, the APT tool was used at R-19 to obtain the neutron geophysical survey.

3.2.2.5 Combinable Magnetic Resonance

The nuclear magnetic resonance (NMR) data are obtained to determine the porosity, pore size distribution and in situ hydraulic conductivity properties of the formations. The CMR makes pulse-echo NMR measurements that are sensitive to the hydrogen nuclei (protons) contained in the pore space of the formation. These measurements contain information relating to both pore volume and pore size in a saturated formation. The pore size information is used to partition the formation porosity into (1) bound water volumes, and (2) free-fluid volumes. In saturated formations, this information is used to estimate the hydraulic conductivity of the formation. The pore size information is unique to NMR logging devices.

In the unsaturated zone, the CMR provides a volumetric moisture content of the formation, independent of lithology, and provides an estimate of the amount of water that binds to the pore walls (e.g., capillary bound vs. producible water). This tool has a very shallow lateral depth of investigation (approximately 1 in.) and a 6-in. vertical resolution.

3.2.2.6 Formation Microimager

The formation microimager (FMI) tool collects resistivity data from multiple micro-pads located on four caliper arms. The orientation of the tool in the borehole is recorded, enabling the resistivity data to be "imaged" to show a likeness of the borehole wall at the caliper pad and the data processed to calculate formation dip angles. The FMI tool provides images that are almost totally insensitive to borehole conditions and offers quantitative information for fracture analysis.

3.2.2.7 Hostile Environment Natural Gamma Sonde

The hostile environment natural gamma sonde (HNGS) uses two bismuth germanate scintillation detectors to measure the natural gamma-ray radiation of the formation. The HNGS makes similar measurements to the NGR tool (section 3.2.2.1), but the HNGS is capable of gamma-ray energy discrimination. The HNGS uses 5-window spectroscopy to resolve the detected spectrum into the three most common components of the naturally occurring radiation: potassium, thorium, and uranium. The high-energy part of the spectrum is divided into three energy windows, each covering a characteristic peak of the three radioactivity series. The concentration of each component is determined from the count rates in each window. Because the high-energy region contains only 10% of the total spectrum count

rates, the measurements are subject to large statistical variations, even using a low logging speed. The results are considerably improved by including the contribution from the low-energy part of the spectrum.

Filtering techniques are used to further reduce the statistical noise by comparing and averaging counts at a certain depth with counts sampled just before and after. The final outputs are the total gamma ray; a uranium-free gamma-ray measurement; and the concentrations of potassium, thorium, and uranium. The radius of investigation depends on several factors: hole size, mud density, formation bulk density (denser formations display a slightly lower radioactivity), and on the energy of the gamma rays (a higher energy gamma ray can reach the detector from deeper in the formation).

3.2.3 Results of Borehole Geophysical Surveys

3.2.3.1 NGR Obtained Using Laboratory Borehole Survey Tools

Figure 3.1-3 shows the results of the NGR survey obtained by support contractor personnel on March 14, 2000, using Laboratory survey equipment. Stratigraphic information is also shown on the figure. The data were collected for each 0.1 ft throughout the borehole; these data were averaged for each 1-ft interval for display on the figure. At the time of the survey, heavy-walled drill casing (13.375-in. diameter) extended to a depth of 205 ft bgs; the borehole was open from 205 to 1902.5 ft.

Table 3.2-2 summarizes the NGR measured for each major stratigraphic unit encountered in the borehole and for the cased portion of the borehole. In general, the highest NGR occurs in the Guaje Pumice Bed and the Otowi Member, which contain a mean rate of 324 and 317 cps, respectively. The Cerro Toledo interval between the Otowi and Tshirege Member contains a mean natural gamma rate of 187 cps, which is lower than the surrounding Bandelier Tuff Members. The lowest natural gamma radiation occurs in the massive Cerros del Rio basalt flow, which contains a mean rate of 45 cps. The lower Puye Formation contains varying lithologies that exhibit characteristic natural gamma radiation (see Section 3.1 of this document).

Table 3.2-2
Summary of Natural Gamma Radiation at R-19 on March 14, 2000

Rock Unit	Depth (ft)	Natural Gamma (cps)				
		Min	Max	Mean	Median	Std. Deviation
Tshirege Member, cased hole	0–205	15	107	78	81	16
Tshirege Member, open hole	205–377	172	281	245	246	18
Tsankawi Pumice Bed	377–380	269	303	282	274	18
Cerro Toledo interval	380–645	159	212	187	186	10
Otowi Member	645–808	217	366	317	322	24
Guaje Pumice Bed	808–840	267	352	324	326	20
Puye Formation upper	840–925	89	280	116	111	22
Basalt, massive	925–1000	36	92	45	43	10
Volcaniclastics	1000–1176	45	147	102	103	17
Puye Formation, Lower A	1176–1365	32	124	66	63	13
Puye Formation, Lower B	1365–1528	77	150	112	113	15
Puye Formation, Lower C	1528–1902	72	122	102	103	9

3.2.3.2 Results of Schlumberger Geophysical Logging

The results of the geophysical surveys obtained by Schlumberger Wireline Services Company on March 16, 2000, are shown in the plate included in this document. This plate, Open Hole Formation Evaluation Well Montage, is a montage of processed and interpreted information about geology, hydrology, and rock structure parameters. Gamma radiation measurements obtained by Schlumberger Wireline Services Company are recorded in American Petroleum Institute (API) units (1 API = 2.5 cps).

Summary statistics of the Schlumberger geophysical data obtained for each formation encountered at R-19 are shown in Tables 3.2-3 and 3.2-4. The results of the geophysical logging were averaged over the thickness of each formation; both geologic data and hydrologic data summaries are shown in Tables 3.2-3 and 3.2-4. In general, the formation containing the greatest amount of porosity as shown by the density porosity is the Guaje Pumice Bed from 808 to 840 ft. The formation containing the least porosity is the massive Cerros del Rio basalt unit from 925 to 1000 ft. Formations containing the highest amount of permeability are the Guaje Pumice Bed and the lower Puye Formation.

Porosity Zones

Formation porosity zones were identified from the geophysical surveys, which are shown on the montage plate. Notable porosity zones are discussed below.

Table 3.2-3
Average Borehole Geophysical Data for Each Formation, Geologic Summary

Rock Unit	Geologic Parameters										
	Natural Gamma[a] (API)	Neutron Moisture/ Porosity[b,c] (%)	Density Porosity[d] (%)	Total Porosity[e] (%)	Shallow Porosity[b] (%)	Bulk Density[d] (g/cc)	Grain Density[d] (g/cc)	Thorium[f] (ppm)	Uranium[f] (ppm)	Potassium (wt %)	Deep Resistivity[a] (ohm-m)
Tshirege Member Cased Hole	134	NR[g]	NR	NR	NR	1.91	2.65	26.7	8.3	2.61	1950
Tshirege Member Open Hole	299	NR	49.4	13.5	25.5	1.43	2.65	49.3	13.5	4.40	1454
Tsankawi Pumice Bed	286	5.7	50.9	18.7	23.3	1.36	2.65	45.7	13.0	4.17	830
Cerro Toledo Interval	232	7.1	45.6	12.0	26.8	1.51	2.65	36.5	10.4	4.28	703
Otowi Member	380	8.7	44.4	18.5	31.9	1.56	2.65	55.2	18.2	4.08	569
Guaje Pumice Bed	379	8.2	47.2	26.7	33.5	1.49	2.66	58.6	19.9	3.69	736
Puye Formation Upper	148	4.3	34.9	11.3	19.1	2.03	3.05	27.1	7.9	3.21	138
Basalt, massive	62	-0.1	19.8	4.5	8.1	2.50	3.10	24.9	5.2	0.80	156
Volcaniclastics	136	2.8	22.8	11.5	13.3	2.14	2.73	32.3	6.1	2.49	268
Puye Formation Lower A	104	24.8	21.7	19.3	27.4	2.06	2.35	9.3	2.5	2.24	108
Puye Formation Lower B	121	34.3	31.1	31.1	NR	1.91	2.32	9.9	2.7	2.86	74

[a] Source data tool is array induction.

[b] Source data tool is APT neutron.

[c] Neutron porosity data measure moisture content in the unsaturated portion of the borehole above 1176-ft depth in the Puye Formation, Lower A.

[d] Source data tool is lithodensity.

[e] Source data tool is CMR.

[f] Source data tool is hostile environment natural gamma ray sonde (HNGS).

[g] NR = not reported.

830- to 840-ft Interval

This interval from about 830 to 840 ft within the Guaje Pumice Bed exhibits a lower formation density than the overlying Otowi Member and an elevated density porosity up to 20%. The neutron porosity curve through this zone is tracking moisture content and exhibits a slightly increased moisture content in this interval over the Otowi section above and the Puye Formation below. The CMR log data indicate total porosity up to 40% in this interval, a free fluid porosity of up to 28%, and a calculated permeability up to 1000 millidarcies (md). However, flowing water was not encountered in this zone and the increased moisture content may be unsaturated moisture contained within the formation, which may have been introduced during drilling. Nonetheless, well screen #1 was targeted for this interval of possible perched groundwater based on the interpretation of higher moisture from the geophysical logs. The deep resistivity curves show higher resistivity and separation from the shallow curves from 834 to 838 ft, which indicates some near-borehole formational changes possibly caused by drilling.

Table 3.2-4
Average Borehole Geophysical Data for Each Formation, Hydrologic Summary

Rock Unit	Hydrologic Parameters					
	Bound Fluid Volume (%)	Capillary Bound Fluid (%)	Free Fluid Porosity (%)	Total Porosity (%)	Calculated Permeability (SDR method) (md)[a]	Calculated Permeability (Timor taper method) (md)
Tshirege Member, cased hole	NR[b]	NR	NR	NR	NR	NR
Tshirege Member, open hole	12.9	7.2	0.6	13.5	0.1	0.1
Tsankawi Pumice Bed	17.8	16.3	0.8	18.7	0.4	0.4
Cerro Toledo interval	11.3	3.8	0.7	12.0	1.1	0.1
Otowi Member	16.4	11.1	2.1	18.5	0.1	0.3
Guaje Pumice Bed	14.9	22.8	11.8	26.7	177.8	484.9
Puye Formation Upper	9.1	6.3	2.2	11.3	36.5	1.3
Basalt, massive	1.7	3.1	2.7	4.5	125.0	2.1
Volcaniclastics	8.5	6.9	3.0	11.5	43.3	2.6
Puye Formation Lower A	13.2	14.3	7.2	19.3	57.5	48.4
Puye Formation Lower B	14.0	26.6	17.2	31.1	142.5	307.9

Note: Source data tool is CMR.

[a] md = millidarcies.

[b] NR = not reported.

896- to 912-ft Interval

A 16-ft interval from 896 to 912 ft in the upper Puye Formation above the Cerros del Rio basalt also exhibits higher porosity values. The average grain density recorded through the Puye is about 2.2 g/cc but the grain density in this interval is significantly below 2.0 g/cc and the density porosity ranges from 30% to 60%. The relative neutron moisture content increases by a factor of about 3 compared with the adjacent zones within the Puye Formation. The open-hole video log shows an increase in moisture on the walls of the borehole between 900 and 910 ft. The total CMR porosity increases from an average in the formation of 6% to 20% with a high of about 35%. The calculated permeability from 906 to 910 ft is from 1 to 10 md. Below 912 ft the porosity curves return to 4% to 6% with no detectable calculated permeability.

Well screen #2 was targeted for this interval to sample possible perched water based on the interpretation of geophysical data of increased moisture and from observations of increased moisture from the borehole video log.

There is no separation of the resistivity curves through this interval, indicating that the formation was not significantly affected by drilling. Formation water moving from the formation into the borehole would exhibit similar resistivity values at both the deep and shallow depths of investigation; therefore the resistivity curves would not be expected to exhibit separation. The natural gamma curve in the upper Puye Formation averages about 140 API units, but from 896 to 912 ft bgs the gamma values are 170 to 180 API units (on density log), suggesting a lithologic change through this part of the Puye Formation, probably with a higher content of finer-grained materials. The higher gamma values correspond to the zone of higher porosity and moisture content. The CMR pore water data show that the majority of the water in this interval is bound to fine-grained sediments, small-pore, micro-pore, and clay-bound.

998- to 1030-ft Interval

A 32-ft interval corresponds to the zone of volcaniclastic sediments between two massive basalt flows in the Cerros del Rio basalt. The red scoria zone from 1018 to 1030 ft is differentiated from the breccia zone above by a higher gamma value of 140 API units compared to about 100 API units in the breccia zone. The lower part of the breccia zone from 1006 to 1018 ft contains density porosity of 50% to 60% and corresponding CMR total porosity of 17% to 25%. The scoria zone contains density porosity of 20% to 30% and CMR total porosity of 10% to 20%. However, the CMR free fluid porosity in the breccia zone is about 5%, which increases up to 15% in the scoria zone. The neutron log indicates some level of elevated moisture content in the breccia zone, which decreases downward in the scoria zone. The CMR log shows limited permeability in the breccia zone but permeability ranging from 1 to 10 md in the scoria zone. The CMR bound water data indicate that moisture in this zone is primarily bound up in clay-sized pores.

1064- to 1072-ft Interval

This 8-ft interval is present directly beneath the lower massive basalt flow and may represent a basalt breccia zone similar to the breccia zone from 998 to 1018 ft described above. This zone exhibits increased moisture content on the neutron log, density porosity of 35% to 40%, CMR total porosity of 16% to 20%. However the CMR log does not indicate the presence of significant free-fluid porosity, nor does the CMR log indicate the presence of significant calculated permeability. There is some separation in the resistivity curve, indicating that the formation contains low permeability.

Regional Aquifer

The water level of the regional aquifer was encountered at 1178 ft at the time of the Schlumberger logging. The neutron moisture and CMR data indicate less than 1 ft of capillary fringe above the water level. The permeability, as interpreted from the geophysical logs, at the top of the water table, is very low (1 to 10 md).

1178- to 1530-ft Interval

The upper part of the regional saturation from 1178 to about 1550 ft exhibits 24% to 30% porosity on the neutron log and 30% to 40% porosity on the density log with the highest porosity zone at 1242 to 1246 ft. The total porosity shown on the CMR averages about 20% with 2% to 8% free fluid porosity. The porosity

through this zone is generally from smaller pore sizes from clay to micro-pore size. Calculated permeability shown on the CMR log varies generally from 1 to 10 md. The resistivity curves track very closely showing the saturated nature of the formation; the only separation is in the deep resistivity in zones of less porosity where some higher resistivity values are present at deeper distances from the borehole.

1530- to 1900-ft Interval

The deeper part of the regional saturation from 1530 to 1900 ft exhibits higher porosity values than the zone described above. The neutron log shows average porosity values of approximately 35% to 40% and the density log shows 40% to 50% average porosity. The CMR log shows 24% to 40% total porosity with an average of 4% to 20% free fluid porosity. Average calculated permeability shown on the CMR log varies generally from 0.1 to 177.8 md (Table 3.2-4), with the highest porosity and permeability zones at 1534 to 1638 ft and 1733 to 1736 ft. The resistivity curves track very close to showing the saturated nature of the formation; the only separation is in the deep resistivity in zones of less porosity where some higher resistivity values are present. This lower zone appears to be a more transmissive part of the regional aquifer in R-19.

Screen Intervals

Average summary statistics of the Schlumberger geophysical data obtained for each screened interval in R-19 are shown in Tables 3.2-5 and 3.2-6. The results of the geophysical logging were averaged over the length of each screened interval; both geologic data and hydrologic data summaries are shown in Tables 3.2-3 and 3.2-4. In general, the screen interval with the highest average permeability and porosity as shown by the density porosity log and the CMR log is screen #1 in the Guaje Pumice Bed. Within the regional zone of saturation, screen #6 has the highest average amount of porosity and screen #5 has the highest average permeability.

Borehole Washout Zones

The open portion of the borehole from 205-ft to 1886-ft depth remained stable during drilling. The top of the open borehole from 205 to about 350 ft in the Tshirege Formation enlarged during drilling, with the upper 20 ft of the open portion enlarging from 12.25 in. to about 14 in. A smaller amount of enlargement is noted in borehole through the Guaje Pumice Bed.

Several large washouts of the borehole are observed in the lower Puye Formation where washouts to 18 and 20 in. occur at 1194 to 1197 ft, 1257 to 1259 ft, 1280 to 1283 ft, and 1774 to 1778 ft. Borehole rugosity to 14-in. diameter is observed throughout the lower Puye Formation, especially from 1200 to 1300 ft, 1530 to 1550 ft, and 1690 to 1804 ft.

Borehole Deviation Survey

The borehole deviation survey shows that the borehole drifted to the southwest throughout the entire length. The bottom of the borehole is located about 100 ft south and 43 ft west of the surface location. The rate of borehole drift to the west increased at about 900 to 950 ft in the Puye Formation and the Cerros del Rio basalt.

Table 3.2-5
Average Borehole Geophysical Data for Each Screen Interval, Geologic Summary

Screen[g] No.	Geologic Parameters									
	Natural Gamma[a] (API)	Neutron Moisture/ Porosity[b,c] (%)	Density Porosity[d] (%)	Total Porosity[e] (%)	Shallow Porosity[b] (%)	Bulk Density[d] (g/cc)	Grain Density[d] (g/cc)	Thorium[f] (ppm)	Uranium[f] (ppm)	Deep Resistivity[a] (ohm-m)
1	306	6.8%	46.6%	26.1%	24.6%	1.55	2.76	50.00	16.60	657
2	165	8.0%	38.6%	19.0%	10.4%	1.95	3.05	33.24	8.81	82
3	101	23.6%	24.2%	17.9%	18.1%	2.01	2.35	8.40	2.32	170
4	140	25.9%	21.6%	21.7%	13.1%	2.06	2.35	13.92	3.87	64
5	121	34.6%	34.1%	31.6%	29.7%	1.87	2.32	9.94	2.51	110
6	124	40.3%	37.1%	34.9%	30.3%	1.83	2.32	10.12	2.72	48
7	116	39.6%	34.5%	34.3%	29.0%	1.86	2.32	9.99	2.27	45

[a] Source data tool is array induction.

[b] Source data tool is APS neutron.

[c] Neutron porosity data measure moisture content in the unsaturated portion of the borehole in screens #1 and #2 and porosity in the saturated portion of the borehole at screens #3 through #7.

[d] Source data tool is lithodensity.

[e] Source data tool is CMR.

[f] Source data tool is HNGS.

[g] Data averaged for screen interval; does not include filter pack.

Table 3.2-6
Average Borehole Geophysical Data for Each Screen Interval, Hydrologic Summary

Screen No.[a]	Bound Fluid Volume (%)	Capillary Bound Fluid (%)	Free Fluid Porosity (%)	Total Porosity (%)	Calculated Permeability (SDR method) (md)[b]	Calculated Permeability (Timor taper method) (md)
1	7.7%	0.4%	18.4%	26.1%	343.16	936.83
2	15.0%	3.9%	3.9%	19.0%	1.10	4.03
3	11.3%	2.0%	11.8%	17.9%	56.10	55.48
4	16.6%	3.6%	5.1%	21.7%	1.01	3.85
5	10.8%	0.4%	20.8%	31.6%	178.77	397.66
6	15.0%	1.5%	19.9%	34.9%	131.79	261.84
7	14.0%	1.4%	20.3%	34.3%	92.68	239.25

Note: Source data tool is CMR.

[a] Data averaged for screen interval; does not include filter pack.

[b] md = millidarcies.

Bed Boundary Dip Data

The FMI tool collected data that were calculated to approximate formation bed dip, strike, and angles. The data were collected below water level at 1178 ft to total depth. Due to the conglomeratic nature of the Puye Formation, the dip data are erratic and do not show a definitive bed dip direction. From 1178- to about 1500-ft depth the data show dip angles in all directions, sometimes in a bimodal southwest-northeast or west-east direction. Below 1500 ft to total depth the dip data show a slightly higher preponderance for directions to the southwest. Overall the dip data show that 90% of the dips are less than 10 degrees in magnitude with the highest percentage of strike angles in the northwest and southeast directions.

4.0 HYDROLOGY

4.1 Unsaturated Zone

This section discusses the hydrologic properties of the unsaturated zone at R-19.

4.1.1 Soil-Water Occurrence

4.1.1.1 Methods

For the upper 126 ft, moisture content was determined from core samples recovered by HSA. A total of 25 samples were collected at approximately 5-ft intervals for the cored part of the borehole. Samples were immediately placed in preweighed and prelabeled jars with tightly fitting lids. The moisture content was determined gravimetrically by drying the samples in an oven in accordance with American Society for Testing and Materials method D2216-90. Samples collected for moisture content are listed with the analytical results in Appendix C. Moisture content is given as the ratio of the weight of water to the weight of the dry sample.

4.1.1.2 Results

Moisture content in the upper 126 ft of the borehole ranges between 2.3% and 7.7% gravimetric (Figure 4.1-1). Overall, there is a general trend of decreasing moisture content with depth. Moisture content in weathered tuff just below the alluvium at a depth of 4 ft has a moisture content maximum of 7.7%. Below this maximum, moisture contents generally decrease with depth until a minimum of 2.6% is reached at about 40 ft. A second maximum is represented by a single sample containing 5.7% moisture at 54-ft depth. Moisture contents range from 2.8% to 3.2% from 60- to 77-ft depth. The lowest moisture measured (2.3%) occurs at a depth of 83 ft. Moisture contents range from 2.6% to 4.3% from 87- to 126-ft depth.

Moisture contents measured in samples from R-19 are consistent with those found in the upper Bandelier Tuff in other parts of the Laboratory. In LADP-4, gravimetric moisture contents for Tshirege Member Qbt-2 range from 10% to 12% in weathered tuff just below the alluvium and 2.5% to 7% in the unweathered tuff in the central part of Qbt-2 (Broxton et al. 1995, 50119).

4.1.2 Soil-Water Movement

4.1.2.1 Methods

When the pores in a rock are not filled with water, the hydrostatic pressure (or matric potential in unsaturated rock) is less than atmospheric pressure. The pressure potential is negative, meaning that work

is required to remove water from the rock. The energy making up matric potential arises from capillary forces holding water in the pores, and adsorption that holds water to particle surfaces. Figure 4.1-1 shows the absolute value of the matric potential for core samples collected in the upper 126 ft of R-19.

Matric potential for 25 samples was measured using a chilled-mirror water-activity meter as described by Gee et al. (1992, 58717). Samples were doubly sealed in ziplock bags and wrapped in packing tape immediately following wireline retrieval and opening of the split core barrel. Measurements were made in duplicate within 10 min after loading plastic vials with tight-fitting lids that were directly inserted into the water-activity meter. Core was crushed into millimeter-sized fragments as quickly as possible after the seal was broken in order to load the vials.

Repeat measurements demonstrated that samples produced the same results as long as the measurements were made less than three hours after the vials were loaded and the lids were secured. All analytical runs were bracketed by measurements of standards, which demonstrate a two sigma (2σ) reproducibility of 0.0026 for 114 analyses of the matric potential of distilled water. This is close to the instrumental precision stated in Gee et al. (1992, 58717) of 0.003 water-activity units (-0.4 millipascals [MPa] or -4080 cm H_2O). Data listed in Appendix C for matric-potential analyses represent the average of two measurements made on a sample.

The chilled-mirror psychrometer (or water-activity meter) measures matric potential in very dry soils or rocks. The meter measures water activity, which can be converted to matric potential. The units of matric potential may be given as pressure in pascals (Pa), or as the height of an equivalent column of water, in centimeters (10,200 cm H_2O = 1 MPa). The limit for the meter is reached in soils drier than 0.003 water-activity units (-0.4 MPa or -4080 cm H_2O) (Gee et al. 1992, 58717). This value is shown on the accompanying plots as the limit of the chilled mirror psychrometer.

Despite the limitation of the water-activity meter for measuring matric potential in the driest rocks, the method has advantages. Where the water-activity meter works it is inexpensive, and gives more detailed vertical information than would laboratory measurements on the available core samples. In dry rock such as in R-19 the profile from the water-activity meter provides a picture of vertical matric-potential fluctuations over a 126-ft depth that would not otherwise be apparent.

4.1.2.2 Results

A profile of matric potential versus depth appears next to the moisture-content data in Figure 4.1-1. The axis of the matric-potential plot is reversed so that drier values appear to the left on the plot, corresponding to the direction of drier values of moisture-content data. The values of matric potential range between -5.83E+04 cm and -7.04E+03 cm. All matric-potential measurements were within the working range of the water-activity meter. These samples have gravimetric moisture contents below 7.7%.

4.2 Saturated Zones

R-19 afforded the opportunity to characterize both the occurrence and movement of groundwater, at least as far as possible in a single well. Occurrence includes the depth, stratigraphic interval, and hydrologic condition (perched or regional; unconfined or confined) of all zones of saturation encountered. In the case of a single well, movement includes the vertical gradient from head distribution along the borehole and potential rate of groundwater flow as reflected by hydraulic conductivity.

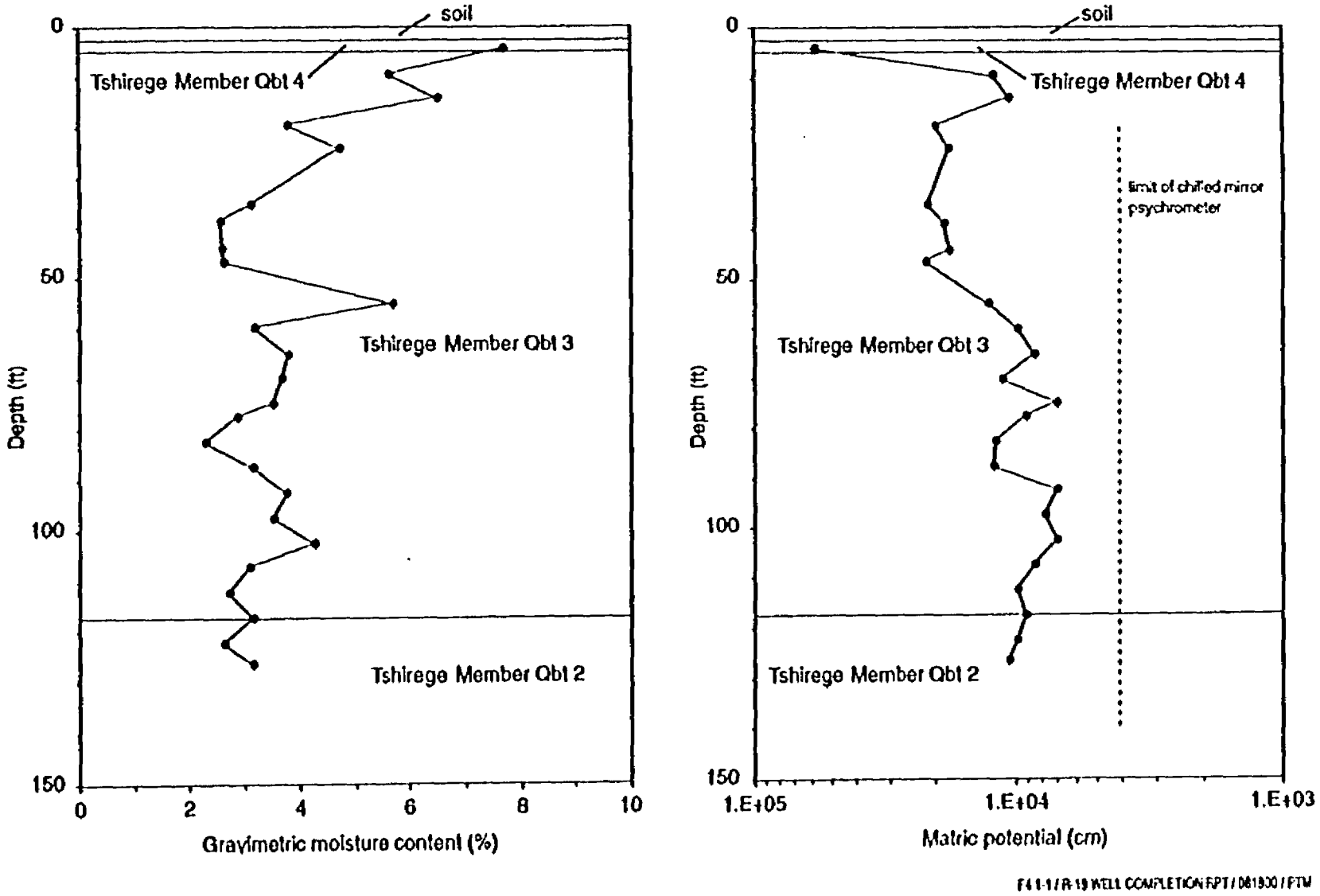


Figure 4.1-1. Gravimetric moisture and matric potential in borehole R-19

4.2.1 Groundwater Occurrence

Three zones of saturation were anticipated at R-19. Two were expected to be perched: one in the Guaje Pumice Bed and one in the Puye Formation and/or the upper Cerros del Rio basalt. The third zone of saturation anticipated in R-19 was that beneath the regional water table.

The presence of perched saturation at R-19 is unclear. No water was encountered in the Guaje Pumice Bed. Saturation reported by the driller in the Otowi Member of the Bandelier Tuff at a depth of 738 ft and in the Puye Formation at a depth of 920 ft was possibly associated with drilling water. Drillers often report saturation when there is an increase in return flow of drilling fluid. However, that is not a foolproof indication that the borehole has penetrated a saturated interval. Such an increase can also signify just the opposite. That is, it may be caused by the bit entering a less permeable formation that does not take up as much drilling fluid as did materials up-hole, so more of the injected fluid returns than usual.

Two zones of possible perched saturation were identified based on borehole geophysical logs indicating zones of relatively high moisture content. The upper zone from 834- to 840-ft depth is located at the base of the Guaje Pumice Bed. The second zone is located from 894- to 912-ft depth within the upper part of the Puye Formation. Screens were installed in both zones and will be sampled if they produce water.

The regional water table was predicted to lie at a depth of 1118 ft in Cerros del Rio basalt (Figure 3.0-1). However, it was found to be 60 ft deeper than this in the Puye Formation. Although the driller reported possible saturation at 1156 ft, geophysical logging performed some time later by Schlumberger showed the water table to be at a depth of 1178 ft. This water appeared to be unconfined and saturation continued to total depth (1902.5 ft).

4.2.2 Groundwater Movement

Vertical head distribution is essential for determining vertical hydraulic gradient. However, it could not be determined at R-19 as drilling was mainly by open-hole methods and the use of even small volumes of drilling fluids made water-level measurement difficult if not impossible. As a result of the open-hole drilling, the borehole was not a true piezometer at any of the depths where water level was measured. That is, there were no instances when measurements were made while the casing was screwed into the bottom of the borehole and hydraulic head at that depth could be determined. However, a plot of depth-to-water vs. borehole depth using all water-level readings, regardless of whether they are believed to represent static values or not, suggests a general downward vertical gradient. Static water levels during hydrologic testing also indicate a downward vertical gradient: 5932 ft at screen #6 and 5903 ft at screen #7. The observations are consistent with the conceptual hydrogeologic model for the Pajarito Plateau in which R-19 is located in a suspected recharge area. Measurement of head distribution in the Westbay® Instruments, Inc., system will provide further opportunities to evaluate vertical gradient at R-19.

The rate of groundwater movement in saturated materials is dictated by hydraulic conductivity and hydraulic gradient, according to Darcy's law. Although this nonvertical gradient cannot be evaluated using a single well, hydraulic conductivity of the various saturated materials in R-19 was determined by hydrologic testing of each screened interval. More specifically, straddle packer/injection slug tests were conducted. The test design called for isolating the target screen with a pair of straddle packers and injecting water at a constant rate. The rate of injection was monitored by reference to a flow meter placed in the line between the water supply and the Bean pump on the UDR drill rig.

Test results are summarized in Table 4.2-1. For the test of the unassigned pre-Puye deposits opposite screen #6 (1725.8- to 1733.4-ft depth), a hydraulic conductivity value of 17.5 ft/day was obtained using the Cooper-Jacob method (1946, 66645). For the test of the lower portion of the pre-Puye deposits

opposite screen #7 (1832.4- to 1839.5-ft depth), hydraulic conductivity of 19.6 ft/day was obtained using the Cooper-Jacob method (1946, 66645).

Table 4.2-1
Summary of Data for Straddle-Packer/Injection Testing of Pre-Puye Deposits at R-19

Screen #	Static Water-Level Elevations (ft)	Average Injection Rate (gpm)	Injection Rate Variation (gpm)	Test Duration (min)	Hydraulic Conductivity (ft/d)	Analytical Method
6	5932.2	11.8	0.2 (1.4%)	94	17.5	Cooper & Jacob (1946, 66645)
7	5903.5	14.6	0.2 (1.7%)	86	19.6	Cooper & Jacob (1946, 66645)

5.0 HYDROGEOCHEMISTRY

Screening borehole water samples were collected from R-19 and analyzed for a limited suite of constituents. The samples were collected primarily to determine if potential contaminants within perched zones were being carried down to the regional aquifer during drilling operations. Potential contaminants of concern at R-19 include HE compounds and associated degradation products.

5.1 Geochemistry of Core and Cutting Samples Collected during Drilling

Samples of core and cuttings were not collected from R-19 and analyzed for contaminants because HE compounds were not definitely identified in groundwater at concentrations that would be expected to adsorb onto Bandelier Tuff or Puye Formation lithologies. No other contaminants are known to occur at R-19, based on previous information presented in the Pajarito Canyon work plan (Chapter 2, LANL 1998, 59577).

5.2 Hydrogeochemistry of Groundwater Samples

Borehole water samples were collected at depths of 738, 833, 1157, and 1860 ft and analyzed for screening constituents and parameters. Borehole water samples were analyzed for HE within a zone of greater water returns (738 ft; based on driller observations) and a possible perched zone (838 ft). Borehole water samples were analyzed for inorganic and organic chemicals and isotopic uranium within the regional aquifer (1157 and 1860 ft) to determine natural solute and contaminant distributions within the different saturated zones.

Due to the presence of EZ-MUD and other drilling fluids, these borehole water samples are not representative of groundwater, especially in the low-yield possible perched zones. Consequently, these data were used only for screening purposes to assist drilling decisions. Groundwater samples shall be collected and analyzed for major ions, trace metals, stable isotopes, organic compounds, selected radionuclides, and other chemicals during quarterly sampling.

Analysis of a groundwater sample collected at 833 ft (possible perched zone) indicated the possible presence of an HE compound and degradation products of 2,4,6-trinitrotoluene (TNT). The compound HMX (cyclotetramethylenetetranitramine) was reported at 0.11 µg/L and this value should be considered an estimated (J) concentration because it is less than the practical quantitation limit but above the method detection limit (EPA method 8330, high-performance liquid chromatography [HPLC]). In addition, the

matrix spike recovery was low and the percent difference between the primary HPLC column and secondary HPLC column exceeded 25%. Nitrobenzene was reported at 0.36 µg/L in this zone. This value is considered an estimate (J) based on the percent difference between the primary column and secondary column which exceeded 25%. The TNT degradation product 2-amino-4,6-dinitrotoluene, was reported at 0.62 µg/L in the sample and the value is estimated (J) because the matrix spike recovery was low. The TNT degradation product 2,6-dinitrotoluene, which was reported at 0.34 µg/L, is estimated because the percent difference between the primary column and secondary column exceeded 25%.

Presence of EZ-MUD and other drilling fluids in the groundwater may have caused false positives due to the hydrophobic nature of these fluids. Additional groundwater samples shall be collected during quarterly sampling to evaluate the presence or absence of HE compounds at the well.

Analyses of two groundwater samples collected at 1157 ft and 1860 ft (regional saturation), respectively, did not detect any HE compounds and degradation products of TNT.

6.0 WASTE MANAGEMENT

Management of waste streams generated during R-19 drilling, sampling, and well installation activities was conducted in accordance with the site-specific waste characterization strategy form (WCSF). Wastes consisted of disposable sampling equipment, residual materials from field screening kits, personal protective equipment (PPE), plastic sheeting, sorbent pads, soil contaminated with petroleum products, and decontamination water. No borehole materials exhibited elevated field screening hits; therefore borehole materials were managed onsite as follows:

- Dry drill cuttings were contained in 55-gal. drums, directly from the dust-suppression system discharge, and were transferred and emptied into a bermed waste management storage area onsite. The material was spread and contoured along the northern edge of the drill pad. The cuttings were covered with topsoil during site restoration.

- Wet drill cuttings generated while injecting TORKease or EZ-MUD slurries mixed with municipal hydrant water, while drilling in unsaturated zones, were transferred and contained within a bermed waste management storage area onsite. The drill cuttings were allowed to dry and were then spread and contoured at the northern edge of the drill pad. The cuttings were covered with topsoil during site restoration.

- Groundwater generated as a result of drilling through saturated zones, purging, and well development operations was contained and transferred directly to potable storage tanks staged within the bermed waste management storage area onsite. Water from different saturated zones was segregated into separate tanks. A total of 63,000 gal. of groundwater was generated from all saturated intervals during drilling activities. Approximately 50,000 gal. of groundwater was generated during well development. The groundwater was applied to the site in accordance with the New Mexico Environment Department (NMED)-approved Notice of Intent to discharge permit.

- Disposable sampling equipment, residual materials from HE field screening kits (solid waste), and PPE were placed in a drum liner, sealed, labeled, and stored onsite in accordance with the WCSF. A total of one bag was generated. A waste profile form was prepared and approved for disposal of the waste at the Los Alamos County landfill.

- Petroleum-contaminated soil as well as plastic sheeting and sorbent pads that had been placed beneath the drill rig and heavy equipment to contain leaking hydraulic fluid, lubricants, and

antifreeze, were contained in four 55-gal. drums. The materials were managed and disposed of as New Mexico special waste.

7.0 SURVEY ACTIVITIES

7.1 Geodetic Survey

The approximate coordinates for R-19 are X = 1,630,147; Y = 1,760,200; and Z = 7060. The X, Y, and Z designations represent easting, northing, and elevation, respectively. Horizontal location coordinates are based on New Mexico State Plane Grid Coordinates, Central Zone (North American Datum 83) and are expressed in feet. Elevation is recorded in feet above mean sea level (ft MSL) using the National Geodetic Vertical datum of 1929.

The Facility for Information Management, Analysis, and Display (FIMAD) location identification number for R-19 is TH-10,000.

7.2 Surface Radiological Survey

A surface radiological survey was conducted by a Laboratory radiological control technician (RCT) before site construction or drilling activities began at R-19. The site radiation survey was conducted on January 10, 2000, and consisted of sweeping the proposed drill pad for areas of radioactivity above established background levels. Results of the survey indicated levels were below background with the exception of one fragment of shrapnel, which was removed from the site and disposed of using DX protocols for such materials. DX protocols typically require all personnel and equipment that have traveled off the paved roads at TA-36 to be screened by an RCT before exiting TA-36. By establishing the area as a nonradioactive area, DX permitted access of personnel and equipment to and from the R-19 drill site without radiological screening.

8.0 WELL DESIGN, CONSTRUCTION, AND DEVELOPMENT

8.1 Well Design

Geophysical logs, video logs, and borehole cuttings were reviewed to plan screen placements for well construction. The number and placement of screens was designed to meet the following criteria:

- to sample possible perched groundwater (screens #1 and #2) that could be connected upgradient with HE-contaminated perched water at R-25;
- to sample the top of the regional zone of saturation (screen #3);
- to sample high-permeability zones that might act as fast pathways for contaminants in the regional system (screens #5, #6, and #7); and
- to provide spatial coverage for sampling in the thick sequence of less-permeable rocks in the upper part of the regional zone of saturation (screen #4).

The identification of potential perched groundwater and high permeability zones in the regional system was largely based on information developed from geophysical logs. The planned and actual screen locations are given in Table 8.1-1.

Table 8.1-1
Planned and Actual Screen Placements in Well R-19

Screen #	Planned Depth (ft)	Actual Depth (ft)	Geologic/Hydrologic Setting
1	829–840	827.2–843.6	Possible perched zone at base of Guaje Pumice Bed
2	900–910	893.3–909.6	Possible perched zone in Puye Formation above basalt
3	1173–1213	1171.4–1215.4	Spans regional water table in Puye Formation
4	1410–1420	1410.2–1417.4	Spatial coverage of regional system in Puye Formation
5	1580–1590	1582.6–1589.8	Permeable zone in Puye Formation
6	1730–1740	1726.8–1733.9	Permeable zone in Puye Formation
7	1830–1840	1832.4–1839.5	Permeable zone in Puye Formation

8.2 Well Construction

The stainless-steel well components were cleaned using a hot-water cleaner and scrub brushes onsite. The bottom of the borehole was sounded at 1885 ft bgs before installation of well components began. Stainless-steel centralizers were installed above and below each screen to hold the screened intervals away from the borehole wall.

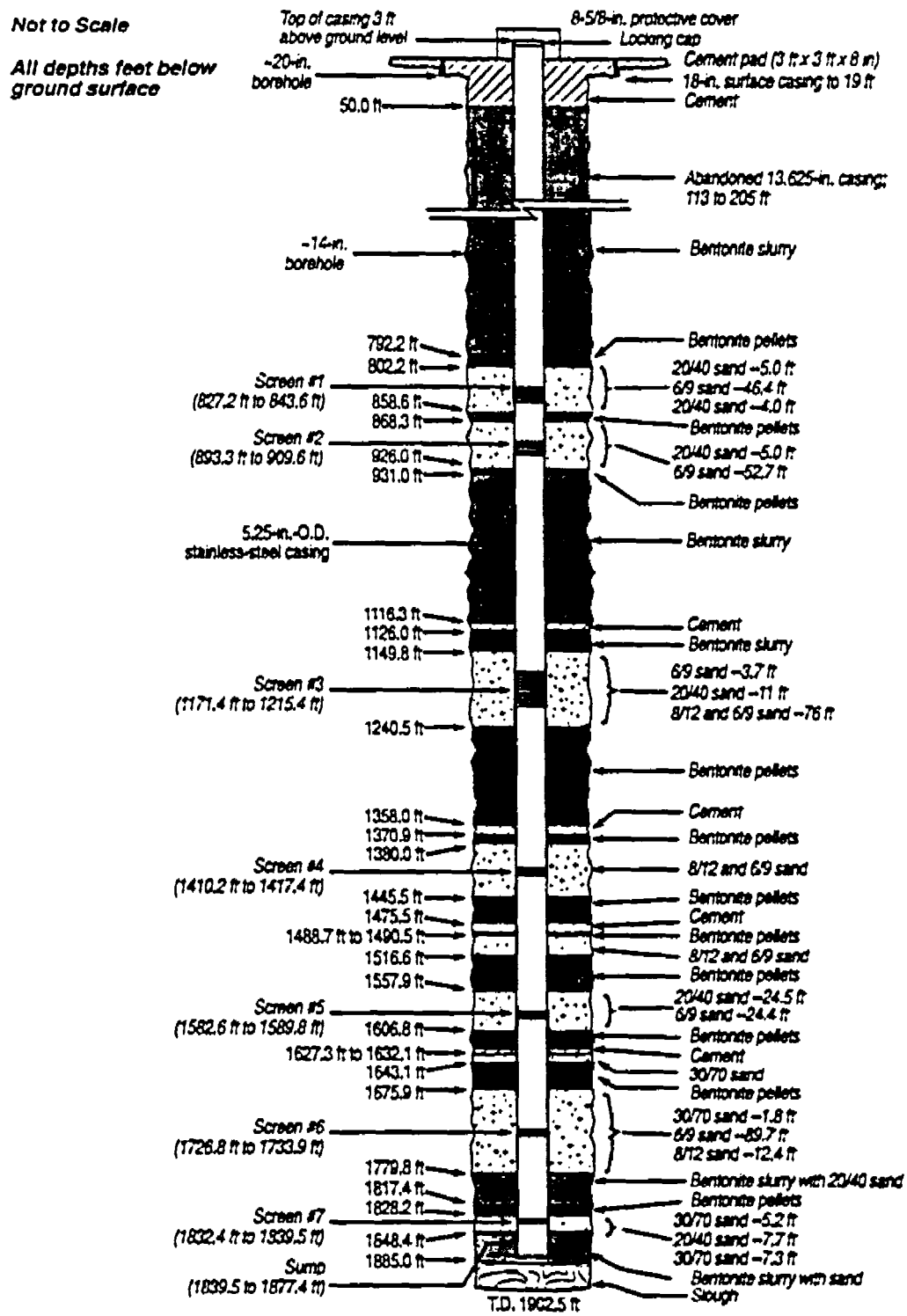
Pipe-base screens were constructed from the same tubulars as the well casing risers (4.5-in.-I.D./5.0-in.-O.D. stainless steel). These screens were constructed by drilling holes into 5 ft and 10 ft sections of well casing, and a wire wrap with a gap of 0.010-in. was attached to the outside of the perforated intervals. Holes are 0.375-in. in diameter. The five-ft screens contain 8 rows of holes with 28 holes per row, giving a flow-through cross-sectional area of 24.7 in^2. The 10-ft screens contain 8 rows of holes, with 42 holes per row giving a flow-through cross-sectional area of 37.1 in^2. A 37.9-ft sump extends below screen #7 to the bottom of the well to accommodate the Westbay sampling probes, which extend below the port during sampling. As constructed, the total depth of the well is 1877.4 ft bgs. The as-built well-completion drawing for R-19 is shown in Figure 8.2-1. All backfill materials were emplaced through a tremie pipe.

8.3 Well Development

Development was especially aggressive at R-19 in response to concerns over the impact of using small volumes of drilling fluid in its construction. Three separate stages of development were applied to each screened interval: jetting, airlifting, and pumping.

First all screens were washed and air-jetted, starting at the top of the well and working down. Each screen was treated for 15 min. As no water was discharged in this process, the various field parameters used to determine if the well had been sufficiently developed were not evaluated.

Next came airlifting. This involved two phases. First the sump was cleaned out and a volume of water equivalent to that introduced in jetting (approximately 8000 gal.) was airlifted out. This took longer than anticipated, as the discharge rate for this method was lower than expected. When this had been accomplished, a sample was taken for polymer titration to determine whether drilling fluid was present. Then airlifting focused on each screen, starting at the bottom of the well and working up, since the tool was already there. Samples were collected approximately every 15 min and field parameters (pH, specific conductance/temperature, turbidity and total organic carbon) were checked. Airlifting at a given screen was halted when field parameters were acceptable (namely, turbidity <5 nephelometric turbidity units [NTUs]) or could not be improved. The tool was raised to the next screen up and the process was repeated.



Note: The screen intervals list the footages of the pipe perforations, not the tops and bottoms of screen joints.

FIL2-1 / R-19 WELL COMPLETION RPT / 083000 / PTM

Figure 8.2-1. As-built well-completion diagram of well R-19

Finally, the saturated screens (#3 through #7) were developed by pumping, starting at the top of the well and working down. As in the case of airlifting, samples were taken for checking field parameters approximately every 15 min. When field parameters were acceptable or could not be improved, the pump was shut off for 15 min. Then it was turned back on and samples were taken again at 15-min intervals to see if the previous values for field parameters could be reproduced. This process was repeated three times. After acceptable or stable values had been reproduced for three episodes, a final sample for polymer titration was collected and the tool was moved to the next screen down where the process was repeated.

Field-parameter values during the development of all screens in R-19 are given in Table 8.3-1. Selected results plotted in Figure 8.3-1 are typical.

Table 8.3-1
Summary of Final (Pumping) Phase of Development at R-19

Screen #	Elapsed Time (min)	Range of Field Parameters[a]				
		Water Produced/Rate (gpm)	pH	Specific Conductance (uS/cm)	Temperature (C)	Turbidity (NTU)
3	365	91.25 (0.25)	7.86–7.95	130–116	17.6–21.7	45.40–12.90
4	235	1175 (5)	N.A.[b]	117–109	19.4–221.1	62.25–4.64
5	350	3500 (10)	6.85–7.72	130–122	17.8–20.8	47.40–4.61
6	240	2400 (10)	7.76–7.94	126–127	21.10–20.60	142.10–5.09
7	275	5050 (15–20)	7.46–8.09	125–126	17.9–21.6	27.00–4.90

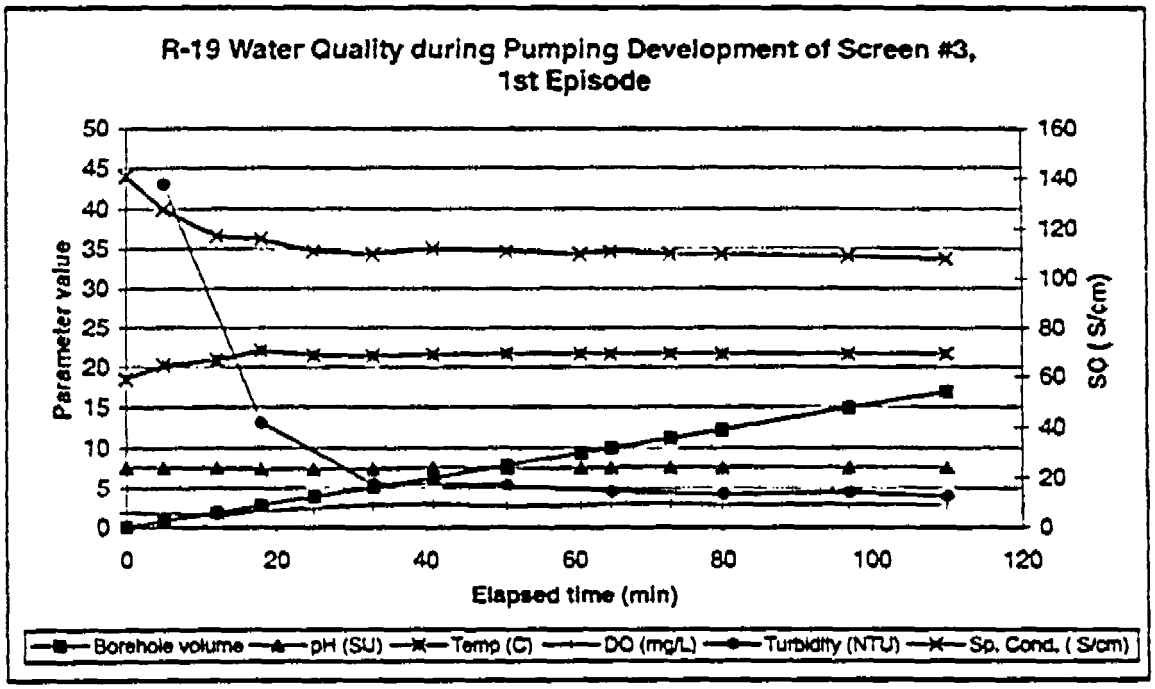
[a] Values at beginning and end of development; intermediate values may be higher than at beginning.

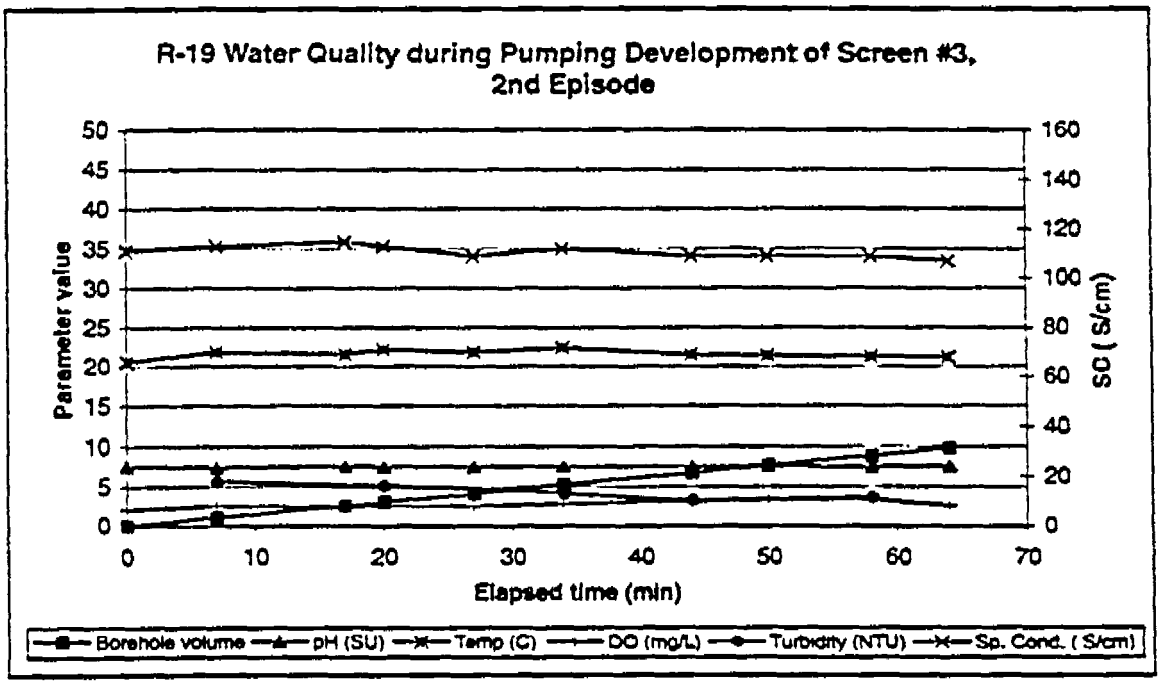
[b] N.A. = not available.

8.4 Geochemical Tests to Evaluate the Cleanup of Drilling Fluids During Well Development

Borehole R-19 was drilled with fluids consisting of regional aquifer water, EZ-MUD, and TORKease to enhance drilling rates. EZ-MUD is a viscosifier and also improves borehole stability. EZ-MUD consists of a polyacrylamide-polyacrylate (PHPA) copolymer that eventually dissociates to smaller organic compounds containing carbon, hydrogen, nitrogen, and oxygen. The substance has a density of 8.7 lb/gal. EZ-MUD has a net negative surface charge of 30% (0.3 mole per mole of polymer). One to two cups of EZ-MUD per thousand gallons of water were used at R-19 during drilling operations. EZ-MUD can be broken down by adding 5% sodium hypochlorite (bleach) to water injected into a well during development. This procedure was not followed at R-19 because of concern about the effect the sodium hypochlorite would have on water-quality parameters. EZ-MUD has a pH of 8.5 at a concentration of 1 quart per 100 gal. of water. TORKease reduces frictional sticking of drill string encountered in low-permeability material. TORKease consists of an emulsion of complex potassium stearates and has a specific gravity of 0.95. TORKease has a pH range of 9.3 to 9.5 when mixed with low-ionic-strength water.

Titration experiments were performed to determine the concentration of EZ-MUD remaining in R-19 during well development. Groundwater samples collected from screens #3 through #7 (those in the regional aquifer; screens #1 and 2 were dry at the time) were tested for EZ-MUD at the beginning of each day and during initial and final pumping. The groundwater samples were collected from June 20, 2000, through June 24, 2000. Baroid developed the titration procedure used during this investigation.





F8.3-1 / R-19 WELL COMPLETION RPT / 091200 / PTM

Figure 8.3-1. Results of final development (pumping) for screen #3

At R-19, approximately 50,000 gal. of regional aquifer water were pumped out of the well during development. Groundwater samples collected from R-19 showed concentrations of EZ-MUD ranging between 0.017 and 0.063 parts per thousand, suggesting most of the residual EZ-MUD has been removed from the well. Concentrations of total organic carbon (TOC) ranged between 1.4 and 36.5 mg C/L, suggesting that some residual EZ-MUD is present at R-19. During well development, concentrations of TOC generally decreased over time, with some increases occurring periodically. The elevated TOC is consistent with the presence of small amounts of residual EZ-MUD. Concentrations of TOC should decrease as EZ-MUD continues to dissociate, eventually approaching natural TOC concentrations. Tests were not performed on quantifying the amounts of TORKease potentially remaining in the borehole. According to the drillers, small amounts of TORKease were used in the Bandelier Tuff to lubricate casing that was rock-locked.

8.5 Installation of Westbay's MP55 System®

Following well development, the Westbay MP55 system for groundwater monitoring was installed in the steel-cased well. Model 2523 MOSDAX® System sampler probe equipment will be used to collect groundwater samples from the completed well.

An MP casing installation log, which specifies the location of each Westbay well component in the borehole, was prepared in the field by Westbay in consultation with the Laboratory based on a draft of the well-completion diagram. Available geophysics logs and an as-built video log taken inside the steel well casing were also reviewed before measurement ports and packers were sited within the well screen intervals. The final version of the MP casing installation log was approved in the field on August 8, 2000, by the Laboratory prior to installation of the Westbay well components. The MP casing installation log as approved was used as the installation guide in the field.

An MP measurement-port coupling and associated magnetic location collar were included in each primary monitoring zone to provide the capability to measure fluid pressures and collect fluid samples. A pumping-port coupling was also included in each of the seven screens to provide purging, sampling, and hydraulic conductivity testing capabilities. Additional measurement-port couplings were included below the pumping ports for monitoring hydraulic tests.

Measurement-port couplings were included in quality assurance (QA) zones to provide QA testing capabilities. All measurement ports were positioned below each of the MP55 packers to permit routine operation of the squeeze relief venting with the MP55 packer inflation equipment during the inflation process.

The MP casing components were set out in sequence according to the MP casing installation log on racks near the borehole. Each casing length was numbered in order beginning with the lowermost as an aid in confirming the proper sequence of components. The appropriate MP Systems® coupling was attached to each piece of MP casing. Magnetic location collars were attached 2.5 ft below the measurement ports in each of the monitoring zones and 2.5 ft below MP coupling No. 226 near the top of the well.

The length of each MP casing section was measured with a steel tape to confirm nominal lengths, and the data were entered on the MP casing installation log. Each casing component was visually inspected, and serial numbers for each packer, measurement-port coupling and pumping-port coupling were recorded on the field copy of the MP casing installation log.

The MP casing components were lowered into the well in sequence. The sections of MP casing were lowered by a Smeal work-over rig provided by the Laboratory. Each casing joint was tested with a

minimum internal pressure of 300 psi for one minute to confirm hydraulic seals. Deionized water was used for the joint tests. A record of each successful joint test and the placement of each casing component is on the field copy of the MP casing installation log. The suspended weight of the MP casing components was monitored during lowering to confirm that operating limits of the MP system casing components were not exceeded. Lowering of the MP casing to the target position was successfully completed on September 9, 2000.

After the casing was lowered into the borehole, the water level inside the MP casing was left at a depth of more than 1531 ft below the top of the MP casing to confirm hydraulic integrity of the casing. The open-hole water level was 1175 ft below ground level. With this differential pressure acting on the MP casing string, the water level inside the MP casing was monitored with a pressure transducer for a period of 40 min, and the measured pressures were stable. The test indicated that the MP casing was watertight.

After the components were lowered into the well and the hydraulic integrity of the MP casing had been confirmed, the MP casing string was positioned as shown in Appendix D. The MP packers were inflated on September 9, 10, and 11, using deionized water. The packers were inflated in sequence beginning with the lowermost. All the packers were inflated successfully and QA tests showed that all the packer valves were closed and sealed.

Westbay's procedure for destressing the MP casing was used after all of the packers had been inflated. The top MP55 casing was cut and trimmed to suit the final configuration of the wellhead assembly and the MP top completion was installed. The final tensile load at the top of the MP casing was 300 lb. The maximum limit for long-term tensile loading of the MP casing is 1000 lb (454 kg). A sketch of the as-built top of the MP casing and final positions of the MP well components are shown in Appendix D. A summary of depth information for key MP well components is shown on Table 8.5-1.

After packer inflation was completed, fluid pressures were measured at each measurement port. The fluid pressure profile measurements were taken on September 11, 2000. At that time, the in situ formation pressures may not have recovered from the preinstallation and installation activities. Longer term monitoring may be required to establish representative fluid pressures.

A plot of the piezometric levels in all zones, including QA zones, based on the September 11, 2000, pressure measurements were examined to confirm proper operation of the measurement ports and as a check on the presence of annulus seals between adjacent monitoring zones. All the measurement ports operated normally. Each of the packers was supporting a differential hydraulic pressure, indicating the presence of packer seals.

8.6 Wellhead Protection

A reinforced concrete vault was installed to provide wellhead protection. Figure 8.6-1 shows plan and profile views of the wellhead configuration.

9.0 SITE RESTORATION

The R-19 drill site area was recontoured to match the surrounding topography using a backhoe. The surface of the drill pad was roughened and native dryland seed was applied to the denuded areas. Straw mulch was then spread over the seeded areas and wheel-rolled to crimp in the straw and cover the seed.

Table 8.5-1
Depths of Key Items Installed During R-19 MP55 Completion

Zone No.	Screen Interval[a] (ft)	Sand Pack Interval[a] (ft)	MP Casing No. (from MP Log)	Packer No.	Packer Serial No. (0612)	Nominal Packer Position[b] (ft)	Magnetic Collar Depth (ft)	Measurement Port Depth[b] (ft)	Pumping Port Depth[b] (ft)	Port Name	Comments
QA2			186				None	402.0		QA2	
			185	1	169	412.3					
QA1			145				None	800.0		QA1	
			144	2	150	810.3					
SQA1			143				None	814.8		SQA1	
			142	3	113	820.1					
Zone 1	827.2 to 843.6	802.2 to 858.6	139				846.7	844.2		MP1A	
			138						849.6	PP1	
			137					855.2		MP1B	
			136	4	161	859.1					
LQA1			135					863.4		LQA1	
			133	5	152	877.0					
SQA2			132					881.5		SQA2	
			131	6	105	886.8					
Zone 2	893.3 to 909.6	868.3 to 926.0	127				911.8	909.3		MP2A	
			126						914.7	PP2	
			125					920.3		MP2B	
			124	7	156	924.0					
LQA2			123				None	928.5		LQA2	
			99	8	164	1153.5					
SQA3			98				None	1158.0		SQA3	
			97	9	160	1163.3					
Zone 3	1171.4 to 1215.4	1149.8 to 1240.5	93				1193.2	1190.7		MP3A	
			92						1196.1	PP3A	
			91				1204.2	1201.7		MP3B	
			90						1207.1	PP3B	
			89					1212.8		MP3C	
			88	10	167	1218.1					
LQA3			87				None	1222.6		LQA3	
			70	11	149	1390.4					
SQA4			69				None	1394.9		SQA4	

Table 8.5-1 (continued)

Zone No.	Screen Interval[a] (ft)	Sand Pack Interval[a] (ft)	MP Casing No. (from MP Log)	Packer No.	Packer Serial No. (0612)	Nominal Packer Position[b] (ft)	Magnetic Collar Depth (ft)	Measurement Port Depth[b] (ft)	Pumping Port Depth[b] (ft)	Port Name	Comments
			68	12		1400.2					
Zone 4	1410.2 to 1417.4	1380 to 1445.5	65				833.4	1412.9		MP4A	
			64						1418.3	PP4	
			63					1423.9		MP4B	
			62	13		1427.6					
LQA4			61				None	1432.1		LQA4	
			47	14		1563.5					
SQA5			46				None	1568.0		SQA5	
			45	15		1573.4					
Zone 5	1582.6 to 1589.8	1557.9 to 1606.8	42				1013.8	1586.1		MP5A	
			41						1591.5	PP5	
			40					1597.1		MP5B	
			39	16		1600.8					
LQA5			38				None	1605.3		LQA5	
			27	17		1707.5					
SQA6			26				None	1712.0		SAQ6	
			25	18		1717.4					
Zone 6	1726.8 to 1733.9	1675.9 to 1779.8	22				1732.6	1730.1		MP6A	
			21						1735.4	PP6	
			20					1741.1		MP6B	
			19	19		1744.8					
LQA6			18				None	1749.3		LQA6	
			11	20		1812.1					
SQA7			10				None	1816.6		SQA7	
			9	21		1822.0					
Zone 7	1832.4 to 1839.5	1828.2 to 1848.4	6				1837.2	1834.7		MP7A	
			5							PP7	
			4					1845.7		MP7B	
			3	22		1849.4			1851.0		
LQA7			2				None	1853.9		LQA7	

[a] All depths are with respect to ground level.

[b] All depths of MP System casing components are the depth to the top of the respective coupling

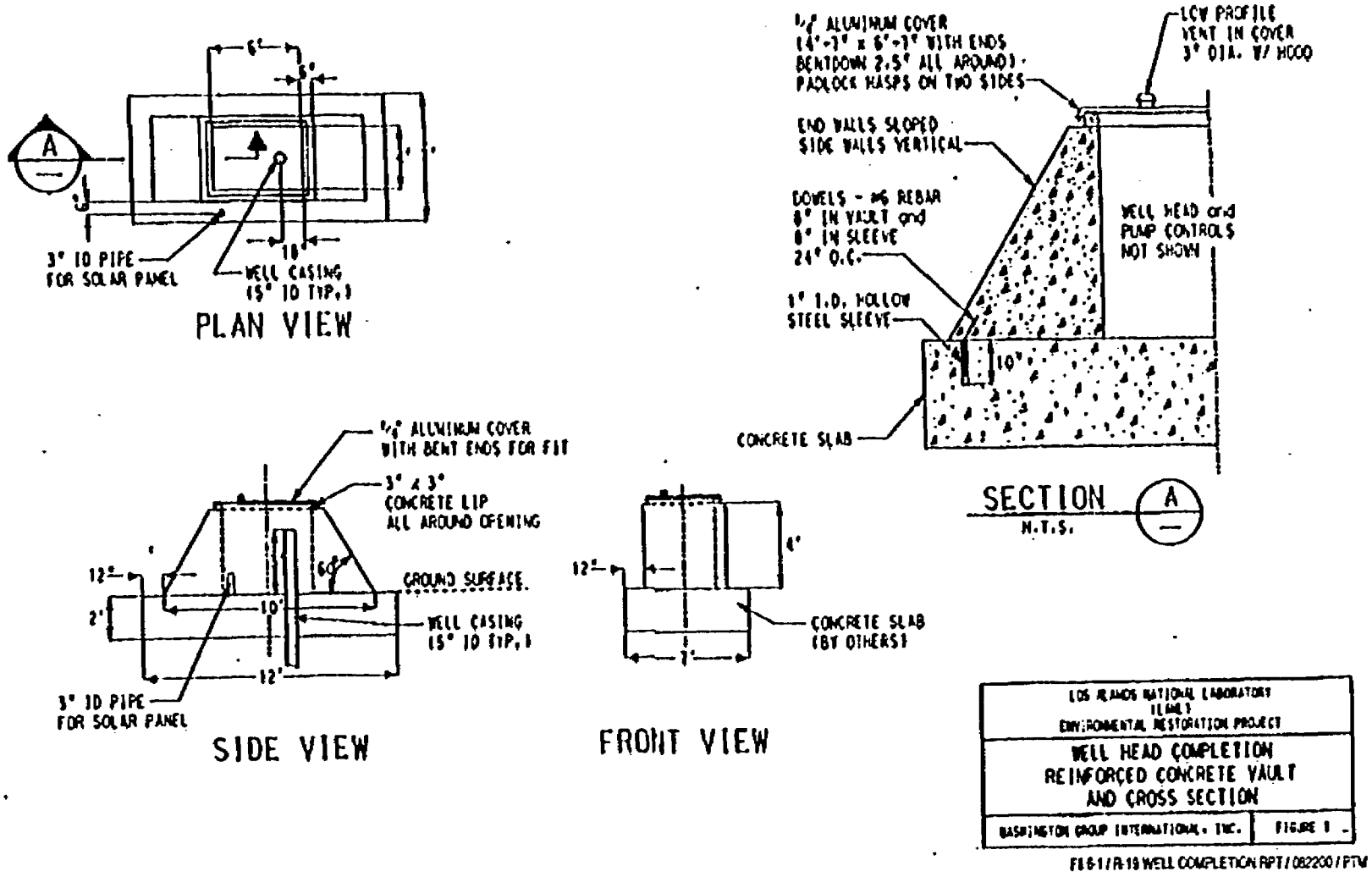


Figure 8.6-1. Well R-19 wellhead diagram

10.0 MODIFICATIONS TO WORK PLANS

Table 10.0-1 compares the actual characterization activities performed at R-19 with the planned activities in the "Work Plan for Pajarito Canyon" (LANL 1998, 59577), the Hydrogeologic Workplan (LANL 1998, 59599), and the "Field Implementation Plan for the Drilling and Testing of LANL Regional Aquifer Characterization Well R-19" (LANL 1999, 66644).

The final depth and completion design of R-19 was based on ongoing evaluations of hydrogeologic data collected during drilling activities and discussions with the groundwater integration team and the NMED. In the hydrogeologic work plan, the depth of the well was originally planned at 1278 to 1678 ft (100 to 500 ft into the regional zone of saturation). Because of the identification of HE contamination in groundwater at well R-25, the data quality objectives of R-19 were reevaluated and the well was redesigned as an early warning monitoring well upgradient of the southern part of the Pajarito municipal well field. The depth of the well was increased to 1950 ft during preparation of the field implementation plan in order to provide a more comprehensive monitoring of potential HE contaminants moving in groundwater eastward from TA-16 toward municipal supply well PM-2. The increased depth allowed overlap of R-19 well screens with the most productive zones in the nearby water supply wells based on spinner log data from PM-4. Presumably these productive zones represent fast pathways for groundwater and are most at risk from contaminants originating from TA-16. The borehole was actually completed at a depth of 1902.5 ft when collapsing hole conditions made further drilling activities risky.

The amount of core collected in R-19 (6.6%) was a minor deviation from the amount specified in the hydrogeologic work plan (10%). In the hydrogeologic work plan R-19 is designated as a type 2 well (10% coring). During actual drilling operations, core was collected from the upper 126 ft of R-19 using an HSA method. In R-19, good performance of the HSA system was achieved in the upper Bandelier Tuff and continuous core could be collected without penalizing the drilling rate. Because of open-hole conditions, use of geophysical logs was preferred over additional core collection for geologic and hydrologic characterization. In addition, the groundwater integration team has adopted a characterization strategy emphasizing hydrology tests in completed wells over laboratory testing of core for hydrologic properties.

At R-19, significant problems were encountered while trying to ensure that sand filter packs were correctly placed opposite the screen intervals. Unexpected changes in the vertical positions of annular fill materials were encountered for screens located in the regional zone of saturation. This occurred when annular material volumes were calculated, material was put into the borehole, and the "tagged" depth-to-surface of material differed significantly from what was estimated based on the expected annular volume. At times tagged levels appeared to rise or fall unexpectedly after adding annular fill materials on top of the previous materials.

Solutions used to deal with these problems included

- utilizing high-expansion bentonite pellets to plug fractures or stabilize the hole;
- utilizing coarser-grained sands to settle faster, bridge fractures, and plug larger formation pores and washout zones;
- placing plugs of cement grout to re-establish vertical stabilization immediately below zones that either serve as hydraulic barriers or are hydrostratigraphic zones of interest for well screens;
- introducing high volumes of water to overcome hydraulic pressures of high-producing zones while using a tremie to introduce backfill materials;
- waiting for periods of time (hours or days) for the borehole to stabilize; and
- increasing the vertical distance of annular seal or filter pack lengths to account for vertical movement of backfill materials.

Table 10.0-1
Activities Planned for R-19 Compared with Work Performed

	Work Plan for Pajarito Canyon	Hydrogeologic Work Plan	R-19 Field Implementation Plan	R-19 Actual Work
Planned Depth (ft)	Refers to hydrogeologic work plan	100 to 500 into the regional aquifer (1278 to 1678 ft)	Nominally 1950	1902.5
Drilling Method	Auger or rotary drilling	Methods may include, but are not limited to, HSA, air-rotary/Odex/Stratex, air-rotary/Barber rig, mud rotary drilling	Phase I – HSA Phase II – Air-rotary under-reamer advance of casing systems	Phase I – HSA Phase II – Air-rotary under-reamer advance of casing systems to 211 ft. Open-borehole drilling from 211 to 1902.5 ft using a 12.25-in. tricone carbide button bit
Amount of Core	Refers to hydrogeologic work plan	10% of the borehole	Core to refusal with HSA	Cored to refusal with HSA; 126.5 ft or 6.6% of the borehole
Lithologic Log	Log to be prepared from core, cuttings, drilling performance	Log to be prepared from core, cuttings, drilling performance	Log to be prepared from core, cuttings, geophysical logs, and drilling performance.	Log was prepared from core, cuttings, geophysical logs, and drilling performance.
Number of Water Samples Collected for Contaminant Analysis	A water sample may be collected from each saturated zone. Well to be sampled at completion and at six months.	A water sample may be collected from each saturated zone. The number of sampling events after well completion are not specified.	A water sample will be collected from each saturated zone. The geochemistry project leader and technical team will determine the number and locations of samples based on conditions encountered. The number of sampling events after well completion are not specified. Up to six water samples are planned.	To date, water samples were collected for screening purposes from two possible perched zones and two samples were collected from the regional aquifer.
Water Sample Analytes	**Trace Elements/Metals:** Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, Tl, U, V, Zn **Anions:** Br, ClO_3, Cl, F, NO_3, PO_4, HCO_3, SO_4 **Other Inorganic Chemicals:** Si, cyanide **Radionuclides:** ^{3}H, ^{90}Sr, ^{137}Cs, ^{234}U, ^{235}U, ^{236}U, ^{238}U, ^{238}Pu, $^{239,240}Pu$, ^{241}Am **Organic Compounds:** pesticides, PCBs, VOCs, SVOCs, HE **Other Analyses:** ^{14}C, ^{13}C, $^{18}O/^{16}O$, D/H, DOC	Radiochemistry I, II, and III analytes; ^{3}H, gamma spectroscopy scan; general inorganic chemicals; metals; stable isotopes	**Trace Elements/Metals:** Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, U, V, Zn, NH^{4} **Anions:** Br, ClO_3, Cl, F, NO_3, NO_2, PO_4, HCO_3, SO_4 **Other Inorganic Chemicals:** Si, cyanide, total organic carbon **Radionuclides:** ^{3}H, ^{90}Sr, ^{137}Cs, ^{241}Am, ^{234}U, ^{235}U, ^{236}U, ^{238}Pu, $^{239,240}Pu$, gamma spectroscopy, gross-alpha, gross-beta, gross gamma **Organic Compounds:** VOCs, SVOCs **Other Analyses:** ^{14}C, ^{13}C, $^{18}O/^{16}O$, D/H, DOC	Same as field implementation plan except for the deletion of gamma spectroscopy, ^{241}Am, ^{238}Pu, ^{235}Pu, total Cn, and ^{90}Sr. These detected analytes are not present as contaminants in the new mesa-top location for R-19.

Table 10.0-1 (continued)

	Work Plan for Pajarito Canyon	Hydrogeologic Work Plan	R-19 Field Implementation Plan	R-19 Actual Work
Water Sample Field Measurements	Alkalinity, dissolved oxygen, pH, specific conductance, temperature, turbidity	Alkalinity, pH, specific conductance, temperature, turbidity	Alkalinity, dissolved oxygen (completed well only), pH, specific conductance, temperature, turbidity	Alkalinity, pH, specific conductance, temperature, turbidity
Number of Core/Cuttings Samples Collected for Contaminant Analysis	Collect and preserve seven cores to represent major hydrogeologic units and zones above and below major hydrogeologic contacts	Twenty samples of core or cuttings to be analyzed for contaminants in each borehole	Up to 31 core/cuttings samples planned, number of samples dependant on number of saturated zones encountered	No samples of cores/cutting have been collected for contaminant analysis because contaminants were not detected in groundwater screening samples during drilling
Core Sample Analytes	**Trace Elements/Metals:** Al, Sb, As, Ba, Be, Br, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, Ti, U, V, Zn **Anions:** B, Cl, F, SO_4 **Other Inorganic Chemicals:** Si, cyanide **Radionuclides:** ^{3}H, ^{90}Sr, ^{137}Cs, ^{230}Th, ^{232}Th, ^{234}U, ^{235}U, ^{238}U, ^{239}Pu, $^{238,240}Pu$, gamma spectroscopy, gross-alpha, gross-beta, gross gamma	Uppermost sample to be analyzed for a full range of compounds; deeper samples to be analyzed for radiochemistry I, II, and III analytes; ^{3}H, and metals; four samples to be analyzed for VOCs	**Trace Elements/Metals:** Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Tl, U, V, Zn **Anions:** Br, Cl, F, SO_4, NO_3 **Other Inorganic Chemicals:** cyanide **Radionuclides:** ^{3}H, ^{90}Sr, ^{137}Cs, ^{241}Am, ^{234}U, ^{235}U, ^{238}U, ^{239}Pu, $^{238,240}Pu$, gamma spectroscopy, gross-alpha, gross-beta, gross gamma VOCs and SVOCs to be determined in four samples and where PID detects occur	See text block above.
Laboratory Hydraulic-Property Tests	Selected borehole core samples will be analyzed for bulk density, porosity, moisture content, moisture potential, saturated hydraulic conductivity	Physical properties to be determined on 5 samples and will typically include: moisture content, porosity, particle density, bulk density, saturated hydraulic conductivity, and water retention characteristics.	Selected unsaturated materials may be tested in the laboratory for the full suite of hydraulic properties.	Twenty-five samples were analyzed for moisture content and matric potential. No samples were submitted for laboratory analysis of other hydraulic properties.
Geology	Refers to hydrogeologic work plan	Approximately 10 samples of core or cuttings will be collected for mineralogy, petrography, and rock chemistry.	The geology task leader will determine the number of samples for characterization of mineralogy, petrography, and rock chemistry based on geologic and hydrologic conditions encountered during drilling	A total of 11 samples were characterized for mineralogy, 26 samples for petrography, and 34 samples for rock chemistry.

Table 10.0-1 (continued)

	Work Plan for Pajarito Canyon	Hydrogeologic Work Plan	R-19 Field Implementation Plan	R-19 Actual Work
Geophysics	Refers to hydrogeologic work plan	In general, open-hole geophysics includes caliper, electromagnetic induction, natural gamma, magnetic susceptibility, borehole color videotape, fluid temperature (saturated), fluid resistivity (saturated), single-point resistivity (saturated), and spontaneous potential (saturated). In general, cased-hole geophysics includes: gamma-gamma density, natural gamma, and thermal neutron.	In general, open-hole geophysics includes caliper, electromagnetic induction, natural gamma, magnetic susceptibility, borehole color videotape, fluid temperature (saturated), fluid resistivity (saturated), single point resistivity (saturated), and spontaneous potential (saturated). In general, cased-hole geophysics includes: gamma-gamma density, natural gamma, and thermal neutron.	Open-hole geophysics included caliper, resistivity, natural gamma radiation, spontaneous potential, lithodensity, magnetic resonance, borehole color videotape, epithermal neutron, neutron porosity, spectral natural radiation (K, U, Th), formation microimager, hole deviation
Water-Level Measurements			Water levels will be determined for each saturated zone by water-level meter or by pressure transducer. Additional water-level readings are to be made at as many borehole depths as possible for vertical gradient determination.	Water levels were determined for each saturated zone by water-level meter or by pressure transducer. Water-level measurements were taken at various borehole depths, but open-hole conditions precluded true piezometric measurements.
Field Hydraulic-Property Tests			Slug or pumping tests may be conducted in saturated intervals once the well is completed.	Straddle-Packer/Injection tests were conducted for two intervals in the regional zone of saturation.
Surface Casing	Refers to hydrogeologic work plan	Approximately 20-in. O.D., extends from land surface to 10-ft depth in underlying competent layer and grouted in place	16-in.-diameter low-carbon steel casing set to a depth of 37 ft	18-in. surface casing extends to a depth of 19 ft.
Minimum Well Casing Size	Refers to hydrogeologic work plan	6-5/8-in. O.D.	5.56-in. O.D.	Nominally 5.0-in. O.D.
Well Screen	Refers to hydrogeologic work plan	Machine-slotted (0.01-in.) stainless-steel screens with flush-jointed threads; number and length of screens to be determined on a site-specific basis and proposed to NMED	Five screens ranging from 10 to 25 ft in length; wire-wrapped 304 stainless-steel screens with 0.010-in. gaps.	Seven screens from 7.1 to 44 ft in length of stainless-steel pipe-base screen with wire wrap; 0.010-in. gaps.
Filter Material	Refers to hydrogeologic work plan	>90% silica sand, properly sized for the 0.010-in. slot size of the well screen; extends 2 ft above and below the well screen	>98% silica sand, properly- sized for the 0.010-in. slot size of the well screen; extends 2 ft above and below the well screen	>98% silica sand; sizes include 30/70, 20/40, 8/12, and 6/9 in various combinations; from 4.2 to 50.9 ft above screen to 7.1 to 45.9 ft below screen

Table 10.0-1 (continued)

	Work Plan for Pajarito Canyon	Hydrogeologic Work Plan	R-19 Field Implementation Plan	R-19 Actual Work
Conductor Casing	Refers to hydrogeologic work plan	Carbon-steel casing from land surface to top of stainless-steel casing	Carbon-steel casing 5.56-in. in diameter extending from land surface to dielectric coupling at top of stainless-steel casing; 10 ft of 5.56-in.-diameter stainless-steel casing below dielectric coupling	5-in.-O.D. stainless-steel casing used throughout well
Backfill Materials (exclusive of filter materials)	Refers to hydrogeologic work plan	Uncontaminated drill cuttings below sump and bentonite above sump	Bentonite in borehole below well; fine sand in transition zone 10 ft above and 3 ft below filter pack; bentonite above transition zone to bottom of surface casing; cement grout between surface casing and borehole wall and between surface casing and well casing	Bentonite below well screen #7; sand next to well screens; bentonite between sand packs; cement placed at 0 to 50 ft, 1116.3 to 1126 ft, 1358 to 1370.9 ft, 1475.5 to 1488.7 ft, 1627.3 to 1632.1 ft
Sump	Refers to hydrogeologic work plan	Stainless-steel casing with an end cap	5.56-in.-diameter stainless-steel casing 10 ft long	37.9 ft of 5-in.-O.D. stainless-steel casing with an end cap
Bottom Seal	Refers to hydrogeologic work plan	Bentonite	Bentonite	Bentonite

At R-19, it was necessary to extend sand filter packs well above and below some screens because the borehole would not stabilize even after using all available solutions. Movement of annular fill materials suggested that these materials could continue to "fall" while annular filling activities were occurring higher up the borehole or even after the well had been completed. This made it difficult to ensure that no annular seal material (i.e., bentonite) would relocate itself over the screens. Emplacing only 5 ft of sand pack above the top of the screen in these instances would have seriously jeopardized the use of these screens. The only solution was to extend the lengths of sand packs to account for subsequent vertical movement of annular fill materials.

11.0 IMPLICATIONS FOR CONCEPTUAL GEOLOGIC, HYDROGEOLOGIC, AND GEOCHEMICAL MODELS

The most significant implications from R-19 for the conceptual hydrogeologic model is that the thick perched zone of saturation encountered at R-25 was not observed at either R-19 or CdV-R-15-3. In fact, the occurrence of any perched water at these wells is uncertain. If such saturation is present, it is markedly thinner than at R-25. These observations suggest there is little danger of transport of HE through perched water from the R-25 area across the area of R-19.

The regional water table is 60 ft deeper at R-19 than anticipated. This is as much a consequence of contouring sparse water-level data as anything else and shows the need for additional spatial data to constrain the depth and geometry of the water table.

Head data collected within the regional zone of saturation at R-19 indicate a downward vertical gradient. This confirms the existing conceptual model that R-19 is located in a recharge area.

Hydrologic testing of pre–Puye Formation deposits yielded hydraulic-conductivity values that are consistent with those for medium sand or silty sand. Hydraulic-property values for these pre-Puye Formation deposits have not previously been available. These deposits were unanticipated in the 3-D sitewide geologic model available at the time R-19 was drilled. Revisions to the 3-D sitewide geologic model will include the incorporation of this pumiceous pre-Puye unit, the adaptation to much thicker Cerro Toledo deposits in this part of the Laboratory, the modeling of thinner Cerros del Rio basaltic units, and the absence of axial river gravels or Santa Fe Group sediments at the depth drilled.

12.0 ACKNOWLEDGEMENTS

The following individuals contributed to this investigation.

B. Hull was the drilling consultant, and he contributed to drilling activities, placement of annular fill materials, and well design.

J. Caldwell and M. Caldwell constructed the R-19 drill pad.

Stewart Brothers Drilling Company provided Phase I drilling services under the direction of P. Garcia, the drilling supervisor. The driller was S. Johnson.

Dynatec Drilling, Inc. (formerly Tonto Environmental Drilling Company) provided Phase II drilling services under the direction of J. Eddy, the drilling supervisor. The drillers were L. Thoren, D. Wilson, G. Woodward, R. Brown, C. Howe, and S. Devers.

R. Baran and D. Barney were the site safety officers. T. Robinson, W. Gallegos, and A. Cucchiara provided radiological control support for drilling activities.

M. Cash was the host facility point-of-contact for administrative oversight for DX Division. S. T. Alexander was the facility manager for facility management unit 67.

S. Bolivar, D. Daymon, and J. Skalski provided contract oversight for drilling activities and field support. L. Martinez and J. Duran provided technical support for drilling activities and field support.

S. Hagelberg, J. Valdez, and A. Garcia provided sample management support. B. Hardesty provided data management support. M. Clevenger provided support for borehole material curation.

M. Benak, C. Goetz, D. Harris, R. Hutton, R. Koch, C. Romero, J. Santo, J. Sena, and R. Trueblood provided field support for drilling, sampling, and well completion activities. R. Sitton and a team of technicians provided downhole geophysical logging.

D. Larssen installed the Westbay sampling system.

D. Counce was the analyst for water chemistry analyses used for screening of groundwaters collected from saturated zones. E. Kluk and M. Snow were analysts for moisture and matric-potential determinations.

R. Bohn provided support and oversight for waste management.

The groundwater integration team, led by C. Nylander, participated in the planning and evaluation of data collected during this investigation.

G. Turner provided Department of Energy (DOE) oversight during the investigation.

J. Young of NMED provided regulatory oversight during drilling operations. M. Dale and C. Hanlon-Meyer from the NMED's DOE Oversight Bureau collected sample splits from groundwater zones and acted as liaisons with the regulators.

A. Lee, B. Hull, C. LaDelfe, and H. Wheeler-Benson were reviewers for the document.

J. Torline was editor for this document; P. Maestas was compositor.

A. Pratt and D. Daymon supported all phases of this investigation as leaders of the Canyons Focus Area and the Groundwater Investigations, respectively.

13.0 REFERENCES

Broxton, D. E., and S. L. Reneau, August 1995. "Stratigraphic Nomenclature of the Bandelier Tuff for the Environmental Restoration Project at Los Alamos National Laboratory," Los Alamos National Laboratory Report LA-13010-MS, Los Alamos, New Mexico. (Broxton and Reneau 1995, 49726)

Broxton, D. E., and S. L. Reneau, 1996. "Buried Early Pleistocene Landscapes Beneath the Pajarito Plateau, Northern New Mexico," in *New Mexico Geological Society Guidebook*, 47th Field Conference, Jemez Mountains Region, New Mexico, F. Goff, B. S. Kues, M. A. Rogers, L. D. McFadden, and J. N. Gardner, eds., New Mexico Geological Society, Inc., pp 325–334. (Broxton and Reneau 1996, 55429)

Broxton, D. E., P. A. Longmire, P. G. Eller, and D. Flores, June 1995. "Preliminary Drilling Results for Boreholes LADP-3 and LADP-4," in "Earth Science Investigations for Environmental Restoration—Los Alamos Nation Laboratory Technical Area 21," Los Alamos National Laboratory Report LA-12934-MS, UC-903, Los Alamos, New Mexico, pp. 93–109. (Broxton et al. 1995, 50119)

Broxton, D. E., D. T. Vaniman, F. M. Byers, Jr., S. J. Chipera, E. C. Kluk, and R. G. Warren, December 1995. "Stratigraphy, Mineralogy and Chemistry of Bedrock Tuffs at Pajarito Mesa," in "Geological Site Characterization for the Proposed Mixed Waste Disposal Facility, Los Alamos National Laboratory," Los Alamos National Laboratory Report LA-13089-MS, UC-903/940, Los Alamos, New Mexico, pp. 5-30. (Broxton et al. 1995, 54709)

Broxton, D. E., D. Vaniman, W. Stone, S. McLin, M. Everett, and A. Crowder, September 2000. "Characterization Well R-9i Completion Report," Los Alamos National Laboratory Report LA-UR-00-4255, Los Alamos, New Mexico. (Broxton et al. 2000, 66600)

Cooper, H. H., Jr., and C. E. Jacob, August 1946. "A Generalized Graphical Method for Evaluating Formation Constants and Summarizing Well-Field History," *Transaction*, American Geophysical Union, Vol. 27, No. IV, pp. 526–534. (Cooper and Jacob 1946, 66645)

Gee, G. W., M. D. Campbell, G. S. Campbell, and J. H. Campbell, 1992. "Rapid Measurement of Low Soil Water Potentials Using a Water Activity Meter," *Soil Science Society of America Journal*, Vol. 56, pp. 1068–1070. (Gee et al. 1992, 58717)

Griggs, R. L., 1964. "Geology and Ground-Water Resources of The Los Alamos Area New Mexico," with a section on Quality of Water by John D. Hem, US Geological Survey Water-Supply Paper 1753, Washington, DC. (Griggs 1964, 8795)

LANL (Los Alamos National Laboratory), October 25, 1995. "Groundwater Protection Management Program Plan" (draft), Revision 2.0, Los Alamos, New Mexico. (LANL 1995, 50124)

LANL (Los Alamos National Laboratory), November 1995. "Task/Site Work Plan for Operable Unit 1049, Los Alamos Canyon and Pueblo Canyon," Los Alamos National Laboratory Report LA-UR-95-2053, Los Alamos, New Mexico. (LANL 1995, 50290).

LANL (Los Alamos National Laboratory), May 22, 1998. "Hydrogeologic Workplan," Los Alamos, New Mexico. (LANL 1998, 59599)

LANL (Los Alamos National Laboratory), September 1998. "Work Plan for Pajarito Canyon," Los Alamos National Laboratory Report LA-UR-98-2550, Los Alamos, New Mexico. (LANL 1998, 59577)

LANL (Los Alamos National Laboratory), December 1999. "Field Implementation Plan for the Drilling and Testing of LANL Regional Aquifer Characterization Well R-19," Los Alamos National Laboratory report, Los Alamos, New Mexico. (LANL 1999, 66644)

Purtymun, W. D., January 1984. "Hydrologic Characteristics of the Main Aquifer in the Los Alamos Area: Development of Ground Water Supplies," Los Alamos National Laboratory Report LA-9957-MS, Los Alamos, New Mexico. (Purtymun 1984, 6513)

Waresback, D. B., August 1986. "The Puye Formation, New Mexico: Analysis of a Continental, Rift-Filling, Volcaniclastic Alluvial-Fan Sequence," Master of Science in Geology thesis, University of Texas, Arlington, Texas. (Waresback 1986, 58715)

Appendix A

Drilling Chronology

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Phase 1 Drilling Operations														
Mob	01/07/00	Fri	D	1.0	12.00	14.30			0 0	2.30		Mob CME-750 drill rig and sample trailer to R-19 site.		
Set up	01/07/00	Fri	D	1.0	14 30	14.40			0.0	0.10		Set rig on R-19 location.		
Drill	01/07/00	Fri	D	1.0	14.40	14.50	0 0	2.7	2.7	0.10	16 2	Drill 4 1/2" HSA from surface to 2.7' in topsoil.		2.7
Drill	01/07/00	Fri	D	1.0	14 50	15:15	2.7	5.0	2.3	0:25	5 5	Drill 4 1/2" HSA from 2.7' to 5' in Qbt4.		5 0
Shift	01/10/00	Mon	D	2.0	7.00	8.30			0.0	1:30		*At FSF - coordinating crew.*		
Enroute	01/10/00	Mon	D	2.0	8 30	9.30			0 0	1.00		Crew departs FSF and enters DX.		
Equip	01/10/00	Mon	D	2.0	9.30	10.00			0.0	0.30		Warm up rig and equipment.		
Parker	01/10/00	Mon	D	2.0	9 30	16:30			0 0	7.00		Jack Caldwell, Parker Construction onsite with dozer; start leveling pad area.		
Drill	01/10/00	Mon	D	2.0	10.00	11:00	5.0	32.5	27.5	1:00	27.5	Drill 4 1/2" HSA from 5' to 32.5' in Qbt3.		32 5
Equip	01/10/00	Mon	D	2.0	11:00	13.00			0.0	2.00		Marin, Tommy, Paul depart to get new bit.		
Trip out	01/10/00	Mon	D	2.0	11:00	11:30	32.5	0 0	32.5	0.30	65 0	Trip out 4 1/2 "HSA from 32.5' to surface.		
Lunch	01/10/00	Mon	D	2.0	11:30	12.00			0 0	0.30		SBDC takes lunch.		
Equip	01/10/00	Mon	D	2.0	12 05	12.15			0 0	0.10		SBDC puts on new bit.		
Trip in	01/10/00	Mon	D	2 0	12.15	12.30	0.0	32 5	32.5	0.15	130 0	Tripped in 4 1/2" HSA from surface to 32.5'.		32 5
Lunch	01/10/00	Mon	D	2.0	12.00	12.30			0 0	0.30		Parker takes lunch.		
Repair	01/10/00	Mon	D	2.0	12.30	12.35			0 0	0 05		SBDC Repair needle on pull down gauge		
Drill	01/10/00	Mon	D	2.0	12.40	16:30	32.5	112.5	80.0	3 50	20.9	Drilled HSA from 32.5 ' to 112.5' in Qbt3.		112.5
RCT	01/10/00	Mon	D	2.0	14:20	14.25			0 0	0.05		Will Griegos, DX RCT onsite to perform rad sweep following initial site prep clearing		
Depart	01/10/00	Mon	D	2.0	16:30				0 0			Depart site.		
Support	01/11/00	Tue	D	3 0	7.00	7.30			0.0	0.30		*At FSF, load core boxes.*		
Enroute	01/11/00	Tue	D	3 0	7.30	7.45			0 0	0.15		Proceed to site, at gate 431.		
Enroute	01/11/00	Tue	D	3 0	7.45	8 00			0.0	0.15		Proceed to site, at access control.		
Equip	01/11/00	Tue	D	3 0	8 00				0 0			Arrive at site - warm equipment.		
Support	01/11/00	Tue	D	3 0	8 00	8.15			0 0	0.15		Found L&L Portable toilet and moved it to site.		
Tailgate	01/11/00	Tue	D	3 0	8.15	8 20			0 0	0 05		Tailgate safety meeting		
Escort	01/11/00	Tue	D	3 0	8 20				0 0			Ken Mitchell departs site to talk to Lucille Westerhold RE: DX access control.		
Drill	01/11/00	Tue	D	3 0	8 20	8 50	112.5	117.5	5 0	0 30	10 0	Drilled HSA from 112.5 ' to 117.5' in Qbt3.		117.5

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Drill	01/11/00	Tue	D	3.0	8.50	9.45	117.5	126.5	9.0	0.55	9.8	Drilled HSA from 117.5' to 126.5' in Qbt2.		126.5
TD	01/11/00	Tue	D	3.0	9.45	9:45			0.0	0.00		Phase 1 TD = 126.5'.		
Equip	01/11/00	Tue	D	3.0	10.00	11:25			0.0	1:25		SBDC to FSF to get 11" HSA.		
Rigup	01/11/00	Tue	D	3.0	11:25	11:50			0.0	0.25		Rigged up to over ream 11" HSA.		
Drill	01/11/00	Tue	D	3.0	11.50	12:20	0.0	14.0	14.0	0.30	28.0	Drilled 11" HSA over 4 1/4" HSA from surface to 14 ft.		
Trip out	01/11/00	Tue	D	3.0	12:20	14:30	126.5	0.0	126.5	2:10	58.4	Tripped out 4 1/4" HSA from 126.5 ft to surface.		126.5
Support	01/11/00	Tue	D	3.0	12.00	14:15			0.0	2:15		Moved core trailer & generator to West side of site.		
Visitor	01/11/00	Tue	D	3.0	13.10	13:20			0.0	0:10		Rudy Rodriguez, DX-4 visits and informs shot is postponed until tomorrow.		
Equip	01/11/00	Tue	D	3.0	13.40	16:10			0.0	2.30		All persons off site to FSF to get one 20' stem of 18" casing		
Load	01/11/00	Tue	D	3.0	15.00	16.00			0.0	1:00		Load casing		
Unload	01/11/00	Tue	D	3.0	16.00	16:10			0.0	0:10		Deliver to R-19.		
Depart	01/11/00	Tue	D	3.0	16:10				0.0			All depart.		
Shift	01/12/00	Wed	D	4.0	7.00	7.05			0.0	0.05		FSF		
Enroute	01/12/00	Wed	D	4.0	7.05	7:30			0.0	0.25		At Access control		
Tailgate	01/12/00	Wed	D	4.0	7:40				0.0			At site, tailgate safety meeting		
Drill	01/12/00	Wed	D	4.0	7:45	8.00	14.0	20.0	6.0	0.15	24.0	Drill 11" HSA from 14 ft to 20 ft		126.5
Trip out	01/12/00	Wed	D	4.0	8.00	8:40	20.0	0.0	20.0	0:40	30.0	Trip out 11" HSA		126.5
Trip in	01/12/00	Wed	D	4.0	8.40	9.00	0.0	19.5	19.5	0.20	58.5	Lowered 18" casing to 19.5', 6 in. of stickup		126.5
Setup	01/12/00	Wed	D	4.0	9.00	9:10			0.0	0:10		set up to mix cement		
Mix	01/12/00	Wed	D	4.0	9:10	9.15			0.0	0.05		Mixed cement for lower plug on 18" casing		
Tremie	01/12/00	Wed	D	4.0	9:15	9.30			0.0	0.15		Tremied cement to 16ft bgs inside and around casing.		
Demob	01/12/00	Wed	D	4.0	9.30	9.40			0.0	0:10		Mast down		
Demob	01/12/00	Wed	D	4.0	9:45	9.50			0.0	0.05		Moved rig to east side of pad area		
Equip	01/12/00	Wed	D	4.0	9.50				0.0			Tommy & Ken return with cutting torch regulators and jumper cables		
Weld	01/12/00	Wed	D	4.0	9.51	10.05			0.0	0:14		Welded plate on casing		
DX	01/12/00	Wed	D	4.0	10:20	13:30			0.0	3:10		All personnel off site to FSF for DX shot.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Parker	01/12/00	Wed	D	4.0	13:30	16.00			0.0	2.30		Jack Caldwell, Parker Construction finishes leveling drill pad area.		
DX	01/12/00	Wed	D	4 0	13 20				0 0			Access control states shot OK		
Parker	01/12/00	Wed	D	4 0	13 30	16 00			0.0	2.30		Parker and SBDC return to site, Parker levels pad, SBDC puts more cement into casing annulus from 16 - 6 ft.		
Mob	01/12/00	Wed	D	4 0	15 00				0.0			Marin to R-31 with Dynatec to mob equipment		
Support	01/12/00	Wed	D	4.0	15 30				0.0			Marin departs R-31 to SAIC office		
Accident	01/12/00	Wed	D	4 0	15 00				0.0			Darrel Wilson, Dynatec, hurts finger while off loading equipment- Skalski calls appropriate persons		
Shift	01/13/00	Thu	D	5 0	7.00	7.20			0.0	0 20		At FSF - crew meeting		
Enroute	01/13/00	Thu	D	5.0	7:20	7:40			0 0	0.20		Parker, SAIC/LATA and escorts to R-19.		
Enroute	01/13/00	Thu	D	5.0	7.40				0.0			Site Access - Rodriguez states small shots , but will not shut down R-19		
Tailgate	01/13/00	Thu	D	5 0	7.50	8 00			0 0	0.10		At site, tailgate safety meeting		
Support	01/13/00	Thu	D	5 0	8 00	11:00			0 0	3 00		Michelle Benak works on Phase 1 core for curation		
Parker	01/13/00	Thu	D	5 0	8 00	12.00			0 0	4.00		Parker continues to level the site, Melissa Caldwell is running lazer leveler.		
DX	01/13/00	Thu	D	5 0	10.15	10:30			0.0	0.15		Tom Robinson, DX RCT on site to screen HSA for release - OK		
Parker	01/13/00	Thu	D	5 0	10 30				0.0			Marin, Ken Mitchel, & Parker crew back on site		
Parker	01/13/00	Thu	D	5 0	10.40	12 00			0.0	1:20		Parker backhoe crew digs cellar excavation.		
DX	01/13/00	Thu	D	5 0	12 00	12.30			0 0	0 30		Lunch.		
DX	01/13/00	Thu	D	5 0	12 30	15:00			0.0	2.30		SBDC builds forms for concrete floor in cellar excavation.		
DX	01/13/00	Thu	D	5 0	15 00	15:30			0 0	0 30		DX RCT onsite		
Cellar	01/13/00	Thu	D	5 0	15 00	18 00			0 0	3 00		SBDC finishes forms for concrete floor in cellar excavation.		
Depart	01/13/00	Thu	D	5 0	18 00				0.0			All personnel; SBDC, and escorts offsite		
Phase 2 Drilling Operations														
Support	01/20/00	Thu	D	0 0					0 0			GE Capital Modular space delivers and stages office trailer at the R-19 site.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	01/22/00	Sat	D	0.0					0.0			Dynatec demobs drill and equipment from R-12.		
Equip	01/23/00	Sun	D	0.0					0.0			Foremost DR-24 rig maintenance at FSF		
Equip	01/24/00	Mon	D	0.0					0.0			Foremost DR-24 rig maintenance at FSF		
Mob	01/25/00	Tue	D	1.0	6.00	18.00			0.0	12.00		Mob to R-19		
Mob	01/26/00	Wed	D	2.0	6.00	18.00			0.0	12.00		Mob to R-19		
Setup	01/27/00	Thu	D	3.0	6.00	18.00			0.0	12.00		Setup		
Setup	01/28/00	Fri	D	4.0	6.00	18.00			0.0	12.00		Setup		
Setup	01/29/00	Sat	D	5.0	6.00	18.00			0.0	12.00		Setup		
Off	01/30/00	Sun	D		6.00	18.00			0.0	12.00		Off		
Equip	01/31/00	Mon	D	6.0	5.45	8.10			0.0	2.25		Dynatec (Thoren, Howe) load supplies at FSF - escorts Jadine and Glick		
Enroute	01/31/00	Mon	D	6.0	8:10	8.40			0.0	0:30		Enroute , arrive at R-19		
Setup	01/31/00	Mon	D	6.0	8.40	11:45			0.0	3.05		Set up site using boom truck, welding equipment		
Support	01/31/00	Mon	D	6.0	7:30	10.00			0.0	2.30		Field support Goetz and Sena obtain supplies and arrive at site.		
Support	01/31/00	Mon	D	6.0	10:40				0.0			Sena departs		
Lunch	01/31/00	Mon	D	6.0	11:45	12:15			0.0	0.30		Lunch		
H&S	01/31/00	Mon	D	6.0	12:15	12.30			0.0	0:15		SSHASP review - supplement to ESH-5 briefing		
Setup	01/31/00	Mon	D	6.0	12.30	14:30			0.0	2.00		Cont site set up- set lead casing in hole using standard steel shoe - no carbide		
Equip	01/31/00	Mon	D	6.0	14:30	15:15			0.0	0:45		Adding oil to rig		
Setup	01/31/00	Mon	D	6.0	15:15	17:45			0.0	2:30		Checking cyclone- cont set up		
Support	01/31/00	Mon	D	6.0	16.00	16.30			0.0	0.30		Marin onsite		
Depart	01/31/00	Mon	D	6.0	17.45	18.00			0.0	0.15		All personnel depart R-19		
Support	01/31/00	Mon	D	6.0	18.00				0.0			Driller's helper badge missing - report at gate 431 PTLA		
Equip	02/01/00	Tues	D	7.0	6:00	9.00			0.0	3.00		Load supplies at FSF; new badge for Howe; 3 escorts provided; fill water truck		
Enroute	02/01/00	Tues	D	7.0	9.00	9.30			0.0	0:30		Drillers enroute to R-19		
Setup	02/01/00	Tues	D	7.0	9.30	11:15			0.0	1:45		On site - cont to set up		
Tailgate	02/01/00	Tues	D	7.0	11:15	11:45			0.0	0:30		Meeting to review tailgate safety and activities		
Setup	02/01/00	Tues	D	7.0	11:45	12.30			0.0	0:45		Cont to set up cyclone		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Lunch	02/01/00	Tues	D	7.0	12.30	13 00			0 0	0.30		Lunch		
Setup	02/01/00	Tues	D	7.0	13 00	16:45			0 0	3.45		Cont set up		
Visitor	02/01/00	Tues	D	7.0	13 30	13 50			0 0	0 20		Mike Dimaria (DX)establishes smoking area at east end of office trailer.		
Support	02/01/00	Tues	D	7.0	14:00	15.30			0 0	1:30		Goetz offsite to meeting on Neutron probe		
Safety	02/01/00	Tues	D	7.0	15 00	15:15			0 0	0.15		Doug Barney onsite to aid in site set up for safety concerns		
Safety	02/01/00	Tues	D	7.0	15:35	15.50			0 0	0.15		Barney returns and discusses site operations with Goetz		
Fuel	02/01/00	Tues	D	7.0	15 35				0 0			*Eddy arrives with Barney for fueling*		
Support	02/01/00	Tues	D	7.0	16.07	16.15			0 0	0 08		Marin onsite with supplies, discuss sampling protocol		
Support	02/01/00	Tues	D	7.0	16.15				0.0			Goetz escorts Marin out - Skalski set ups for night shift		
Setup	02/01/00	Tues	D	7.0	16.45	17.30			0 0	0 45		Dynatec prepares for night shift		
Drill	02/01/00	Tues	D	7.0	17.30	18.51	16 0	50.0	34 0	1:21	25 2	Drilled 13" casing dry from 16-50 ft in cement and Qbt3.		126 5
Equip	02/01/00	Tues	D	7.0	18 00				0 0			Lights arrive		
Shift	02/01/00	Tues	N	8 0	18.51	18 51			0 0	0 00		Night crew arrives - Wilson, Manzanares, Wilcox, field support Marin		
Setup	02/01/00	Tues	N	8.0	18 51	19 20			0.0	0 29		Additional lights set up		
Shift	02/01/00	Tues	N	8 0	19 20	19 20			0.0	0.00		Goetz and day crew off site		
Waste	02/01/00	Tues	N	8 0	19 20	20 00			0 0	0 40		Empty drums with boom truck		
Drill	02/01/00	Tues	N	8 0	20.00	20.30	50 0	67.0	17.0	0 30	34 0	Drilled 13" casing dry from 50 67 ft in Qbt3		126 5
Circ	02/01/00	Tues	N	8 0	20 30	20.40			0 0	0.10		Recirculate cuttings		
Equip	02/01/00	Tues	N	8 0	20.40	21.00			0 0	0 20		Reseal packoff		
Support	02/01/00	Tues	N	8 0	21:00	21 00			0 0	0 00		Trueblood onsite		
Support	02/01/00	Tues	N	8 0	21:10	21:10			0 0	0 00		Marin departs		
Equip	02/01/00	Tues	N	8 0	22.45	23 23			0 0	0 38		Crew re sealed packoff and setting top head		
Connect	02/01/00	Tues	N	8 0	23 23	0 00			0 0	0 37		Connect 13" casing and rod		
Connect	02/02/00	Weds	N	8 0	0 00	0.15			0 0	0.15		Connect 13" casing and rod		
Lunch	02/02/00	Weds	N	8 0	0.15	0 45			0 0	0 30		Lunch		
Drill	02/02/00	Weds	N	8 0	0.45	1:25	67.0	87.0	20 0	0 40	30 0	Drilled 13" casing dry from 67-87 ft in Qbt3		126 5

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Connect	02/02/00	Weds	N	8.0	1:25	2.15			0.0	0.50		Connect 13" casing and rod		
Drill	02/02/00	Weds	N	8.0	2:15	3.00	87.0	107.0	20.0	0:45	26.7	Drilled 13" casing dry from 87-107 ft in Obt3.		126.5
Connect	02/02/00	Weds	N	8.0	3.00	3.15			0.0	0.15		Connect 13" casing and rod.		
Drill	02/02/00	Weds	N	8.0	3:15	3.35	107.0	117.5	10.5	0.20	31.5	Drilled 13" casing dry from 107-117.5 ft in Obt3.		126.5
Drill	02/02/00	Weds	N	8.0	3.35	3.50	117.5	127.0	9.5	0.15	38.0	Drilled 13" casing dry from 117.5-127 ft in Obt2.		127.0
Connect	02/02/00	Weds	N	8.0	3.00	3.20			0.0	0.20		Connect 13" casing and rod.		
Drill	02/02/00	Weds	N	8.0	3.20	3.50	127.0	137.0	10.0	0.30	20.0	Drilled 13" casing dry from 127-137 ft in Obt2.		137.0
Casing	02/02/00	Weds	N	8.0	3.50	5:30				1:40		Hard drilling in Obt2.		
Shift	02/02/00	Weds	D	9.0	6.00				0.0			Day crew arrives- Thoren, Howe, Field support Goetz.		
Shift	02/02/00	Weds	D	9.0	6:30				0.0			Night crew departs.		
Casing	02/02/00	Weds	D	9.0	6.30				0.0			Casing is bridged by softer overlying material falling in around casing.		
Tailgate	02/02/00	Weds	D	9.0	6:30	6.45			0.0	0:15		Tailgate Day shift.		
Fuel	02/02/00	Weds	D	9.0	6:30	7.00			0.0	0:30		Fueling - Howe.		
Cond	02/02/00	Weds	D	9.0	7:00				0.0			Begin to slowly work casing in borehole.		
H&S	02/02/00	Weds	D	9.0	7:45				0.0			Response check Hnu.		
Drill	02/02/00	Weds	D	9.0	8:20	8.30	137.0	143.0	6.0	0:10	36.0	Drilled 13" casing dry from 137-143 ft in Obt2.		143.0
Repair	02/02/00	Weds	D	9.0	8.40	12.00			0.0	3.20		Trouble with rig part - drillers to FSF; back onsite at noon.		
Visitors	02/02/00	Weds	D	9.0	9.00	9.08			0.0	0.08		Broxton, Pratt, Woodworth onsite - approved changing to wet drilling to gain production; Detechs for moist, wet or regional zones.		
Fuel	02/02/00	Weds	D	9.0	9.05	10:30			0.0	1:25		Jackl Eddy refuels rig and support equipment.		
Support	02/02/00	Weds	D	9.0	10.30				0.0			Goetz escorts Jackl Eddy offsite and joins drillers at FSF.		
Lunch	02/02/00	Weds	D	9.0	12.00	12.30			0.0	0.30		Lunch.		
Repair	02/02/00	Weds	D	9.0	12:30	17.45			0.0	5:15		Drillers continue to make repair.		
FSF	02/02/00	Weds	D	9.0	12.30	13:15			0.0	0:45		Joel Duran, FSF staff, wires support trailer to diesel generator.		
Equip	02/02/00	Weds	D	9.0	13.15				0.0			Jackl Eddy returns Larry's truck - refueled.		
Repair	02/02/00	Weds	D	9.0	13:30				0.0			Joel and Jackl escorted out, drillers cont to repair the packers.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Casing	02/02/00	Weds	D	9.0	13 30				0 0			Casing must be pulled from the borehole.		
Shift	02/02/00	Weds	D	9.0	17.45	18 00			0 0	0.15		Night crew arrives - Wilson, Manzanares, Wilcox, field support Trueblood.		
Shift	02/02/00	Weds	N	10.0	18 00	18.20			0.0	0.20		Complete shift passdown, day crew departs		
Tailgate	02/02/00	Weds	N	10 0	18 30	19.00			0.0	0 30		Night shift tailgate and safety inspections.		
Repair	02/02/00	Weds	N	10.0	19.00	0.00			0.0	5 00		Night crew continues to repair top seal and head bearings.		
Dynatec	02/02/00	Weds	N	10 0	20 03				0 0			Call to John Eddy for directions.		
Repair	02/03/00	Thu	N	10 0	0 00	5:40			0 0	5.40		Seals and bearing repaired.		
Connect	02/03/00	Thu	N	10 0	5:40	6.00			0.0	0 20		Connect 13" casing and rod.		
Shift	02/03/00	Thu	D	11.0	6 00	6 20			0.0	0 20		Day crew arrives- Thoren, Howe, Field support Goetz		
Tailgate	02/03/00	Thu	D	11.0	6:20	6.40			0 0	0 20		Tailgate safety meeting, rig inspection		
Equip	02/03/00	Thu	D	11.0	6:45	8.00			0 0	1:15		Return to FSF for sample buckets		
Visitors	02/03/00	Thu	D	11 0	8 00				0 0			Broxton, Vanlman on site		
Drill	02/03/00	Thu	D	11.0	8 20	9 30	143.0	157.0	14 0	1:10	12 0	Drilled 13" casing wet (EZ-MUD & TORKease) from 143 to 157 ft in Qbt2.		157.0
H&S	02/03/00	Thu	D	11.0	9.15	10.40			0 0	1:25		Doug Barney onsite		
Casing	02/03/00	Thu	D	11.0	10.45				0 0			Drilling slow - tight		
Visitors	02/03/00	Thu	D	11.0	11.45	12.05			0 0	0 20		Michael Dale and Harvey Decker onsite (NVED)		
Support	02/03/00	Thu	D	11.0	12.05				0 0			Goetz departs for SAIC training		
Lunch	02/03/00	Thu	D	11.0	12 30	13 00			0 0	0.30		Drillers take lunch		
Cond	02/03/00	Thu	D	11.0	13 30				0.0			Goetz returns - borehole is cleaned out and back to 157 ft		
Connect	02/03/00	Thu	D	11 0	13 30	14.00			0 0	0 30		Connect 13" casing and rod.		
Drill	02/03/00	Thu	D	11.0	14 00	14 30	157.0	177.0	20.0	0 30	40 0	Drilled 13" casing wet (EZ-MUD & TORKease) from 157 to 177 ft in Qbt2.		177.0
Stuck	02/03/00	Thu	D	11.0	14 30	15 25			0 0	0 55		13" casing stuck at 177 ft.		
H&S	02/03/00	Thu	D	11.0	15 05	15 30			0 0	0 25		Doug Barney and Trung Nguyen, ESH-5, onsite.		
Water	02/03/00	Thu	D	11.0	15 25	17.30			0 0	2.05		Drillers depart for water and additives.		
Shift	02/03/00	Thu	D	11.0	17.30	18 00			0 0	0 30		Night shift drillers arrive, Larry Wilcox and Darrell Wilson - discuss strategy.		
Tailgate	02/03/00	Thu	N	12.0	18 00	18 30			0 0	0 30		Night shift tailgate.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Pull	02/03/00	Thu	N	12.0	18:30	20:12	177.0	175.0	2.0	1:42	1.2	Pulling back 13" casing to help free up casing - using mixture of TORKease and EZ-MUD		177.0
Equip	02/03/00	Thu	N	12.0	20:12				0.0			Luke departs to R-31 for supplies		
Vol	02/03/00	Thu	N	12.0	20:45				0.0			Estimated 1500 gals of water, EZ-MUD and TORKease have been added to borehole		
Cond	02/03/00	Thu	N	12.0	21:00	21:25			0.0	0.25		Letting hole sit- call John Eddy for directions		
Cond	02/03/00	Thu	N	12.0	21:25	22.10			0.0	0.45		Working hole		
Water	02/03/00	Thu	N	12.0	22.10	23:07			0.0	0.57		Water truck offsite for load and returns		
Repair	02/03/00	Thu	N	12.0	22.55	0:00			0.0	1.05		Driller notes the tophead is slipping - bolts appear to be stripped		
Cond	02/04/00	Fri	N	12.0	0:00	0:10			0.0	0.10		Hole is full of water/additives and will allow it to soak		
Lunch	02/04/00	Fri	N	12.0	0:10	0:40			0.0	0:30		Lunch		
Repair	02/04/00	Fri	N	12.0	1:30	2.05			0.0	0:35		Repair tophead		
Connect	02/04/00	Fri	N	12.0	2.05	2.30			0.0	0:25		Connect 13" casing and rod to obtain more torque; 197' down.		
Casing	02/04/00	Fri	N	12.0	2.30	2.48			0.0	0:18		13" casing beginning to move		
Casing	02/04/00	Fri	N	12.0	2:48	4:45			0.0	1:57		13" casing free		
Water	02/04/00	Fri	N	12.0	3:50	4.50			0.0	1:00		Water truck needs new load - 6000 gals with additives down hole		
Fuel	02/04/00	Fri	N	12.0	4:00	4:25			0.0	0:25		Refueling		
Water	02/04/00	Fri	N	12.0	4.30	4.50			0.0	0:20		Water truck reloaded and onsite.		
Cond	02/04/00	Fri	N	12.0	4.50	5:35			0.0	0.45		Conditioning the hole		
Pull	02/04/00	Fri	N	12.0	5:35				0.0			Removed last section of rod and casing; 177 down - tight again.		
Shift	02/04/00	Fri	D	13.0	5:45	6:05			0.0	0:20		Day crew arrives- Thoren, Howe, Field support Goetz; discuss operations with night crew.		
Tailgate	02/04/00	Fri	D	13.0	6:05	6:45			0.0	0.40		Day crew tailgate; review safety issues with new escort- Mike Baca.		
Trip out	02/04/00	Fri	D	13.0	6:05	12.00	177.0	0.0	177.0	5.55	29.9	Tripping out 13" casing and 7" drill rods together from 177 ft to the surface.		177.0
Support	02/04/00	Fri	D	13.0	8.30	10:30			0.0	2.00		Goetz offsite to FSF		
Lunch	02/04/00	Fri	D	13.0	12.00	12.30			0.0	0:30		Lunch		
Support	02/04/00	Fri	D	13.0	12:30	13:00			0.0	0:30		Drillers go with Goetz to site access		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	02/04/00	Fri	D	13 0	13 00	14:30			0 0	1:30		Replace drill bit- cont to make repair to rig		
Trip In	02/04/00	Fri	D	13.0	14.30	18.00	0 0	127.0	127.0	3.30	36 3	Tripped in 13" casing and 7" drill rods to 127 ft.		177.0
H&S	02/04/00	Fri	D	13.0	14.45	15 00			0 0	0.15		Barney arrives with signs		
Fuel	02/04/00	Fri	D	13.0	16:45	18 00			0 0	1:15		Jackl Eddy arrives to refuel		
Depart	02/04/00	Fri	D	13 0	17.45	18 00			0 0	0.15		All depart.		
Enroute	02/05/00	Sat	D	14 0	6.00	6 25			0 0	0 25		FSF; access DX; to R-19.		
Tailgate	02/05/00	Sat	D	14 0	6:25	6.50			0 0	0.25		Tailgate and safety inspections.		
Equip	02/05/00	Sat	D	14 0	6 50	7.00			0 0	0.10		Warm up equipment.		
Support	02/05/00	Sat	D	14 0	7.00	9.45			0 0	2.45		Marin to R-31		
Trip In	02/05/00	Sat	D	14 0	7.00	9.00	127.0	177 0	50 0	2.00	25 0	Reamed back to 177 ft.		177.0
Rigup	02/05/00	Sat	D	14 0	9.00	9 30			0 0	0.30		Set up to drill		
Drill	02/05/00	Sat	D	14 0	9 30	12.55	177.0	227.0	50 0	3.25	14 6	Drilled 13" casing wet (EZ-MUD & TORKease) from 177 to 227 ft in Qbt2.		227.0
Visitors	02/05/00	Sat	D	14 0	10 50	11:15			0.0	0 25		John Eddy, Lorenzo, Juan R. and Dave Frank onsite.		
Fuel	02/05/00	Sat	D	14 0	11:39	12.28			0 0	0.43		Jackl Eddy onsite to fuel rig and support equip		
Lunch	02/05/00	Sat	D	14 0	12.55	13 25			0 0	0 30		Lunch		
Cond	02/05/00	Sat	D	14 0	13 25	13.45			0 0	0 20		Cleaned and reamed borehole.		
Drill	02/05/00	Sat	D	14 0	13.45	14:30	227.0	227.0	0.0	0.45		Drilled 13" casing wet (EZ-MUD & TORKease) from 227 ft in Qbt2; no progress.		227.0
Equip	02/05/00	Sat	D	14 0	14 30	14.50			0 0	0 20		Jackl Eddy onsite with bobcat for onsite cuttings; water management.		
Stuck	02/05/00	Sat	D	14 0	14 50				0 0			13" casing stuck at 227 ft.		227.0
Water	02/05/00	Sat	D	14 0	15:23				0.0			Water truck reload		
Break	02/05/00	Sat	D	14 0	15:30	15.45			0.0	0.15		Break		
Vol	02/05/00	Sat	D	14 0					0 0			Have pumped 3 tanks of EZ-MUD/TORKease since noon		
Vol	02/05/00	Sat	D	14 0					0.0			Mix and Pump fourth		
Pull	02/05/00	Sat	D	14 0					0 0			Attempt to remove one joint of 13" casing		
Visitor	02/05/00	Sat	D	14 0	16.40	16 58			0 0	0.18		Dave Broxton onsite		
Fuel	02/05/00	Sat	D	14 0	16.48	17.15			0 0	0 27		Jackl Eddy onsite to fuel rig and support equipment		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	02/05/00	Sat	D	14.0	15:00	17:45			0.0	2.45		Maintenance		
Shift	02/05/00	Sat	D	14.0	17:45	18.00			0.0	0.15		Night shift arrives		
Tailgate	02/05/00	Sat	N	15.0	18.00	18.15			0.0	0:15		Tailgate		
Escort	02/05/00	Sat	N	15.0	18.20				0.0			Escorts arrive		
Support	02/05/00	Sat	N	15.0	18.30				0.0			Marin departs		
Cond	02/05/00	Sat	N	15.0	18:30	20.30			0.0	2.00		Condition hole, casing still tight		
Cond	02/05/00	Sat	N	15.0	20:30	20.45			0.0	0:15		Fluid added, allow to sit		
Cond	02/05/00	Sat	N	15.0	20:45	21:45			0.0	1:00		Condition hole.		
Cond	02/05/00	Sat	N	15.0	21:45	22.30			0.0	0.45		Add fluid		
Strategy	02/05/00	Sat	N	15.0	22.30	22.35			0.0	0.05		Discuss strategy to drill down 15 ft then condition hole for period then advance further		
Water	02/05/00	Sat	N	15.0	22.35	0.00			0.0	1:25		Fill water truck		
Water	02/06/00	Sun	N	15.0	0.00	0:15			0.0	0:15		Fill water truck		
Lunch	02/06/00	Sun	N	15.0	0:15	0.45			0.0	0.30		Lunch		
Cond	02/06/00	Sun	N	15.0	0.45	0.53			0.0	0.08		Clearing system by blowing out		
Cond	02/06/00	Sun	N	15.0	0.53	1:25			0.0	0.32		Pump fluid and cond hole		
Cond	02/06/00	Sun	N	15.0	1:25	2.00			0.0	0:35		Condition hole		
Cond	02/06/00	Sun	N	15.0	2.00	3.05			0.0	1:05		Tight, add fluid		
Stuck	02/06/00	Sun	N	15.0	3.05	4:45			0.0	1:40		Condition hole.		
Stuck	02/06/00	Sun	N	15.0	4:45	5:00			0.0	0:15		13" casing still stuck at 227 ft.		227.0
Equip	02/06/00	Sun	N	15.0	5:00	5:45			0.0	0:45		Equipment maintenance.		
Vol	02/06/00	Sun	N	15.0	5:45	6.00			0.0	0:15		Little movement, approx 5000 gals of water and 4 TORKease and 2EZ-MUD have been added.		
Shift	02/06/00	Sun	D	16.0	6.00	6.15			0.0	0:15		Day shifts arrive; shift passdown.		
Shift	02/06/00	Sun	D	16.0	6:15				0.0			Night shift offsite		
Stuck	02/06/00	Sun	D	16.0	6:15				0.0			13" casing still stuck at 227 ft.		227.0
Repair	02/06/00	Sun	D	16.0	6:15	9.15			0.0	3.00		Repair jaws on bottom drive		
Support	02/06/00	Sun	D	16.0	7:40	8.05			0.0	0:25		Marin to gate for page		
Fuel	02/06/00	Sun	D	16.0	8.05	8:45			0.0	0:40		Jackl Eddy onsite to fuel rig and support equip		
Casing	02/06/00	Sun	D	16.0	8:45	11:10			0.0	2.25		Continue to try and free casing.		
Support	02/06/00	Sun	D	16.0	10.55	15.00			0.0	4.05		Rick Hutton onsite.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Casing	02/06/00	Sun	D	16.0	11:00	11:10			0.0	0:10		Work casing both wet and dry		
Dynatec	02/06/00	Sun	D	16.0	11:10	11:30			0.0	0:20		Driller offsite to make call		
Equip	02/06/00	Sun	D	16.0	12:10	12:35			0.0	0:25		Escort picks up Jackl Eddy and the bobcat		
Lunch	02/06/00	Sun	D	16.0	12:10	12:45			0.0	0:35		Lunch		
Casing	02/06/00	Sun	D	16.0	12:45	15:00			0.0	2:15		Work casing		
Security	02/06/00	Sun	D	16.0	13:20	13:30			0.0	0:10		PTLA stops by		
Waste	02/06/00	Sun	D	16.0	13:30	15:00			0.0	1:30		Driller enlarges lined bermed area with the bobcat for onsite waste management		
Break	02/06/00	Sun	D	16.0	15:00	15:15			0.0	0:15		Break		
Pull	02/06/00	Sun	D	16.0	15:15	15:50			0.0	0:35		Work casing		
Fuel	02/06/00	Sun	D	16.0	15:50	16:30			0.0	0:40		Jackl Eddy onsite to fuel rig and support equip		
Support	02/06/00	Sun	D	16.0	15:50				0.0			Goetz onsite		
Support	02/06/00	Sun	D	16.0	16:00				0.0			Rich Koch offsite		
Repair	02/06/00	Sun	D	16.0	16:30	18:30			0.0	2:00		Hydraulic line leak - repair		
Visitor	02/06/00	Sun	D	16.0	16:50	18:40			0.0	1:50		Dave Broxton onsite		
Tailgate	02/06/00	Sun	N	17.0	18:10	18:40			0.0	0:30		Night shift onsite - Tailgate safety meeting		
Equip	02/06/00	Sun	N	17.0	18:40	20:15			0.0	1:35		Hydraulic problems with lower drive.		
Dynatec	02/06/00	Sun	N	17.0	21:00	21:20			0.0	0:20		Driller calls Thoren and Eddy for ideas on how to proceed		
Water	02/06/00	Sun	N	17.0	21:20	22:30			0.0	1:10		Luke gets load of water		
Equip	02/06/00	Sun	N	17.0	22:30	23:30			0.0	1:00		Luke and Larry offsite to get TORKease and dispose of trash		
Dynatec	02/06/00	Sun	N	17.0	23:30				0.0			Luke departs for night		
Vol	02/06/00	Sun	N	17.0	23:30	0:00			0.0	0:30		Pump fluid into hole, approx 1500gal's- will wait to add more		
Water	02/07/00	Mon	N	17.0	0:00	1:30			0.0	1:30		Crew to get water		
Support	02/07/00	Mon	N	17.0	1:30	4:45			0.0	3:15		RLT to SAIC		
Vol	02/07/00	Mon	N	17.0	4:45	5:15			0.0	0:30		RLT onsite; additional 1500 gal. have been added to hole - 6000 gal. of water plus 6 buckets, 4 buckets of EZ-MUD and TORKease.		
Depart	02/07/00	Mon	N	17.0	5:25	6:00			0.0	0:35		Escorts and Dynatec depart to meet Day shift at FSF.		
Repair	02/07/00	Mon	D	18.0	6:00	8:00			0.0	2:00		Day shift at FSF - Repair made to equip		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Repair	02/07/00	Mon	D	18.0	8.00	18.00			0.0	10.00		Repair hydraulic problems on rig.		
Support	02/07/00	Mon	D	18.0	16:42	17:45			0.0	1:03		Marin onsite.		
Support	02/07/00	Mon	D	18.0	17.00	18.00			0.0	1:00		Goetz onsite; night shift support.		
Support	02/07/00	Mon	D	18.0	7:00	17.45			0.0	10:45		Marin onsite.		
Dynatec	02/07/00	Mon	D	18.0	15:00	17:45			0.0	2:45		Dave Foreman onsite		
Shift	02/07/00	Mon	N	19.0	18.00				0.0			Night crew arrives		
Tailgate	02/07/00	Mon	N	19.0	18:00	18:10			0.0	0:10		Tailgate safety meeting to crew and escorts		
Shift	02/07/00	Mon	N	19.0	18.10				0.0			Day crew departs		
Repair	02/07/00	Mon	N	19.0	18.10	23.10			0.0	5.00		Continue making repair to rig (hydraulic lines and jaws on lower drive).		
Casing	02/07/00	Mon	N	19.0	23.10	0.00			0.0	0.50		Working freeing up casing		
Equip	02/07/00	Mon	N	19.0	23.10	0.00			0.0	0.50		Luke and Juan to FSF for TORKease		
Equip	02/08/00	Tue	N	19.0	0.00	0.05			0.0	0.05		Luke and Juan to FSF for TORKease		
Casing	02/08/00	Tue	N	19.0	0.00	0:30			0.0	0.30		Cont working hole		
Lunch	02/08/00	Tue	N	19.0	0.30	1:00			0.0	0.30		Lunch		
Casing	02/08/00	Tue	N	19.0	1:00	2.50			0.0	1.50		13" casing still stuck at 227 ft.		227.0
Repair	02/08/00	Tue	N	19.0	2.50	3.15			0.0	0.25		Hydraulic line fails - bad leak- shut down to repair; absorbent used to clean up leak.		
Repair	02/08/00	Tue	N	19.0	3.15	4.30			0.0	1:15		Dynatec helpers to yard to find replacement hose, could not find a replacement hose.		
H&S	02/08/00	Tue	N	19.0	4:30	5:05			0.0	0:35		Clean up site (housekeeping).		
Shift	02/08/00	Tue	N	19.0	5.05	6.00			0.0	0.55		Leave to meet day shift at gate, or FSF, to inform of need for hose.		
Equip	02/08/00	Tue	D	20.0	6.00	11:20			0.0	5:20		At FSF; arranging to get new hydraulic hose made.		
Fuel	02/08/00	Tue	D	20.0	9.00	9.40			0.0	0:40		Jackl Eddy onsite to fuel rig and support.		
Repair	02/08/00	Tue	D	20.0	11:20	11:20			0.0	0.00		Dynatec, escort and JRM onsite with new hydraulic hose		
Tailgate	02/08/00	Tue	D	20.0	11:20	11:30			0.0	0:10		Tailgate safety meeting and daily equipment inspections.		
Repair	02/08/00	Tue	D	20.0	11:30	11:45			0.0	0.15		Hose rating too small; need a 5000 psi hose and got a 2400 psi hose.		
Repair	02/08/00	Tue	D	20.0	11:45	12.00			0.0	0:15		Back to FSF.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Repair	02/08/00	Tue	D	20.0	12.00	12.00			0.0	0.00		John Eddy directed Larry to use the 2400 psi hose until Jackl gets one in Albuquerque.		
Enroute	02/08/00	Tue	D	20.0	12.00	12.15			0.0	0.15		Larry Thoren and escort onsite.		
Equip	02/08/00	Tue	D	20.0	13.00	13.00			0.0	0.00		Jackl Eddy to Alb to get 6000 psi hydraulic hose.		
Support	02/08/00	Tue	D	20.0	14.10	14.10			0.0	0.00		JRM and Dynatec onsite.		
Waste	02/08/00	Tue	D	20.0	15:12	15:12			0.0	0.00		Crane, JCI personnel, white 12,000 gallon water tank on flatbed truck from R-25, Lorenzo Martinez and Juan Rivera onsite.		
Waste	02/08/00	Tue	D	20.0	15.45	15:45			0.0	0.00		JCI personnel offsite; did not offload tank; too close to end of shift.		
H&S	02/08/00	Tue	D	20.0	15.45	18.00			0.0	2.15		Housekeeping		
Support	02/08/00	Tue	D	20.0	17.30	18.00			0.0	0.30		Cathy Goetz onsite.		
Shift	02/08/00	Tue	N	20.0	18.00	18.00			0.0	0.00		Night crew arrives		
Support	02/08/00	Tue	N	20.0	18.00	18.00			0.0	0.00		Marin departs		
Tailgate	02/08/00	Tue	N	20.0	18.05	18.15			0.0	0.10		Tailgate safety meeting - new helper = Rodney Price.		
Security	02/08/00	Tue	N	20.0	18.15	18.20			0.0	0.05		PTLA stops- badges not on drillers - must have on person		
Strategy	02/08/00	Tue	N	20.0	18.30	18.45			0.0	0.15		Wilson calls in to get strategy discussed		
Casing	02/08/00	Tue	N	20.0	18.30	20.00			0.0	1:30		Working borehole		
Waste	02/08/00	Tue	N	20.0	19.00	19.15			0.0	0.15		Dump drum dirt in waste piles		
Equip	02/08/00	Tue	N	20.0	20.00				0.0			Dies have slipped - casing was moving		
Equip	02/08/00	Tue	N	20.0	20.00	22.00			0.0	2.00		Repair dies		
Waste	02/08/00	Tue	N	20.0	21:15	22.00			0.0	0.45		Luke takes drum of used sorbent to yard and gets supplies		
Casing	02/08/00	Tue	N	20.0	22.00	23.00			0.0	1.00		Working hole		
Casing	02/08/00	Tue	N	20.0	23.00				0.0			Stuck - little movement - bolts on three dies have broken and are slipping- cont to slowly work casing up		
Pull	02/08/00	Tue	N	20.0	23.00	23.30	227.0	220.0	3.0	0.30	6.0	Pulled back 13" casing from 227 ft to 220 ft ; teeth in lower drive jaws have slipped on casing		
Equip	02/08/00	Tue	N	20.0	23.30	0.00			0.0	0.30		Repair dies and switch hoses on pump (need to repair pump so as not have to manually switch hoses)		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	02/09/00	Wed	N	20.0	0.00	0.30			0.0	0.30		Repair dies and switch hoses on pump (need to repair pump so as not have to manually switch hoses)		
Lunch	02/09/00	Wed	N	20.0	0.30	1:00			0.0	0.30		Lunch		
Equip	02/09/00	Wed	N	20.0	1:00	2.00			0.0	1:00		Replaced teeth on lower drive jaws		
Pull	02/09/00	Wed	N	20.0	2.00	4:00	220.0	217.0	7.0	2.00	3.5	Pulled back 13" casing from 220 ft to 217 ft.		
Pull	02/09/00	Wed	N	20.0	4:00	5.00	217.0	212.0	5.0	1:00	5.0	Pulled back 13" casing from 217 ft to 212 ft.		
Shift	02/09/00	Wed	N	20.0	5:00	5:15			0.0	0.15		Site shut down procedures.		
Shift	02/09/00	Wed	N	20.0	5:15	5:30			0.0	0:15		Change clothes. Sign out, and depart site.		
Support	02/09/00	Wed	N	20.0	5:30	5:40			0.0	0:10		DX radio checked back into Access Control		
Shift	02/09/00	Wed	N	20.0	5:40				0.0			R-19 shut down for DX work restriction until night shift Friday, at least.		
DX	02/09/00	Wed	D		6:00	18.00			0.0	12.00		Site shut down due to DX restriction.		
DX	02/09/00	Wed	N		18.00	0.00			0.0	6.00		Site shut down due to DX restriction.		
DX	02/10/00	Thu	N		0.00	6.00			0.0	6.00		Site shut down due to DX restriction.		
DX	02/10/00	Thu	D		6.00	18.00			0.0	12.00		Site shut down due to DX restriction.		
DX	02/10/00	Thu	N		18.00	0.00			0.0	6:00		Site shut down due to DX restriction.		
DX	02/11/00	Fri	N		0.00	6:00			0.0	6.00		Site shut down due to DX restriction.		
DX	02/11/00	Fri	D		6:00	18.00			0.0	12.00		Site shut down due to DX restriction.		
DX	02/11/00	Fri	N		18.00	0.00			0.0	6.00		Site shut down due to DX restriction.		
DX	02/12/00	Sat	N		0.00	6.00			0.0	6.00		Site shut down due to DX restriction.		
Dynatec	02/12/00	Sat	D	21.0	6.00	9.00			0.0	3.00		Dynatec safety meeting held by Bill Rixey at FSF.		
Support	02/12/00	Sat	D	21.0	8:30	8.35			0.0	0.05		JRM called Access Control; no answer.		
Support	02/12/00	Sat	D	21.0	8:45	9.00			0.0	0:15		JRM paged DX FMD (Cathy Smith) to find out if DX shots were completed and we could re-occupy R-19 site; she didn't know; said call Access Control; I said I did, but no answer; she said well "OK then".		
Fab	02/12/00	Sat	D	21.0	9.00	12.00			0.0	3.00		Tool fabrication at the FSF.		
Equip	02/12/00	Sat	D	21.0	12.00	14:00			0.0	2.00		Replaced cable on rig.		
Dynatec	02/12/00	Sat	D	21.0	14:00	16.00			0.0	2.00		Larry Thoren training Roy Brown to operate modified DR-24.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Weather	02/12/00	Sat	D	21.0	16.00	17.00			0 0	1 00		Intermittent snow, light to moderate.		
Pull	02/12/00	Sat	D	21 0	16 00	17.30	212.0	210 0	2 0	1:30	1.3	Pulled back 13" casing from 212 ft to 210 ft.		
Strategy	02/12/00	Sat	D	21.0	18 00	18.30			0 0	0 30		Took Thoren to access control, paged John Eddy.		
Tailgate	02/12/00	Sat	N	22.0	18 38	18 50			0.0	0.12		Night crew arrives. Tailgate (pinch points and ground hazards). It is snowy and slick. Corey Howe offsite to transport Dynatec1 to FSF.		
Vol	02/12/00	Sat	N	22 0	17.10	17:30			0 0	0 20		Crew rigging up to pump up to 3000 gal. of water downhole.		
Vol	02/12/00	Sat	N	22 0	20.00	20 20			0 0	0 20		Driller says crew pumped 300 g/s water, 2.5 g/s TORKease and 1 qt EZ-MUD downhole. Now crew is standing by to let fluid condition hole.		
Pull	02/12/00	Sat	N	22 0	20 20	21:05	210.0	209 7	0 3	0.45	0 4	Pulled back 13" casing from 210 ft to 209 7 ft.		
Casing	02/12/00	Sat	N	22 0	21.05	21.53			0 0	0.48		Still working casing out.		
Vol	02/12/00	Sat	N	22 0	21.05	21.53			0 0	0 48		Crew has used a total of 600 g/s water, 5 g/s TORKease and 2 qts of EZ-MUD.		
Break	02/12/00	Sat	N	22.0	21.53	22.05			0 0	0.12		Crew breaking to allow hole to relax.		
Equip	02/12/00	Sat	N	22 0	22.45	0.00			0 0	1:15		Jaws are slipping on lower drive, so they are changing them out. They are also resetting hydraulic hoses to check pump flow.		
Equip	02/13/00	Sun	N	22.0	0.00	0 50			0 0	0 50		Juan and Danny offsite to yard for dies.		
Equip	02/13/00	Sun	N	22.0	0 50	1:35			0.0	0.45		Crew replacing teeth of Jaws and resetting hoses.		
Lunch	02/13/00	Sun	N	22.0	1:35	2 20			0 0	0.45		Crew takes lunch. Casey says they are ready to fire up after lunch.		
Equip	02/13/00	Sun	N	22.0	2.20	3 00			0 0	0.40		Crew fires up rig and begins ops. Jaws still presenting slippage problems.		
Pull	02/13/00	Sun	N	22.0	3 00	4.45	209.7	209 0	0 7	1:45	0.4	Pulled back 13" casing from 209.7 ft to 209 0 ft		
Equip	02/13/00	Sun	N	22.0	4.45	5:15			0 0	0 30		Crew still working on the jaws		
Shift	02/13/00	Sun	N	22 0	5:15	6 00			0 0	0.45		Crew shuts down site for shift change at FSF.		
Shift	02/13/00	Sun	D	23 0	6 00	6 20			0 0	0 20		Shift Change at FSF.		
Enroute	02/13/00	Sun	D	23 0	6 20	6.40			0 0	0 20		To R-19.		
Tailgate	02/13/00	Sun	D	23 0	6 40	7.15			0 0	0 35		Radio check LA Fire. Tailgate and safety inspections.		
Equip	02/13/00	Sun	D	23 0	7.00	10 00			0 0	3 00		Thoren returns to yard for supplies.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Pull	02/13/00	Sun	D	23.0	7.15	7:35	209.0	208.5	0.5	0.20	1.5	Pulled back 13" casing from 209.0 ft to 208.5 ft.		
Fuel	02/13/00	Sun	D	23.0	7:35	8:15			0.0	0:40		Jack/ Eddy fueling equipment.		
Support	02/13/00	Sun	D	23.0	8.05				0.0			Jon Marin departs.		
Repair	02/13/00	Sun	D	23.0	8.05	10.30			0.0	2.25		Rig repair		
Support	02/13/00	Sun	D	23.0	9.30	10:15			0.0	0:45		Goetz offsite- calls.		
Pull	02/13/00	Sun	D	23.0	10:30	11:10	208.5	208.0	0.5	0.40	0.8	Pulled back 13" casing from 208.5 ft to 208.0 ft.		
H&S	02/13/00	Sun	D	23.0	10:30	12.00			0.0	1:30		Housekeeping		
Stat	02/13/00	Sun	D	23.0	11:10				0.0			Still at 208'. Try not adding fluid. Full crew today - Larry Thoren, Roy Brown, Jason McKinney, Dennis Chavez, Doug Jones and FTL1 with escorts in tow.		
Support	02/13/00	Sun	D	23.0	11:30	14.15			0.0	2.45		Goetz at R-31		
Lunch	02/13/00	Sun	D	23.0	12.00	12.30			0.0	0.30		Lunch		
Pull	02/13/00	Sun	D	23.0	12.30	14:15	208.0	207.5	0.5	1:45	0.3	Pulled back 13" casing from 208.0 ft to 207.5 ft.		
Equip	02/13/00	Sun	D	23.0	12.30	14:15			0.0	1:45		Occasional hot work and housekeeping		
Break	02/13/00	Sun	D	23.0	15:10	15:25			0.0	0:15		Let casing rest.		
Repair	02/13/00	Sun	D	23.0	15:25	16:25			0.0	1.00		Replace dies on Jaws.		
Fuel	02/13/00	Sun	D	23.0	16:10	16:25			0.0	0:15		Fueled boom truck.		
Pull	02/13/00	Sun	D	23.0	16:25	16.40	207.5	207.0	0.5	0.15	2.0	Pulled back 13" casing from 207.5 ft to 207.0 ft.		
Vol	02/13/00	Sun	D	23.0	16:40	17.00			0.0	0.20		300 gls of water, 2 qts EZ-MUD and 2 cups foam have been pumped down hole. Have lost last set of dies - have gone through 2 sets of new dies (12 ea. Set). and inverted and reused one set for a total of replacements of 36 dies today. Have tripped out 12"		
Shift	02/13/00	Sun	D	23.0	17:00	17:10			0.0	0:10		Shutting down for shift change. Crew leaves for FSF. Goetz stays onsite with the generators.		
Shift	02/13/00	Sun	N	24.0	18.00	18.20			0.0	0.20		FSF; to R-19, & night shift onsite.		
Tailgate	02/13/00	Sun	N	24.0	18.20	18.40			0.0	0.20		Tailgate and safety inspections.		
Remove	02/13/00	Sun	N	24.0	18.40	20.20			0.0	1:40		Removed joint of 13" casing. Will place 3' sub to try and blow down casing.		
Equip	02/13/00	Sun	N	24.0	20.20	21:20			0.0	1:00		Casey and Vern to R-31 for parts.		
H&S	02/13/00	Sun	N	24.0	20.20	21:20			0.0	1:00		Housekeeping.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Repair	02/13/00	Sun	N	24 0	21:20	0.00			0.0	2.40		No parts at R-31 so they used what they had onsite.		
Pull	02/14/00	Mon	N	24 0	0.00	0:30	207.0	206 5	0.5	0 30	1.0	Pulled back 13" casing from 207 ft to 206 5 ft.		
Equip	02/14/00	Mon	N	24 0	0 30	0 50			0 0	0 20		Crew working on mast. Zip line needs to be rewound. Crew replaced fluids in rig		
Lunch	02/14/00	Mon	N	24 0	0.50	1 25			0 0	0 35		Crew takes lunch.		
Pull	02/14/00	Mon	N	24 0	1:30	4 00	206 5	205.5	1.0	2.30	0.4	Pulled back 13" casing from 206.5 ft to 205 5 ft.		
Vol	02/14/00	Mon	N	24 0	1:30				0.0			So far drillers have pumped 300gls water, 2 gls TORKease.		
Equip	02/14/00	Mon	N	24 0	4 00	4.15			0.0	0.15		Crew is working on chucks and dies in order to be ready to pull sub.		
Remove	02/14/00	Mon	N	24 0	4.15	4.45			0 0	0 30		Removed 3' sub from 13" casing string		
Shift	02/14/00	Mon	N	24 0	4.45	5 30			0 0	0.45		Driller is now on new section of casing and trying to extract it. Shutting down site for shift change.		
Shift	02/14/00	Mon	D	25 0	5 30	6 30			0.0	1:00		FSF, to R-19.		
Security	02/14/00	Mon	D	25.0	6 30	7.10			0 0	0:40		Day Crew arrives onsite. Driller's helpers have not read DX paperwork and will rotate to access control to complete.		
Fuel	02/14/00	Mon	D	25 0	6 30	7.10			0 0	0.40		Jack Eddy refueling		
Security	02/14/00	Mon	D	25 0	7.10	7.45			0 0	0.35		Drillers helpers rotated to Access Control.		
Equip	02/14/00	Mon	D	25 0	7.30	8 30			0.0	1:00		Continue site prep. Jaws replaced or repaired.		
H&S	02/14/00	Mon	D	25 0	7:45				0 0			Radio check		
Casing	02/14/00	Mon	D	25 0	7.50				0.0			Thoren measures actual casing depth. Confirms at 205 5'		
Stuck	02/14/00	Mon	D	25 0	8 30	9 30			0.0	1.00		13" casing stuck at 205 5 ft with no up/down movement. Dies on jaws shot.		227.0
Trip out	02/14/00	Mon	D	25 0	9:30	9 50	205 0	0.0	205.0	0 20	615 0	Tripped out rods and 13" under reamer.		
Support	02/14/00	Mon	D	25.0	9 50				0 0			Secure site; all personnel offsite to FSF.		
FSF	02/14/00	Mon	D	25 0	9.50	11:30			0 0	1:40		To FSF for dies and safety records etc.		
H&S	02/14/00	Mon	D	25 0	10 05	11:30			0.0	1:25		FSF. Goetz confers with Baran (ESH-5), regarding drillers records being kept at Skalski's office.		
Enroute	02/14/00	Mon	D	25 0	11.30	12 00			0 0	0 30		Depart FSF to R-19.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	02/14/00	Mon	D	25.0	11:30	22.00			0.0	10.30		Jackl Eddy to Farmington for spear to fish casing.		
Lunch	02/14/00	Mon	D	25.0	12.00	12.30			0.0	0:30		Lunch.		
Rigup	02/14/00	Mon	D	25.0	12.30	12.40			0.0	0.10		Set up to hammer casing.		
Casing	02/14/00	Mon	D	25.0	12.40	14.00			0.0	1:20		Hammering casing trying to extract.		
Casing	02/14/00	Mon	D	25.0	14.00	14:05			0.0	0.05		Casing not moving. Thoren concerned he may be exacerbating problem.		
Casing	02/14/00	Mon	D	25.0	14.05	14:15			0.0	0:10		Thoren attempts to gain rotation without success.		
H&S	02/14/00	Mon	D	25.0	14:15	16.55			0.0	2.40		Timbers holding rig foot are cracked and canting towards vault. Safety hazard.		
Support	02/14/00	Mon	D	25.0	14.25	16:30			0.0	2.05		Goetz offsite to make call.		
Equip	02/14/00	Mon	D	25.0	14:25	16.55			0.0	2.30		Crew to FSF for supplies.		
Support	02/14/00	Mon	D	25.0	16:30				0.0			Goetz onsite. Make sure site is secure and then depart for FSF.		
Equip	02/14/00	Mon	D	25.0	16.55	17.45			0.0	0.50		All return - unload timbers and build new platform for rig.		
Shift	02/14/00	Mon	D	25.0	17.45				0.0			Depart site.		
									0.0					
Shift	02/14/00	Mon	N	26.0	17:45	19.30			0.0	1:45		Shift passdown at FSF.		
Enroute	02/14/00	Mon	N	26.0	19.30	20.00			0.0	0.30		To R-19. Mix up with escorts caused our late arrival onsite.		
Tailgate	02/14/00	Mon	N	26.0	20.00	20.15			0.0	0:15		Tailgate (hot work); safety inspections.		
Equip	02/14/00	Mon	N	26.0	20.15	21:15			0.0	1.00		Crew begins to fabricate new rig footers.		
Equip	02/14/00	Mon	N	26.0	21:15	23.00			0.0	1:45		Jacking up rig to set new platform for rig.		
H&S	02/14/00	Mon	N	26.0	21:20	21:20			0.0	0.00		Need training records for Danny Nelson and Corey Howe.		
Dynatec	02/14/00	Mon	N	26.0	22.26	23.30			0.0	1:04		Thoren offsite to FSF.		
Rigup	02/14/00	Mon	N	26.0	23.00	23.30			0.0	0.30		Crew rigging up to run spear downhole.		
Rigup	02/14/00	Mon	N	26.0	23:30	0.00			0.0	0.30		Loading spear into hole.		
Rigup	02/15/00	Tue	N	26.0	0.00	1:20			0.0	1:20		Spear and one length of rod in hole.		
Lunch	02/15/00	Tue	N	26.0	1:20	1.50			0.0	0:30		Lunch		
Trip In	02/15/00	Tue	N	26.0	1.50	2:45	0.0	200.0	200.0	0.55	218.2	Tripped in spear and rods from surface to 200 ft.		227.0

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Spear	02/15/00	Tue	N	26.0	2.45	4.00			0.0	1:15		Attempt to wedge spear into 13" casing		
Spear	02/15/00	Tue	N	26.0	4.00	5:30			0.0	1:30		Pulling rods out and running them back in to vibrate spear throughout length of casing to break it free by allowing bridged cutting to fall out.		
FSF	02/15/00	Tue	N	26.0	5:30	6.00			0.0	0.30		Crew offsite to FSF.		
Shift	02/15/00	Tue	D	27.0	6.00	6:30			0.0	0.30		Shift change at FSF.		
Enroute	02/15/00	Tue	D	27.0	6:30	6.50			0.0	0.20		To R-19		
Tailgate	02/15/00	Tue	D	27.0	6.50	7.10			0.0	0.20		Shift inspections, tailgate		
Fuel	02/15/00	Tue	D	27.0	6.50	7.30			0.0	0.40		Jackl Eddy onsite to fuel rig and support.		
Rigup	02/15/00	Tue	D	27.0	7:10	7.50			0.0	0.40		Set up spear.		
Spear	02/15/00	Tue	D	27.0	7.50	9.20			0.0	1:30		Hammer up on spear; using casing jacks to pull casing.		
Trip out	02/15/00	Tue	D	27.0	9.20	10.25	200.0	0.0	200.0	1:05	184.6	Tripped out spear on 7" dual wall rods. Spear does not release easily.		227.0
Equip	02/15/00	Tue	D	27.0	10.25	11:25			0.0	1.00		Centralizer broke on spear; wedged into spear; repair onsite.		
Equip	02/15/00	Tue	D	27.0	10.25	11:25			0.0	1:00		Goetz escorts Thoren to FSF for supplies to repair spear while crew begins spear repair		
Escort	02/15/00	Tue	D	27.0	10.50	11:25			0.0	0.35		Escort shutdowns site to answer page at gate; all personnel had to leave with escort per security plan.		
Support	02/15/00	Tue	D	27.0	11.50	16:30			0.0	4:40		Marin onsite.		
Support	02/15/00	Tue	D	27.0	11.59	16.30			0.0	4:31		Goetz offsite to LATA H&S training with Bob Hull.		
Equip	02/15/00	Tue	D	27.0	11:25	12.30			0.0	1.05		Working on spear.		
Rigup	02/15/00	Tue	D	27.0	12.30	12.50			0.0	0.20		Hung spear in mast.		
Lunch	02/15/00	Tue	D	27.0	12.50	13.20			0.0	0.30		Lunch		
Rigup	02/15/00	Tue	D	27.0	13.20	13.40			0.0	0.20		Rig to trip.		
Trip In	02/15/00	Tue	D	27.0	13.40	14.15	0.0	200.0	200.0	0.35	342.9	Tripping spear from surface - 200'.		227.0
Spear	02/15/00	Tue	D	27.0	14.15	14.30			0.0	0:15		Hammer on spear.		
Spear	02/15/00	Tue	D	27.0	14.30	14.37			0.0	0.07		Trying to re latch spear to casing		
Trip out	02/15/00	Tue	D	27.0	14.37	15.07	200.0	0.0	200.0	0.30	400.0	Trip out spear.		
Spear	02/15/00	Tue	D	27.0	15.07	15:15			0.0	0.08		Hang spear in mast.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	02/15/00	Tue	D	27.0	15:15	15:20			0.0	0:05		Repair spear.		
Trip in	02/15/00	Tue	D	27.0	15:20	15:40	0.0	200.0	200.0	0:20	600.0	Trip in spear.		
Spear	02/15/00	Tue	D	27.0	15:40	15:46			0.0	0:06		Set spear.		
Spear	02/15/00	Tue	D	27.0	15:46	17:15			0.0	1:29		Hammer spear up hole.		
Support	02/15/00	Tue	D	27.0	16:30				0.0			Goetz onsite and Marin off. Crew having difficult hammering casing.		
Stuck	02/15/00	Tue	D	27.0	17:15				0.0			Spear couple failed and spear lost downhole. Threads may have stripped from sub. Does not rotate.		
Fuel	02/15/00	Tue	D	27.0	17:30				0.0			Day crew departs for FSF after refueling. Goetz remains onsite for Night crew.		
Shift	02/15/00	Tue	N	28.0	18:00	18:20			0.0	0:20		Night shift to R-19, plus three escorts.		
Tailgate	02/15/00	Tue	N	28.0	18:20	18:35			0.0	0:15		Tailgate and safety inspection completed.		
Trip out	02/15/00	Tue	N	28.0	18:35	19:05	200.0	0.0	200.0	0:30	400.0	Tripping out rod/spear. Spear is sheared off at middle of tool.		227.0
Dynatec	02/15/00	Tue	N	28.0	19:05	19:30			0.0	0:25		Goetz & Thoren to site access. Thoren to call Eddy. Helper will be sent to Farmington for catcher while remaining crew makes Repair on rig.		
Equip	02/15/00	Tue	N	28.0	19:40	20:15			0.0	0:35		Crew departs site to FSF.		
Support	02/15/00	Tue	N	28.0	19:45	20:15			0.0	0:30		FTL 2 arrives at gate 431 as crew is departing. Crew retrieves parts from FSF and returns to site.		
Equip	02/15/00	Tue	N	28.0	20:15				0.0	#VALUE!		FTL2 and crew arrive onsite.		
Equip	02/15/00	Tue	N	28.0	20:15	21:50			0.0	1:35		Replaced seals		
Equip	02/15/00	Tue	N	28.0	21:50	23:40			0.0	1:50		Crew has replaced valve but driller believes the pump has failed. Crew continues breaking down hammer.		
Depart	02/15/00	Tue	N	28.0	23:40				0.0			Crew and escorts offsite. FTL to SAIC office.		
Equip	02/16/00	Wed	D	29.0	6:00	7:58			0.0	1:58		FSF to repair truck and get supplies.		
Enroute	02/16/00	Wed	D	29.0	7:50	8:15			0.0	0:25		Enroute to R-19		
Tailgate	02/16/00	Wed	D	29.0	8:15	8:20			0.0	0:05		Crew arrives site. Tailgate and safety inspections.		
Fuel	02/16/00	Wed	D	29.0	8:15	9:40			0.0	1:25		Jackl Eddy refueling equipment.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	02/16/00	Wed	D	29.0	8:20	9:15			0.0	0.55		Warming up equipment. Plan is to extract broken spear and pull up casing		
Trip in	02/16/00	Wed	D	29.0	9.15	9.45	0.0	200.0	200.0	0:30	400.0	Trip in fishing tool and rods		227.0
Equip	02/16/00	Wed	D	29.0	10.00				0.0			Mike Baca escorts helpers to FSF to show John Eddy metal shards found in pump filter which suggests pump impellers have failed. Still fishing		
Fish	02/16/00	Wed	D	29.0	9.40	10:30			0.0	0.50		Still fishing. Spear appears to be off center. Trip out rods.		
Equip	02/16/00	Wed	D	29.0	10:30	10.45			0.0	0.15		Jumping boom truck to start.		
Visitors	02/16/00	Wed	D	29.0	10.40	10.50			0.0	0:10		Dave Broxton and Brad Martin onsite.		
Trip out	02/16/00	Wed	D	29.0	10.45	11:45	200.0	0.0	200.0	1:00	200.0	Tripping out rods.		227.0
Dynatec	02/16/00	Wed	D	29.0	11:45	15:00			0.0	3.15		John Eddy onsite.		
Fish	02/16/00	Wed	D	29.0	11:45	11.55			0.0	0:10		Look inside casing to see if able to determine the spears position.		
Fab	02/16/00	Wed	D	29.0	11.55	12.30			0.0	0.35		Fabricate device to align spear in hole as spear is slightly canted to one side.		
Lunch	02/16/00	Wed	D	29.0	12:30	13:00			0.0	0.30		Lunch		
Support	02/16/00	Wed	D	29.0	13.10	13.40			0.0	0.30		PHOTOS - 2 by Goetz of the aligning tool on rig, facing east		
Trip in	02/16/00	Wed	D	29.0	13.10	13.40	0.0	200.0	0.0	0:30		Tripping in rods, aligning tool and catcher assembly.		
Fish	02/16/00	Wed	D	29.0	13.40	14:10			0.0	0:30		Attempt to align spear and catch - unsuccessful.		
Trip out	02/16/00	Wed	D	29.0	14:10	14.50	200.0	0.0	200.0	0.40	300.0	Trip out rods and catching assembly.		227.0
Dynatec	02/16/00	Wed	D	29.0	14:10	14:20			0.0	0:10		Thoren to make call.		
Equip	02/16/00	Wed	D	29.0	14.50	15:00			0.0	0:10		Grapple for catching spear is too big - John Eddy departs to have Jackl Eddy drive to Farmington to get proper size.		
Waste	02/16/00	Wed	D	29.0	15:30	16:00			0.0	0.30		Crew secures rig. Proceed to use boom truck to lift the 2 steel 8000 gals tanks. Will attempt to place tarp beneath the tanks to provide secondary containment. Tarp is 12 mil plastic.		
Waste	02/16/00	Wed	D	29.0	16:00				0.0			Unsuccessful in lifting tanks.		
H&S	02/16/00	Wed	D	29.0	16:00	16:15			0.0	0.15		Continue in securing site- strapping O2 cylinder, placing mirror back on boom truck (was used to get sunlight downhole to see position of spear).		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Repair	02/16/00	Wed	D	29.0	16:15	16:25			0.0	0:10		Site secured. Return to FSF to make repair to breakout wrench, etc.		
Shift	02/16/00	Wed	D	29.0					0.0			No night shift at R-19.		
Equip	02/17/00	Thurs	D	30.0	6:00	6:30			0.0	0:30		FSF- Load new grapple and supplies		
Enroute	02/17/00	Thurs	D	30.0	6:30	7:00			0.0	0:30		Enroute to R-19		
Tailgate	02/17/00	Thurs	D	30.0	7:00	7:10			0.0	0:10		Arrive at R-19; Tailgate.		
Equip	02/17/00	Thurs	D	30.0	7:00	7:30			0.0	0:30		Warming up equipment. Plan is to extract broken spear.		
Trip in	02/17/00	Thurs	D	30.0	7:55	8:20	0.0	200	0.0	0:25		New grapple set up. Trip in rods.		
Fish	02/17/00	Thurs	D	30.0	8:20	8:39			0.0	0:19		Attempt to catch spear.		
Trip out	02/17/00	Thurs	D	30.0	8:40	9:40	200.0	0.0	200.0	1:00	200.0	On spear- Trip out slowly and carefully.		227.0
Fish	02/17/00	Thurs	D	30.0	9:40				0.0			Spear out		
Support	02/17/00	Thurs	D	30.0	9:40				0.0			PHOTOS -by Goetz of the catcher (black) and spear		
Dynatec	02/17/00	Thurs	D	30.0	9:40				0.0			Thoren to call of success.		
Equip	02/17/00	Thurs	D	30.0	9:50	11:30			0.0	1:40		Crew breaks spear apart.		
Dynatec	02/17/00	Thurs	D	30.0	11:08				0.0			John Eddy onsite.		
Equip	02/17/00	Thurs	D	30.0	11:30				0.0			Damaged portion of spear (a sub) is loaded in Thoren's truck - a metallurgist will inspect		
Equip	02/17/00	Thurs	D	30.0	11:30				0.0			Eddy and Thoren depart to make calls; crew continues to work on spear- resetting assembly, replacing centralizer sub, and measuring the assembly diameters and lengths.		
Support	02/17/00	Thurs	D	30.0	11:53	12:10			0.0	0:17		Jon Marin onsite		
Dynatec	02/17/00	Thurs	D	30.0	12:15				0.0			Thoren and Eddy return - Thoren departs		
Lunch	02/17/00	Thurs	D	30.0	12:45	13:15			0.0	0:30		Lunch		
Equip	02/17/00	Thurs	D	30.0	13:15	13:45			0.0	0:30		Crew continues to work on spear.		
Trip in	02/17/00	Thurs	D	30.0	13:45	16:30	0.0	200.0	200.0	2:45	72.7	Trip in spear and rods.		227.0
Spear	02/17/00	Thurs	D	30.0	16:30	16:45	200.0	207.0	7.0	0:15	28.0	Adjusting to get spear at base of shoe.		227.0
Spear	02/17/00	Thurs	D	30.0	16:45	17:30			0.0	0:45		Operate hammer with low pressure with upward pull while spear is at base of casing.		
Support	02/17/00	Thurs	D	30.0	17:00				0.0			PHOTO by Goetz of rig facing east.		
Equip	02/17/00	Thurs	D	30.0	17:30	17:50			0.0	0:20		Adding hammer oil.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Fuel	02/17/00	Thurs	D	30.0	17.50	18.00			0.0	0:10		Fueling vehicles.		
Depart	02/17/00	Thurs	D	30.0	18.00	18.20			0.0	0.20		Depart to FSF		
Shift	02/17/00	Thurs	N	31.0	18.00	19.00			0.0	1:00		Night shift arrives		
Tailgate	02/17/00	Thurs	N	31.0	19.05	19.15			0.0	0:10		Tailgate safety meeting		
Rigup	02/17/00	Thurs	N	31.0	19.15	19.55			0.0	0.40		Prepare to hammer at 207'.		
Equip	02/17/00	Thurs	N	31.0	19.55				0.0			Hammer is frozen.		
Dynatec	02/17/00	Thurs	N	31.0	19.55	20.10			0.0	0:15		Driller calls Eddy to get strategy.		
Equip	02/17/00	Thurs	N	31.0	20.10	20.30			0.0	0.20		Driller adds water(no additives) to hole according to Eddy's instructions.100 gals of water added - still frozen.		
Support	02/17/00	Thurs	N	31.0	20.30				0.0			Ron Trueblood onsite. Goetz departs.		
Trip out	02/17/00	Thurs	N	31.0	20.50	21:20	207.0	0.0	207.0	0.30	414.0	Tripping out hammer to thaw using torch.		227.0
Equip	02/17/00	Thurs	N	31.0	21:20	21:35			0.0	0:15		Thaw hammer using torch.		
Trip in	02/17/00	Thurs	N	31.0	21:35	21.50	0.0	67.0	67.0	0.15	268.0	Tripping back into hole.		227.0
Trip in	02/17/00	Thurs	N	31.0	21.50	22.15	67.0	140.0	0.0	0.25		Still tripping in - 140' to go.		
Break	02/17/00	Thurs	N	31.0	22.15	22.30			0.0	0.15		Crew breaks.		
Trip in	02/17/00	Thurs	N	31.0	22.30	23.15	140.0	207.0	140.0	0.45	186.7	Tripping back into hole.		227.0
Trip out	02/17/00	Thurs	N	31.0	23.15	23.30	207	0	0.0	0:15		Tripping out.		
Trip in	02/17/00	Thurs	N	31.0	23.30	23.40	0	207	0.0	0:10		Continue to Trip in and out to free casing.		
Trip out	02/17/00	Thurs	N	31.0	23.40	0.00	207.0	105.0	102.0	0.20	306.0	Trip out rods completely. Apparently there are pressure problems with the hammer.		227.0
Trip out	02/18/00	Fri	N	31.0	0.00	0.20	105.0	0.0	105.0	0.20	315.0	Trip out rods completely.		
Security	02/18/00	Fri	N	31.0	0.00	0.20			0.0	0.20		PTLA guard onsite.		
Lunch	02/18/00	Fri	N	31.0	0.20	0.50			0.0	0.30		Lunch		
Trip in	02/18/00	Fri	N	31.0	0.50	1:45	0.0	207.0	207.0	0.55	225.8	Tripping back into hole.		227.0
Spear	02/18/00	Fri	N	31.0	1:45	3.15			0.0	1:30		Hammer to stick spear into casing.		
Trip out	02/18/00	Fri	N	31.0	3.15	4.00	207.0	0.0	207.0	0.45	276.0	Trip out		227.0
Spear	02/18/00	Fri	N	31.0	4.00	4:10			0.0	0.10		Driller is hammering at the bottom head		
Break	02/18/00	Fri	N	31.0	4.10	4.20			0.0	0:10		Crew breaks.		
Trip in	02/18/00	Fri	N	31.0	4.20	4.45	0.0	207.0	207.0	0.25	496.8	Trip in.		227.0
Spear	02/18/00	Fri	N	31.0	4.45	5:15			0.0	0.30		Hammering		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Shift	02/18/00	Fri	N	31.0	5:15	5:30			0.0	0:15		Begin securing site for shift change.		
Depart	02/18/00	Fri	N	31.0	5:30	5:45			0.0	0:15		Depart to FSF		
Shift	02/18/00	Fri	D	32.0	6:00	6:30			0.0	0:30		FSF - shift change		
Enroute	02/18/00	Fri	D	32.0	6:30	6:45			0.0	0:15		Enroute		
Tailgate	02/18/00	Fri	D	32.0	6:45	6:55			0.0	0:10		Arrive at R-19; Tailgate and safety inspections.		
Support	02/18/00	Fri	D	32.0	7:10	9:50			0.0	2:40		Goetz to SAIC for training/paperwork; meets the Eddys at FSF		
Spear	02/18/00	Fri	D	32.0	7:00	9:00			0.0	2:00		Hammering on 13" casing		
Trip out	02/18/00	Fri	D	32.0	9:00	10:00	207.0	0.0	207.0	1:00	207.0	Hammer froze - Trip out.		227.0
Fuel	02/18/00	Fri	D	32.0	9:50	10:25			0.0	0:35		Jackl Eddy onsite - Fuels equipment		
Equip	02/18/00	Fri	D	32.0	9:50	14:50			0.0	5:00		John Eddy onsite works with drillers to thaw out the hammer and make Repair to spear. Some welding		
Trip in	02/18/00	Fri	D	32.0	12:05	12:38	0.0	207.0	207.0	0:33	376.4	Trip in rods		227.0
Spear	02/18/00	Fri	D	32.0	12:38	13:07			0.0	0:29		Hammering lower portion of casing and pulling upward with jaws.		
Pull	02/18/00	Fri	D	32.0	13:07				0.0			Approx. 2" gain - something in hole has broken.		
Lunch	02/18/00	Fri	D	32.0	13:15	13:45			0.0	0:30		Lunch		
Safety	02/18/00	Fri	D	32.0	13:45	14:25			0.0	0:40		Safety Inspection by Clint Daymon and Bob Stoub		
Trip out	02/18/00	Fri	D	32.0	13:45	14:30	207.0	0.0	207.0	0:45	276.0	Drillers Trip out		227.0
Spear	02/18/00	Fri	D	32.0	14:30	14:40			0.0	0:10		Inspect spear and hammer - spear has sheared off at a sub assembly		
Equip	02/18/00	Fri	D	32.0	14:40	14:50			0.0	0:10		John Eddy and Roy Brown review measurements- appropriate grapple size is not onsite- will go to Farmington for grapple.		
Depart	02/18/00	Fri	D	32.0	14:50				0.0			Secure and depart site		
Equip	02/18/00	Fri	D	32.0	15:00	17:00			0.0	2:00		FSF- Repair to equipment		
Equip	02/18/00	Fri	N	33.0	18:00	6:00			0.0	6:00		Night shift obtained grapple from Farmington and began setting up tool for day shift.		
Escort	02/19/00	Sat	D	34.0	6:00	6:45			0.0	0:45		FSF; new escort, not on papers cannot use this weekend		
Enroute	02/19/00	Sat	D	34.0	6:45	7:20			0.0	0:35		Enroute		
Equip	02/19/00	Sat	D	34.0	7:20	7:30			0.0	0:10		Warm equipment		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tailgate	02/19/00	Sat	D	34 0	7.30	7.40			0 0	0:10		Tailgate and safety inspections		
Rigup	02/19/00	Sat	D	34 0	7.40	7.45			0 0	0.05		Drillers set up catcher assembly to 7 1/2"		
Dynatec	02/19/00	Sat	D	34 0	7.45	8.10			0 0	0 25		John Eddy onsite		
Support	02/19/00	Sat	D	34.0	8.10	8 25			0.0	0.15		PHOTOS by Goetz 1) of open hole stabilizer 2) close up of carbide coated fins for back reaming		
Trip In	02/19/00	Sat	D	34 0	9 00	9 30	0 0	193 0	193.0	0.30	386 0	Trip in rods		227.0
Fuel	02/19/00	Sat	D	34 0	9 30	10:30			0.0	1.00		Jackl Eddy onsite to refuel		
Dynatec	02/19/00	Sat	D	34 0	9 50	10.02			0.0	0.12		R-31 crew onsite for supplies		
Support	02/19/00	Sat	D	34 0	10.15				0.0			PHOTOS by Goetz of catcher assembly.		227.0
Trip out	02/19/00	Sat	D	34 0	9.45	10.15	193 0	0 0	193.0	0.30	356 0	Tripping out		
Support	02/19/00	Sat	D	34 0	10.30	10.50			0.0	0.20		Marin onsite.		
Visitor	02/19/00	Sat	D	34 0	10.45	10 50			0.0	0.05		Dave Broxton onsite.		
Equip	02/19/00	Sat	D	34 0	11:00	11:30			0 0	0.30		John Eddy has modified fins on back reamer		
Trip In	02/19/00	Sat	D	34 0	11:15	11.45	0.0	193 0	193 0	0.30	386 0	Trip in		227.0
Lunch	02/19/00	Sat	D	34 0	11.45	12.15			0.0	0 30		Break for lunch.		
Trip out	02/19/00	Sat	D	34 0	12.45	13:15	193 0	0 0	193.0	0 30	386 0	Trip out		227 0
Fab	02/19/00	Sat	D	34 0	13.15	14 00			0.0	0.45		Heat and reshape grappler.		
Support	02/19/00	Sat	D	34 0	14 05	16 05			0.0	2.00		Goetz offsite to R-31		
Trip In	02/19/00	Sat	D	34 0	16.45	17.15	0.0	193 0	193 0	0.30	386 0	Trip in with adjusted tool.		227.0
Fish	02/19/00	Sat	D	34 0	17.15	17.35			0.0	0 20		Work grapple. Trying to get spear to release grapple. Spear disengaged.		
Shift	02/19/00	Sat	D	34 0	17.40	18 30			0 0	0 50		Shift change at yard.		
Maint	02/19/00	Sat	N	35 0	18.00	0 00			0 0	6 00		Night shift arrives onsite and begins work. Maintenance continued until shift was called		
Lunch	02/20/00	Sun	N	35 0	0.00	0 30			0 0	0 30		Lunch		
Depart	02/20/00	Sun	N	35 0	0 00	2.15			0 0	2:15		Maintenance continued until shift was called. End Shift.		
Shift	02/20/00	Sun	D	36 0	6.00	7 20			0 0	1:20		Prepping in yard for departure for site.		
Enroute	02/20/00	Sun	D	36 0	7:20	7.40			0 0	0 20		Enroute to site.		
Tailgate	02/20/00	Sun	D	36 0	7.40	7.50			0 0	0.10		Tailgate and safety inspections		
Waste	02/20/00	Sun	D	36 0	8 00	10:15			0 0	2.15		Set liners beneath tanks.		
Break	02/20/00	Sun	D	36 0	10.15	10 30			0 0	0.15		Break		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	02/20/00	Sun	D	36.0	10:30	12.15			0.0	1:45		Repair truck hitch and build drillers helper stand.		
Lunch	02/20/00	Sun	D	36.0	12.15	12.45			0.0	0:30		Lunch		
Equip	02/20/00	Sun	D	36.0	12.45	13:00			0.0	0:15		Continue repair.		
Dynatec	02/20/00	Sun	D	36.0	13:00	13:50			0.0	0.50		John Eddy onsite with milling tool.		
Trip in	02/20/00	Sun	D	36.0	13:50	14:20	0.0	190.0	190.0	0:30	380.0	Tripping in.		227.0
Visitor	02/20/00	Sun	D	36.0	13:50	14:20			0.0	0.30		Broxton onsite for review of cuttings.		
Mill	02/20/00	Sun	D	36.0	14:20	15:40			0.0	1:20		Milling spear		
Trip out	02/20/00	Sun	D	36.0	15:40	16:08	190.0	0.0	190.0	0:28	407.1	Tripping out.		227.0
Trip in	02/20/00	Sun	D	36.0	16:30	17:15	0.0	190.0	190.0	0:45	253.3	Trip in.		227.0
Fuel	02/20/00	Sun	D	36.0	17:20	17.30			0.0	0.10		Fueling equipment.		
Depart	02/20/00	Sun	D	36.0	17.40				0.0			To FSF.		
Tailgate	02/20/00	Sun	N	37.0	18:25	18.40			0.0	0:15		Dynatec2, John Eddy and FTL onsite.		
Tailgate	02/20/00	Sun	N	37.0	18:40	19:05			0.0	0:25		Tailgate and Safety Inspection.		
Fish	02/20/00	Sun	N	37.0	19:05	19.30			0.0	0:25		Start rig and begin extraction ops.		
Fish	02/20/00	Sun	N	37.0	19.30	20:20			0.0	0.50		Trying to reset fishing tool with spear.		
Fish	02/20/00	Sun	N	37.0	20:20	21:20			0.0	1:00		Spear pulled free and crew must re-tool.		
Fish	02/20/00	Sun	N	37.0	21:20	23.10			0.0	1.50		Re-tooling and now going fishing		
Fish	02/20/00	Sun	N	37.0	23:10	23:20			0.0	0:10		Working on spear.		
Lunch	02/20/00	Sun	N	37.0	23:20	23.55			0.0	0.35		Crew takes lunch.		
Equip	02/20/00	Sun	N	37.0	23.55				0.0			Crew must go to yard to effect repair.		
Equip	02/20/00	Sun	N	37.0	0:15	5:45			0.0	5:30		Crew to yard for repair to spear. FTL2 to SAIC office.		
Equip	02/20/00	Sun	N	37.0	2:30	3.45			0.0	1:15		FTL2 arrives at gate 431 and meets Danny Nelson on his way into site. FTL2 assists helper to find reducing sub. None onsite. Back to yard.		
Shift	02/20/00	Sun	N	37.0	6:10	6.30			0.0	0:20		Day shift arrives-passdown from night shift.		
Tailgate	02/21/00	Mon	D	38.0	7:20	7:40			0.0	0:20		Tailgate (MSDS for diesel covered).		
Equip	02/21/00	Mon	D	38.0	7.50	8:00			0.0	0:10		Warming up equipment.		
Equip	02/21/00	Mon	D	38.0	8.00	11:00			0.0	3:00		Repair jaws to grab 13" casing.		
Dynatec	02/21/00	Mon	D	38.0	8:15	13.15			0.0	5.00		John Eddy onsite with geophysical trailer.		
Equip	02/21/00	Mon	D	38.0	8:15	11:00			0.0	2.45		Continue to try and repair jaws.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Casing	02/21/00	Mon	D	38.0	10.45	11.00			0.0	0.15		13" casing separated at ~ 113 ft bgs.		
Camera	02/21/00	Mon	D	38.0	11.00	11:30			0.0	0.30		Set up downhole camera.		
Visitors	02/21/00	Mon	D	38.0	11.30	12.00			0.0	0.30		Dave Broxton onsite.		
Casing	02/21/00	Mon	D	38.0	12.00				0.0			Downhole camera view shows casing broke at 113' and open hole from 204'.		
Camera	02/21/00	Mon	D	38.0	12.00	12.30			0.0	0:30		Retract camera and clean. Strategy is to pull another section of casing, attach two smaller subs and set so that jacks can be used		
Lunch	02/21/00	Mon	D	38.0	12.30	13.00			0.0	0.30		Lunch		
Rigup	02/21/00	Mon	D	38.0	13.00	14.00			0.0	1:00		Set up to remove 113 ft of 13" casing		
Dynatec	02/21/00	Mon	D	38.0	13.15				0.0			Jackl and John Eddy offsite		
Equip	02/21/00	Mon	D	38.0	14.00	14.07			0.0	0.07		Crew offloading subs off of boom truck.		
Trip out	02/21/00	Mon	D	38.0	14.10	15.45	113.0	0.0	113.0	1:35	71.4	Tripped out 13" casing from 113 ft to surface.		227.0
Rigup	02/21/00	Mon	D	38.0	14.35	17:30			0.0	2.55		Rig up for open-hole drilling		
Support	02/21/00	Mon	D	38.0	15.45	16.05			0.0	0:20		Photos by Goetz of sub assembly and open hole drilling system.		
Trip in	02/21/00	Mon	D	38.0	17:30	17.45	0.0	140.0	140.0	0.15	560.0	Trip in 12 1/4" tricone bit and sub assembly on 7" dual wall drill rod from surface to 140'.		227.0
Shift	02/21/00	Mon	D	38.0	17.50				0.0			To FSF.		
Shift	02/21/00	Mon	N	39.0	18.10	18.20			0.0	0:10		Pass down completed. 7 rods and bit downhole.		
Tailgate	02/21/00	Mon	N	39.0	19.00	19.15			0.0	0:15		Arrive onsite. Had to refuel escort vehicle before coming to site. Tailgate.		
Trip in	02/21/00	Mon	N	39.0	19.15	19.45	140.0	180.0	40.0	0.30	80.0	Trip in 12 1/4" tricone bit on 7" dual wall drill rod from 140' to 180'.		227.0
Support	02/21/00	Mon	N	39.0	19.26	19.35			0.0	0.09		Jon Marin onsite to download FTL logs.		
Support	02/21/00	Mon	N	39.0	19.35				0.0			Inspected fluid meter and equipment is ready to go. Since no direction was given as to when sample are to be taken I will sample every ten ft or hourly, whichever is needed.		
Equip	02/21/00	Mon	N	39.0	19.45	20.00			0.0	0.15		Moving rod.		
Trip in	02/21/00	Mon	N	39.0	20.00	20.10	180.0	225.0	45.0	0.10	270.0	Trip in 12 1/4" tricone bit on 7" dual wall drill rod from 180' to 225'.		227.0

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Support	02/21/00	Mon	N	39.0	20:10	21:50			0.0	1:40		Drill prep. Injection fluid a little too viscous so differ will dilute. Conductivity reading for first interval is 450 3 µS. Fluid package consists of 200 gls water and 0 5 cups of EZ-MUD and QUIK-FOAM.		
Conduct	02/21/00	Mon	N	39 0	21:40				0.0			Conductivity reading for first interval		
Drill	02/21/00	Mon	N	39 0	21:50	21.57	225 0	230 0	5.0	0 07	42.9	Drilled 12 1/4" tricone bit wet from 225' to 230' in Obt2		230.0
Drill	02/21/00	Mon	N	39 0	21.57	22 20	230 0	250 0	20 0	0·23	52.2	Drilled 12 1/4" tricone bit wet from 230' to 250' in Obt1v.		250 0
Support	02/21/00	Mon	N	39 0	22.10				0.0			HE Spot test at 240'. Results are negative.		
Drill	02/21/00	Mon	N	39.0	22 20	23 05	250.0	275 0	25 0	0:45	33 3	Drilled 12 1/4" tricone bit wet from 250' to 275' in Obt1v.		275 0
Conduct	02/21/00	Mon	N	39.0	22.45	22.45			0 0	0.00		Conductivity readings at 250'.		
Conduct	02/21/00	Mon	N	39.0	23 05	23 05			0.0	0 00		Conductivity readings at 275'. Effluent reading may be off due to amount of foam produced at present.		
Drill	02/21/00	Mon	N	39.0	23 05	0 00	275 0	279 0	4 0	0.55	4.4	Drilled 12 1/4" tricone bit wet from 275' to 279' in Obt1v.		279 0
Drill	02/22/00	Tue	N	39.0	0.00	0:15	279 0	280.0	1.0	0.15	4.0	Drilled 12 1/4" tricone bit wet from 279' to 280' in Obt1v.		280 0
Repair	02/22/00	Tue	N	39.0	0:15	1:10			0.0	0.55		Crew is repairing seals on tophead. Dynatec directed to discharge water into sump until he knows encountered groundwater, then it would go into tanks.		
Waste	02/22/00	Tue	N	39 0	1:00	1:10			0 0	0:10		Dynatec directed to discharge water into sump until he knows encountered groundwater, then it would go into tanks.		
Connect	02/22/00	Tue	N	39.0	1:10	2.00			0.0	0.50		Add another rod.		
Equip	02/22/00	Tue	N	39.0	1:10	2.00			0 0	0.50		Loading 13" casing onto rod truck.		
Lunch	02/22/00	Tue	N	39 0	2.00	2:45			0.0	0:45		Break for lunch.		
Drill	02/22/00	Tue	N	39 0	2.45	2.57	280.0	285 0	5.0	0:12	25.0	Drilled 12 1/4" tricone bit wet from 280' to 285' in Obt1v.		285 0
Drill	02/22/00	Tue	N	39.0	2 57	3.30	285 0	300.0	15.0	0 33	27.3	Drilled 12 1/4" tricone bit wet from 285' to 300' in Obt1g.		300 0
Conduct	02/22/00	Tue	N	39.0	2:45	3.30			0.0	0:45		Conductivity reading taken at 285'.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Drill	02/22/00	Tue	N	39.0	3.30	4.00	300.0	320.0	20.0	0.30	40.0	Drilled 12 1/4" tricone bit wet from 300' to 320' in Obt1g		320.0
Borehole	02/22/00	Tue	N	39.0	3.30	4.00			0.0	0.30		Driller says they hit a ratty area around 300'. Large number of lithics in sample between 300' - 310'.		
Conduct	02/22/00	Tue	N	39.0	3.30	4.00			0.0	0.30		Conductivity reading taken at 300'.		
Conduct	02/22/00	Tue	N	39.0	3.45	3.45			0.0	0.00		Conductivity read at 315'.		
Connect	02/22/00	Tue	N	39.0	4.00	4:10			0.0	0.10		Add another rod.		
Drill	02/22/00	Tue	N	39.0	4.10	4.50	320.0	340.0	20.0	0.40	30.0	Drilled 12 1/4" tricone bit wet from 320' to 340' in Obt1g		340.0
Conduct	02/22/00	Tue	N	39.0	4.45	4.45			0.0	0.00		Conductivity read at 335'.		
Connect	02/22/00	Tue	N	39.0	4.45	4.53			0.0	0.08		Add another rod.		
Drill	02/22/00	Tue	N	39.0	4.53	5:30	340.0	360.0	20.0	0.37	32.4	Drilled 12 1/4" tricone bit wet from 340' to 360' in Obt1g		360.0
Waste	02/22/00	Tue	N	39.0	4.53	5.30			0.0	0.37		Helpers are offloading 55-gal. drums of cuttings into cutting management area.		
Depart	02/22/00	Tue	N	39.0	6.30	6:30			0.0	0.00		Offsite to FSF after site clean-up.		
Shift	02/22/00	Tue	D	40.0	6.00	6:45			0.0	0.45		Wait for night shift to arrive and for helpers		
Crew	02/22/00	Tue	D	40.0	7:00	7.30			0.0	0.30		Helper's badge in truck onsite - escorts depart to retrieve		
Crew	02/22/00	Tue	D	40.0	7:30	8.00			0.0	0:30		Obtain badge proceed to site		
Tailgate	02/22/00	Tue	D	40.0	8.00	8.10			0.0	0.10		Tailgate and safety inspections.		
Equip	02/22/00	Tue	D	40.0	8.00	8.10			0.0	0.10		Warm equipment		
Support	02/22/00	Tue	D	40.0	8.20	8.40			0.0	0.20		Goetz offsite for page re: SAA		
Cond	02/22/00	Tue	D	40.0	8.10	8.30			0.0	0.20		Condition hole		
Drill	02/22/00	Tue	D	40.0	8.30	9.13	360.0	368.0	8.0	0.43	11.2	Drilled 12 1/4" tricone bit wet from 360' to 368' in Obt1g		368.0
Conduct	02/22/00	Tue	D	40.0		8.59			0.0	8.59		New fluid batch conductivity reading on last shifts		
Repair	02/22/00	Tue	D	40.0	9.13	9.25			0.0	0.12		Lost air line hose on rig - reattach, add hammer oil		
Conduct	02/22/00	Tue	D	40.0	9.15				0.0			Conductivity readings - each batch is approx 200 gals + EZ-MUD + QUIK-FOAM		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Drill	02/22/00	Tue	D	40.0	9.25	10.16	368.0	379.0	11.0	0.51	12.9	Drilled 12 1/4" tricone bit wet from 368' to 379' in Obt1g.		379.0
Drill	02/22/00	Tue	D	40.0	10.16	10.21	379.0	380.0	1.0	0.05	12.0	Drilled 12 1/4" tricone bit wet from 379' to 380' in Obt1g (Tsankawi Pumice Bed).		380.0
Conduct	02/22/00	Tue	D	40.0	9.42	9.42			0.0	0.00		Conductivity readings on return fluid		
Mud	02/22/00	Tue	D	40.0	9:45				0.0			New batch of fluid - much foam in cuttings		
Borehole	02/22/00	Tue	D	40.0	9.45				0.0			Driller notes during 1st 5 ft of today's drilling (360-365') a marked change to softer material occurred		
Conduct	02/22/00	Tue	D	40.0	10.00				0.0			New batch of fluid - Conductivity readings - reduce flow in hole and allow to condition		
Cond	02/22/00	Tue	D	40.0	10.21	10.30			0.0	0.09		Condition and add next stem		
Conduct	02/22/00	Tue	D	40.0	10.30	10.30			0.0	0.00		Conductivity readings		
Drill	02/22/00	Tue	D	40.0	10.30	11:10	380.0	400.0	20.0	0.40	30.0	Drilled 12 1/4" tricone bit wet from 380' to 400' in Cerro Toledo Interval.		400.0
Borehole	02/22/00	Tue	D	40.0	10.36				0.0			Driller notes that no indicators of perched water seen; however, 380- 382 were easier drilling and dark lithics appeared		
Borehole	02/22/00	Tue	D	40.0	10.50				0.0			383-385' slightly easier drilling noted and color change to orange brown		
Conduct	02/22/00	Tue	D	40.0	11:09	11:09			0.0	0.00		Conductivity readings on return fluid - thick orange brown		
Connect	02/22/00	Tue	D	40.0	11:10	11:36			0.0	0.26		Add another rod.		
Fuel	02/22/00	Tue	D	40.0	11:36				0.0			Jackl Eddy onsite to fuel equipment		
Conduct	02/22/00	Tue	D	40.0	11:40	11:40			0.0	0.00		Conductivity readings on return fluid.		
Drill	02/22/00	Tue	D	40.0	11:36	12:33	400.0	420.0	20.0	0.57	21.1	Drilled 12 1/4" tricone bit wet from 400' to 420' in Cerro Toledo Interval; 400 - 405' driller notes harder drilling.		420
Mud	02/22/00	Tue	D	40.0	12:15	12:33			0.0	0:18		New batch of fluids		
Conduct	02/22/00	Tue	D	40.0	11:45	11:45			0.0	0.00		Conductivity readings on injection fluid.		
Borehole	02/22/00	Tue	D	40.0	11.50				0.0			Beginning to see pumice frags; orange brown cont; smaller grain size		
Conduct	02/22/00	Tue	D	40.0	12.05				0.0			Conductivity readings of return fluid - foamy- lt. tan orange		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Conduct	02/22/00	Tue	D	40.0	12:14				0.0			Conductivity readings of return - foamy- low return 415 - 417'		
Borehole	02/22/00	Tue	D	40.0	12.16				0.0			417'-- large vol of dark lithics; greyer and orange frags		
Lunch	02/22/00	Tue	D	40.0	12.33	13 00			0.0	0 27		Lunch		
Connect	02/22/00	Tue	D	40 0	13 00	13.20			0 0	0 20		Add another rod.		
Drill	02/22/00	Tue	D	40 0	13.20	14.00	420 0	440 0	20.0	0.40	30.0	Drilled 12 1/4" tricone bit wet from 420' to 440' in Cerro Toledo Interval.		440 0
Mud	02/22/00	Tue	D	40 0	13 20	14 00			0 0	0.40		Resume drilling - note driller has used 6 tanks of EZ-MUD, QUIK-FOAM blend		
Mud	02/22/00	Tue	D	40.0	13.40				0.0			Prep batch of fluids		
Conduct	02/22/00	Tue	D	40 0	13 56	13 56			0 0	0 00		Conductivity readings of new batch and return		
Connect	02/22/00	Tue	D	40.0	14 00	14.07			0.0	0.07		Add another rod.		
Drill	02/22/00	Tue	D	40 0	14.07	15:00	440 0	455 0	15 0	0.53	17.0	Drilled 12 1/4" tricone bit wet from 440' to 455' in Cerro Toledo Interval.		455.0
Conduct	02/22/00	Tue	D	40 0	14:16				0.0			Tank of fluids prep - Conductivity reading		
Conduct	02/22/00	Tue	D	40 0		14.18			0 0	14.18		Conductivity readings of new batch		
Conduct	02/22/00	Tue	D	40.0	14:25				0.0			Conductivity reading of return water @ 446'		
Water	02/22/00	Tue	D	40 0	15 00				0.0			Out of water		
Water	02/22/00	Tue	D	40 0	15 05				0.0			Depart for water		
Drill	02/22/00	Tue	D	40.0	16:10	16.45	455 0	460.0	5.0	0.35	8 6	Drilled 12 1/4" tricone bit wet from 445' to 460' in Cerro Toledo Interval.		460 0
Mud	02/22/00	Tue	D	40.0	16:10	16.45			0.0	0 35		10th tank fluids		
Support	02/22/00	Tue	D	40.0	16:15	16:45			0 0	0.30		Goetz offsite for calls		
Connect	02/22/00	Tue	D	40 0	16.45	16 50			0 0	0.05		Add another rod.		
Drill	02/22/00	Tue	D	40 0	16 50	17:25	460 0	480 0	20.0	0 35	34 3	Drilled 12 1/4" tricone bit wet from 460' to 480' in Cerro Toledo Interval.		480 0
Conduct	02/22/00	Tue	D	40 0	16 55	16 55			0 0	0 00		Conductivity readings of new batch		
Fuel	02/22/00	Tue	D	40 0	17 25	17:45			0.0	0 20		Site clean up and fuel		
Depart	02/22/00	Tue	D	40 0	17.45				0 0			Depart		
Vol	02/22/00	Tue	D	40 0	17:45				0.0			Drill has used at least 12 tanks, likely 14		
Shift	02/22/00	Tue	N	41.0	18 00	18.15			0 0	0.15		Shift change at FSF		
Enroute	02/22/00	Tue	N	41.0	18.15	18 30			0 0	0.15		To R-19		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tailgate	02/22/00	Tue	N	41.0	18:30	18:45			0.0	0:15		Tailgate - covered MSDS for diesel fuel		
HSS	02/22/00	Tue	N	41.0	18:45	18:55			0.0	0:10		Rig inspections		
Waste	02/22/00	Tue	N	41.0	18:50	20:30			0.0	1:40		Prep site for drilling- move cuttings, etc.		
DTW	02/22/00	Tue	N	41.0	19:10	19:15			0.0	0:05		Sounding well - sounder broken -	failed	
Equip	02/22/00	Tue	N	41.0	19:15	20:00			0.0	0:45		Turbo to R-31 to get better sounder		
Waste	02/22/00	Tue	N	41.0	19:15	20:30			0.0	1:15		Remainder of crew moves cuttings, etc.		
Connect	02/22/00	Tue	N	41.0	20:30	20:42			0.0	0:12		Add another rod.		
Conduct	02/22/00	Tue	N	41.0	19:43	19:43			0.0	0:00		Conductivity readings of last shift's last batch of drilling fluid		
Drill	02/22/00	Tue	N	41.0	20:42	21:30	480.0	500.0	20.0	0:48	25.0	Drilled 12 1/4" tricone bit wet from 480' to 500' in Cerro Toledo interval.		500.0
Conduct	02/22/00	Tue	N	41.0	20:30	20:30			0.0	0:00		Conductivity measured		
Conduct	02/22/00	Tue	N	41.0	20:45	20:45			0.0	0:00		Conductivity measured		
Conduct	02/22/00	Tue	N	41.0	21:00	21:00			0.0	0:00		Conductivity measured.		
Connect	02/22/00	Tue	N	41.0	21:30	21:35			0.0	0:05		Add another rod.		
Drill	02/22/00	Tue	N	41.0	21:35	22:10	500.0	520.0	20.0	0:35	34.3	Drilled 12 1/4" tricone bit wet from 500' to 520' in Cerro Toledo interval.		520.0
Connect	02/22/00	Tue	N	41.0	22:10	22:15			0.0	0:05		Add another rod.		
Drill	02/22/00	Tue	N	41.0	22:15	23:00	520.0	540.0	20.0	0:45	26.7	Drilled 12 1/4" tricone bit wet from 520' to 540' in Cerro Toledo interval.		540.0
Conduct	02/22/00	Tue	N	41.0	22:15	22:15			0.0	0:00		Conductivity taken at 520'		
Connect	02/22/00	Tue	N	41.0	23:00	23:10			0.0	0:10		Add another rod.		
Drill	02/22/00	Tue	N	41.0	23:10	0:00	540.0	560.0	20.0	0:50	24.0	Drilled 12 1/4" tricone bit wet from 540' to 560' in Cerro Toledo interval.		560.0
Lunch	02/23/00	Wed	N	41.0	0:00	0:30			0.0	0:30		Lunch		
Conduct	02/23/00	Wed	N	41.0	0:15	0:15			0.0	0:00		Conductivity reading		
Connect	02/23/00	Wed	N	41.0	0:30	0:35			0.0	0:05		Add another rod.		
Drill	02/23/00	Wed	N	41.0	0:35	1:05	560.0	568.0	8.0	0:30	16.0	Drilled 12 1/4" tricone bit wet from 560' to 568' in Cerro Toledo interval.		568.0
Equip	02/23/00	Wed	N	41.0	1:05	3:40			0.0	2:35		Hose fitting at top head has failed. Driller tripped out one rod and tried to repair fitting. Had to go to yard for parts.		
Equip	02/23/00	Wed	N	41.0	3:40	3:40			0.0	0:00		Returned to site.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	02/23/00	Wed	N	41.0	3.40	5:10			0 0	1:30		Driller to R-31 for parts.		
Equip	02/23/00	Wed	N	41.0	3 40	5:10			0.0	1:30		Remainder of crew preps for day shift.		
Shift	02/23/00	Wed	N	41.0	5:10	6 00			0.0	0 50		Offsite to FSF		
Repair	02/23/00	Wed	D	42.0	6.00	7:15			0 0	1:15		Repair return line coupler at FSF		
Enroute	02/23/00	Wed	D	42.0	7:15	7:30			0.0	0:15		Enroute to R-19		
Tailgate	02/23/00	Wed	D	42.0	7:30	8 30			0.0	1.00		Tailgate SSHASP review, MSDS for Antifreeze covered		
Equip	02/23/00	Wed	D	42.0	8.30	8 50			0.0	0.20		Warming equip, fueling, attach coupler, intermittent use of boom truck to move drums		
Equip	02/23/00	Wed	D	42.0	8.50	10 00			0 0	1:10		Hydraulic line broke during repair		
Mud	02/23/00	Wed	D	42.0	10.00	10.15			0 0	0.15		New batch fluids - Driller will make thicker today		
Support	02/23/00	Wed	D	42.0	10.10	10.15			0 0	0.05		Porta potty serviced		
Support	02/23/00	Wed	D	42.0	10.20	10 30			0.0	0.10		Goetz offsite to make calls		
DTW	02/23/00	Wed	D	42.0	10.55	10.55			0 0	0.00		Driller indicates 539 35' DTW - likely drilling fluids; Goetz requests driller to blow out hole to confirm drilling fluid	539 35	
Support	02/23/00	Wed	D	42.0	11:00	11:30			0 0	0.30		Goetz offsite to confirm strategy		
Conduct	02/23/00	Wed	D	42.0	11:30	11:30			0 0	0.00		Conductivity reading		
DTW	02/23/00	Wed	D	42.0	11:30	11:45			0.0	0:15		Blew out hole and measure DTW	403 4	
DTW	02/23/00	Wed	D	42.0	11:45	11:49			0 0	0.04		Recheck DTW - likely mud caused false reading at 400'	564 6	
Lunch	02/23/00	Wed	D	42.0	12:15	12.45			0.0	0 30		Lunch		
DTW	02/23/00	Wed	D	42 0	12.45	12 50			0.0	0.05		DTW 564 5	564 5	
Support	02/23/00	Wed	D	42 0	12.50	13 00			0 0	0.10		Confirm probe is reading OK		
Drill	02/23/00	Wed	D	42.0	13 00	14 20	568 0	580.0	12 0	1:20	9 0	Drilled 12 1/4" tricone bit wet from 568' to 580' in Cerro Toledo interval.		580 0
Conduct	02/23/00	Wed	D	42.0	13.15	13.15			0 0	0.00		Conductivity reading at 570'		
Support	02/23/00	Wed	D	42.0	13 25	14 02			0.0	0 37		Goetz offsite - TA 8 for 1812 papers; Driller cont to note that drilling has been harder since 565'		
Support	02/23/00	Wed	D	42.0	14 02	14.18			0.0	0.16		Thick batch of fluid		
Conduct	02/23/00	Wed	D	42.0	14.18	14.18			0 0	0 00		Conductivity reading		
Connect	02/23/00	Wed	D	42 0	14 20	14 30			0 0	0.10		Add new stem drill rod		
Conduct	02/23/00	Wed	D	42 0	14 38	14 38			0 0	0 00		Conductivity readings		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Drill	02/23/00	Wed	D	42.0	14:30	15:30	580.0	600.0	20.0	1:00	20.0	Drilled 12 1/4" tricone bit wet from 580' to 600' in Cerro Toledo Interval		600.0
Connect	02/23/00	Wed	D	42.0	15:30	15:35			0.0	0.05		Add new stem drill rod		
Drill	02/23/00	Wed	D	42.0	15:35	16:45	600.0	612.0	12.0	1:10	10.3	Drilled 12 1/4" tricone bit wet from 600' to 612' in Cerro Toledo Interval.		612.0
Visitors	02/23/00	Wed	D	42.0					0.0			Roy Bohn onsite for waste management oversight.		
Visitors	02/23/00	Wed	D	42.0	16:20	16:20			0.0	0.00		Broxton ,Vanlman onsite to review cuttings - still in Oct?		
Fuel	02/23/00	Wed	D	42.0	17:05	17:05			0.0	0.00		Jackl Eddy onsite to fuel equipment		
Dynatec	02/23/00	Wed	D	42.0	17:05	17:05			0.0	0.00		John Eddy on site for Dynatec		
Conduct	02/23/00	Wed	D	42.0	17:10	17:10			0.0	0.00		Conductivity reading		
Cond	02/23/00	Wed	D	42.0	17:15	17.55			0.0	0:40		End drilling ; remove water from hole		
DTW	02/23/00	Wed	D	42.0	17.55	17.55			0.0	0.00		DTW sounded dry at 612' TOC(interchange)	dry	612.0
Shift	02/23/00	Wed	D	42.0	18.00				0.0			Depart		
									0.0					
Shift	02/23/00	Wed	N	43.0	18.00				0.0			Passdown at FSF		
Shift	02/23/00	Wed	N	43.0		19:25			0.0	19.25		Arrive onsite		
Drill	02/23/00	Wed	N	43.0	19.40	19.55	612.0	615.0	3.0	0:15	12.0	Drilled 12 1/4" tricone bit wet from 612' to 615' in Cerro Toledo Interval.		615.0
Conduct	02/23/00	Wed	N	43.0	19.55				0.0			Conductivity readings		
Equip	02/23/00	Wed	N	43.0	19.55	20:13			0.0	0:18		Rig lost air pressure - crew repair		
Drill	02/23/00	Wed	N	43.0	20:15	20:35	615.0	620.0	5.0	0:20	15.0	Drilled 12 1/4" tricone bit wet from 615' to 620' in Cerro Toledo Interval.		620.0
Connect	02/23/00	Wed	N	43.0	20:35	20:45			0.0	0:10		Add another rod.		
Drill	02/23/00	Wed	N	43.0	20:45	21:35	620.0	640.0	20.0	0.50	24.0	Drilled 12 1/4" tricone bit wet from 620' to 640' in Cerro Toledo Interval.		640.0
Connect	02/23/00	Wed	N	43.0	21:35	21:40			0.0	0.05		Add another rod.		
Drill	02/23/00	Wed	N	43.0	21:40	22.00	640.0	645.0	5.0	0:20	15.0	Drilled 12 1/4" tricone bit wet from 640' to 645' in Cerro Toledo Interval.		645.0
Drill	02/23/00	Wed	N	43.0	22.00	22:35	645.0	660.0	20.0	0.35	34.3	Drilled 12 1/4" tricone bit wet from 645' to 660' in Obo.		660.0
Connect	02/23/00	Wed	N	43.0	22.35	22.40			0.0	0.05		Add another rod.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Drill	02/23/00	Wed	N	43 0	22.40	23.50	660 0	680.0	20.0	1:10	17.1	Drilled 12 1/4" tricone bit wet from 660' to 680' in Qbo.		680.0
DTW	02/24/00	Thu	N	43 0	0 00	0 00			0.0			DTW - water level taken - dry	dry	
Connect	02/24/00	Thu	N	43 0	0 00	0 05			0.0	0 05		Add another rod.		
Drill	02/24/00	Thu	N	43.0	0.05	0.45	680 0	700 0	20 0	0.40	30.0	Drilled 12 1/4" tricone bit wet from 680' to 700' in Qbo.		700 0
Lunch	02/24/00	Thu	N	43 0	0.45	1:20			0.0	0 35		Lunch. Driller to yard for supplies		
Connect	02/24/00	Thu	N	43 0	1:25	1:45			0 0	0 20		Add another rod.		
Drill	02/24/00	Thu	N	43.0	1:45	3.00	700 0	720 0	20.0	1:15	16 0	Drilled 12 1/4" tricone bit wet from 700' to 720' in Qbo.		720 0
Repair	02/24/00	Thu	N	43 0	2.30	3 05			0 0	0 35		Replace seal in jack stand		
Connect	02/24/00	Thu	N	43.0	3 05	3.10			0 0	0 05		Add another rod.		
Drill	02/24/00	Thu	N	43 0	3.10	4 55	720 0	740 0	20.0	1.45	11.4	Drilled 12 1/4" tricone bit wet from 720' to 740' in Qbo.		740 0
Borehole	02/24/00	Thu	N	43 0	4 59	4 59			0.0	0.00		Driller believes water encountered at 738'. Stop drilling Blow out and wait for recharge		
DTW	02/24/00	Thu	N	43 0	5 55	5 55			0 0	0 00		DTW measurement inaccurate due to material in pipe	failed	
H&S	02/24/00	Thu	N	43 0	6.00	6 30			0 0	0.30		Clean up site, housekeeping, for shift change		
Sample	02/24/00	Thu	N	43 0	6:32	6.40			0 0	0 08		GW sample airlifted, 25 gallons in (5) 5 gal DI water jugs		
Shift	02/24/00	Thu	N	43 0	6.45				0 0			Shift change at FSF		
									0.0					
Shift	02/24/00	Thur	D	44 0	6 00	7.30			0 0	1.30		Shift change at FSF		
Equip	02/24/00	Thur	D	44 0	7:30	8 30			0.0	1:00		11" casing delivered to FSF.		
Equip	02/24/00	Thur	D	44 0	8.30	10 30			0 0	2.00		11" casing delivered to R-19.		
Equip	02/24/00	Thur	D	44 0	10 30	13 00			0 0	2.30		Dynatec offloads 11" casing		
Support	02/24/00	Thur	D	44.0	10 30				0 0			Goetz departs to set up Detech kit to run on 6 32 sample; JRM to set up EES-1 screen bottles		
Sample	02/24/00	Thur	D	44 0	10.40				0 0			JRM collected 2 one liter bottles of non filtered 6 32 water		
Support	02/24/00	Thur	D	44 0	10 50				0 0			JRM to FSF with EES-1 water; water too turbid for HE field screening kit		
Fuel	02/24/00	Thur	D	44 0	10 50	12.10			0 0	1:20		Jack Eddy on site to fuel equip		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
DTW	02/24/00	Thur	D	44.0	10.54				0.0			DTW	710.1	740.0
Support	02/24/00	Thur	D	44.0	11:20	12:00			0.0	0:40		Goetz and driller offsite to make calls.		
Sample	02/24/00	Thur	D	44.0	11:30	11:30			0.0	0.00		Roy Bohn informs Goetz that AIP wants 2 one liter glass samples without preservatives.		
Waste	02/24/00	Thur	D	44.0	11:32	11:32			0.0	0.00		Bohn also requests that cuttings from saturated zone be segregated and to pump return water to tanks		
Sample	02/24/00	Thur	D	44.0	11:45				0.0			Delivered unfiltered 6.32 water to Dale Counce, EES-1; picked up more 5" filters for sampling trailer.		
Filter	02/24/00	Thur	D	44.0	13.00				0.0			Began filtering 6.32 water for EES-1, and some to do D TECH HE field analysis.		
Waste	02/24/00	Thur	D	44.0	13.04				0.0			Route return water to tank #1		
Support	02/24/00	Thur	D	44.0	13.04				0.0			PHOTO by Goetz of sampling set up		
Equip	02/24/00	Thur	D	44.0	13.07	13.16			0.0	0.09		Semi truck that delivered casing is stuck - use support vehicle to pull out		
Sample	02/24/00	Thur	D	44.0	13.16	13.33			0.0	0.17		Attempted to airlift sample purge lines, no return.		
Equip	02/24/00	Thur	D	44.0	13.33				0.0			Problems with airlift - checked lines		
Sample	02/24/00	Thur	D	44.0	14:00				0.0			No recovery		
Lunch	02/24/00	Thur	D	44.0	14.00	14:30			0.0	0:30		Lunch		
DTW	02/24/00	Thur	D	44.0	14:30				0.0			DTW during recharge effort to attempt to obtain GW sample.	687.1	740.0
Equip	02/24/00	Thur	D	44.0	15.00				0.0			Offload drill rod using boom truck		
DTW	02/24/00	Thur	D	44.0	15:15				0.0			DTW during recharge effort to attempt to obtain GW sample.	686.7	740.0
DTech	02/24/00	Thur	D	44.0					0.0			D TECH RDX run on filtered water sample - no evidence of RDX although sample runs quickly		
DTW	02/24/00	Thur	D	44.0	15:44				0.0			DTW during recharge effort to attempt to obtain GW sample.	686.7	740.0
DTech	02/24/00	Thur	D	44.0	16:40	16.57			0.0	0:17		D TECH rerun - kit is running under projected reaction times - running very fast - LO% was given at interval approx. 300's and at 288; one sample left		
DTW	02/24/00	Thur	D	44.0	16:43				0.0			DTW during recharge effort to attempt to obtain GW sample.	689.2	740.0

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Sample	02/24/00	Thur	D	44 0	17.15				0 0			Attempted to airlift sample; no return.		
Shift	02/24/00	Thur	D	44 0	17:30				0.0			Depart to FSF		
									0.0					
Shift	02/24/00	Thur	N	45 0	18 00	18.40			0.0	0.40		FSF		
Crew	02/24/00	Thur	N	45 0	18.30	18.40			0.0	0.10		Driller to get badge at home		
Enroute	02/24/00	Thur	N	45 0	18.40	19 00			0.0	0 20		To R-19		
Visitor	02/24/00	Thur	N	45 0	19 00	19 20			0 0	0 20		At R-19.		
Visitor	02/24/00	Thur	N	45 0	19.15	19.40			0 0	0 25		Dave Broxton onsite		
Tailgate	02/24/00	Thur	N	45 0	19 20	19 30			0 0	0.10		Tailgate safety meeting and safety inspections.		
Equip	02/24/00	Thur	N	45 0	19 30	21:10			0 0	1:40		Rig maintenance		
Sample	02/24/00	Thur	N	45 0	19 30	19.40			0 0	0.10		Broxton discusses strategy for collecting water		
Support	02/24/00	Thur	N	45.0	20.20	20.40			0.0	0 20		Goetz offsite to make calls		
DTW	02/24/00	Thur	N	45 0	21:10	21:20			0 0	0.10		DTW	711	740 0
Connect	02/24/00	Thur	N	45 0	21:25	21:40			0.0	0.15		Add another rod.		
Drill	02/24/00	Thur	N	45 0	21:40	22.35	740 0	760.0	20 0	0 55	21.8	Drilled 12 1/4" tricone bit wet from 740' to 760' in Qbo.		760 0
Circ	02/24/00	Thur	N	45 0	22.35	22.40			0 0	0 05		Driller notes that took 15 min of adding air/additives before return		
Connect	02/24/00	Thur	N	45 0	22.40	22.50			0.0	0.10		Add another rod.		
Drill	02/24/00	Thur	N	45 0	22.50	0 00	760.0	780 0	20.0	1:10	17.1	Drilled 12 1/4" tricone bit wet from 760' to 780' in Qbo.		780 0
Connect	02/25/00	Fri	N	45 0	0 00	0 05			0.0	0.05		Add another rod.		
Drill	02/25/00	Fri	N	45 0	0 05	0.40	780 0	800 0	20 0	0 35	34 3	Drilled 12 1/4" tricone bit wet from 780' to 800' in Qbo.		800 0
Lunch	02/25/00	Fri	N	45 0	0.45	1:30			0 0	0.45		Lunch		
Connect	02/25/00	Fri	N	45 0	1:30	1:40			0 0	0:10		Add another rod.		
Drill	02/25/00	Fri	N	45 0	1:40	2 30	800 0	820 0	20.0	0.50	24 0	Drilled 12 1/4" tricone bit wet from 800' to 820' in Qbo.		820 0
Connect	02/25/00	Fri	N	45 0	2.30	2.45			0.0	0:15		Add another rod.		
Conduct	02/25/00	Fri	N	45 0	3 00	3 00			0 0	0 00		Conductivity readings - fluid foamy		
Drill	02/25/00	Fri	N	45 0	2.45	3 00	820 0	830 0	10.0	0.15	40 0	Drilled 12 1/4" tricone bit wet from 820' to 830' in Qbo.		830 0

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Drill	02/25/00	Fri	N	45.0	3.00	3.30	830.0	840.0	10.0	0:30	20.0	Drilled 12 1/4" tricone bit wet from 830' to 840' in Obo Guaje Pumice Bed.		840.0
Conduct	02/25/00	Fri	N	45.0	3.23	3.23			0.0	0.00		Conductivity readings		
Cond	02/25/00	Fri	N	45.0	3.30	3.45			0.0	0:15		Condition hole.		
Connect	02/25/00	Fri	N	45.0	3.45	3.50			0.0	0.05		Add another rod.		
Conduct	02/25/00	Fri	N	45.0		4.00			0.0	4.00		Conductivity readings		
Drill	02/25/00	Fri	N	45.0	3.50	4:40	840.0	842.5	2.5	0.50	3.0	Drilled 12 1/4" tricone bit wet from 840' to 842.5' in Puye Fm fanglomerate.		842.5
Borehole	02/25/00	Fri	N	45.0	4:40	4.40			0.0	0.00		Driller notes drilling is difficult; will blow out hole and set up for day shift to sample		
Blow	02/25/00	Fri	N	45.0	5:10				0.0			Complete blow out of hole		
DTW	02/25/00	Fri	N	45.0	5:40				0.0			DTW - dry; previous activity- had drilled 12 1/4" tricone bit to 842.5' at 4:40 2/25/00	dry	842.5
Shift	02/25/00	Fri	N	45.0	5:45				0.0			Depart site		
Shift	02/25/00	Fri	D	46.0	6:00	6:45			0.0	0.45		FSF		
Enroute	02/25/00	Fri	D	46.0	6:45	7:15			0.0	0.30		To R-19		
Tailgate	02/25/00	Fri	D	46.0	7:15	7:45			0.0	0.30		At R-19; Tailgate; Discuss strategy for day		
DTW	02/25/00	Fri	D	46.0	8.00				0.0			DTW - set up for sampling; previous activity - had drilled 12 1/4" tricone bit to 842.5'at 4:40 2/25/00	799.5	842.5
DTW	02/25/00	Fri	D	46.0	8.55				0.0			DTW - bit 2' off bottom; previous activity -had drilled 12 1/4" tricone bit to 842.5' at 4:40 2/25/00	801.5	842.5
Circ	02/25/00	Fri	D	46.0	9.03				0.0			Turn on air to airlift sample		
Circ	02/25/00	Fri	D	46.0	9.38				0.0			Dripping starts from cyclone		
Sample	02/25/00	Fri	D	46.0	9:46				0.0			No recovery will consider other method		
Rigup	02/25/00	Fri	D	46.0	9.53	10.00			0.0	0.07		Prep to trip out tri-cone open hole system		
Trip out	02/25/00	Fri	D	46.0	10.00	12.30	842.5	0.0	840.0	2.30	336.0	Tripped out 12 1/4" tricone bit on 7" dual wall rods from 842.5' to surface		842.5
Crew	02/25/00	Fri	D	46.0	13.17				0.0			Escorts, JRM, drill crew onsite		
Prep	02/25/00	Fri	D	46.0	13.19				0.0			Prep to obtain DTW with rods removed.		
DTW	02/25/00	Fri	D	46.0	13.25				0.0			DTW failed - probe wires shorting out	failed	842.5
Equip	02/25/00	Fri	D	46.0	13.30				0.0			Repair probe		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Support	02/25/00	Fri	D	46.0	13 42				0 0			JRM offsite		
Sample	02/25/00	Fri	D	46 0	15:45				0 0			Trueblood and Sena onsite. Collect 500 mL of drilling fluid for Longmire		
Trip In	02/25/00	Fri	D	46 0	15.45	17:45	0.0	840 0	840.0	2.00	420.0	Tripped in 12 1/4" tricone bit on 7" dual wall rods from surface to 840'.		842 5
Visitors	02/25/00	Fri	D	46 0	16.00				0.0			Sena, Broxton, Longmire, Vaniman offsite		
Shift	02/25/00	Fri	D	46 0	17.45				0 0			Depart to FSF		
									0.0					
Shift	02/25/00	Fri	N	47.0	18.00				0.0			Shift change		
Tailgate	02/25/00	Fri	N	47.0	18 30	18.40			0 0	0.10		Arrive at R-19, Tailgate		
Drill	02/25/00	Fri	N	47.0	18.45	20.50	840 0	848 0	8 0	2.05	3 8	Drilled 12 1/4" tricone bit wet from 840' to 848' in Puye Fm fanglomerate.		848 0
Circ	02/25/00	Fri	N	47.0	20.50	20.50			0 0	0:00		Problems getting return water		
Water	02/25/00	Fri	N	47.0	20.15	21:15			0.0	1:00		Helper off site for load of water		
Drill	02/25/00	Fri	N	47.0	21:15	23 55	848 0	855 0	7.0	2.40	2.6	Drilled 12 1/4" tricone bit wet from 848' to 855' in Puye Fm fanglomerate.		855 0
Pull	02/25/00	Fri	N	47.0	23 55	0.00	855 0	840 0	15.0	0.05	180 0	Remove one rod.		
Shift	02/25/00	Fri	N	47.0	0.00				0.0			Depart - next shift Sun. AM		
Dynatec	02/26/00	Sat	D						0.0	.		Dynatec safety training day		
Shift	02/27/00	Sun	D	48 0	6.00	6:30			0.0	0.30		FSF		
Enroute	02/27/00	Sun	D	48 0	6:30	7:15			0.0	0.45		Enroute		
Tailgate	02/27/00	Sun	D	48 0	7.15	7:30			0 0	0.15		Arrive at R-19, tailgate & safety inspections.		
Fuel	02/27/00	Sun	D	48 0	7:15	8.10			0 0	0.55		Jack Eddy fuels equip		
Repair	02/27/00	Sun	D	48 0	7:30	8.10			0.0	0.40		Repair to rig		
Support	02/27/00	Sun	D	48.0	7:30				0 0			PHOTOS by Goetz of rig head for Eddy		
H&S	02/27/00	Sun	D	48 0	7:45				0 0			Radio check to LA Fire Department		
Equip	02/27/00	Sun	D	48 0	8.10	9.10			0 0	1:00		Return to FSF for part		
Equip	02/27/00	Sun	D	48.0	9.10	9 35			0.0	0 25		Return to R-19, Repair to lower head		
DTW	02/27/00	Sun	D	48 0	9 35	9.48			0 0	0.13		DTW; previous activity- had backed out rod from 855 to 840 at 23 55 on 2/25/00.	826.32	855 0
Circ	02/27/00	Sun	D	48 0	9 50	13 00			0 0	3.10		Resume drilling; problems getting return water		
Lunch	02/27/00	Sun	D	48 0	13 00	13 30			0 0	0.30		Lunch - has just begun to regain circ.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Dynatec	02/27/00	Sun	D	48.0	13.30	14:15			0.0	0.45		Eddys onsite		
Visitor	02/27/00	Sun	D	48.0	13.30	14:10			0.0	0:40		Broxton onsite		
Circ	02/27/00	Sun	D	48.0	13.30	13.50			0.0	0.20		Regain circ		
Drill	02/27/00	Sun	D	48.0	13.50	17:45	855.0	860.0	5.0	3.55	1.3	Drilled 12 1/4" tricone bit wet from 855' to 860' in Puye Fm fanglomerate.		860.0
Conduct	02/27/00	Sun	D	48.0	15:30				0.0			Conductivity reading-frag of red clay noted by driller(<1g)		
Equip	02/27/00	Sun	D	48.0	17:25				0.0			Seals going out		
Borehole	02/27/00	Sun	D	48.0	17:35				0.0			Site secured - driller noted the last material @ 860' was easier drilling - chips appeared the same		
Shift	02/27/00	Sun	D	48.0	17:40				0.0			Depart site - drillers will inform night shift of several Repair needed		
Shift	02/27/00	Sun	N	49.0	18.00				0.0			At FSF		
Tailgate	02/27/00	Sun	N	49.0	19.00	19:15			0.0	0.15		Arrive at R-19; Tailgate		
Water	02/27/00	Sun	N	49.0	19.15	20.05			0.0	0.50		Water truck offsite		
Cond	02/27/00	Sun	N	49.0	19:15	19:45			0.0	0.30		Conditioning hole; site cleanup		
Connect	02/27/00	Sun	N	49.0	19.50	19.55			0.0	0.05		Add another rod.		
Drill	02/27/00	Sun	N	49.0	19.55	21:45	860.0	865.0	5.0	1:50	2.7	Drilled 12 1/4" tricone bit wet from 860' to 865' in Puye Fm fanglomerate.		865.0
Repair	02/27/00	Sun	N	49.0	21:50	22.50			0.0	1:00		Repair seals; cont drilling - no progress		
Lunch	02/27/00	Sun	N	49.0	23.50	0.00			0.0	0:10		Lunch		
Lunch	02/28/00	Mon	N	49.0	0.00	0.20			0.0	0.20		Lunch		
Drill	02/28/00	Mon	N	49.0	0:25	1:50	865.0	865.0	0.0	1:25		Drilled 12 1/4" tricone bit wet from 865' to 865' in Puye Fm fanglomerate.		
Trip out	02/28/00	Mon	N	49.0	2.00	3:20	865.0	430.0	435.0	1:20	326.3	Tripping out open borehole tricone bit system.		865.0
Break	02/28/00	Mon	N	49.0	3:20	3:30			0.0	0:10		Break		
Trip out	02/28/00	Mon	N	49.0	3:30	4.50	430.0	0.0	430.0	1:20	322.5	Tripping out open borehole tricone bit system.		865.0
Equip	02/28/00	Mon	N	49.0	4.50	4:55			0.0	0.05		Inspect bit - odd wear pattern - cones not moving		
Dynatec	02/28/00	Mon	N	49.0	4.55	5:20			0.0	0.25		Driller calls John Eddy		
Dynatec	02/28/00	Mon	N	49.0	5:20				0.0			Eddy states to pull bit and bring to FSF		
Equip	02/28/00	Mon	N	49.0	5:20	5:45			0.0	0.25		Pull bit; site cleanup		
Shift	02/28/00	Mon	N	49.0	6:00				0.0			Offsite to FSF		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	02/28/00	Mon	D	50 0	6.00	7.15			0 0	1:15		At FSF - repair equip; get new bit - tricone with inner open hole return		
Enroute	02/28/00	Mon	D	50 0	7.15	7.45			0 0	0:30		To R-19		
Tailgate	02/28/00	Mon	D	50 0	7:45	7.55			0.0	0.10		At R-19, tailgate; discuss strategy for day		
Equip	02/28/00	Mon	D	50 0	7.55	8 00			0.0	0.05		Warm equip; replace bit		
Trip In	02/28/00	Mon	D	50.0	8 30	10.35	0 0	865 0	865.0	2.05	415 2	Trip in open borehole tricone bit system.		865.0
Crew	02/28/00	Mon	D	50 0	9.35	10 20			0.0	0.45		Driller's helper offsite with boom truck to help Crowder		
Fuel	02/28/00	Mon	D	50.0	10 05	11:30			0 0	1:25		Jackl Eddy onsite to fuel equip		
Cond	02/28/00	Mon	D	50.0	10.35	12:25			0 0	1:50		Regain circ; ream borehole		
Lunch	02/28/00	Mon	D	50 0	12 25	13 00			0 0	0 35		Lunch		
Stuck	02/28/00	Mon	D	50.0	13.05	16 00			0.0	2.55		Resume drilling - difficult - stuck twice then freed		865.0
Conduct	02/28/00	Mon	D	50.0		13.15			0 0	13.15		Conductivity readings		
Drill	02/28/00	Mon	D	50 0	16 00	16:45	865.0	875 0	10 0	0.45	13 3	Drilled 12 1/4" tricone bit wet from 865' to 875' in Puye Fm fanglomerate.		875.0
Fuel	02/28/00	Mon	D	50.0	16.45	17:15			0.0	0.30		Refuel		
Support	02/28/00	Mon	D	50 0	17:15				0 0			Secure site		
Shift	02/28/00	Mon	D	50.0	17.30				0.0			Depart site		
Shift	02/28/00	Mon	N	51.0	18 20				0.0			Night shift arrives at R-19		
Weather	02/28/00	Mon	N	51.0	18.43				0.0			Weather is cold, windy, some snow		
Drill	02/28/00	Mon	N	51.0	18 50	19:15	875.0	880 0	5 0	0 25	12.0	Drilled 12 1/4" tricone bit wet from 875' to 880' in Puye Fm fanglomerate.		880.0
Connect	02/28/00	Mon	N	51.0	19.15	19 20			0 0	0 05		Add another rod.		
Drill	02/28/00	Mon	N	51.0	19 20	20.45	880 0	900 0	20.0	1:25	14.1	Drilled 12 1/4" tricone bit wet from 880' to 900' in Puye Fm fanglomerate.		900 0
DTW	02/28/00	Mon	N	51.0	20.40	20.45			0.0	0.05		DTW is dry; previous activity had drilled 12 1/4" tricone bit to 900' at 20.45 2/28/00	dry	
Connect	02/28/00	Mon	N	51.0	20.45	20.50			0.0	0 05		Add another rod.		
Drill	02/28/00	Mon	N	51.0	20 50	21:30	900.0	920 0	20 0	0.40	30.0	Drilled 12 1/4" tricone bit wet from 900' to 920' in Puye Fm fanglomerate.		920 0
Vol	02/28/00	Mon	N	51.0	21:05				0 0			Used 1200 gals oil water and 7gal EZ-MUD		
Connect	02/28/00	Mon	N	51.0	21:30	21:40			0 0	0:10		Add another rod.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Borehole	02/28/00	Mon	N	51.0	22:30	23:30			0.0	1.00		Driller notes that we may have hit water - letting hole settle - Clay fines noted in the last 6" of the cuttings - Hole is caving in		
Borehole	02/28/00	Mon	N	51.0	23:30				0.0			Large amount of clay frags seen in cuttings @ 920'; possibly encountered at 900';		
Lunch	02/28/00	Mon	N	51.0	23:30	0:00			0.0	0:30		Lunch		
Trip out	02/29/00	Tue	N	51.0	0:00	1:30	920.0	460.0	460.0	1:30	306.7	Tripping out open borehole tricone system to unplug rods		920.0
Break	02/29/00	Tue	N	51.0	1:30	1:50			0.0	0:20		Break		
Trip in	02/29/00	Tue	N	51.0	1:50	3:15	460.0	920.0	460.0	1:25	324.7	Trip in rod, circ fluid		920.0
Circ	02/29/00	Tue	N	51.0	3:15				0.0			Have not regained circ; will cont drilling		
Drill	02/29/00	Tue	N	51.0	3:15	4:30	920.0	920.0	0.0	1:15		Drilled 12 1/4" tricone bit wet from 920' to 920' in Puye Fm fanglomerate.		920.0
Drill	02/29/00	Tue	N	51.0	4:30	5:30	920.0	925.0	5.0	1:00	5.0	Drilled 12 1/4" tricone bit wet from 920' to 925' in Puye Fm fanglomerate; no return.		925.0
Circ	02/29/00	Tue	N	51.0	5:30				0.0			No return - clay is plugging rods		
H&S	02/29/00	Tue	N	51.0	5:50	6:00			0.0	0:10		Site cleanup , housekeeping		
Shift	02/29/00	Tue	N	51.0	6:00				0.0			Depart		
									0.0					
Shift	02/29/00	Tues	D	52.0	6:00	6:45			0.0	0:45		FSF.		
Enroute	02/29/00	Tues	D	52.0	6:45	7:25			0.0	0:40		Enroute		
Tailgate	02/29/00	Tues	D	52.0	7:25	8:00			0.0	0:35		Tailgate - covered EZ-MUD and QUIK-FOAM MSDSs		
Trip out	02/29/00	Tues	D	52.0	8:00	9:15	870.0	320.0	550.0	1:15	440.0	Tripped out to clear rods.		
Fuel	02/29/00	Tues	D	52.0	9:15	11:00			0.0	1:45		Jack Eddy onsite to fuel equip		
Trip out	02/29/00	Tues	D	52.0	11:00	12:45			0.0	1:45		Tripped out to clear rods.		
Lunch	02/29/00	Tues	D	52.0	12:45	13:15			0.0	0:30		Lunch		
Trip out	02/29/00	Tues	D	52.0	13:15	14:40	320.0	0.0	320.0	1:25	225.9	Cont tripping out -		
Visitors	02/29/00	Tues	D	52.0	14:15	14:40			0.0	0:25		Roy Bohn and Bill Stone onsite		
Support	02/29/00	Tues	D	52.0	14:40	14:45			0.0	0:05		Photo by Goetz of clogged stabilizer		
Equip	02/29/00	Tues	D	52.0	14:40	15:40			0.0	1:00		Clear stabilizer		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
DTW	02/29/00	Tues	D	52 0	15.40	15:45			0 0	0.05		DTW open hole; previous activity - had tripped out 12 1/4" tricone bit on 7" dual wall rods from 920' to surface at 14.40 2/29/00.	824 5'	925 0
DTW	02/29/00	Tues	D	52.0	16 33	16.43			0 0	0.04		DTW open hole; previous activity - had tripped out 12 1/4" tricone bit on 7" dual wall rods from 920' to surface at 14:40 2/29/00.	825.7'	925 0
Prep	02/29/00	Tues	D	52 0	16.40	17:04			0 0	0 24		Set up to bail sample - decon bailer w/DI water		
Support	02/29/00	Tues	D	52 0	16.40	17:00			0 0	0 20		Decon bailer w/DI water		
Bail	02/29/00	Tues	D	52.0	17.04	17:20			0 0	0.16		Begin bailing - purge 1 bailer		
Sample	02/29/00	Tues	D	52 0	17:20	18 00			0 0	0.40		Begin sampling - note last fluids added at 5:30 AM today		
Shift	02/29/00	Tues	N	53.0	18 00	18:20			0 0	0 20		Night shift arrives to take over bailing - larger bailer 3 5" will now be used		
Tailgate	02/29/00	Tues	N	53.0	18.30	18.40			0.0	0.10		Tailgate and safety inspections.		
Rigup	02/29/00	Tues	N	53.0	18 40				0 0			Set up 3 5" bailer		
Sample	02/29/00	Tues	N	53 0	19.14	19.53			0 0	0 39		Bailed 30 gallons of water; end at 19 53 2/29/00		925 0
Sample	02/29/00	Tues	N	53 0	19 53				0 0			End sampling - 30 gals collected		
DTW	02/29/00	Tues	N	53.0					0 0			DTW; bailed 30 gallons of water; 19 53 2/29/00	832 2	925 0
Break	02/29/00	Tues	N	53 0	20.10	20 50			0 0	0.40		Break		
Support	02/29/00	Tues	N	53 0	20.30				0.0			Trueblood onsite		
DTW	02/29/00	Tues	N	53 0	20 50				0 0			DTW; previous activity- bailed 30 gallons of water at 19.53 2/29/00	832.85	925.0
Support	02/29/00	Tues	N	53 0	20.50				0.0			Crew cont maintenance; Goetz and Sena offsite		
Trip In	02/29/00	Tues	N	53 0	21:30	0 00	0 0	600.0	600 0	2.30	240 0	Tripped in open borehole tricone system.		925 0
Lunch	03/01/00	Wed	N	53 0	0 00	1:30	600 0	925 0	320.0	1:30	213 3	Tripped in open borehole tricone system.		925 0
Lunch	03/01/00	Wed	N	53 0 .	1:00	1.30			0 0	0 30		Lunch		
Drill	03/01/00	Wed	N	53 0	1:35	5:20	925 0	940 0	15 0	3.45	4 0	Drilled 12 1/4" tricone bit wet from 925' to 940' in Cerros del Rio Basalt.		940 0
Equip	03/01/00	Wed	N	53 0	3 20	3 35			0 0	0.15		Blew jack stand		
Water	03/01/00	Wed	N	53 0	4 00	5:00			0 0	1:00		Water truck refilled		
Drill	03/01/00	Wed	N	53 0	5:20	6 00	940 0	945 0	5 0	0.40	7.5	Drilled 12 1/4" tricone bit wet from 940' to 945' in Cerros del Rio Basalt.		945 0
Site	03/01/00	Wed	N	53 0	6 00	6:15			0.0	0:15		Site cleanup - depart		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Shift	03/01/00	Wed	D	54.0	6.00	7.30			0.0	1:30		Day crew at FSF - problems with access control, barricades and lack of escorts		
Enroute	03/01/00	Wed	D	54.0	7.30	8.00			0.0	0.30		Enroute		
Tailgate	03/01/00	Wed	D	54.0	8.00	8.05			0.0	0.05		Tailgate and safety inspections.		
Equip	03/01/00	Wed	D	54.0	8.05	8.15			0.0	0:10		Warm equip		
DTW	03/01/00	Wed	D	54.0	8.15				0.0			DTW measured; previous activity drilled 12 1/4" tricone bit to 945' at 6.00 3/1/00	828.88	945.0
Drill	03/01/00	Wed	D	54.0	8.30	10.30	945.0	960.0	15.0	2.00	7.5	Drilled 12 1/4" tricone bit wet from 945' to 960' in Cerros del Rio Basalt.		960.0
Connect	03/01/00	Wed	D	51.0	10.30	10.40			0.0	0.10		Add another rod.		
Drill	03/01/00	Wed	D	54.0	10:40	12.30	960.0	970.0	10.0	1.50	5.5	Drilled 12 1/4" tricone bit wet from 960' to 970' in Cerros del Rio Basalt.		970.0
Lunch	03/01/00	Wed	D	54.0	12.30	13.00			0.0	0:30		Lunch		
Drill	03/01/00	Wed	D	54.0	13.00	14.45	970.0	980.0	10.0	1:45	5.7	Drilled 12 1/4" tricone bit wet from 970' to 980' in Cerros del Rio Basalt.		980.0
Borehole	03/01/00	Wed	D	54.0	13.00	17.45			0.0	4.45		Drilling- driller notes approx 2" clay seam at 951' and used less drilling fluids following encountering this clay		
Connect	03/01/00	Wed	D	51.0	14:45	15.00			0.0	0:15		Add another rod.		
Drill	03/01/00	Wed	D	54.0	15:00	17:45	980.0	995.0	15.0	2:45	5.5	Drilled 12 1/4" tricone bit wet from 980' to 995' in Cerros del Rio Basalt.		995.0
Vol	03/01/00	Wed	D	54.0	17:45				0.0			Fluid used is EZ-MUD and QUIK-FOAM - approx 1000gals used on shift		
Shift	03/01/00	Wed	D	54.0	17.45				0.0			Depart to FSF		
Shift	03/01/00	Wed	N	55.0	18.00	18.30			0.0	0.30		Night shift FSF & enroute to site		
Tailgate	03/01/00	Wed	N	55.0	18.30	18.50			0.0	0.20		Tailgate		
Drill	03/01/00	Wed	N	55.0	18.50	20.00	995.0	1000.0	5.0	1:10	4.3	Drilled 12 1/4" tricone bit wet from 995' to 1000' in Cerros del Rio Basalt.		1000.0
DTW	03/01/00	Wed	N	55.0	20:15	20.20			0.0	0.05		DTW; previous activity drilled 12 1/4" tricone bit to 1000' at 20.00 3/1/00	977.9	
Connect	03/01/00	Wed	N	51.0	20:20	20:25			0.0	0.05		Add another rod.		
Drill	03/01/00	Wed	N	55.0	20:25	21:00	1000.0	1020.0	20.0	0.35	34.3	Drilled 12 1/4" tricone bit wet from 1000' to 1020' in Cerros del Rio Basalt.		1020.0
Borehole	03/01/00	Wed	N	55.0	20.44	20:44			0.0	0.00		Clay - drilling became soft at 1002'		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Borehole	03/01/00	Wed	N	55 0	20.53	20.53			0.0	0.00		Vesicular basalt at 1007'.		
Connect	03/01/00	Wed	N	51.0	21:45	21.50			0 0	0.05		Add another rod.		
Drill	03/01/00	Wed	N	55 0	21.50	22.55	1020 0	1040.0	20.0	1.05	18 5	Drilled 12 1/4" tricone bit wet from 1020' to 1040' in Cerros del Rio Basalt.		1040 0
Connect	03/01/00	Wed	N	51.0	22.55	23 05			0.0	0.10		Add another rod.		
Drill	03/01/00	Wed	N	55 0	23.05	0 00	1040 0	1045 0	5.0	0.55	5 5	Drilled 12 1/4" tricone bit wet from 1040' to 1045' in Cerros del Rio Basalt.		1045 0
Drill	03/02/00	Thu	N	55 0	0.00	0.40	1045.0	1050 0	5 0	0.40	7.5	Drilled 12 1/4" tricone bit wet from 1045' to 1050' in Cerros del Rio Basalt.		1050 0
Lunch	03/02/00	Thu	N	55.0	0.40	1:20			0 0	0.40		Lunch		
Drill	03/02/00	Thu	N	55 0	1:20	2.00	1050 0	1060 0	10 0	0.40	15 0	Drilled 12 1/4" tricone bit wet from 1050' to 1060' in Cerros del Rio Basalt.		1060 0
Repair	03/02/00	Thu	N	55 0	2.00	2 35			0 0	0.35		Crew replace seals at dust head		
Connect	03/02/00	Thu	N	51.0	2.35	2.45			0.0	0.10		Add another rod.		
Drill	03/02/00	Thu	N	55.0	2.45	5 00	1060 0	1075 0	15 0	2.15	6.7	Drilled 12 1/4" tricone bit wet from 1060' to 1075' in Cerros del Rio Basalt.		1075 0
Drill	03/02/00	Thu	N	55 0	5:00	5 45	1075 0	1080 0	5.0	0.45	6 7	Drilled 12 1/4" tricone bit wet from 1075' to 1080' in Puye Fm fanglomerate.		1080 0
Cond	03/02/00	Thu	N	55 0	5:50	6.00			0.0	0.10		Cond hole and site clean up		
Vol	03/02/00	Thu	N	55 0	6:15				0.0			Approx 4000 gals of drilling fluid used - Trueblood estimates 1375 gals collected at return		
Shift	03/02/00	Thu	N	55 0	6.15				0 0			Depart to FSF		
Shift	03/02/00	Thurs	D	56.0	6.00	6:15			0.0	0.15		Day shift at FSF.		
Water	03/02/00	Thurs	D	56 0	6:15	7:00			0 0	0.45		Fill water truck		
Enroute	03/02/00	Thurs	D	56 0	7.00	7.30			0 0	0 30		Enroute		
Tailgate	03/02/00	Thurs	D	56 0	7.30	8 00			0.0	0 30		Tailgate and safety inspections.		
Rigup	03/02/00	Thurs	D	56 0	8 00	8.10			0 0	0.10		set up for DTW		
DTW	03/02/00	Thurs	D	56 0	8.10	8.15			0.0	0 05		DTW, previous activity drilled 12 1/4" tricone bit to 1080' at 5:45 3/2/00	834 76	1080 0
Repair	03/02/00	Thurs	D	56 0	8.10	8.49			0.0	0 33		Repair-		
Borehole	03/02/00	Thurs	D	56 0	8.10	8.10			0 0	0 00		Driller notes will add more foam to mix per Eddy's advice - approx 1 cup + 3 qts EZ-MUD to 200 gals		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Support	03/02/00	Thurs	D	56.0	8.49	9.15			0.0	0.26		Helper offsite to FSF.		
Support	03/02/00	Thurs	D	56.0	8.49	8.49			0.0	0.00		Cond readings on last night's batch		
Connect	03/02/00	Thurs	D	56.0	9.15	9.20			0.0	0.05		Add another rod.		
Drill	03/02/00	Thurs	D	56.0	9.20	11:39	1080.0	1085.0	5.0	2:19	2.2	Drilled 12 1/4" tricone bit wet from 1080' to 1085' in Puye Fm fanglomerate.		1085.0
Conduct	03/02/00	Thurs	D	56.0	9.22	9.22			0.0	0.00		Cond reading on return		
Conduct	03/02/00	Thurs	D	56.0	9.46	9.46			0.0	0.00		Cond reading on third batch		
Mud	03/02/00	Thurs	D	56.0	10:13	10:13			0.0	0.00		Very foamy - can't get return reading		
Borehole	03/02/00	Thurs	D	56.0	10.13	10.13			0.0	0.00		Material at 1080 fine to coarse grain lt. brown; fines		
Dynatec	03/02/00	Thurs	D	56.0	10.50	10.50			0.0	0.00		Foam out of control - Eddy states to cut in half QUIK-FOAM		
Drill	03/02/00	Thurs	D	56.0	11:39	12.45	1085.0	1095.0	10.0	1:06	9.1	Drilled 12 1/4" tricone bit wet from 1085' to 1095' in Puye Fm fanglomerate.		1095.0
Conduct	03/02/00	Thurs	D	56.0	11:39	12.45			0.0	1:06		Cond readings		
Borehole	03/02/00	Thurs	D	56.0	12.09	12.09			0.0	0.00		Reddish brown - 1089'		
Borehole	03/02/00	Thurs	D	56.0	12:35	12:35			0.0	0.00		Driller suspects clay at 1095		
Lunch	03/02/00	Thurs	D	56.0	12.45	13.15			0.0	0:30		Lunch		
Rigup	03/02/00	Thurs	D	56.0	13:15	13:30			0.0	0:15		Set up		
Drill	03/02/00	Thurs	D	56.0	13:30	14:30	1095.0	1100.0	5.0	1:00	5.0	Drilled 12 1/4" tricone bit wet from 1095' to 1100' in Puye Fm fanglomerate.		1100.0
Connect	03/02/00	Thurs	D	56.0	14:30	14.35			0.0	0.05		Add another rod.		
Drill	03/02/00	Thurs	D	56.0	14:35	17:30	1100.0	1115.0	15.0	2.55	5.1	Drilled 12 1/4" tricone bit wet from 1100' to 1115' in Puye Fm fanglomerate.		1115.0
Conduct	03/02/00	Thurs	D	56.0	13.58	13.58			0.0	0.00		Cond readings - return; sample from 1095 - 1100' show fines with fine to granular size lithics-angular to subrounded		
Fuel	03/02/00	Thurs	D	56.0	14:00	16:30			0.0	2:30		Jackl Eddy onsite to fuel equip		
Borehole	03/02/00	Thurs	D	56.0	14:20				0.0			Driller notes more difficult drilling at 1101'		
Dynatec	03/02/00	Thurs	D	56.0	15:40	16:30			0.0	0.50		John Eddy and additional crew onsite to deliver trailer and supervise		
Support	03/02/00	Thurs	D	56.0	16:30				0.0			Eddys and crew escorted out by Goetz		
Vol	03/02/00	Thurs	D	56.0	17:30				0.0			2250 gal. fluid used		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Site	03/02/00	Thurs	D	56 0	17:30	17.45			0 0	0.15		Secure site		
Shift	03/02/00	Thurs	D	56 0	17:45	18 00			0.0	0:15		Enroute to FSF		
Shift	03/02/00	Thurs	N	57.0	18 00	18.15			0.0	0.15		FSF		
Equip	03/02/00	Thurs	N	57.0	18:20	18 40			0.0	0 20		Tailgate and safety inspections.		
Equip	03/02/00	Thurs	N	57.0	18.20	22.30			0 0	4:10		Crew at R-19, conducts maintenance		
Support	03/02/00	Thurs	N	57.0	21:30				0 0			Trueblood onsite as field support.		
Drill	03/02/00	Thurs	N	57.0	22:30	23.20	1115.0	1120.0	5 0	0.50	6 0	Drilled 12 1/4" tricone bit wet from 1115' to 1120' in Puye Fm fanglomerate.		1120 0
Connect	03/02/00	Thurs	N	56 0	23 20	23 30			0 0	0.10		Add another rod.		
Drill	03/02/00	Thurs	N	57.0	23 30	23.45	1120 0	1123.0	3 0	0.15	12 0	Drilled 12 1/4" tricone bit wet from 1120' to 1123' in Puye Fm fanglomerate.		1123 0
Water	03/02/00	Thurs	N	57.0	23.45	0 00			0 0			All depart with escort to fill water truck		
Lunch	03/03/00	Fri	N	57.0	0.00	0.30			0 0	0 30		Lunch		
Drill	03/03/00	Fri	N	57.0	0.30	1.50	1123 0	1140 0	17.0	1:20	12.8	Drilled 12 1/4" tricone bit wet from 1123' to 1140' in Puye Fm fanglomerate.		1140 0
Connect	03/03/00	Fri	N	57.0	1.50	1.55			0 0	0 05		Add another rod.		
Drill	03/03/00	Fri	N	57.0	1.55	4.15	1140 0	1159.0	19 0	2 20	8.1	Drilled 12 1/4" tricone bit wet from 1140' to 1159' in Puye Fm fanglomerate.		1159 0
Borehole	03/03/00	Fri	N	57.0	4.15	4.55			0 0	0.40		Possible groundwater at 1156' - set up to sample- estimated flow is 5 gals/min		
Sample	03/03/00	Fri	N	57.0	4 55	5 05			0 0	0.10		Sample 30 gals of water; circ was stopped, waited for 5 min. then circ to airlift sample; pH =6 5		
Equip	03/03/00	Fri	N	57.0	5:10	6:15			0 0	1.05		Repair		
Vol	03/03/00	Fri	N	57.0	6.15				0 0			total fluids added for shift approx. 2000gals		
Shift	03/03/00	Fri	N	57.0	6:15				0 0			Depart to FSF		
									0 0					
Shift	03/03/00	Fri	D	58 0	6.00	6.45			0 0	0.45		Day shift at FSF		
Enroute	03/03/00	Fri	D	58 0	6:45	7.00			0.0	0.15		To R-19.		
Tailgate	03/03/00	Fri	D	58 0	7.00	7.30			0 0	0 30		Tailgate - covered 10w40 motor oil MSDS		
Support	03/03/00	Fri	D	58 0	7.30	8 30			0 0	1.00		Goetz takes samples to sample trailer		
DTW	03/03/00	Fri	D	58 0	7.45	7.50			0 0	0 05		DTW; previous activity - drilled 12 1/4" tricone bit to 1159', 4.15 3/3/00	832 65	

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Repair	03/03/00	Fri	D	58 0	7:30	8 30			0.0	1.00		Crew makes Repair / maintenance to rig		
Drill	03/03/00	Fri	D	58 0	8.30	9.00	1159 0	1160.0	1.0	0 30	2.0	Drilled 12 1/4" tricone bit wet from 1159' to 1160' in Puye Fm fanglomerate.		1160 0
Borehole	03/03/00	Fri	D	58 0	8.54	8 54			0 0	0 00		Driller notes he is adding fluids to hole at same rate as yesterday- suspects water was a minor perched zone		
Support	03/03/00	Fri	D	58 0	10.20	14.15			0.0	3 55		Rich Koch onsite		
Borehole	03/03/00	Fri	D	58 0	10 50	10.50			0 0	0 00		Drilling has proceed very slow - driller suspects he is losing the hole to cave-in		
Visitor	03/03/00	Fri	D	58 0	11:05	13 00			0 0	1.55		Dave Broxton onsite		
Connect	03/03/00	Fri	D	56 0	11:05	11:10			0 0	0.05		Add another rod.		
Trip out	03/03/00	Fri	D	58 0	11:10	12.15	1160 0	1100 0	60 0	1:05	55.4	Tripped out open borehole tricone system from 1160'-1100'.		1160 0
Lunch	03/03/00	Fri	D	58 0	12.15	12.45			0 0	0.30		Lunch		
Dynatec	03/03/00	Fri	D	58 0	12.45	12.45			0 0	0 00		Call John Eddy for guidance.		
Trip out	03/03/00	Fri	D	58 0	12.45	14:00	1100 0	820 0	280 0	1:15	224 0	Tripped out open borehole tricone system from 1100' - 820'.		1160 0
Borehole	03/03/00	Fri	D	58 0	14:05	14 05			0 0	0.00		Driller suspects area where groundwater was sampled on 02/29/00 is caving-in		
Trip In	03/03/00	Fri	D	58.0	14:15	14 45	820 0	1160.0	340 0	0.30	680.0	Trip in and clean hole		1160 0
Drill	03/03/00	Fri	D	58.0	14:45	16 00	1160 0	1180 0	20.0	1:15	16 0	Drilled 12 1/4" tricone bit wet from 1160' to 1180' in Puye Fm fanglomerate.		1180 0
Connect	03/03/00	Fri	D	58 0	16 00	16.05			0 0	0.05		Add another rod.		
Drill	03/03/00	Fri	D	58 0	16:05	17:45	1180.0	1190 0	10.0	1:40	6.0	Drilled 12 1/4" tricone bit wet from 1180' to 1190' in Puye Fm fanglomerate.		1190.0
Borehole	03/03/00	Fri	D	58 0	15:00	15 00			0 0	0.00		Driller notes hole appears open and is not caving		
Dynatec	03/03/00	Fri	D	58.0	15:05	15 05			0.0	0.00		Larry Thoren onsite		
Borehole	03/03/00	Fri	D	58.0	15:15	15:15			0 0	0.00		Thoren states Puye drills rough and could be on boulder - advancing borehole		
Conduct	03/03/00	Fri	D	58 0	16 00	16 00			0 0	0.00		Conductivity readings		
Drill	03/03/00	Fri	D	58.0	17:45	17.50	1190 0	1190 5	0 5	0.05	6 0	Drilled 12 1/4" tricone bit wet from 1190' to 1190 5' in Puye Fm fanglomerate.		1190 5
Vol	03/03/00	Fri	D	58.0	17.50	17.50			0.0	0.00		Driller estimates approx.1700 - 1800 gals of fluid added to hole		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Support	03/03/00	Fri	D	58.0	17.50	17.50			0.0	0.00		Secure site; driller departs with water truck		
Shift	03/03/00	Fri	D	58.0	18.10	18.10			0.0	0.00		Remaining crew departs		
									0.0					
Shift	03/03/00	Fri	N	59.0	18.00	18.30			0.0	0.30		At FSF.		
Enroute	03/03/00	Fri	N	59.0	18.30	18.50			0.0	0.20		To R-19.		
Tailgate	03/03/00	Fri	N	59.0	18.50	19.00			0.0	0.10		Tailgate and safety insp.		
DTW	03/03/00	Fri	N	59.0	18.50	18.50			0.0	0.00		DTW=897.8'.		
DTW	03/03/00	Fri	N	59.0	18.55	18.55			0.0	0.00		DTW; previous activity -drilled 12 1/4" tricone bit to 1190.5', 17.50 3/3/00	897.80	1190.5
Rigup	03/03/00	Fri	N	59.0	19.00	21.55			0.0	2.55		Crew rigging for drilling Corey and Danny offsite for more drill rod Goetz offsite.		
Drill	03/03/00	Fri	N	59.0	19.15	20.35	1190.5	1200.0	9.5	1.20	7.1	Drilled 12 1/4" tricone bit wet from 1190.5' to 1200' in Puye Fm fanglomerate.		1200.0
Connect	03/03/00	Fri	N	59.0	20.35	20.40			0.0	0.05		Add another rod.		
Drill	03/03/00	Fri	N	59.0	20.40	21.40	1200.0	1220.0	20.0	1.00	20.0	Drilled 12 1/4" tricone bit wet from 1200' to 1220' in Puye Fm fanglomerate.		1220.0
Connect	03/03/00	Fri	N	59.0	21.40	22.00			0.0	0.20		Add another rod		
Drill	03/03/00	Fri	N	59.0	22.00	23.15	1220.0	1240.0	20.0	1.15	16.0	Drilled 12 1/4" tricone bit wet from 1220' to 1240' in Puye Fm fanglomerate.		1240.0
Connect	03/03/00	Fri	N	59.0	23.15	23.20			0.0	0.05		Add another rod.		
Drill	03/03/00	Fri	N	59.0	23.20	0.00	1240.0	1250.0	10.0	0.40	15.0	Drilled 12 1/4" tricone bit wet from 1240' to 1250' in Puye Fm fanglomerate.		1250.0
Drill	03/04/00	Sat	N	59.0	0.00	0.45	1250.0	1260.0	10.0	0.45	13.3	Drilled 12 1/4" tricone bit wet from 1250' to 1260' in Puye Fm fanglomerate.		1260.0
Connect	03/04/00	Sat	N	59.0	0.45	0.55			0.0	0.10		Add another rod.		
Drill	03/04/00	Sat	N	59.0	0.55	2.10	1260.0	1280.0	20.0	1:15	16.0	Drilled 12 1/4" tricone bit wet from 1260' to 1280' in Puye Fm fanglomerate.		1280.0
Drill	03/04/00	Sat	N	59.0	2.10	3.50	1280.0	1300.0	20.0	1:40	12.0	Drilled 12 1/4" tricone bit wet from 1280' to 1300' in Puye Fm fanglomerate.		1300.0
Connect	03/04/00	Sat	N	59.0	3.50	4.00			0.0	0.10		Add another rod.		
Drill	03/04/00	Sat	N	59.0	4.00	5.15	1300.0	1320.0	20.0	1:15	16.0	Drilled 12 1/4" tricone bit wet from 1300' to 1320' in Puye Fm fanglomerate.		1320.0
Conduct	03/04/00	Sat	N	59.0	4.40	4.40			0.0	0.00		Conductivity taken while pumping drilling fluid		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	03/04/00	Sat	N	59.0	5:20	5:20			0.0	0.00		Driller says he can not continue drilling due to the sanding up of the trash pumps. They will repair and pump off water. Crew is fueling up and cleaning site.		
Shift	03/04/00	Sat	N	59.0	6:15	6:15			0.0	0.00		Crew offsite to FSF.		
Shift	03/04/00	Sat	D	60.0	6:00	6:15			0.0	0:15		FSF		
Enroute	03/04/00	Sat	D	60.0	6:15	6:30			0.0	0:15		To R-19; meet night shift at gate.		
Water	03/04/00	Sat	D	60.0	6:30	7:25			0.0	0.55		Helper fills water truck		
Tailgate	03/04/00	Sat	D	60.0	7:00	7:05			0.0	0.05		Arrive at site; Tailgate; radio check to LA fire		
DTW	03/04/00	Sat	D	60.0	7:05	7:25			0.0	0.20		DTW; previous activity - drilled 12 1/4" tricone bit to 1320', 6:15 3/4/00	890.2	1320.0
Crew	03/04/00	Sat	D	60.0	7:25	7:30			0.0	0.05		Water truck onsite; helper tailgate		
Connect	03/04/00	Sat	D	60.0	8:00	8:05			0.0	0.05		Add another rod.		
Drill	03/04/00	Sat	D	60.0	8:05	8.40	1320.0	1335.0	15.0	0:35	25.7	Drilled 12 1/4" tricone bit wet from 1320' to 1335' in Puye Fm fanglomerate.		1335.0
Borehole	03/04/00	Sat	D	60.0	8:00	8.40			0.0	0.40		No recovery for 1320 to 1330', but easy drilling; no evidence of encountering groundwater		
Drill	03/04/00	Sat	D	60.0	8.40	9.00	1335.0	1340.0	5.0	0.20	15.0	Drilled 12 1/4" tricone bit wet from 1335' to 1340' in Puye Fm fanglomerate.		1340.0
Conduct	03/04/00	Sat	D	60.0	8.44				0.0			Conductivity reading		
Connect	03/04/00	Sat	D	60.0	9:00	9:25			0.0	0:25		Add stem, repair seals		
Drill	03/04/00	Sat	D	60.0	9:25	10.00	1340.0	1360.0	20.0	0:35	34.3	Drilled 12 1/4" tricone bit wet from 1340' to 1360' in Puye Fm fanglomerate.		1360.0
Cond	03/04/00	Sat	D	60.0	10.00	12.45			0.0	2.45		Condition hole; add stem - rods plugged		
Conduct	03/04/00	Sat	D	60.0	10:30				0.0			Conductivity reading		
Lunch	03/04/00	Sat	D	60.0	12.45	13:15			0.0	0.30		Lunch		
Trip out	03/04/00	Sat	D	60.0	13:15	13:25	1360.0	1320.0	40.0	0:10	240.0	Trip out with attempts to unplug rod		1360.0
Repair	03/04/00	Sat	D	60.0	13:25	15:30			0.0	2.05		Hydraulic hose broke on top head		
Trip out	03/04/00	Sat	D	60.0	15:30	18.00	1320.0	600.0	720.0	2.30	288.0	Resume trip out		
Shift	03/04/00	Sat	N	61.0	18:30	18:30			0.0	0.00		Arrive site after passdown at yard.		
Tailgate	03/04/00	Sat	N	61.0	18:30	18.45			0.0	0:15		Tailgate and Safety Inspection. FTL working on bringing dailies up to speed.		
Trip out	03/04/00	Sat	N	61.0	18.45	19:30	600.0	0.0	600.0	0:45	800.0	Crew tripping out last 600' of rod to facilitate unplugging rod.		1360.0

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTW's, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	03/04/00	Sat	N	61.0	19 30	0.00			0 0	4 30		Crew working on unplugging centralizer. The plug happened 10' up in tool and between center tube and outer sheath.		
Lunch	03/05/00	Sun	N	61 0	0.00	0.30			0 0	0.30		Lunch		
Dynatec	03/05/00	Sun	N	61.0	0.30	1:45			0 0	1:15		Driller offsite to call John Eddy.		
Waste	03/05/00	Sun	N	61.0	0 30	1:45			0 0	1:15		Crew working on pad and waste management areas.		
Circ	03/05/00	Sun	N	61 0	2.15	3 00			0 0	0.45		John Eddy has crew using .25" tubing to blow out plug with water. Not working as of yet		
Circ	03/05/00	Sun	N	61.0	3 00	3 00			0.0	0 00		Crew unplugged rods and will begin tripping after breaking		
Trip In	03/05/00	Sun	N	61.0	3 05	4.10	0 0	300.0	300 0	1:05	276 9	Tripping in open borehole tricone drill system.		1360 0
Break	03/05/00	Sun	N	61.0	4.10	4 20			0.0	0.10		Crew takes break.		
Trip In	03/05/00	Sun	N	61 0	4 25	6.00	300 0	780 0	480 0	1:35	303.2	Tripping in open borehole tricone drill system.		1360.0
Crew	03/05/00	Sun	N	61.0	4 30	4 30			0 0	0 00		Driller is calling it a day. He feels ill and believes it unsafe to continue. Crew will do site maintenance and we will head to shop.		
Crew	03/05/00	Sun	N	61 0	4 30	6.00			0 0	1 30		Crew will do site maintenance and we will head to shop.		
Shift	03/05/00	Sun	D	62.0	6 00				0 0			Depart FSF for drill site		
Tailgate	03/05/00	Sun	D	62 0	6 30	7.45			0 0	1:15		Tailgate & safety inspections.		
Trip In	03/05/00	Sun	D	62.0	7.45	9 00	780 0	1360.0	580 0	1:15	464 0	Trip in- unable to get a DTW as driller needed to 600 gals make -up fluid to trip in rods to TD		1360.0
DTW	03/05/00	Sun	D	62 0	7.45	9.00			0.0	1:15		DTW; previous activity -drilled 12 1/4" tricone bit to 1360', 10 00 3/4/00	failed	1360 0
Cond	03/05/00	Sun	D	62 0	9 00	11:00			0 0	2 00		Condition hole		
Drill	03/05/00	Sun	D	62 0	11:00	13 20	1360.0	1380 0	20.0	2 20	8 6	Drilled 12 1/4" tricone bit wet from 1360' to 1380' in Puye Fm fanglomerate.		1380 0
Connect	03/05/00	Sun	D	62 0	13 20	13 25			0.0	0 05		Add another rod.		
Drill	03/05/00	Sun	D	62 0	13 25	14.15	1380 0	1395 0	15 0	0 50	18 0	Drilled 12 1/4" tricone bit wet from 1380' to 1395' in Puye Fm fanglomerate.		1395 0
Support	03/05/00	Sun	D	62 0	11.44				0 0			Conductivity reading		
Borehole	03/05/00	Sun	D	62 0	13.15				0 0			Clay encountered at 1390- 1393 as noted by driller. Cuttings indicate fines beginning at 1380		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Waste	03/05/00	Sun	D	62.0	13:30	13.45			0 0	0.15		Site cleanup; transfer pump sanded up and lost control of return water		
Lunch	03/05/00	Sun	D	62 0	13.45	14:15			0 0	0.30		Lunch		
H&S	03/05/00	Sun	D	62.0	14:15	14:40			0 0	0 25		Site cleanup, housekeeping.		
Drill	03/05/00	Sun	D	62.0	14:15	14:35	1395 0	1400 0	5 0	0 20	15 0	Drilled 12 1/4" tricone bit wet from 1395' to 1400' in Puye Fm fanglomerate.		1400 0
Connect	03/05/00	Sun	D	62.0	14.35	14:40			0 0	0 05		Add another rod.		
Drill	03/05/00	Sun	D	62.0	14:40	15 50	1400 0	1420 0	20 0	1:10	17.1	Drilled 12 1/4" tricone bit wet from 1400' to 1420' in Puye Fm fanglomerate.		1420 0
Conduct	03/05/00	Sun	D	62.0	15:44				0 0			Conductivity reading		
Cond	03/05/00	Sun	D	62 0	15 50	16 25			0.0	0.35		Bleed air; condition hole		
Connect	03/05/00	Sun	D	62.0	16:25	16:30			0 0	0 05		Add another rod.		
Drill	03/05/00	Sun	D	62.0	16 30	16 50	1420.0	1440 0	20 0	0.20	60.0	Drilled 12 1/4" tricone bit wet from 1420' to 1440' in Puye Fm fanglomerate.		1440 0
Cond	03/05/00	Sun	D	62.0	16.50	18 00			0 0	1:10		Began conditioning hole and bit became plugged, successfully cleared blockage		
Support	03/05/00	Sun	D	62.0	18 00	18 05			0 0	0 05		Secure site		
Shift	03/05/00	Sun	D	62.0	18 05				0 0			Depart		
Shift	03/05/00	Sun	N	63 0	18 00	18 00			0 0	0 00		Arrive site after passdown.		
Tailgate	03/05/00	Sun	N	63.0	18 00	18 30			0.0	0.30		Tailgate and Safety Inspection completed.		
Equip	03/05/00	Sun	N	63 0	18 30	20.30			0.0	2.00		Loading more drill rod		
DTW	03/05/00	Sun	N	63.0	20.35	20.35			0 0	0 00		DTW; previous activity -drilled 12 1/4" tricone bit to 1440', 16.50 3/5/00	1133 3	1440 0
Connect	03/05/00	Sun	N	62.0	20 35	20:40			0 0	0.05		Add another rod.		
Drill	03/05/00	Sun	N	63 0	20.40	22:20	1440.0	1460.0	20.0	1:40	12.0	Drilled 12 1/4" tricone bit wet from 1440' to 1460' in Puye Fm fanglomerate.		1460 0
Circ	03/05/00	Sun	N	63 0	22:20	23 55			0 0	1:35		Bleeding air pressure off.		
Connect	03/05/00	Sun	N	62.0	23 55	0 00			0.0	0.05		Add another rod.		
Drill	03/06/00	Mon	N	63 0	0.00	1:00	1460.0	1480.0	20 0	1.00	20 0	Drilled 12 1/4" tricone bit wet from 1460' to 1480' in Puye Fm fanglomerate.		1480 0
Circ	03/06/00	Mon	N	63 0	1.05	3 05			0 0	2.00		Bleeding air. Crew will leave for yard and to refill water truck.		
Water	03/06/00	Mon	N	63 0	1.05	3.05			0 0	2.00		Crew will leave for yard and to refill water truck.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
DTW	03/06/00	Mon	N	63.0	3:10	3:20			0.0	0.10		DTW; previous activity - drilled 12 1/4" tricone bit to 1480', 1:00 3/5/00	1169.5	1480.0
Connect	03/06/00	Mon	N	62.0	3:05	3:30			0.0	0.25		Add another rod.		
Drill	03/06/00	Mon	N	63.0	3:30	6:00	1480.0	1500.0	20.0	2.30	8.0	Drilled 12 1/4" tricone bit wet from 1480' to 1500' in Puye Fm fanglomerate.		1500.0
Shift	03/06/00	Mon	N	63.0	6:00	6:30			0.0	0.30		Crew offsite after policing site		
Tailgate	03/06/00	Mon	D	64.0	7:00	7:15			0.0	0.15		Tailgate after arriving onsite.		
DTW	03/06/00	Mon	D	64.0	7:15	7:30			0.0	0.15		Attempted to take DTW with no success. Probe sticking to rods.	failed	
Equip	03/06/00	Mon	D	64.0	7:30	8:00			0.0	0.30		Prep for drilling; off load additional rods		
Cond	03/06/00	Mon	D	64.0	8:00	8:10			0.0	0:10		Condition borehole		
Connect	03/06/00	Mon	D	62.0	8:10	8:15			0.0	0.05		Add another rod.		
Drill	03/06/00	Mon	D	64.0	8:15	8:40	1500.0	1520.0	20.0	0.25	48.0	Drilled 12 1/4" tricone bit wet from 1500' to 1520' in Puye Fm fanglomerate.		1520.0
Connect	03/06/00	Mon	D	64.0	8:40	8:50			0.0	0:10		Bleeding off pressure; add another rod.		
Cond	03/06/00	Mon	D	64.0	8:50	9:40			0.0	0:50		Condition		
Equip	03/06/00	Mon	D	64.0	9:40	12:45			0.0	3:05		Repairing cyclone blow-out.		
Visitor	03/06/00	Mon	D	64.0	10:30	12:45			0.0	2.15		Bill Stone onsite.		
DTW	03/06/00	Mon	D	64.0	11:00	11:40			0.0	0.40		DTW; previous activity - drilled 12 1/4" tricone bit to 1520', 8:40 3/5/00	failed	1520.0
DTW	03/06/00	Mon	D	64.0	12:13	12:25			0.0	0.12		DTW; previous activity -drilled 12 1/4" tricone bit to 1520', 8:40 3/5/00	failed	1520.0
Visitor	03/06/00	Mon	D	64.0	12:45	12:45			0.0	0:00		Cyclone has been patched. Bill Stone states no point in another DTW attempt.		
Lunch	03/06/00	Mon	D	64.0	12:45	13:15			0.0	0:30		Lunch		
Equip	03/06/00	Mon	D	64.0	12:45	14:00			0.0	1:15		Cyclone re-attached		
Borehole	03/06/00	Mon	D	64.0	14:00	15:00			0.0	1.00		Driller conditions borehole and believes formation making water.		
Drill	03/06/00	Mon	D	64.0	15:00	15:15	1520.0	1530.0	10.0	0.15	40.0	Drilled 12 1/4" tricone bit wet from 1520' to 1530' in Puye Fm fanglomerate.		1530.0
Drill	03/06/00	Mon	D	64.0	15:15	15:30	1530.0	1540.0	10.0	0.15	40.0	Drilled 12 1/4" tricone bit wet from 1530' to 1540' in pumiceous Puye Fm fanglomerate.		1540.0
Circ	03/06/00	Mon	D	64.0	15:30	16:15			0.0	0.45		Bleeding off pressure.		
Connect	03/06/00	Mon	D	64.0	16:15	16:20			0.0	0.05		Add another rod.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Drill	03/06/00	Mon	D	64.0	16:20	17:30	1540.0	1555.0	15.0	1:10	12.9	Drilled 12 1/4" tricone bit wet from 1540' to 1555' in pumiceous Puye Fm fanglomerate.		1555.0
Borehole	03/06/00	Mon	D	64.0	16:30	17:30			0.0	1:00		Hard material encountered at 1551'		
Equip	03/06/00	Mon	D	64.0	17:30	18:00			0.0	0:30		Loading remaining 13" equipment to yard.		
Site	03/06/00	Mon	D	64.0		18:10			0.0	18:10		Secure site.		
Shift	03/06/00	Mon	D	64.0		18:15			0.0	18:15		Depart		
Shift	03/06/00	Mon	N	65.0	18:00	18:30			0.0	0:30		Arrive site after passdown, replenish supplies and equipment.		
Waste	03/06/00	Mon	N	65.0	18:30	19:30			0.0	1:00		There is approx. 1000 gls of storage left in tanks.		
DTW	03/06/00	Mon	N	65.0	19:30	20:25			0.0	0:55		DTW = 1188.17'.Previous activity -drilled 12 1/4" tricone bit to 1560', 17:30 3/6/00	1188.1	1555.0
Drill	03/06/00	Mon	N	65.0	20:25	21:15	1555.0	1560.0	5.0	0:50	6.0	Drilled 12 1/4" tricone bit wet from 1555' to 1560' in pumiceous Puye Fm fanglomerate.		1560.0
Borehole	03/06/00	Mon	N	65.0	20:25	21:15			0.0	0:50		Hole is making a large amount of water. Driller believes that there will be no more production tonight after drilling down this rod (water storage shortage).		
Cond	03/06/00	Mon	N	65.0	21:25	22:00			0.0	0:35		Conditioning hole and then allowing air pressure to bleed off. Once bled the DTW will be taken immediately and then periodically over the night.		
DTW	03/06/00	Mon	N	65.0	22:00	22:00			0.0	0:00		DTW; previous activity - drilled 12 1/4" tricone bit to 1560', 21:15 3/6/00	failed	1560.0
Equip	03/06/00	Mon	N	65.0	21:45	0:00			0.0	2:15		Site Repair and policing have commenced. This includes changing out Cyclone, squaring away pad		
Trip out	03/06/00	Mon	N	65.0	22:00	0:00	1560.0	1000.0	560.0	2:00	280.0	Trip out rods 560' in order to protect against caving and a stuck bit.		1560.0
Support	03/06/00	Mon	N	65.0	23:00	0:00			0.0	1:00		FTL offsite to SAIC office to begin work on monthly report.		
Waste	03/07/00	Tues	N	65.0	0:00	5:30			0.0	5:30		Work on cuttings management area.		
Waste	03/07/00	Tues	N	65.0	5:30	6:00			0.0	0:30		Crew offsite to FSF for passdown.		
Shift	03/07/00	Tues	D	66.0	6:00	7:15			0.0	1:15		FSF; load supplies		
Enroute	03/07/00	Tues	D	66.0	7:15	7:45			0.0	0:30		Enroute		
Tailgate	03/07/00	Tues	D	66.0	7:45	8:00			0.0	0:15		Tailgate		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	03/07/00	Tues	D	66.0	8.00	12:15			0.0	4.15		Prep for frac tanks; change out supply trailer; load rod		
Break	03/07/00	Tues	D	66.0	11.00	11:15			0.0	0.15		Break		
Equip	03/07/00	Tues	D	66.0	11:15	12.15			0.0	1:00		Prep for frac tanks; change out supply trailer; load rod		
Lunch	03/07/00	Tues	D	66.0	12.15	12.45			0.0	0.30		Lunch		
H&S	03/07/00	Tues	D	66.0	12.45	13.40			0.0	0.55		Resume site prep, general maintenance and waste management housekeeping		
Equip	03/07/00	Tues	D	66.0	13.40	14.20			0.0	0.40		First frac arrives- longer than expected. Set up larger berm area.		
Visitor	03/07/00	Tues	D	66.0	13.50	14.15			0.0	0.25		Broxton onsite to review lithology		
Waste	03/07/00	Tues	D	66.0	14.50	15.00			0.0	0:10		Second frac tank arrives		
H&S	03/07/00	Tues	D	66.0	15.00	15:10			0.0	0.10		Housekeeping:		
Trip In	03/07/00	Tues	D	66.0	15.10	17.05	1000.0	1540.0	540.0	1:55	281.7	Trip in open borehole tricone drill system. Hole bottom at 1540 ft (caved)		1560.0
Support	03/07/00	Tues	D	66.0	14.10	14.35			0.0	0.25		Rich Koch onsite- discuss need for sampling tanks and review lithology		
Site	03/07/00	Tues	D	66.0	17.05	17.25			0.0	0.20		Secure site		
Shift	03/07/00	Tues	D	66.0	17.25				0.0			Depart with boom truck/rods		
Shift	03/07/00	Tues	N	67.0	18.00	18.45			0.0	0.45		Arrive on site		
DTW	03/07/00	Tues	N	67.0	19.00	19.00			0.0	0.00		DTW; previous activity -tripped in 12 1/4" tricone bit on 7" dual wall rods to 1540'; 17.05 3/7/00	1183.1	1560.0
Rigup	03/07/00	Tues	N	67.0	19.15				0.0			Starting to drill, prepping everything		
Connect	03/07/00	Tues	N	67.0	19.20				0.0			Adding 20' of drill rod		
Equip	03/07/00	Tues	N	67.0	20.30	20.45			0.0	0.15		Removed 20' drill rod, added it back on		
Drill	03/07/00	Tues	N	67.0	21:10	0.00	1540.0	1560.0	20.0	2.50	7.1	Drilled 12 1/4" tricone bit wet from 1540' to 1560' in pumiceous Puye Fm fanglomerate.		
Circ	03/07/00	Tues	N	67.0	21:20	21:35			0.0	0.15		Bleeding the hole		
Plug	03/07/00	Tues	N	67.0	21:35	22.30			0.0	0.55		No drilling, cannot advance anything, may be plugged		
Borehole	03/07/00	Tues	N	67.0	22.30	22.45			0.0	0.15		Remove 20' casing, drill rods at 1560'		
Circ	03/07/00	Tues	N	67.0	23.00	23.05			0.0	0.05		Casey thinks we are plugged up - but are slowly getting unplugged		
Connect	03/07/00	Tues	N	67.0	23.05	0.00			0.0	0.55		Adding another rod.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Lunch	03/08/00	Wed	N	67.0	0.00	0.30			0.0	0:30		Lunch		
Cond	03/08/00	Wed	N	67.0	0.30	1:45			0.0	1:15		Conditioned borehole.		
Drill	03/08/00	Wed	N	67.0	1:45	3:10	1560.0	1580.0	20.0	1:25	14.1	Drilled 12 1/4" tricone bit wet from 1560' to 1580' in pumiceous Puye Fm fanglomerate.		1580.0
Circ	03/08/00	Wed	N	67.0	3:10	4:30			0.0	1:20		Drilling keeps getting plugged		
Plug	03/08/00	Wed	N	67.0	4:30	5:30			0.0	1:00		Still plugged		
Shift	03/08/00	Wed	N	67.0	5:30	6.00			0.0	0:30		Trying to unplug, will head back to the FSF		
Shift	03/08/00	Wed	D	68.0	6.00	6:30			0.0	0:30		Meet at FSF; depart to R-19		
Tailgate	03/08/00	Wed	D	68.0	7.00	7:15			0.0	0:15		Tailgate		
DTW	03/08/00	Wed	D	68.0	7:15	7.30			0.0	0:15		DTW failed - probe malfunction	failed	
Connect	03/08/00	Wed	D	67.0	7:30	7:35			0.0	0:05		Adding another rod.		
Drill	03/08/00	Wed	D	68.0	7:35	9:15	1580.0	1600.0	20.0	1:40	12.0	Drilled 12 1/4" tricone bit wet from 1580' to 1600' in pumiceous Puye Fm fanglomerate.		1600.0
Connect	03/08/00	Wed	D	67.0	9:15	9:20			0.0	0:05		Adding another rod.		
Drill	03/08/00	Wed	D	68.0	9.20	11:00	1600.0	1620.0	20.0	1:40	12.0	Drilled 12 1/4" tricone bit wet from 1600' to 1620' in pumiceous Puye Fm fanglomerate.		1620.0
Fuel	03/08/00	Wed	D	68.0	8.20	9.00			0.0	0.40		Jackl Eddy onsite to fuel equipment		
Connect	03/08/00	Wed	D	68.0	11:00	11:05			0.0	0.05		Adding another rod.		
Circ	03/08/00	Wed	D	68.0	11:05	11:10			0.0	0:05		Regain pressure in borehole		
Drill	03/08/00	Wed	D	68.0	11:10	11:40	1620.0	1640.0	20.0	0:30	40.0	Drilled 12 1/4" tricone bit wet from 1620' to 1640' in pumiceous Puye Fm fanglomerate.		1640.0
Sample	03/08/00	Wed	D	68.0	11:30	12:20			0.0	0.50		Joe Sena onsite to collect waste samples		
Sample	03/08/00	Wed	D	68.0	11:33	11:33			0.0	0.00		Collect NMSW soil sample		
Cond	03/08/00	Wed	D	68.0	11:40	12.00			0.0	0.20		Bleed off, condition		
Connect	03/08/00	Wed	D	68.0	12:00	12.05			0.0	0.05		Adding another rod.		
Sample	03/08/00	Wed	D	68.0	11:45	11:45			0.0	0.00		Waste water sample collected from tank #1		
Sample	03/08/00	Wed	D	68.0	11:50	11.50			0.0	0.00		Waste water sample collected from tank # 2		
Cond	03/08/00	Wed	D	68.0	12.05	12:15			0.0	0:10		Condition borehole.		
Drill	03/08/00	Wed	D	68.0	12.15	12:45	1640.0	1660.0	20.0	0.30	40.0	Drilled 12 1/4" tricone bit wet from 1640' to 1660' in pumiceous Puye Fm fanglomerate.		1660.0
Support	03/08/00	Wed	D	68.0	12:20				0.0			Joe Sena departs to FSF with samples		
Cond	03/08/00	Wed	D	68.0	12.45	13.00			0.0	0:15		Condition hole		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Lunch	03/08/00	Wed	D	68 0	13 00	13:30			0.0	0:30		Lunch		
Connect	03/08/00	Wed	D	68 0	13.30	13.40			0.0	0:10		Adding another rod.		
Drill	03/08/00	Wed	D	68 0	13.40	14.00	1660 0	1680.0	20 0	0 20	60 0	Drilled 12 1/4" tricone bit wet from 1660' to 1680' in pumiceous Puye Fm fanglomerate.		1680.0
Safety	03/08/00	Wed	D	68 0	14.05	15:20			0.0	1:15		Safety walkthrough by Barney and Baran		
Cond	03/08/00	Wed	D	68 0	14 00	15 20			0.0	1:20		Condition hole, bleed off.		
Connect	03/08/00	Wed	D	68.0	15:20	15:25			0.0	0.05		Adding another rod.		
Drill	03/08/00	Wed	D	68.0	15:25	15.50	1680 0	1700.0	20.0	0 25	48 0	Drilled 12 1/4" tricone bit wet from 1680' to 1700' in pumiceous Puye Fm fanglomerate.		1700.0
Cond	03/08/00	Wed	D	68 0	15.50	17.05			0.0	1:15		Condition hole; John Eddy onsite, move boom truck to get more rods, bleed off hole pressure		
Vol	03/08/00	Wed	D	68 0	17.05				0 0			Used approx. 600 gals of fluid for shift		
Shift	03/08/00	Wed	D	68 0	17.05				0.0			Depart to FSF		
Shift	03/08/00	Wed	D	68.0	17.30				0 0			Arrive at FSF		
									0.0					
Shift	03/08/00	Wed	N	69 0	18 00	18 30			0 0	0 30		Meet at FSF		
Enroute	03/08/00	Wed	N	69 0	18.30	19.00			0 0	0:30		To R-19		
Circ	03/08/00	Wed	N	69 0	19.30	20.30			0 0	1:00		Drillers are blowing water out of the hole		
Conduct	03/08/00	Wed	N	69.0	20 20	20 25			0.0	0 05		Took a conductivity reading- foamy, drillers pumped more water out of the hole		
H&S	03/08/00	Wed	N	69.0	21:30	22.00			0 0	0.30		Drillers are cleaning up the site and their trailer; housekeeping		
H&S	03/08/00	Wed	N	69 0	22 00	23 30			0.0	1:30		Basic Housekeeping around the site		
Crew	03/08/00	Wed	N	69.0	23 30	0 00			0.0	0 30		MB off site. Going back to the FSF. Crew will continue housekeeping at the site.		
Crew	03/09/00	Thurs	D	70.0	6 00	14 00			0 0	8.00		Rod is not yet available - drilling housekeeping, then aid R-9i drill crew with tripping out and deconning and loading rod		
Tailgate	03/09/00	Thurs	D	70 0	14 00	14.10			0 0	0.10		Arrive at R-19, Tailgate meeting covering the SSHASP Mod		
Rigup	03/09/00	Thurs	D	70 0	14.10	14 50			0 0	0.40		Prep to drill		
DTW	03/09/00	Thurs	D	70 0	14 50	15 02			0 0	0.12		DTW attempt failed - meter is bent and bridges off in rods	failed	

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Circ	03/09/00	Thurs	D	70.0	15:02	16:40			0.0	1:33		Cont drilling prep + regain circulation, Trip in to 1700' condition the hole		
Drill	03/09/00	Thurs	D	70.0	16:40	17:00	1700.0	1720.0	20.0	0:20	60.0	Drilled 12 1/4" tricone bit wet from 1700' to 1720' in pumiceous Puye Fm fanglomerate.		1720.0
Conduct	03/09/00	Thurs	D	70.0	16:55				0.0			Conductivity readings		
Cond	03/09/00	Thurs	D	70.0	17:00	17:25			0.0	0:25		Condition hole, secure site- NOTE: driller noted the hole has remained open in the down period from last night		
Shift	03/09/00	Thurs	D	70.0	17:30				0.0			Depart		
Shift	03/09/00	Thurs	N	71.0	18:00	18:30			0.0	0:30		Arrive on site		
Tailgate	03/09/00	Thurs	N	71.0	18:30	18:50			0.0	0:20		Tailgate and safety inspections.		
H&S	03/09/00	Thurs	N	71.0	18:45	18:55			0.0	0:10		Cathy G. went over SSHASP with new line management		
Prep	03/09/00	Thurs	N	71.0	18:50	19:50			0.0	1:00		Drillers are bleeding the hole, Corey Howe off site for the water level meter		
Connect	03/09/00	Thurs	N	71.0	19:50	19:50			0.0	0:00		Add another rod.		
Drill	03/09/00	Thurs	N	71.0	20:00	20:15	1720.0	1740.0	20.0	0:15	80.0	Drilled 12 1/4" tricone bit wet from 1720' to 1740' in pumiceous Puye Fm fanglomerate.		1740.0
Cond	03/09/00	Thurs	N	71.0	20:15	20:50			0.0	0:35		Conditioning and bleeding		
Connect	03/09/00	Thurs	N	71.0	20:50	21:00			0.0	0:10		Add another rod.		
DTW	03/09/00	Thurs	N	71.0	21:00	21:05			0.0	0:05		Tried to obtain a water level, probe is sticking and not giving an accurate reading, will try after lunch	failed	
Drill	03/09/00	Thurs	N	71.0	21:20	22:00	1740.0	1760.0	20.0	0:40	30.0	Drilled 12 1/4" tricone bit wet from 1740' to 1760' in pumiceous Puye Fm fanglomerate.		1760.0
Borehole	03/09/00	Thurs	N	71.0	22:10				0.0			Casey brought in some samples and said finer sands are plugging up at the bottom		
Circ	03/09/00	Thurs	N	71.0	22:15	23:55			0.0	1:40		Bleeding the hole		
Connect	03/09/00	Thurs	N	71.0	23:55	0:00			0.0	0:05		Add another rod.		
Lunch	03/10/00	Fri	N	71.0	0:00	0:25			0.0	0:25		Lunch.		
Drill	03/10/00	Fri	N	71.0	0:25	0:45	1760.0	1780.0	20.0	0:20	60.0	Drilled 12 1/4" tricone bit wet from 1760' to 1780' in pumiceous Puye Fm fanglomerate.		1780.0
Cond	03/10/00	Fri	N	71.0	2:00	3:45			0.0	1:45		Bleeding and conditioning the hole after unplugging		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Borehole	03/10/00	Fri	N	71.0	2.40	2.40			0.0	0.00		Driller noted that material is soft and easy to drill in		
Equip	03/10/00	Fri	N	71.0	3.45	4:10			0 0	0 25		Generator out - smelled like something was burning		
Repair	03/10/00	Fri	N	71.0	4.10	6.00			0 0	1.50		Belt broke on the generator, keep conditioning borehole and will go back to the FSF for shift change.		
Shift	03/10/00	Fri	D	72.0	6.00	6 30			0.0	0.30		Shift change at FSF.		
Water	03/10/00	Fri	D	72.0	6:30	6.45			0 0	0.15		Fill water truck.		
Enroute	03/10/00	Fri	D	72.0	6.45	7.05			0.0	0:20		To R-19		
Tailgate	03/10/00	Fri	D	72 0	7.05	7.15			0.0	0.10		Arrive at R-19; safety inspections, tailgate; "cables".		
Rigup	03/10/00	Fri	D	72.0	7.15	9 28			0.0	2.13		Prep to drill		
DTW	03/10/00	Fri	D	72 0	8.00				0 0			Measured DTW at 1194 2'	1194 2	
DTBot	03/10/00	Fri	D	72 0	8 05				0 0			Measured TD bottom at 1780'.		1780 0
Drill	03/10/00	Fri	D	72 0	9 28	9.40	1780 0	1800.0	20 0	0.12	100 0	Drilled 12 1/4" tricone bit wet from 1780' to 1800' in pumiceous Puye Fm fanglomerate.		1800 0
Cond	03/10/00	Fri	D	72.0	9.40	10.35			0.0	0 55		Condition borehole; bleed of circulation.		
Connect	03/10/00	Fri	D	72 0	10.35	10.40			0 0	0.05		Add another rod.		
Drill	03/10/00	Fri	D	72.0	10.40	10.50	1800 0	1815 0	15 0	0.10	90.0	Drilled 12 1/4" tricone bit wet from 1800' to 1815' in pumiceous Puye Fm fanglomerate.		1815 0
Circ	03/10/00	Fri	D	72 0	10.50	11:30			0.0	0.40		Lost circulation		
Drill	03/10/00	Fri	D	72.0	11:30	11.45	1815 0	1820.0	5.0	0.15	20 0	Drilled 12 1/4" tricone bit wet from 1815' to 1820' in pumiceous Puye Fm fanglomerate.		1820 0
Visitor	03/10/00	Fri	D	72.0	11:30	12 08			0 0	0 38		Dave Broxton and Brad Martin onsite; advise to go to 2000' & not to run any more tanks.		
Visitor	03/10/00	Fri	D	72.0	11.50	12.05			0.0	0.15		Roy Bohn onsite; review waste management – berm OK.		
Support	03/10/00	Fri	D	72 0	11.50	12.45			0.0	0.55		Jon Marin delivers generator from R-31; takes beltless generator to FSF for repair.		
Dynatec	03/10/00	Fri	D	72.0	12.10	12.20			0 0	0.10		John Eddy onsite to assist with air pressure problem; appears to be a permeable unit between bit and interchange, causes air loss to formation.		
Repair	03/10/00	Fri	D	72 0	13.15	13 25			0 0	0.10		Repair generator.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Lunch	03/10/00	Fri	D	72.0	13:25	13:55			0.0	0:30		Lunch		
Cond	03/10/00	Fri	D	72.0	13:55	14:05			0.0	0.10		Condition borehole; regain circulation.		
Circ	03/10/00	Fri	D	72.0	14:05	15:35			0.0	1:30		Circulation		
Connect	03/10/00	Fri	D	72.0	15:35	15:42			0.0	0:07		Add another rod.		
Drill	03/10/00	Fri	D	72.0	15:42	15:55	1820.0	1830.0	10.0	0:13	46.2	Drilled 12 1/4" tricone bit wet from 1820' to 1830' in pumiceous Puye Fm fanglomerate.		1830.0
Trip out	03/10/00	Fri	D	72.0	15:42	15:55	1830.0	1780.0	50.0	0:13	230.8	Tripped out open borehole tricone drill system.		1830.0
Shift	03/10/00	Fri	D	72.0	17:45	18:00			0.0	0.15		Prep for night shift.		
Shift	03/10/00	Fri	N	73.0	18:00	18:30			0.0	0.30		At FSF.		
Tailgate	03/10/00	Fri	N	73.0	18:30	19:00			0.0	0.30		Arrive site. Tailgate and Safety Inspection. FTL set up Dosimetor(Ametex MK2) on Dynatec helpers Luke Manzanares, John Fulton).		
Rigup	03/10/00	Fri	N	73.0	19:00	19:10			0.0	0:10		Crew out to set up for tripping out of hole. Air is still bleeding off.		
Trip out	03/10/00	Fri	N	73.0	19:10	0:00	1780.0	700.0	1080.0	4.50	223.4	Begin tripping out. Hot work commences.		1830.0
Crew	03/10/00	Fri	N	73.0	22:00	22:20			0.0	0:20		Thoren offsite to contact wife after her page.		
Crew	03/10/00	Fri	N	73.0	23:00	23:35			0.0	0.35		Sena and crew from R-31 onsite to refuel for their operation at R-31.		
H&S	03/11/00	Sat	N	73.0	0:00	0:30			0.0	0:30		Luke Manzanares brought in MK-2 dosimeter (#33535) with wire and mike pulled loose from instrument.		
Lunch	03/11/00	Sat	N	73.0	0:00	0:30			0.0	0:30		Lunch		
Trip out	03/11/00	Sat	N	73.0	0:30	2:00	700.0	360.0	340.0	1:30	226.7	Continue to trip out after lunch.		1830.0
Crew	03/11/00	Sat	N	73.0	0:40	2:00			0.0	1:20		John Fulton left site.		
Crew	03/11/00	Sat	N	73.0	2:00	2:40			0.0	0.40		Crew breaking due to the severe coughing and wretching of Luke Manzanares.		
Trip out	03/11/00	Sat	N	73.0	2:40	4:10	360.0	0.0	360.0	1:30	240.0	Tripping out again.		1830.0
Trip out	03/11/00	Sat	N	73.0	4:10	4:20			0.0	0:10		Break		
Trip in	03/11/00	Sat	N	73.0	4:25	5:30	0.0	600.0	600.0	1:05	553.8	Begin tripping in.		1830.0
Fuel	03/11/00	Sat	N	73.0	5:30	6:00			0.0	0.30		Refueling ops begin		
Shift	03/11/00	Sat	N	73.0	6:00	6:00			0.0	0:00		FTL and crew offsite.		
Shift	03/11/00	Sat	D	74.0	6:00	6:30			0.0	0:30		Shift change at FSF.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Support	03/11/00	Sat	D	74.0	7.00	9.14			0.0	2.14		Jon Marin away for resupply from SAIC office and R-31.		
Crew	03/11/00	Sat	D	74.0	6:30	7:00			0.0	0.30		Dynatect to site.		
Tailgate	03/11/00	Sat	D	74.0	7.00	7:45			0.0	0.45		Tailgate and Safety Inspections.		
Trip in	03/11/00	Sat	D	74.0	7:45	10.00	600.0	1300.0	700.0	2.15	311.1	Trip in open borehole tricone drill system.		1830.0
Equip	03/11/00	Sat	D	74.0	10.00	10:15			0.0	0.15		Clean bit.		
DTW	03/11/00	Sat	D	74.0	10.15	11:25			0.0	1:10		DTW = 1175.9, tripping in.	1175.9	
Trip in	03/11/00	Sat	D	74.0	11:30	13.00	1300.0	1820.0	520.0	1:30	346.7	Trip in open borehole tricone drill system.		1830.0
Connect	03/11/00	Sat	D	74.0	13.00	13.05			0.0	0.05		Add another rod.		
Circ	03/11/00	Sat	D	74.0	13.05	14.00			0.0	0.55		Circulate.		
Lunch	03/11/00	Sat	D	74.0	14.00	14.30			0.0	0.30		Lunch		
Rigup	03/11/00	Sat	D	74.0	14.30	15:20			0.0	0.50		Prepping to drill.		
Drill	03/11/00	Sat	D	74.0	15:30	16.00	1820.0	1840.0	20.0	0.30	40.0	Drilled 12 1/4" tricone bit wet from 1820' to 1840' in pumiceous Puye Fm fanglomerate.		1840.0
H&S	03/11/00	Sat	D	74.0	16.00	18.00			0.0	2.00		Housekeeping.		
Shift	03/11/00	Sat	N	75.0	18.00	20.20			0.0	2.20		Passdown and then to site. Larry Thoren's fuel truck's windshield broken; reports at police station. Crew arrives.		
Tailgate	03/11/00	Sat	N	75.0	20.20	20.30			0.0	0.10		Arrive site. Tailgate and Safety Insp.		
Plug	03/11/00	Sat	N	75.0	20.30	21:25			0.0	0.55		Trying to clear plug. Driller is getting air back from subs. He will continue to circulate.		
Circ	03/11/00	Sat	N	75.0	21:30	22.40			0.0	1:10		Circulation re-established. Driller will work rod down to bottom slowly to keep circulating		
Pull	03/11/00	Sat	N	75.0	22.40	0.00	1840.0	1780.0	60.0	1:20	45.0	Pulled back to 1780' to re-establish circulation. Waiting for the air to bleed before adding new rod.		1840.0
Lunch	03/11/00	Sat	N	75.0	23.00	23.30			0.0	0.30		Lunch		
Trip in	03/12/00	Sun	N	75.0	0.00	1:00	1780.0	1800.0	20.0	1:00	20.0	Trip in rod to 1800' and circulate.		1840.0
Circ	03/12/00	Sun	N	75.0	1:00	2.00			0.0	1:00		Bleeding air off.		
Trip in	03/12/00	Sun	N	75.0	2.00	2.50	1800.0	1820.0	20.0	0.50	24.0	Tripping in rod to 1820' and circulating		1840.0
Circ	03/12/00	Sun	N	75.0	2.50	3:45			0.0	0.55		Bleeding air off.		
Trip in	03/12/00	Sun	N	75.0	3.50	5:15	1820.0	1840.0	20.0	1:25	14.1	Tripping in rod to 1840' and circulating. Driller found 10' of slough in bottom of hole.		1840.0

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Dynatac	03/12/00	Sun	N	75.0	4:15	5:35			0.0	1:20		John and Jacki Eddy onsite to look at broken window of fuel truck and to decide the next step on this well. John said he wants to try and continue drilling.		
Circ	03/12/00	Sun	N	75.0	5:15	5:45			0.0	0:30		Bleeding air off.		
Fuel	03/12/00	Sun	N	75.0	5:30	6:00			0.0	0:30		Crew refueling and prepping for drilling.		
Trip In	03/12/00	Sun	N	75.0	5:50	6:00	1840.0	1860.0	20.0	0:10	120.0	Drilled 12 1/4" tricone bit wet from 1840' to 1860' in pumiceous Puye Fm fanglomerate.		1860.0
Shift	03/12/00	Sun	N	75.0	6:30				0.0			Day shift arrives.		
Support	03/12/00	Sun	N	75.0	6:55				0.0			Night shift offsite. FTL2 onsite waiting for relief.		
Support	03/12/00	Sun	D	76.0	7:00	7:00			0.0	0:00		FTL2 offsite. FTL1 onsite.		
Circ	03/12/00	Sun	D	76.0	7:00	7:30			0.0	0:30		Passdown. Drillers to circulate and drill keeping the hole cleaned well.		
Visitor	03/12/00	Sun	D	76.0	7:45	11:05			0.0	3:20		Broxton onsite		
Sample	03/12/00	Sun	D	76.0	8:00	8:05			0.0	0:05		Collected 10 gls water at 1860'.		
Connect	03/12/00	Sun	D	76.0	8:05	8:10			0.0	0:05		Add another rod.		
Drill	03/12/00	Sun	D	76.0	8:10	8:35	1860.0	1880.0	20.0	0:25	48.0	Drilled 12 1/4" tricone bit wet from 1860' to 1880' in pumiceous Puye Fm fanglomerate.		1880.0
Dynatac	03/12/00	Sun	D	76.0	8:38				0.0			Topped off frac tanks. Broxton said continue drilling as long as possible. Roy Brown to Access Control.		
Equip	03/12/00	Sun	D	76.0	9:15	10:30			0.0	1:15		Crew offsite to retrieve two 3000 gal. Polys for more water storage.		
Prep	03/12/00	Sun	D	76.0	10:30	11:00			0.0	0:30		Staging tanks		
Connect	03/12/00	Sun	D	76.0	11:00	11:05			0.0	0:05		Add another rod.		
Drill	03/12/00	Sun	D	76.0	11:05	12:10	1880.0	1900.0	20.0	1:05	18.5	Drilled 12 1/4" tricone bit wet from 1880' to 1900' in pumiceous Puye Fm fanglomerate.		1900.0
Connect	03/12/00	Sun	D	76.0	12:10	12:15			0.0	0:05		Add another rod.		
Drill	03/12/00	Sun	D	76.0	12:15	12:30	1900.0	1902.5	2.5	0:15	10.0	Drilled 12 1/4" tricone bit wet from 1900' to 1902.5' in pumiceous Puye Fm fanglomerate.		1902.5
TD	03/12/00	Sun	D	76.0	12:30				0.0			Driller could no longer keep the hole open. Broxton decided this would be TD. TD = 1902.5'. 1230 PM 2/12/2000.		
Lunch	03/12/00	Sun	D	76.0	12:30	13:00			0.0	0:30		Lunch		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Rigup	03/12/00	Sun	D	76 0	12.50				0.0			FTL back onsite and driller informed him of lost circulation. Prep to trip out.		
Trip out	03/12/00	Sun	D	76 0	13.15	18 00	1902 5	1000.0	902.5	4 45	190 0	Trip out open borehole tricone drill system		
Support	03/12/00	Sun	D	76.0	15 00				0.0			FTL Offsite to prepare Strat log for Broxton's comparison with borehole video.		
Shift	03/12/00	Sun	N	77.0	18 30				0.0			Arrive site after passdown at FSF.		
Tailgate	03/12/00	Sun	N	77.0	18.30	18.50			0 0	0 20		Tailgate and Safety Inspection completed.		
Trip out	03/12/00	Sun	N	77.0	18.50	23 30	1000 0	0 0	1000.0	4.40	214 3	Trip out open borehole tricone drill system		
Support	03/12/00	Sun	N	77.0	18 50	23 00			0.0	4:10		FTL2 completing reports and logs.		
Support	03/12/00	Sun	N	77.0	23 00	0.00			0.0	1.00		FTL2 offsite to SAIC office.		
Lunch	03/12/00	Sun	N	77.0	23 30	0.00			0.0	0.30		Lunch		
Support	03/13/00	Mon	N	77.0	0.00	6.00			0.0	6 00		FTL2 offsite to SAIC office.		
Equip	03/13/00	Mon	N	77.0	0.00	6 00			0.0	6.00		Prep for well completion.		
Video	03/13/00	Mon	D	78 0	11:00	11:30			0.0	0 30		Geophysics with ESH-18 trailer. Prepare to run video log		
Video	03/13/00	Mon	D	78 0	11:30	11:45			0.0	0.15		Zero video log, run in hole with small video camera (1 3/4")		
Video	03/13/00	Mon	D	78 0	14.45	15 05			0.0	0 20		Finish video log #1 - prep video log #2		
Video	03/13/00	Mon	D	78 0	15 05	15:20			0 0	0.15		Ready large video camera (4" side view)		
Fuel	03/13/00	Mon	D	78 0	15:20	15:35			0.0	0.15		Refill fuel tanks on logging trailer		
Video	03/13/00	Mon	D	78 0	15:35	19.15			0.0	3.40		Run in hole with large video camera		
Geophys	03/13/00	Mon	D	78 0	19.15				0.0			Difficulty encountered in bringing camera up - cable wrapping incorrectly on drum works		
Shift	03/13/00	Mon	D	78 0	19.15	19.30			0.0	0:15		Rig down video equipment/ site cleanup/depart		
Demob	03/13/00	Mon	N	79 0	19.30	0.00			0 0	4 30		Night shift power-washed rods and transported equipment to CdV-15 site.		
Demob	03/14/00	Tue	N	79 0	0 00	6 00			0 0	6 00		Night shift power-washed rods and transported equipment to CdV-15 site.		
FSF	03/14/00	Tue	D	80 0	7.00	8 00			0 0	1:00		At FSF.		
Geophys	03/14/00	Tue	D	78 0	8 00	8 30			0.0	0 30		To R-19. Geophysics with ESH-18 trailer.		
Prep	03/14/00	Tue	D	80 0	8 30	8 30			0 0	0 00		Arrive at R-19 to prepare to run geophysical log		
Equip	03/14/00	Tue	D	80 0	8 30	12:00			0 0	3 30		Drillers load rods and moving equipment to CdV - 15		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Geophys	03/14/00	Tue	D	80.0	9:00	11:00			0.0	2:00		Ready logging trailer and prepare to run gamma log- problems w/ software, called and worked out		
Geophys	03/14/00	Tue	D	80.0	11:00	12:00			0.0	1:00		Run in hole with gamma tool		
TD	03/14/00	Tue	D	80.0	12:00	12:00			0.0	0:00		Gamma tool stops at @ 1100'; tool is too light to settle on bottom		
TD	03/14/00	Tue	D	80.0	12:00	12:30			0.0	0:30		Lunch		
Demob	03/14/00	Tue	D	80.0	12:30	18:00			0.0	5:30		Drillers cont breaking down stabilizer and moving equipment		
Geophys	03/14/00	Tue	D	80.0	12:00	13:45			0.0	1:45		Start logging gamma uphole- few cable problems - have some repeat sections		
Geophys	03/14/00	Tue	D	80.0	13:45	13:45			0.0	0:00		Out of hole with gamma tool - break down tool and close out log		
Load	03/14/00	Tue	D	80.0	14:00	14:00			0.0	0:00		Logging trailer prep to depart- drillers loading equipment		
Shift	03/14/00	Tue	D	80.0	14:50	14:50			0.0	0:00		Koch and Lorenzo depart site with logging trailer		
Demob	03/14/00	Tue	N	81.0	18:00	0:00			0.0	6:00		Demob equipment		
Demob	03/15/00	Wed	N	81.0	0:00	6:00			0.0	6:00		Demob equipment		
Geophys	03/15/00	Wed	D	82.0	8:00	9:00			0.0	1:00		Meet Schlumberger @ FSF.		
Safety	03/15/00	Wed	D	82.0	9:00	12:00			0.0	3:00		Brief Schlumberger personnel on SSHASP and ER HASP @ FSF.		
Standby	03/15/00	Wed	D	82.0	6:00	18:00			0.0	12:00		Dynatec crew on standby waiting for Schlumberger to log borehole.		
Geophys	03/16/00	Thu	D	83.0	6:30	6:35			0.0	0:05		Met Schlumberger at FSF		
Enroute	03/16/00	Thu	D	83.0	6:35	7:00			0.0	0:25		To gate 431.		
Security	03/16/00	Thu	D	83.0	7:00	8:15			0.0	1:15		Schlumberger needs ER badges.		
Security	03/16/00	Thu	D	83.0	8:15				0.0			Got three ER badges for Schlumberger at DX-DO.		
Geophys	03/16/00	Thu	D	83.0	9:30				0.0			Schlumberger, Dynatec, SAIC, ESH-12 and DX RCT onsite for downhole logging.		
Tailgate	03/16/00	Thu	D	83.0	9:30	9:45			0.0	0:15		Tailgate		
Prep	03/16/00	Thu	D	83.0	9:45	10:30			0.0	0:45		Schlumberger setup to run density /induction log.		
Prep	03/16/00	Thu	D	83.0	10:00	10:05			0.0	0:05		Insert Cesium-137 source into logtool		
Prep	03/16/00	Thu	D	83.0	10:15				0.0			RIH logging run #1		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
TD	03/16/00	Thu	D	83 0	10.30				0 0			Schlumberger tagged bottom at 1886'; fluid level tagged at 1172'	1172 0	
DX	03/16/00	Thu	D	83 0	10:30	10.45			0 0	0.15		Tom Robinson and Will Griegos onsite for Cs 137 source tool deployment.		
DX	03/16/00	Thu	D	83 0	11:40	11:48			0 0	0.08		Will Griegos onsite to measure rad background when Cs 137 source brought out of hole; pegged my instrument for a second.		
Geophys	03/16/00	Thu	D	83 0	11:45				0 0			Density / resistivity log		
Geophys	03/16/00	Thu	D	83 0	11.50				0.0			Make up APS tool to run neutron log		
Geophys	03/16/00	Thu	D	83.0	12.10				0.0			RIH w/ neutron tool		
Geophys	03/16/00	Thu	D	83 0	15:30	18 00			0 0	2 30		Neutron tool out of hole - RIH with Magnetic Resonance tool		
Geophys	03/16/00	Thu	N	83 5	18 00				0 0			Magnetic resonance tool out of hole		
Geophys	03/16/00	Thu	N	83.5	22.00				0 0			Magnetic resonance tool out of hole		
Geophys	03/16/00	Thu	N	83 5	22.15				0 0			RIH with Microimager/ Deviation tool		
Geophys	03/16/00	Thu	N	83 5	23 50				0 0			Complete microimager/deviation tool		
Shift	03/16/00	Thu	N	83 5	0.10				0.0			Rig down and depart site		
Support	03/20/00	Mon	N	NA	10.45	12 30			0 0	1.45		Jon Marin & Rich Koch at well design meeting at Pueblo.		
Support	03/20/00	Mon	N	NA	5 00	5:15			0.0	0.15		Casey set up shive for open borehole DTW measurements.		
DTW	03/21/00	Tue	D	NA	8.45				0 0			Measured DTW at 1179 25' TOC - 0 9' stickup = 1178 35'; previous activity- geophysical logging on 3/16/00	1178 3	1902 5
Off load	03/22/00	Wed	D	84 0	8 00	14 00			0 0	6.00		Dynatec off loads tremie rods- 2,000' of H rods (100 rods) and 2,000' of AW rods (100 rods)		
Equip	03/23/00	Thu	D	85.0	6 00	9 00			0 0	3 00		Dynatec waiting on parts (seal for hydraulic motor)		
Repair	03/23/00	Thu	D	85.0	9 00	10 00			0 0	1.00		Crew to R-19 to start repair motor		
Support	03/23/00	Thu	D	85 0	11:15				0 0			JRM onsite		
DTBot	03/23/00	Thu	D	85 0	16 03				0 0			1885 09 - 0.9 - 1.5 = 1882.69, previous activity- DTW measurement on 3/21/00		1882 7
DTW	03/23/00	Thu	D	85 0	16 32				0 0			1179 6 - 0 9 = 1178 7; previous activity- DTW measurement on 3/21/00	1178 7	

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tally	03/23/00	Thu	D	85 0		0 00			0 0	0.00		Rod tally = 103 B rods onsite including 14 footer and 94 A rods including 12 footer		
Dynatec	03/24/00	Fri	D	NA					0 0			Dynatec safety training day		
Trip In	03/25/00	Sat	D	86 0	8.00	11:00	0.0	1840 0	1840.0	3 00	613 3	Tripped in B rod tremie line + pipe tally 92 rods = 1840' minus 2' stick up =1838 GS		
DTW	03/25/00	Sat	D	86 0	11:00	12.00			0 0	1:00		Measured DTW at 1183.1 minus 4 5' stickup	1178 6	
Lunch	03/25/00	Sat	D	86 0	12.00	12:30			0.0	0:30		Lunch		
Trip In	03/25/00	Sat	D	86 0	12:30	15:30	0 0	1820.0	1820 0	3.00	606.7	Tripped in A rod tremie line + pipe tally 91 rods = 1820 minus 5.4 ' stick up		
H&S	03/25/00	Sat	D	86 0	15:30	18 00			0 0	2.30		Housekeeping		
Shift	03/26/00	Sun	D	87.0	6.00	7.00			0 0	1:00		FSF		
Support	03/26/00	Sun	D	87.0	7.00	10.00			0 0	3 00		JRM to SAIC to make electronic spreadsheet of well design for use onsite.		
Enroute	03/26/00	Sun	D	87.0	7.00	7:30			0.0	0.30		Dynatec to R-19 to wash SS blank ends.		
Tailgate	03/26/00	Sun	D	87.0	7:30	7.45			0.0	0:15		Tailgate and safety inspections.		
Support	03/26/00	Sun	D	87.0	10.00				0.0			JRM onsite		
Prep	03/26/00	Sun	D	87.0	7:45	12.00			0 0	4.15		Wash SS well casing		
Lunch	03/26/00	Sun	D	87.0	12.00	12.30			0 0	0.30		Lunch		
Dynatec	03/26/00	Sun	D	87.0	13:10	17:30			0 0	4 20		Bill Rixey and Dave Foreman onsite		
Install	03/26/00	Sun	D	87.0	12.30	12.45			0 0	0.15		Hung first piece w/welded cap		
Tally	03/26/00	Sun	D	87.0	12:45	14 00			0.0	1:15		Ruined threads on female coupler		
Well	03/26/00	Sun	D	87.0	14 00	18 00			0 0	4 00		Measured all stainless steel well components to 0.01"; numbered all components for installation.		
Equip	03/27/00	Mon	D	88 0	6 00	8.50			0.0	2.50		At TA-15 getting plate		
Arrive	03/27/00	Mon	D	88 0	8.50				0.0			Onsite		
Equip	03/27/00	Mon	D	88.0	9.50	10.20			0.0	0 30		Casey to FSF to get one AW rod to sound DTBOT		
Prep	03/27/00	Mon	D	88 0	9.50	10 30			0 0	0:40		Alex and Roland clean up screens		
H&S	03/27/00	Mon	D	88 0	10.30	11:00			0 0	0.30		Doug Barney onsite		
Install	03/27/00	Mon	D	88 0					0.0			Applied liquid Teflon on all SS threads.		
DTBOT	03/27/00	Mon	D	88 0					0.0			DTBOT w/ tremie = 1885 minus 5 = 1880 GS		1880.0
Install	03/27/00	Mon	D	88 0	11:00				0.0			Attach lifting bail to cap piece (8' SS blank with welded cap).		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Install	03/27/00	Mon	D	88 0	11:04				0.0			Lower end cap through table		
Install	03/27/00	Mon	D	88 0					0 0			Connect SS blank T-1 (T stands for ten foot approximate length)		
Install	03/27/00	Mon	D	88 0	11:19				0 0			Lower SS blank T-1 through table		
Install	03/27/00	Mon	D	88 0	11:25				0.0			Raise SS blank 50 to mast (whole number well items are approximate 20' long SS blanks)		
Install	03/27/00	Mon	D	88.0	11:27				0 0			Place centralizer C-1 on SS blank 50.		
Install	03/27/00	Mon	D	88 0	11:28				0 0			Connect SS blank 50		
Install	03/27/00	Mon	D	88 0	11:34				0.0			Lower SS blank 50 through table		
Weld	03/27/00	Mon	D	88 0					0 0			Prep to weld centralizer C-1 below screen S-1		
Install	03/27/00	Mon	D	88 0	11:40				0 0			Lower centralizer C-1 through table - hung on tremie		
Install	03/27/00	Mon	D	88 0	11.42				0 0			Raise screen S-1 to mast (screen # 7)		
Install	03/27/00	Mon	D	88 0	11.44				0 0			Connect screen S-1		
Weld	03/27/00	Mon	D	88 0	11.50				0 0			Weld centralizer C-1 w/ lop abutting collar below screen #7.		
Install	03/27/00	Mon	D	88 0	11.55				0 0			Lower screen S-1 through table		
Install	03/27/00	Mon	D	88 0	12.01				0 0			Raise SS blank 49 to mast.		
Install	03/27/00	Mon	D	88 0	12.03				0 0			Place centralizer C-2 on SS blank 49		
Install	03/27/00	Mon	D	88 0	12.05				0.0			Connect SS blank 49		
Install	03/27/00	Mon	D	88 0	12 08				0.0			Weld centralizer C-2 atop screen S-1 collar.		
Install	03/27/00	Mon	D	88 0	12.14				0 0			Lower SS blank 49 through table		
Install	03/27/00	Mon	D	88.0	12.19				0 0			Raise SS blank 48 to mast.		
Install	03/27/00	Mon	D	88 0	12 22				0 0			Connect SS blank 48.		
Install	03/27/00	Mon	D	88 0	12 24				0 0			Lower SS blank 48 through table		
Install	03/27/00	Mon	D	88 0	12 27				0 0			Raise SS blank 47 to mast		
Install	03/27/00	Mon	D	88 0	12 28				0 0			Connect SS blank 47		
Install	03/27/00	Mon	D	88 0	12 34				0.0			Lower SS blank 47 through table		
Install	03/27/00	Mon	D	88.0	12 39				0 0			Raise SS blank 46 to mast		
Install	03/27/00	Mon	D	88 0	12.44				0 0			Connect SS blank 46		
Install	03/27/00	Mon	D	88 0	12.47				0 0			Lower SS blank 46 through the table		
Install	03/27/00	Mon	D	88 0	12.54				0 0			Raise SS blank 45 to mast		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Install	03/27/00	Mon	D	88.0	12:56				0.0			Place centralizer C-3 on SS blank 45, to be below S-2		
Install	03/27/00	Mon	D	88.0	13:00				0.0			Connect SS blank 45		
Install	03/27/00	Mon	D	88.0	13:09				0.0			Lower SS blank 45 through table		
Install	03/27/00	Mon	D	88.0	13:16				0.0			Raise screen S-2 to mast.		
Install	03/27/00	Mon	D	88.0	13:18				0.0			Connect screen S-2		
Weld	03/27/00	Mon	D	88.0	13:20				0.0			Weld C-3 below screen S-2.		
Install	03/27/00	Mon	D	88.0	13:26				0.0			Lower screen S-2 through table.		
Lunch	03/27/00	Mon	D	88.0	13:28	14:05			0.0	0:37		Lunch		
Install	03/27/00	Mon	D	88.0	14:05	14:19			0.0	0:14		Raise SS blank 44 to mast		
Install	03/27/00	Mon	D	88.0	14:20				0.0			Place centralizer C-4 atop screen S-2.		
Install	03/27/00	Mon	D	88.0	14:21				0.0			Connect SS blank 44		
Equip	03/27/00	Mon	D	88.0	14:30	15:00			0.0	0:30		Casey to TA 15 to get set of Allen wrenches; Alex, Roland, JRM onsite		
Support	03/27/00	Mon	D	88.0	14:40	15:00			0.0	0:20		JRM offsite to get well design diagram from Bob Hull.		
Install	03/27/00	Mon	D	88.0	15:00	17:00			0.0	2:00		Added SS blanks 45 through 38, then screen S-3 with centralizer below S-3		
Install	03/27/00	Mon	D	88.0	17:00	19:00			0.0	2:00		Added centralizer atop S-3, SS blanks 37 to 30, SS blank T-2, and centralizer below screen S-4.		
Install	03/27/00	Mon	D	88.0	19:00	19:20			0.0	0:20		Raised screen S-4 to mast and connected		
Shift	03/27/00	Mon	D	88.0	19:20				0.0			End shift, S-4 in mast		
Arrive	03/28/00	Tue	D	89.0	7:15				0.0			Onsite		
Install	03/28/00	Tue	D	89.0	7:30	12:30			0.0	5:00		Installed to SS blank 12.		
Lunch	03/28/00	Tue	D	89.0	12:30	12:45			0.0	0:15		Lunch		
Install	03/28/00	Tue	D	89.0	12:45	14:00			0.0	1:15		Installed to screen S-10		
Off load	03/28/00	Tue	D	89.0	14:00	15:00			0.0	1:00		Offloaded 30 more SS blank casings; measured, logged, and numbered.		
Supplies	03/28/00	Tue	D	89.0	15:00	16:00			0.0	1:00		To FSF to get more screen and SS blanks		
Install	03/28/00	Tue	D	89.0	16:00	17:45			0.0	1:45		Installed to SS blank T-4 below screen #1 (highest screened interval in well).		
Enroute	03/29/00	Wed	D	90.0	6:00	6:30			0.0	0:30		Crew to R-19		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	03/29/00	Wed	D	90.0	6.30	14.00			0.0	7.30		Casey not comfortable using the quick trip mechanism so put together tools to use top drive to lower well		
Equip	03/29/00	Wed	D	90.0	10.00				0.0			To FSF to get subs		
Lunch	03/29/00	Wed	D	90.0	12.00	12.30			0.0	0.30		Lunch		
Equip	03/29/00	Wed	D	90.0	14.00	14.00			0.0	0.00		Complete change out to stronger lifting system		
Shift	03/29/00	Wed	N	91.0	18.40	19.15			0.0	0.35		Night shift arrives at R-19, Darrol discusses with Casey plan for night shift		
Prep	03/29/00	Wed	N	91.0	18.40	19.00			0.0	0.20		Helper pressure washes the remaining well casing.		
Repair	03/29/00	Wed	N	91.0	18.50	19.30			0.0	0.40		Repair flat tire on day shift crew vehicle.		
Install	03/30/00	Thu	N	91.0	19.30	0.00			0.0	4.30		Trip in remaining casing		
Install	03/30/00	Thu	N	91.0	0.00	1:30			0.0	1:30		Finished installing well components. Have called Jon Marin and discussed with driller options on stick up		
Install	03/30/00	Thu	N	91.0	0.01				0.0			• resolve to leave last casing until Jon Marin arrives in AM to determine final stickup.		
Load	03/30/00	Thu	N	91.0	1:30	2.00			0.0	0.30		Depart to FSF to load well completion supplies- all leave as no trailer generator- all equip off and secure		
Lunch	03/30/00	Thu	N	91.0	2.00	2.30			0.0	0.30		Lunch		
Load	03/30/00	Thu	N	91.0	2.30	4.30			0.0	2.00		FSF load supplies at FSF and depart to R-19		
Arrive	03/30/00	Thu	N	91.0	4:30	4.50			0.0	0.20		Arrive at R-19		
Dynatec	03/30/00	Thu	N	91.0	4.50				0.0			Jon Marin onsite- discuss stick up options • Darrol explains the extra stick up is so small that could not support the weight of well stem;		
Dynatec	03/30/00	Thu	N	91.0	4.51				0.0			Marin determines to raise the well up so bottom of SS collar is level with top of 13" casing. ~ 1' above ground surface.		
Install	03/30/00	Thu	N	91.0	4.55	5.00			0.0	0.05		Drillers pull up the casing approx. 1 ft		
Support	03/30/00	Thu	N	91.0	5.00	5.00			0.0	0.00		Goetz departs		
Weld	03/30/00	Thu	D	92.0	6.00	6.20			0.0	0.20		Drillers weld the bottom of the SS collar to a 1.5" thick skillet plate atop the 13" casing suspended by the hydraulic casing jacks		
Enroute	03/30/00	Thu	D	92.0	7.00	7.20			0.0	0.20		To R-19		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
DTscr	03/30/00	Thu	D	92.0	7:30				0.0			Measure stick up at 1.65' above ground surface: screen 7 = 1839.5 - 1832.4'; screen 6 = 1733.9' - 1726.8'; screen 5 = 1589.8 - 1582.6';		
DTscr	03/30/00	Thu	D	92.0	7:31				0.0			screen 4 = 1417.4 - 1410.2'; screen 3 = 1215.4 - 1171.4'; screen 2 = 909.6 - 893.3'; screen 1 = 843.6 - 827.2'		
Prep	03/30/00	Thu	D	92.0	8:00	16:00			0.0	8:00		Set up to tremie		
Tally	03/30/00	Thu	D	92.0	16:00				0.0			B rods 1860 tally is 1853' ground surface; A rods1860 tally is 1854.7' ground surface; total pipe tally 102 B rods + 10'er and 94 A rods + 5' er		
Prep	03/30/00	Thu	D	92.0	16:00				0.0			Prep to pour 15 bags of HOLEPLUG		
Tremie	03/30/00	Thu	D	92.0	16:30	18:30			0.0	2:00		tremie 9 bags of HOLEPLUG w.EZ-MUD		
Tally	03/30/00	Thu	D	92.0			1853.0		1853.0			B rod at 1860 tally or 1853 ' gs;		
Tally	03/30/00	Thu	D	92.0			1854.7		1854.7			A rods at 1860 tally at 1854.7gs		
Sound	03/30/00	Thurs	N	93.0	18:42							Sounded 6.45 on A rod tremie		1661.2
Trip out	03/30/00	Thurs	N	93.0	19:15	19:20	1853.0	1843.0	10.0	0:05	120.0	Drillers pull 10' B rods		
Trip out	03/30/00	Thurs	N	93.0	19:20	19:25	1854.7	1834.7	20.0	0:05	240.0	Pull 20' A rod		
Support	03/30/00	Thurs	N	93.0	19:20				0.0			Marin off site		
Water	03/30/00	Thurs	N	93.0	19:40	21:05			0.0	1:25		Off site to fill water truck		
Tremie	03/30/00	Thurs	N	93.0	21:08	22:05			0.0	0:57		Add 8 bags of HOLEPLUG - total 23 bags		
Hydrate	03/30/00	Thurs	N	93.0	22:05	22:09			0.0	0:04		HOLEPLUG settles -		
Sound	03/30/00	Thurs	N	93.0	22:09				0.0			Tag - A rods at 1834.7, add (1) 20' stem = 1854.7'		1875.7
Trip in	03/30/00	Thurs	N	93.0					0.0			Add second 20' stem - 1874.7'		
Trip in	03/30/00	Thurs	N	93.0	22:30		1875.7					Add 5' stem ; tags 1' on 5'er		
Trip out	03/30/00	Thurs	N	93.0	22:30		1834.7		1834.7			Remove A rods to reset at 1834.7'		
Prep	03/30/00	Thurs	N	93.0	22:30	22:50			0.0	0:20		Pow wow		
Tremie	03/30/00	Thurs	N	93.0	22:50	0:20			0.0			Pour 11 bags HOLEPLUG.		
Crew	03/30/00	Thurs	N	93.0	23:20				0.0			Darrol departs		
Hydrate	03/31/00	Fri	N	93.0	0:20				0.0			11 bags added (total 34)- Goetz asks drillers to let settle and tag as concerned that tremie lines have been plugging and wants to confirm rate of bentonite climb		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Lunch	03/31/00	Fri	N	93 0	0 30	1.00			0 0	0.30		Lunch		
Sound	03/31/00	Fri	N	93 0	1.00	1 22	1867.0		1867.0	0 22	5091.8	Tag - A rods at 1834.7, add (2) 20' stem = 1874.7' minus 7.7' = 1867'		1867.0
Tremie	03/31/00	Fri	N	93 0	1:22	1:30			0 0	0 08		Cont added HOLEPLUG - driller adds 2 bags of 20/40 sand to try and clear lines		
Tremie	03/31/00	Fri	N	93 0	1.30	3 05			0 0	1:35		Add 10 bags of HOLEPLUG (total 44) ; after 6 bags driller adds 1 bag of 30/70 to clear lines		
Tremie	03/31/00	Fri	N	93 0	1:30	3 05			0 0	1:35				
Sound	03/31/00	Fri	N	93 0	3.15	3.40			0 0	0 25		Sounding - add 40' A rod = 1874 7; sounding 1 = 1874.7 - 9 3' = 1865 3'; sounding 2= 1874.7 - 5 1' = 1869 6'.		1869 6
Tremie	03/31/00	Fri	N	93 0	3.40	4 00			0 0	0 20		Add 3 bags of HOLEPLUG (total 47 bags) and		
Tremie	03/31/00	Fri	N	93.0	4 00	4 30			0 0	0.30		Add 2 bags of 20/40 sand (total 5 bags of sand)		
Water	03/31/00	Fri	N	93 0	4 30				0.0			Drillers depart to fill water truck and to load supplies at FSF		
Shift	03/31/00	Fri	D	94 0	5 00				0 0			Jon Marin onsite, pass down from Cath G		
Prep	03/31/00	Fri	D	94 0	5 30	6 20			0 0	0.50		Figure out stemming		
Crew	03/31/00	Fri	D	94.0	6 20				0 0			Dynatec crew onsite; Darrel , Rodney, Juan		
Sound	03/31/00	Fri	D	94 0	7.10				0 0			Sound w/ A line - 1854 7+1.25'= 1855 95		1856 0
Trip out	03/31/00	Fri	D	94 0			1856 0	1834 7	21.3			Raise A line		
Prep	03/31/00	Fri	D	94 0					0 0			Prepped to tremie 4 bags of HOLEPLUG w/ EZ-MUD		
Tremie	03/31/00	Fri	D	94 0					0.0			Tremied 4 bags HOLEPLUG		
Sound	03/31/00	Fri	D	94 0					0 0			Sound at 1854 7 + 15'=1854 7+1 25		1855 6
Chase	03/31/00	Fri	D	94 0	7.55	8 07			0 0	0.12		Pumped 250 gals of EZ-MUD to confirm that B rod is clear		
Borehole	03/31/00	Fri	D	94 0					0 0			Pressured up after 170 gals then down indicates that HOLEPLUG didn't make it out B tremie		
Prep	03/31/00	Fri	D	94 0	8 07				0 0			Prepped to sound		
Crew	03/31/00	Fri	D	94 0	8.15	8 35			0 0	0 20		All personnel to Access control & Dynatec to TA-15		
Sound	03/31/00	Fri	D	94 0	8 40				0 0			Sound 1854.7 + 3 33		1858 0
Prep	03/31/00	Fri	D	94 0					0 0			Prep to tremie 2 bags of 6/9 sand		
Tremie	03/31/00	Fri	D	94 0	8 56	9 00			0 0	0 04		Tremied 2 bags of 6/9 sand		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tremie	03/31/00	Fri	D	94.0	9.00	9.20			0.0	0.20		Tremied 4 bags of HOLEPLUG w/ EZ-MUD		
Chase	03/31/00	Fri	D	94.0	9.20	9.31			0.0	0:11		Pumped 250 gals to chase		
Sound	03/31/00	Fri	D	94.0	9.31				0.0			Prepped to sound- table at 4.5 ags, stickup 1.7, 1860.6 2=1853.8'		1853.8
Trip In	03/31/00	Fri	D	94.0			1833.8	1853.8	20.0			Lowered sound from 1833.8		
Tag	03/31/00	Fri	D	94.0			1853.8	1865.7	11.9			Lowered Tremie sound 1853.8 + 11.88 = 1865.7		1865.7
Prep	03/31/00	Fri	D	94.0					0.0			Prepped to tremie 6 bags of 6/9 sand		
Support	03/31/00	Fri	D	94.0	9.50	10.00			0.0	0.10		Marin to A.C to call Joe - Shafer and Poweres want to go to R-31 tomorrow, up date 1812		
Tremie	03/31/00	Fri	D	94.0	9.58	10.15			0.0	0.17		Tremied 6 bags of 6/9 sand		
Prep	03/31/00	Fri	D	94.0			1834.0	1854.0	20.0			Lowered sounder		
Sound	03/31/00	Fri	D	94.0	10.28							Sound		1866.4
Trip out	03/31/00	Fri	D	94.0			1866.4	1854.0	12.4			Raise sounder		
Trip out	03/31/00	Fri	D	94.0			1854.0	1834.0	20.0			Raise sounder		
Dynatec	03/31/00	Fri	D	94.0	10.30	13.23			0.0	2.53		Dave Foreman onsite		
Prep	03/31/00	Fri	D	94.0					0.0			Prep to tremie 15 bags of HP		
Tremie	03/31/00	Fri	D	94.0	10.42				0.0			Tremied 3/4 bag of 1 bag of HOLEPLUG w/EZ-MUD		
Plugged	03/31/00	Fri	D	94.0					0.0			B tremie line is plugged		
Plugged	03/31/00	Fri	D	94.0	11:29				0.0			Hooked onto B rod to raise and lower		
Tally	03/31/00	Fri	D	94.0								B rods at 1863		
Tally	03/31/00	Fri	D	94.0								A rods at		
Tremie	03/31/00	Fri	D	94.0	11:50	12.00			0.0	0:10		Tremied 2 bags 6/9 sand to clean out lines		
Tremie	03/31/00	Fri	D	94.0	12.00	12.45			0.0	0:45		Tremied 10 bags of HP		
Sound	03/31/00	Fri	D	94.0	13.10				0.0			Sound 1834+2.7 = 1836.7--centralizer		1836.7
Sound	03/31/00	Fri	D	94.0					0.0			Sound 1843 +13.8 w/ B rods		1856.8
Tremie	03/31/00	Fri	D	94.0					0.0			Tremied 3 bags of HP		
Water	03/31/00	Fri	D	94.0					0.0			Out of water		
Water	03/31/00	Fri	D	94.0	15:10				0.0			Dyn offsite		
Crew	03/31/00	Fri	D	94.0	15:15				0.0			All personnel to FSF		
Repair	03/31/00	Fri	D	94.0	17:30				0.0			Day shift has made Repair to water truck		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Shift	03/31/00	Fri	N	95.0	17:30	18 00			0 0	0.30		Night crew (Scott, Alex) discuss well with day crew		
Enroute	03/31/00	Fri	N	95.0	18.00	18 30			0 0	0 30		Enroute		
Tailgate	03/31/00	Fri	N	95.0	18 30	19 00			0.0	0 30		Arrive at R-19, warm equipment- snowing; tailgate- strategy for 1st part of shift covered		
Plugged	03/31/00	Fri	N	95 0	19.50				0.0			Driller informs B rods are plugged- unable to get lines open		
Dynatec	03/31/00	Fri	N	95 0					0 0			Driller calls for info from Dave Foreman -		
Plugged	03/31/00	Fri	N	95 0					0 0			Lines still plugged		
Tally	03/31/00	Fri	N	95 0					0.0			Foreman calls and asks for a rod count. A rods appear consistent with the tally count and where we should be in hole; B rods are inconsistent		
Trip out	03/31/00	Fri	N	95 0					0.0			Pulled 30 ft of B rods from where day shift end level		
Plugged	03/31/00	Fri	N	95 0					0 0			Reattempt to blow open		
Lunch	04/01/00	Sat	N	95 0	0.00	0.40			0.0	0.40		Lunch		
Sound	04/01/00	Sat	N	95 0	0.50	1:00			0.0	0.10		Tag hole to try and determine where A and B rod are		1838 0
Tally	04/01/00	Sat	N	95 0					0.0			Currently A's are 1834 according to rod count and day shift numbers; B rods are 30ft back from end of day shift - Goetz reviews differing tallies and options on rods depths		
Sound	04/01/00	Sat	N	95.0	1:10				0 0			Tag A rods for comparison		1838 8
Sound	04/01/00	Sat	N	95 0					0 0			Sounding tagged @ 1838 4, then able to push down additional 9' to 1847.4'		1847.4
Trip out	04/01/00	Sat	N	95 0	1:40				0 0			Pull back A rods and pumped to check if plugged		
Borehole	04/01/00	Sat	N	95 0					0.0			Clear- driller not sure if pushed into bentonite or past a centralizer		
Sound	04/01/00	Sat	N	95 0	1:45	2.07			0 0	0 22		Resound		1839 5
Plugged	04/01/00	Sat	N	95.0		2 20			0.0	2 20		A rods are plugged		
Unplug	04/01/00	Sat	N	95 0	2.07	2 20			0 0	0.13		Unplugged		
Tally	04/01/00	Sat	N	95 0	2 20	2.40			0 0	0 20		Reset A rods to 1834'		
Borehole	04/01/00	Sat	N	95 0	2.45				0 0			Driller feel B rods are 30' higher that where left by day shift - uncertainty about depth of rods		
Support	04/01/00	Sat	D	96 0	5 00	6 00			0.0	1 00		JRM to R-19 to collect FTL logs		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Meeting	04/01/00	Sat	D	96.0	6.00	8.00			0.0	2.00		Strategy meeting at FSF		
Enroute	04/01/00	Sat	D	96.0	8.00	8.30			0.0	0.30		Enroute; Darrol, Juan, Rodney, JRM		
Borehole	04/01/00	Sat	D	96.0	8.50				0.0			Darrol reports no water in B tremie line		
Plugged	04/01/00	Sat	D	96.0	9.10	9.20			0.0	0.10		Pumping on B rod, pressures up but moving plug		
Plugged	04/01/00	Sat	D	96.0	9.45				0.0			Tagged plug B rods at 1777' bgs; 1783 TOC		
Support	04/01/00	Sat	D	96.0	10.00	10.45			0.0	0.45		Pump with mud hog and pressure washer		
Plugged	04/01/00	Sat	D	96.0	10.50				0.0			Tagged plug B rods at 1777' bgs; 1783 TOC		
Prep	04/01/00	Sat	D	96.0					0.0			Prep to sound with plugged B tremie		
Sound	04/01/00	Sat	D	96.0	13:10				0.0			Sound plug in B rods at 1777'		
Equip	04/01/00	Sat	D	96.0					0.0			A rod is clear		
Sound	04/01/00	Sat	D	96.0					0.0			Sound with A rod		
Trip out	04/01/00	Sat	D	96.0	13.35	13.40			3.0	0.05	36.0	Raised A tremie from 1837.2 to 1834.7'		
Prep	04/01/00	Sat	D	96.0	13.40	14.00			0.0	0:20		Prep to tremie 10 bags of 30/70 sand		
Dynatec	04/01/00	Sat	D	96.0	11:15	14.00			0.0	2.45		Dave Foreman onsite		
Tremie	04/01/00	Sat	D	96.0	14:00	15:00			0.0	1:00		Tremied 10 bags of 30/70 sand		
Sound	04/01/00	Sat	D	96.0	15.00				2.5			Sound at 1837.4 = centralizer		1837.4
Tremie	04/01/00	Sat	D	96.0					0.0			Tremied 5 bags of 20/40 sand		
Sound	04/01/00	Sat	D	96.0	15:45				0.0			Sound at 1837.4 = centralizer		1837.4
Tremie	04/01/00	Sat	D	96.0					0.0			Tremied 0.5 bags of 20/40 sand		
Plugged	04/01/00	Sat	D	96.0					0.0			AW tremie plugged		
Unplug	04/01/00	Sat	D	96.0					0.0			Pump clear		
Sound	04/01/00	Sat	D	96.0	15.55				0.0			Sound at 1834.7 + 1.05 = 1835.8'		1835.8
Prep	04/01/00	Sat	D	96.0					0.0			Prep to tremie 11 bags of 20/40		
Sound	04/01/00	Sat	D	96.0					0.0			Sound 1814.7 +16.34= 1831.04		1831.0
Prep	04/01/00	Sat	D	96.0					0.0			Prep to tremie 5 bags of 20/40 and 5 bags of 30/70		
Tremie	04/01/00	Sat	D	96.0					0.0			Tremie 5 bags of 20/40 and 5 bags of 30/70		
Tremie	04/01/00	Sat	D	96.0					0.0			Tremie 5 bags of 20/40 and 5 bags of 30/70		
Shift	04/01/00	Sat	D	96.0	18.30				0.0			Meet shift on way out - no escorts		
Shift	04/01/00	Sat	N	97.0	19.00	19.30			0.0	0.30		FSF - Darrol, Goetz, Scott - cover strategy for night		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Water	04/01/00	Sat	N	97.0	19:30	20:00			0.0	0.30		Fill water truck		
Tailgate	04/01/00	Sat	N	97.0	20:20	20:30			0.0	0.10		Arrive R-19, warm equipment and tailgate		
Sound	04/01/00	Sat	N	97.0	20:35				0.0			Tag A rod, add 1 stem 1840 tally		1824.6
Prep	04/01/00	Sat	N	97.0					0.0			Prep to tremie 2 bags 30/70		
Tremie	04/01/00	Sat	N	97.0	20:45	20:50			0.0	0.05		Tremie 2 bags of 30/70		
Escort	04/01/00	Sat	N	97.0					0.0			Escort arrives		
Sound	04/01/00	Sat	N	97.0	20:52				0.0			Sound using A rods -		1322.6
Sound	04/01/00	Sat	N	97.0					0.0			Sound using B rods		1823.1
Tally	04/01/00	Sat	N	97.0					0.0			Tally A's and B's should both be at 1820'		
Prep	04/01/00	Sat	N	97.0	21:30				0.0			Prep to tremie Pel Plug		
Safety	04/01/00	Sat	N	97.0	21:30	21:45			0.0	0.15		Inspect fire extinguishers, eyewash, elect cords in use		
Tremie	04/01/00	Sat	N	97.0	21:45	22:10			0.0	0.25		Tremie Pel Plug - 5 buckets		
Chase	04/01/00	Sat	N	97.0	22:10	22:30			0.0	0.20		Pump fluid		
Sound	04/01/00	Sat	N	97.0	22:33	22:38			0.0	0.05		Sound on B rods		1817.4
Prep	04/01/00	Sat	N	97.0	22:50	23:05			0.0	0:15		Strategy		
Tremie	04/01/00	Sat	N	97.0	23:05	0:00			0.0	0.55		Tremie 3 bags of HOLEPLUG		
Lunch	04/02/00	Sun	N	97.0	0:00	0:50			0.0	0.50		Tremie 3 bags of HOLEPLUG		
Lunch	04/02/00	Sun	N	97.0	0:50	1:20			0.0	0:30		Lunch		
Tremie	04/02/00	Sun	N	97.0	1:20				0.0			Resume tremie of HOLEPLUG		
Water	04/02/00	Sun	N	97.0	2:05	3:15			0.0	1:10		Depart to get water, fuel and supplies (6/9)		
Tremie	04/02/00	Sun	N	97.0	3:15				0.0			Tremie 2 bags of 6/9 sand		
Tremie	04/02/00	Sun	N	97.0	3:40				0.0			Tremie 2.5 bags of HOLEPLUG		
Sound	04/02/00	Sun	N	97.0	4:15				0.0			Attempt to sound -failed- uncertain		
Tally	04/02/00	Sun	N	97.0								Reset B rods to 1800 tally		
Tremie	04/02/00	Sun	N	97.0	4:30				0.0			Tremie 2 bags of 6/9 sand		
Tremie	04/02/00	Sun	N	97.0	4:30				0.0			Resume tremie of holeplug		
Plugged	04/02/00	Sun	N	97.0	4:45				0.0			Started plugging - pumped open		
Tremie	04/02/00	Sun	N	97.0	4:50	5:30			0.0	0.40		Resume tremie of Holeplug - tenth bag since Pelplug		
Plugged	04/02/00	Sun	N	97.0	5:30				0.0			Open 11th bag and plugs off - unplugged		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Timeshift	04/02/00	Sun	N	97.0					0.0			Daylight savings + 5:30 = 6:30		
Shift	04/02/00	Sun	D	98.0	6:30				0.0			Day shift arrives		
Shift	04/02/00	Sun	D	98.0	6:45				0.0			Pull 2 B rods and 1 A rod		
Support	04/02/00	Sun	D	98.0	7:30				0.0			Trueblood arrives + FTL exchange		
Water	04/02/00	Sun	D	98.0	7:45	8:45			0.0	1:00		All depart to FSF and for water		
Tremie	04/02/00	Sun	D	98.0	8:45	9:40			0.0	0:55		Pumped down a bag of sand to clear A rods. tremie in for sounding		
Sound	04/02/00	Sun	D	98.0	9:40							Sounded to 1828.3', 1828.3' + 6' (stickup) = 1822.3'. Pulled back A rods to 1754.9'.		1822.3
Tremie	04/02/00	Sun	D	98.0	9:40	11:15			0.0	1:35		Add a total of 6 bags of HOLEPLUG. Continue pumping water. A rods are plugged. Pumped approximately 1000 gls of water. Hole remains plugged.		
Plugged	04/02/00	Sun	D	98.0	11:15	12:30			0.0	1:15		Crew continues to try and unplug hole.		
Dynatec	04/02/00	Sun	D	98.0	12:00	12:30			0.0	0:30		Hutton onsite.		
Dynatec	04/02/00	Sun	D	98.0	12:30				0.0			Hutton and driller offsite to talk to Dave Foreman about problem with hole.		
Break	04/02/00	Sun	D	98.0	12:30	13:15			0.0	0:45		Crew breaks.		
Dynatec	04/02/00	Sun	D	98.0	13:15	13:35			0.0	0:20		Darrol returns from FSF. Foreman says to continue to unplug. If it won't unplug Trip out A rods.		
Plugged	04/02/00	Sun	D	98.0	13:35	14:52			0.0	1:17		A rods won't clear. Darrol offsite to call Forman again.		
Trip out	04/02/00	Sun	D	98.0	14:55	17:25			0.0	2:30		Begin tripping out A rod. Pulled 44 rods.		
Shift	04/02/00	Sun	D	98.0	17:30				0.0			Offsite to FSF.		
									0.0					
Shift	04/02/00	Sun	N	99.0	17:30				0.0			Night shift meets day shift at gate- discuss strategy; night shift has no provided escorts, discuss getting one with day shift escorts- Goetz to escort		
Trip out	04/02/00	Sun	N	99.0	18:00	19:50	680.0	0.0	680.0	1:50	370.9	Complete tripping out A rods		
Plugged	04/02/00	Sun	N	99.0					0.0			Rods were intermittently plugged and unplugged - last section was plugged with sand		
Tally	04/02/00	Sun	N	99.0					0.0			A rod count by Goetz and Devers - 94 + one 5' rod		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Unplug	04/02/00	Sun	N	99 0		21:30			0 0	21:30		unplug A rods on deck		
Trip In	04/02/00	Sun	N	99 0	21.30	0 00			0.0			Trip In A rods into B rods		
Lunch	04/03/00	Mon	N	99.0	0:10	0.40			0.0	0 30		Break for lunch		
Trip In	04/03/00	Mon	N	99.0	0.40	1.50				1:10	1491.4	complete tripping in A rods into B rods		
Sound	04/03/00	Mon	N	99 0								Tagged plug at approx 1745'		
Unplug	04/03/00	Mon	N	99 0	1.50	1.55				0 05		Pump out material in B rods by pumping into A rods		
Unplug	04/03/00	Mon	N	99 0	1.55	2.45				0 50		Add additional A rod to work inside B rods- continue pumping out material in B rods -last of plug washed out		
Unplug	04/03/00	Mon	N	99 0	2.45	2.53				0.08		Add additional A rod and flush out lines		
Unplug	04/03/00	Mon	N	99 0	2.53	2.55				0 02		Add additional A rod and flush out lines		
Prep	04/03/00	Mon	N	99.0	2.55	3 00			0.0	0 05		Set up to Trip out A rods		
Trip out	04/03/00	Mon	N	99 0	3.15	6.00	1800.0	0.0	1800 0	2.45	654 5	Trip out A rods		
Shift	04/03/00	Mon	N	99 0	6 00	6 20			0.0	0 20		Day shift arrives - discuss strategy, fairly confident that B's are at 1760'; Darrell, Goetz and Scott return to yard to discuss strategy with Dave, Joe, mr. Eddy.		
Shift	04/03/00	Mon	N	99 0	6 30	7.00			0 0	0 30		FSF - Day shift will Trip In A's as tagging rod, and Joe will send out Gamma tool to confirm depth of B's		
Shift	04/03/00	Mon	D	100 0	7.15	7.20			0.0	0 05		Called FTL2 from access control. Night shift unplugged B rods. Geophysics trailer will be brought out to site for tagging B rod depth.		
Equip	04/03/00	Mon	D	100.0	7.35	8.50			0 0	1:15		Driller has helper cut a 45 degree piece for feading		
Trip In	04/03/00	Mon	D	100 0	7.35	8 50			0.0	1:15		A rod for a spear (19 6'-1st joint). Tripping in A rods. 26 rods downhole.		
Geophys	04/03/00	Mon	D	100 0		8 35			0.0	8 35		Koch and Martinez onsite with geophysics trailer.		
Geophys	04/03/00	Mon	D	100 0	8 50	10 00				1:10		Gamma tool indicates that B rods are a 1760'.		
Geophys	04/03/00	Mon	D	100 0	10 00	11:45			0.0	1:45		Gamma tool cleaned and loaded on trailer. Martinez and Koch offsite with geophysics trailer.		
Trip In	04/03/00	Mon	D	100 0	11.50				0 0			Crew continues tripping in A rod. Trueblood offsite.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Support	04/03/00	Mon	D	100.0		15:15				15:15		Pagers and phones down Lab wide. True/blood returns.		
Sound	04/03/00	Mon	D	100.0	16:13	16:30			0.0	0:17		Crew tagging bottom with sounder because A rods are plugged again. Tag depth at 1773'.		1773 0
Prep	04/03/00	Mon	D	100 0	16:35	17:02			0.0	0:27		Driller offsite. Crew is prepping to continue completion.		
Shift	04/02/00	Mon	D	100 0	17.02				0 0			offsite		
Tally	04/03/00	Mon	D	100 0	17:02							Rod Tally - A=94x20' & 1x10', B=2055' total @ 20' joined sections .		
Shift	04/03/00	Mon	N	101.0	17.30	18:15				0:45		FSF - strategy discussed with Day shift driller Darrol, and night shift Scott, Goetz. Mr. Eddy informs Scott to first tag plug A rod and call back. Recap from Day shift- A rods are at 1760' count of 94 + 10ar+5er; B rods- gamma indicates 17 60' in hole, T		
Plugged	04/03/00	Mon	N	101.0	19 00				0 0			Drillers tag the plug in the A rods at 1753'= 7'plug in A rods.		
Dynatec	04/03/00	Mon	N	101.0	19:15	19.40			0.0	0 25		Call Mr. Eddy and report.		
Prep	04/03/00	Mon	N	101.0	19.35	19.45			0.0	0:10		Set up to add 20/40 sand; 1840(last tag) - 1817.4(target 15' above screen) =22.6'		
Tremie	04/03/00	Mon	N	101.0	19.45	20 05			0.0	0 20		Add 6 bags- out of water		
Water	04/03/00	Mon	N	101.0	20.05	21:05			0.0	1:00		Fill water truck		
Prep	04/03/00	Mon	N	101.0	21:05	21:10			0.0	0.05		Set up to pour		
Tremie	04/03/00	Mon	N	101.0	21:10	21:45			0.0	0 35		Pour 24 bags of 20/40		
Chase	04/03/00	Mon	N	101.0	21:45	22:45			0.0	1:00		Flood with 1/2 truck of water		
Vol	04/03/00	Mon	N	101.0					0.0			Total 30 bags of sand added - projected 23' raise in hole		
Sound	04/03/00	Mon	N	101.0	22.45	23.00				0:15		Tag		1828.3
Trip out	04/03/00	Mon	N	101.0	23 00							Pull off one rod		
Water	04/03/00	Mon	N	101.0	23 00	0.00			0.0			Refill water truck		
Borehole	04/04/00	Tue	N	101.0	0.00				0.0			1827.5 - 1817.4 = 10' to reach target		
Prep	04/04/00	Tue	N	101.0	0.00				0 0			Water returns setup to pour		
Tremie	04/04/00	Tue	N	101.0	0.00	0:30			0 0	0 30		missed tag- pour 12 bags		
Sound	04/04/00	Tue	N	101.0	0.30							Tag		1829 0

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Trip out	04/04/00	Tue	N	101.0	0.30	0.35		1820.0	1820.0	0.05		Pull one rod		
Weld	04/04/00	Tue	N	101.0	0.35	0.45			0.0	0:10		Weld Funnel		
Tremie	04/04/00	Tue	N	101.0	0.45				0.0			Pour 1 bag - plugs		
Plugged	04/04/00	Tue	N	101.0	0.57	1.05			0.0	0.08		unplugged - flush		
Tremie	04/04/00	Tue	N	101.0	1:05	1:25			0.0	0.20		Pour 20/40, 17 bags		
Chase	04/04/00	Tue	N	101.0	1:30	1:40			0.0	0:10		Flush		
Sound	04/04/00	Tue	N	101.0	1:40	1:45				0.05		Tag		1820.0
Trip out	04/04/00	Tue	N	101.0	1.50							Pull one rod		
Chase	04/04/00	Tue	N	101.0	1.50	2.20			0.0	0.30		Flood 1/2 truck		
Water	04/04/00	Tue	N	101.0	2:20	3.40			0.0	1:20		Refill water truck		
Sound	04/04/00	Tue	N	101.0	3.40	3.45			0.0	0.05		Tag		1829.0
Prep	04/04/00	Tue	N	101.0	3.45	3.50			0.0	0.05		Set up to pour		
Tremie	04/04/00	Tue	N	101.0	3.50	4.22			0.0	0:32		pour 20 bags 20/40		
Chase	04/04/00	Tue	N	101.0	4.22	4.35			0.0	0:13		Flush and let settle		
Sound	04/04/00	Tue	N	101.0	4.35				0.0			Tag		1815.9
Chase	04/04/00	Tue	N	101.0	4:38	5:15			0.0	0.37		Flood then settle		
Water	04/04/00	Tue	N	101.0	5:15				0.0			Water truck refill		
Sound	04/04/00	Tue	N	101.0	5:20				0.0			Tag- not firm as sand has not settled- estimated at 1829 +/-		1829+/-
Tally	04/04/00	Tue	N	101.0	5:25							Leave 1840 'of A rods so day shift can retag		
Shift	04/04/00	Tue	N	101.0	5:25				0.0			Depart for FSF		
Support	04/04/00	Tues	D	102.0	6.20				0.0			JRM onsite; Catches up on daily reports		
Crew	04/04/00	Tues	D	102.0	6.42				0.0			Darrol and WT onsite		
Prep	04/04/00	Tues	D	102.0	6.55				0.0			Prepped to sound		
Sound	04/04/00	Tues	D	102.0	7.00				0.0			Sound 1840 minus 6' stickup		1834.0
Repair	04/04/00	Tues	D	102.0	7.00	14.00			0.0	7.00		Fix water truck; get spare water truck		
Crew	04/04/00	Tues	D	102.0	14.15				0.0			Dynatec onsite, Darrol, Rodney, Juan, JRM, Mike Brica escort		
Sound	04/04/00	Tues	D	102.0	14.25				0.0			Sound 1840 minus 6' stickup		1834.0
Tally	04/04/00	Tues	D	102.0					0.0			B rods = 1760 tally		
Prep	04/04/00	Tues	D	102.0					0.0			Prep to tremie		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tremie	04/04/00	Tues	D	102.0	14.50	16 05			0 0	1:15		Tremie 10 bags 20/40 & 6 5 bags 8/12		
Tremie	04/04/00	Tues	D	102.0	14.50	16 05			0.0	1:15				
Plugged	04/04/00	Tues	D	102.0	16 05				0 0			Tremie plugged at 1760 minus 6' stickup=1754'		
Trip out	04/04/00	Tues	D	102.0			1754.0	1734.0	20 0			Pulled back up B rod tremie		
Sound	04/04/00	Tues	D	102.0	16:30				0 0			Tag w/ A rod		1781 5
Sound	04/04/00	Tues	D	102.0					0 0			69 rods + 7.5' - 6 = 1781.5'		
Trip out	04/04/00	Tues	D	102.0					0.0			removed A rod		
Plugged	04/04/00	Tues	D	102.0					0 0			Pump on B rods, pressured up end of B rod at 1734		
Trip in	04/04/00	Tues	D	102.0					0.0			Added rod		
Trip in	04/04/00	Tues	D	102 0					0.0			Added A rod worked up and down to 1764'		
Sound	04/04/00	Tues	D	102.0					0 0			Mark A rod = 1820+ 12.2 - 6 = 1806 2'		1806 2
Plugged	04/04/00	Tues	D	102.0	17:45				0.0			Sound inside B rods w/ tape to 1733' to plug		
Tally	04/04/00	Tues	D	102.0								A tally=1800		
Tally	04/04/00	Tues	D	102.0								B tally 1740		
Shift	04/04/00	Tues	N	103 0	17:45				0.0			Night shift arrives - Scott, Alex, Sammy, Goetz		
Tailgate	04/04/00	Tues	N	103 0	17:45	18.05			0.0	0 20		Discuss w/day shift strategy; tailgate		
Unplug	04/04/00	Tues	N	103 0	18 05	18.40			0 0	0:35		Unplug B rods		
Trip in	04/04/00	Tues	N	103 0	19.00				0.0			Try to work down past centralizer		
Escort	04/04/00	Tues	N	103.0	19.00				0.0			Escort arrives		
Flood	04/04/00	Tues	N	103.0	19.30				0.0			Concern that hole has caved in- will flood		
Escort	04/04/00	Tues	N	103 0					0.0			Escort drove off without the water truck- depart to CdV to find her- secure site		
Oversight	04/04/00	Tues	N	103 0					0.0			Call Mr. Eddy at CdV trailer- escort was parked at CdV , takes water truck out		
Trip out	04/04/00	Tues	N	103 0	20 20							Return to R-19, pull back rods to 1740'		
Stuck	04/04/00	Tues	N	103.0								A rods stuck - 1800-13 - 5 = 1782'		
Sound	04/04/00	Tues	N	103.0					0.0			Able to pull free - retagged going down - material 1782'		
Water	04/04/00	Tues	N	103.0	20.40				0.0			Water truck returns with escort		
Trip out	04/04/00	Tues	N	103 0					0.0			Cont tripping to 1740' pull up & lower - likely hitting on centralizers		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Trip In	04/04/00	Tues	N	103.0					0.0			Add 1 B rod, flush		
Dynatec	04/04/00	Tues	N	103.0	21:10				0.0			Call Mr. Eddy report		
Flood	04/04/00	Tues	N	103.0	21:24				0.0			Pushed B rod easily past centralizer - perhaps flushed out material- flush		
Sound	04/04/00	Tues	N	103.0	21:30				0.0			1760-6=1754; Tag with B rods- pumping was plugging up- estimate material was at1754'		
Trip In	04/04/00	Tues	N	103.0	21:30							Add B rod		
Flood	04/04/00	Tues	N	103.0	22.10				0.0			Flood		
Fuel	04/04/00	Tues	N	103.0	22.10				0.0			Fuel vehicles		
Sound	04/04/00	Tues	N	103.0	22.30				0.0			Tag B rods=1762'; A's still stuck		
Flood	04/04/00	Tues	N	103.0					0.0			Cont flooding		
Water	04/04/00	Tues	N	103.0	23.20	0.35			0.0			Water truck refill		
Trip out	04/05/00	Wed	N	103.0	1:20	1:30				0.10		Tagged caved in around B's - pull rods back		
Flood	04/05/00	Wed	N	103.0	1:30				0.0			Material still around rods, flush		
Sound	04/05/00	Wed	N	103.0	2.10				0.0			Tag -estimate firm material		
Trip out	04/05/00	Wed	N	103.0								Rods still stuck -pullout to 1740 to 1735 - possible cave-in		
Stand	04/05/00	Wed	N	103.0	2.20				0.0			Concern flooding has worsen cave in - let stand		
Water	04/05/00	Wed	N	103.0	2.30				0.0			Water truck refilled, fuel cans refilled		
Onsite	04/05/00	Wed	N	103.0	3.55				0.0			Return		
Sound	04/05/00	Wed	N	103.0	3.55				0.0			Sound hole - add 2 B rods = 1772.6		
Tally	04/05/00	Wed	N	103.0	4.10				0.0			Tally B rods =1760 & A rods1740'		
Shift	04/05/00	Wed	N	103.0	4.10				0.0			Secure site - leave hole to settle		
Tally	04/05/00	Wed	D	104.0					0.0			B rod to 1775', B rod tally 1780', A rod to 1750', A rod tally 1760'		
Sound	04/05/00	Wed	D	104.0	7:20				0.0			Tagged with tape, 1805' - 6' 1799 GS, pulled back A rod 1760' - 1740' tally 1753' to 1733'		
Tally	04/05/00	Wed	D	104.0					0.0			B rods tagged at 1806', B rod plugged with sand, B rod back to 1760' tally 1754'		
Prep	04/05/00	Wed	D	104.0	9.05	9.10			20.0	0.05	240.0	Added B rod from 1760' to 1780' tally, prepped to tremie 10 bags 8/12 sand		
Tremie	04/05/00	Wed	D	104.0	9.44	11:15			0.0	1:31		Tremied 7 bags of 8/12 sand		
Chase	04/05/00	Wed	D	104.0	11:15	11:23			0.0	0.08		Pumped chase water		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tremie	04/05/00	Wed	D	104.0	11:23	11:44			0.0	0:21		Tremied 4 bags 8/12 sand		
Chase	04/05/00	Wed	D	104.0	11:44	12:08			0.0	0:24		Pumped chase water		
Trip out	04/05/00	Wed	D	104.0	12:08	12:09				0:01		Pulled back B rod 1780' - 1760' tally		
Chase	04/05/00	Wed	D	104.0					0.0			Removed B rod, attach pumping head, pumped water		
Unplug	04/05/00	Wed	D	104.0	12:30				0.0			B line free and clear		
Sound	04/05/00	Wed	D	104.0					0.0			Run tape sounder		
Sound	04/05/00	Wed	D	104.0	12:42				0.0			Sound 1784' - 6' - 0.5'		1777.5
Water	04/05/00	Wed	D	104.0					0.0			JRM and Darrol off site to run errands, let backfill settle. Rodney gets water		
Sound	04/05/00	Wed	D	104.0	15:13				0.0			Sound 1790' - 6' - 1.5', prep to tremie 11 bags 8/12 sand		1782.5
Tremie	04/05/00	Wed	D	104.0	15:30	16:30			0.0	1:00		Tremied 11 bags of 8/12 sand		
Tally	04/05/00	Wed	D	104.0	16:30	16:45			10.0	0:15	40.0	Pulled back B rod 10' from 1760' to 1750' tally, A rod tally = 1740'; gs 1733.7', B rod tally = 1750'; gs = 1744'		
Prep	04/05/00	Wed	D	104.0					0.0			Prep to sound with tape through Bs		
Plugged	04/05/00	Wed	D	104.0	17:08				0.0			Tag at 1650' B rod plugged		
Unplug	04/05/00	Wed	D	104.0					0.0			Pump water, tag at 1630' inside B rod		
Trip in	04/05/00	Wed	D	104.0	17:30							Added B rod 1760' tally, got past centralizer at 1734 gs		
Shift	04/05/00	Wed	N	105.0	18:35				0.0			Night shift on site		
Unplug	04/05/00	Wed	N	105.0	19:05				0.0			Pumping water down B rod		
Unplug	04/05/00	Wed	N	105.0	19:15				0.0			trying to unplug B rods, lifting up 20', hitting centralizers		
Unplug	04/05/00	Wed	N	105.0	19:20				0.0			Lowering B rod down past obstruction at 1745', pumping on B rod pressured up		1745'(B)
Tally	04/05/00	Wed	N	105.0	19:55				0.0			20' B rod off. Tally 1740', gs ~1736', removed 2 A rods, A @ 1700', gs 1696'		
Unplug	04/05/00	Wed	N	105.0	20:10				0.0			Lifting B up and down and using high pressure water		
Unplug	04/05/00	Wed	N	105.0	20:15				0.0			Bs unplugged		
Obstruc	04/05/00	Wed	N	105.0	20:20				0.0			Trying to get past centralizer		
Obstruc	04/05/00	Wed	N	105.0	21:00				0.0			Still trying to get past obstruction		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Trip out	04/05/00	Wed	N	105.0	21:15				0.0			Tripping out 40' A rods, tally 1660', gs 1656'		
Water	04/05/00	Wed	N	105.0	21:35	22.40			0.0	1.05		Off site for water		
Trip in	04/05/00	Wed	N	105.0	22.45				0 0			Put back on 20' of B rod and pumping water, tally 1760', gs 1756'		
Trip out	04/05/00	Wed	N	105.0	23.45				0 0			Removed 8 A rods 1500' tally		
Trip in	04/06/00	Thu	N	105.0	0.00				0.0			Adding 1 B rod, 1780' tally, pumping more water 1760' in. Scott mentioned hole might of caved or B rods were wedged or stuck, pumping more water to clear rods		
Lunch	04/06/00	Thu	N	105 0	0.10	0.40			0 0	0.30		Lunch		
Sound	04/06/00	Thu	N	105.0	0 50				0.0			Tried to sound through the B rods and tape is sticking to the inside of the pipe		
Trip in	04/06/00	Thu	N	105.0	1:10				0 0			Adding back 20' B to 1780' tally		
Trip out	04/06/00	Thu	N	105 0	1:15				0 0			May have lost some B rods - tripping out		
Trip out	04/06/00	Thu	N	105.0	2.45				0.0			Tripped out 800' plus 40' initially of B rods. Pipe came apart at 740' bgs		
Dynatec	04/06/00	Thu	N	105 0	3.15				0.0			Off site to FSF to consult with John Eddy		
Prep	04/06/00	Thu	D		6.00	18.00			0 0	12.00		Prep to fish		
Fish	04/06/00	Thu	N		18 00	0.00			0 0	6 00		Fish		
Fish	04/07/00	Fri	N		0 00	6.00			0.0	6 00		Fish		
Fish	04/07/00	Fri	D		6 00	18 00			0.0	12.00		Fish		
Fish	04/07/00	Fri	N		18 00	0.00			0.0	6 00		Pulled fish		
Fish	4/8/00	Sat	N		0 00	6 00			0.0	6 00		Pulled fish		
Shift	04/08/00	Sat	D	106.0	5 30	6:15			0 0	0.45		day shift to R-19		
Tailgate	04/08/00	Sat	D	106 0	6:15	6:15			0.0	0 00		Daily tailgate safety meeting and inspections		
Unplug	04/08/00	Sat	D	106 0	6:30				0.0			Tested all B rods		
Trip in	04/08/00	Sat	D	106 0			300 0	1720 0	1420 0			Tripped in ; 300- 1720 tally ,GS 1713		
Support	04/08/00	Sat	D	106.0	14.00				0 0			Marin paged at SAIC - doing paperwork; Dynatec recommends pouring only sand up to 1713 when B rod stopped		
Support	04/08/00	Sat	D	106 0					0 0			Hull concurs		
Prep	04/08/00	Sat	D	106 0	15:20				0 0			Prep to tremie 10' of 30/70 sand = 12 bags		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Plugged	04/08/00	Sat	D	106 0	15:30	15:40			0 0	0:10		Tremie plugged , nothing pour, only pumped water		
Prep	04/08/00	Sat	D	106.0					0.0			Prep to run tape sounder		
Plugged	04/08/00	Sat	D	106 0					0 0			Tagged inside at B rods at 1696 TOB's		1696 0
Plugged	04/08/00	Sat	D	106 0	17.00				0 0			B rods apparently still plugged		
Trip out	04/08/00	Sat	D	106 0					0 0			Pull back and removed 100' B rod		
Unplug	04/08/00	Sat	D	106 0					0 0			Attach pumping head		
Unplug	04/08/00	Sat	D	106.0	17:15				0.0			Pressured up		
Shift	04/08/00	Sat	D	106 0	17:30				0 0			Left site		
Shift	04/08/00	Sat	N	107.0	18 00				0.0			Shift change at FSF; discuss plug w/Eddy - decide to pull B rods and unplug + arrive at R-19		
Tailgate	04/08/00	Sat	N	107.0	18 05				0 0			Tailgate at R-19, Scott, Alex, Sammy, Cath		
Prep	04/08/00	Sat	N	107.0	18.10				0.0			Begin setting up to pull B's		
Trip out	04/08/00	Sat	N	107.0	18:15	21:00	1620.0	0.0	1620.0	2:45	589.1	Pull B rods		
Tally	04/08/00	Sat	N	107.0					0.0			Rod tally + 7 on deck + modified B before pulling		
Trip out	04/08/00	Sat	N	107.0	21:00				0 0			Night shift pulls B rods ; count , last 2 rods had sand pluggin last 25' le) last rod plus 5' of next to last rod		
Dynatec	04/08/00	Sat	N	107.0	21:15				0 0			Attempt to call Mr. Eddy-failed		
Tally	04/08/00	Sat	N	107.0	21:30				0.0			Attempt to call Darrol to determine rod tally he had in the hole-failed		
Tally	04/08/00	Sat	N	107.0	22.00	23 00			0 0	1:00		Driller goes to Darrol's home finds out that 1720' tally		
Strategy	04/08/00	Sat	N	107.0					0.0			Driller strategy to Trip in 1680' of rod tag pump full of water and tag		
Dynatec	04/08/00	Sat	N	107.0	22.45				0.0			Driller attempts to contact Mr. Eddy - failed		
Trip in	04/08/00	Sat	N	107.0	23.00				0.0			Return to R-19, helpers have proceeded to Trip in cleaned rods		
Trip in	04/08/00	Sat	N	107.0	23 00	0.50			0.0			Tripped in rod and pump		
Dynatec	04/08/00	Sat	N	107.0	23:15				0.0			Mr. Eddy woken....Stated info on rods and depth, Mr. Eddy states to determine the depth of the material and make sure it is static, if so proceed with 5' 30/70, then 5' Pel Plug		
Tally	04/09/00	Sun	N	107.0					0 0			Rod tally- on deck 4 + modified		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tally	04/09/00	Sun	N	107.0								In hole, 84 rods		
Chase	04/09/00	Sun	N	107.0	1.05				0 0			Pump water in the hole (less than 1/2/ truck)		
Borehole	04/09/00	Sun	N	107.0	2 00							Out of water, lowered last rod into the hole and didn't indicate material encountered		
Water	04/09/00	Sun	N	107.0	2.30				0.0			Drillers depart for water and fuel		
									0 0					
Equip	04/09/00	Sun	D	108 0	9 05	9 25				0 20	5040 0	Pumping water into hole. Pull rod back 4' and reset block.		1694 3
Trip in	04/09/00	Sun	D	108 0	9 28	9 50			1700 0	0 22	4636 4	Adding 20' of rod after working on pressure head valve.		
Dynatec	04/09/00	Sun	D	108 0	9 30				0 0			John Eddy onsite		
Chase	04/09/00	Sun	D	108 0	9 55	10 05			0 0	0.10		Pumping water downhole while working rod up and down.		
Trip out	04/09/00	Sun	D	109 0	10 08	10.10				0 02		Pull rod back 10'.		
Tremie	04/09/00	Sun	D	108 0	10.10	10 25			0 0	0.15		Added 5 5 bags of 6/9 sand		
Plugged	04/09/00	Sun	D	108 0	10 25	10.40				0.15		Rods plugged. Driller pulls out another 10' of rod and reconnects and blows down on rods.		
Trip out	04/09/00	Sun	D	108 0	10.40	10.45				0 05		Driller pulls back another 20'.		
Sound	04/09/00	Sun	D	108 0	10.45	10 53			0 0	0.08		Tagged bottom at 1729'. Actual is 1729 - 5 7 = 1723 3.		1723 3
Prep	04/09/00	Sun	D	108 0	10.53	11 05			0.0	0.12		Pull sounder out of hole. Driller wants to add more sand		
Tremie	04/09/00	Sun	D	108 0	11:05	12.05			0.0	1:00		Added 10 5 bags of 6/9 sand.		
Stand	04/09/00	Sun	D	108 0	12 05	12 25			0.0	0 20		Allowing sand to settle.		
Sound	04/09/00	Sun	D	108 0	12 30	12.40			0 0	0.10		Tagged bottom at 1705'. Actual is 1705 - 5.7 = 1699 3		1699 3
Prep	04/09/00	Sun	D	108 0	12.40	12.45			0 0	0 05		retrieve sounder.		
Tremie	04/09/00	Sun	D	108 0	12.45	13 50			0 0	1 05		Added 10 bags of 6/9 sand.		
Sound	04/09/00	Sun	D	108 0	13 50	13 55				0 05		Tagged at 1690. Actual is 1690 - 5 7 = 1685.3		
Water	04/09/00	Sun	D	108 0	14 00	15 00			0 0	1 00		offsite for fuel and water.		
onsite	04/09/00	Sun	D	108 0	15 00				0 0			return to site		
Sound	04/09/00	Sun	D	108 0	15 05	15.15			0 0	0.10		Tagged at1685. Actual is 1685 - 5 7 = 1679 3		1679 3
Stand	04/09/00	Sun	D	108 0	15.15	16.15			0 0	1.00		Allowed to settle.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Sound	04/09/00	Sun	D	108 0	16:15	16 25			0 0	0.10		Tagged at 1685 2', Actual is 1685 2' - 5.7 = 1679.5		1679.5
Tremie	04/09/00	Sun	D	108 0	16:30	16 50				0 20		Add 2.5 bags 30/70.		
Sound	04/09/00	Sun	D	108 0	16 50				0 0			Tagged 30/70 at 1680 - 5.7 = 1674.3		1674 3
Shift	04/09/00	Sun	N	109 0	17:30				0 0			Night shift departs FSF to R-19		
Shift	04/09/00	Sun	N	109 0								Meets Day shift enroute - all return to R-19 to exchange info		
Tailgate	04/09/00	Sun	N	109 0	18 00				0 0			Tailgate		
Sound	04/09/00	Sun	N	109 0	19 00				0 0			Tag 1679 5 - 5.7 = 1673 8' ;tape off 1 ' = 1672.8		1672.8
Sound	04/09/00	Sun	N	109 0					0 0			Recheck - 1680 -5.7 = 1674 3; tape off 1' = 1673 3		1673.3
Borehole	04/09/00	Sun	N	109 0					0 0			Driller confident Darrol's readings did not include the 1' deviation from the tape, readings very comparable		
Prep	04/09/00	Sun	N	109 0					0 0			Mix a runny blend of EZ-MUD and prep to pour Pel plug		
Prep	04/09/00	Sun	N	109 0					0 0			Have been informed to use Pel Plug in place of HOLEPLUG		
Trip out	04/09/00	Sun	N	109 0	19 30							Drillers pulled off 40'		
Prep	04/09/00	Sun	N	109 0	19 30				0 0			Drillers ready 35 buckets of 1/4 " Pel Plug- approx 1/2 amount needed		
Support	04/09/00	Sun	N	109.0	19.44				0.0			Test cup of Pel Plug to see yield time		
Tremie	04/09/00	Sun	N	109.0		20 25			0.0	20 25		35 Buckets PP added		
Chase	04/09/00	Sun	N	109 0					0.0			Load 40 buckets on truck ; cont running mud in hole to clear lines		
Support	04/09/00	Sun	N	109 0	20 35				0.0			PEL Plug test has absorbed much of mud and cont yielding		
Sound	04/09/00	Sun	N	109.0	21:00							Tag 1637.5 -5.7 = 1631.8; Tape error 1' = 1630.8		1630 8
Water	04/09/00	Sun	N	109.0	21:10	22:10			0.0	1:00		Water truck refill		
Sound	04/09/00	Sun	N	109 0	22 20				0.0			Tag 1637.5 - 5.7= 1631.8; minus tape error = 1630.8		1630.8
Trip out	04/09/00	Sun	N	109 0								Pull one rod		
Prep	04/09/00	Sun	N	109 0	22.40				0.0			Set up to pour Pel Plug		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tremie	04/09/00	Sun	N	109.0	22.43	23:10			0.0	0.27		Pour 20 buckets Pel plug with EZ-MUD		
Chase	04/09/00	Sun	N	109.0	23.10	23.20			0.0	0.10		Pump lines		
Sound	04/09/00	Sun	N	109.0	23.20	23.33				0.13	7384.6	Tag 1613.8 - 5.7=1614.1 ; minus tape error = 1613.1		1613.1
Tremie	04/09/00	Sun	N	109.0	23.40	23.58			0.0	0.18		Add additional 10 buckets of Pel Plug		
Chase	04/10/00	Mon	N	109.0	0.00	0.05			0.0	0.05		Pump lines		
Prep	04/10/00	Mon	N	109.0	0.05							set up to tag		
Sound	04/10/00	Mon	N	109.0		0.13			0.0	0.13		Tag 1609.65 - 5.7 = 1604 minus tape error = 1603		1603.0
Sound	04/10/00	Mon	N	109.0		0.50				0.50	1920.0	Tag after resting well for 50 min		1602.8
Tremie	04/10/00	Mon	N	109.0	1.09							Add 2.5 buckets = est 1602.8 - 2.5 = 1600.3		1600.3
Borehole	04/10/00	Mon	N	109.0					0.0			Will not retag as est is based on previous readings		
Tremie	04/10/00	Mon	N	109.0	1:28	2.00				0.32	2962.5	Trip out one rod and pour 7 bags 30/70 sand and flush hole using clear water		
Water	04/10/00	Mon	N	109.0	2.10	3.25			0.0	1.15		Fuel and water		
Sound	04/10/00	Mon	N	109.0	3.35							Tag - 1608.5 - 5.7 minus tape error = 1601.8		1601.8
Borehole	04/10/00	Mon	N	109.0					0.0			lost sand - perhaps Pel Plug - let set and recheck		
Sound	04/10/00	Mon	N	109.0	4:15							Tag 1607 - 5.7= 1601.3 minus tape error = 1600.3		1600.3
Borehole	04/10/00	Mon	N	109.0					0.0			bentonite likely stable but losing sand		
Tremie	04/10/00	Mon	N	109.0	4:40	5.00				0.20	4740.0	add 8 bags of 30/70 with clear water		
Chase	04/10/00	Mon	N	109.0	5.00	5.02			0.0	0.02		Flush lines		
Sound	04/10/00	Mon	N	109.0	5.03	5.15				0:12		Tag 1599 - 5.7 minus tape error (1) = 1592.3		1592.3
Sound	04/10/00	Mon	N	109.0	5:15				0.0			Leave sounding tape in hole for day shift to check after sand settles		
Shift	04/10/00	Mon	N	109.0	5:15				0.0			Depart to FSF to inform day shift of needed supplies		
Shift	04/10/00	Mon	D	110.0	6.40				0.0			Day shift tags material		1607.1
Tailgate	04/10/00	Mon	D	110.0	7.00				0.0			Let settle to establish consistent readings. Tailgate.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Fuel	04/10/00	Mon	D	110.0	7:10				0.0			Fuel equip. Recommend that the crews (day and night conduct a comparison check of tagging together to attempt to gain consistent readings. Tags between crews showing 14.8' difference		
Dynatec	04/10/00	Mon	D	110.0	7:40				0.0			Lost 31.4 ft of volume. Darrol off to talk to Mr. Eddy about plans to stabilize		1638.5
Dynatec	04/10/00	Mon	D	110.0	9.52				0.0			Return from FSF and talking with Mr. Eddy and Hull. Decision to tag again and let plug stabilize .		
Sound	04/10/00	Mon	D	110.0					0.0			Darrol Tags material at 1636.3' and cross checks by tagging the inside of the well. Reads 1877'		1636.3
Stand	04/10/00	Mon	D	110.0					0.0			Material settles for remainder of shift		
NA	04/10/00	Mon	N						0.0			No night shift		
Sound	04/11/00	Tue	D	111.0	7:20							Tag with tape		1632.1
Sound	04/11/00	Tue	D	111.0	7.20	7.55			0.0	0.35		Pull out sounder		
Plugged	04/11/00	Tue	D	111.0	8:10				0.0			Plugged B's when sounding		
Plugged	04/11/00	Tue	D	111.0	8.35				0.0			Tape plugged in B's		
Trip out	04/11/00	Tue	D	111.0	8:45	10:15			0.0	1:30		Trip out B rods		
Prep	04/11/00	Tue	D	111.0	10:15	10:30			0.0	0:15		Attach cement shoe (foot valve)		
Trip in	04/11/00	Tue	D	111.0	10:30	14:30	0.0	1631.0	1631.0	4.00	407.8	Trip in B rods		
Prep	04/11/00	Tue	D	111.0	14:30	14:45			0.0	0:15		Prep to mix cement		
Tally	04/11/00	Tue	D	111.0					0.0			B rods at 1626'-1625' bgs; 81-20'+10'+1'=1631 tally		
Prep	04/11/00	Tue	D	111.0					0.0			Prep to pump cement		
Cement	04/11/00	Tue	D	111.0	15:15	15:35			0.0	0:20		Tremie 3 bags cement 15 gal mix + 8gal		
Equip	04/11/00	Tue	D	111.0	15:35	16:00			0.0	0.25		Clean mud hog grout mixing plant.		
Equip	04/11/00	Tue	D	111.0	16:00	16:40			0.0	0:40		Pack up/shut down.		
Shift	04/11/00	Tue	D	111.0	16:45				0.0			All personnel offsite		
NA	04/11/00	Tue	N						0.0			No night shift		
Tag	04/12/00	Wed	D	111.5	16:30				0.0			Cement has been curing during night and day; Tag on cement		1613.0
Tailgate	04/12/00	Wed	N	112.5	18:00	18:10			0.0	0.10		R-19; Tailgate		
Trip in	04/12/00	Wed	N	112.5	18:10	20.00	0.0	1600.0	1600.0	1.50	872.7	B rods		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tag	04/12/00	Wed	N	112.5	20:10	20.10			0 0	0.00		Tag 1612 and 1615 at table; 1606'		1606'
Dynatec	04/12/00	Wed	N	112.5	20 50				0 0			Helper Sammy reports he pulled a muscle in his back - a reoccurring back problem - depart to notify Mr. Eddy		
Dynatec	04/12/00	Wed	N	112.5	20 51				0.0			Sammy used his back and did not bend at his knees to lift a B rod		
Dynatec	04/12/00	Wed	N	112.5	21:00				0.0			John Eddy requests to take Sammy to the emergency room to get checked out Page DX FMD		
Support	04/12/00	Wed	N	112.5	21:30				0 0			Returned to site to pick up Sammy's gear- depart to hospital		
Support	04/12/00	Wed	N	112.5	21:55				0.0			DX_FMD has returned page from Goetz and Goetz contacted Page number - Al Cuchiarra, the DXFMD; Goetz informs him of what has occurred that approx 8 00 Sammy Serano is being checked out by LA Emergency contacted,		
Support	04/12/00	Wed	N	112.5	22:00				0.0			Contacted - left message- with Rick Hution. Paged Doug Barney and Robert Baran- no response to page		
Support	04/12/00	Wed	N	112.5	22.17				0 0			RE-paged Baran		
Dynatec	04/12/00	Wed	N	112.5	22.40				0 0			Dcts. state back strain; gave meds; prescribe off work at least 2 days		
Support	04/12/00	Wed	N	112.5	23.10				0 0			Return site		
Pelplug	04/12/00	Wed	N	112.5	23 30				0 0			Drillers have added 5 buckets of Pel Plug and are currently plugged; 4 buckets made it through tremie, based on amount of Pelplug in B rods upon withdrawal.		
Lunch	04/12/00	Wed	N	112.5	23 30	0 00			0 0			Lunch		
Trip out	04/13/00	Thu	N	112.5	0 00	3 00	1600 0	0 0	1600 0	3 00	533 3	B rods		
Equip	04/13/00	Thu	N	112.5	3.00	3 30			0 0	0 30		Clean plugged rods - 5		
Break	04/13/00	Thu	N	112.5					0 0			Break/prep		
Trip In	04/13/00	Thu	N	112.5	4 30	6 00	0 0	820 0	820 0	1:30	546.7	B rods		
Shift	04/13/00	Thu	N	112.5	6.10				0 0			Depart for day shift		
									0.0					
Shift	04/13/00	Thu	D	113.5	6 00	7.00			0 0	1.00		Shift change; tailgate safety meeting, safety inspections		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Trip In	04/13/00	Thu	D	113.5	7.00	9.02	820.0	1600.0	780.0	2.02	383.6	Trip In B rods to 1600' tally + 6' = 1594 bgs.		1594.0
Prep	04/13/00	Thu	D	113.5	9.02				0.0			Prep to sound w/tape		
Tag	04/13/00	Thu	D	113.5	9.30				0.0			1607-6'-1.5' = 1599.5		1599.5
Sand	04/13/00	Thu	D	113.5	10.00	11:15			0.0	1:15		Tremie 24 bags of 20/40 sand		
Tag	04/13/00	Thu	D	113.5	11:45				0.0			Tag 1580 + 6- 1.5 inside tubing at 1577		1573.1
Settle	04/13/00	Thu	D	113.5					0.0			Let set another 15 min		
Tag	04/13/00	Thu	D	113.5					0.0			Tag 1591.3 + 6' + 1.5'		1583.8
Pulled	04/13/00	Thu	D	113.5	14.00				20.0			Pulled back B rods to 1540 tally		
Sand	04/13/00	Thu	D	113.5					0.0			Tremied 16 bags 20/40 sand		
Tag	04/13/00	Thu	D	113.5					0.0			Tag 1563 TOC + 6 + 1.5		1555.5
Add	04/13/00	Thu	D	113.5					0.0			Lowered B rods to confirm		
Tag	04/13/00	Thu	D	113.5	15:40				60.0			B rods went to 1594 w/o hitting sand		
Tag	04/13/00	Thu	D	113.5	15.53				0.0			Tag with tape: 1612 + 6 + 1.5		1604.5
Tag	04/13/00	Thu	D	113.5					0.0			Tag with tape: 1591.6 + 1.5		
Tag	04/13/00	Thu	D	113.5					0.0			Tag with tape: 1605 + 6 + 1.5		
Tag	04/13/00	Thu	D	113.5					0.0			Tag with tape: 1597.6 + 1.5		1589.5
Tag	04/13/00	Thu	D	113.5					0.0			Range of taggings too great		
Pulled	04/13/00	Thu	D	113.5	16.02				20.0			Pulled back B rods to 1580 tally; 1574 bgs.		
Pump	04/13/00	Thu	D	113.5					0.0			Pumped clear water through pumping head, 250 + gals		
Equip	04/13/00	Thu	D	113.5					0.0			B rods clear		
Pulled	04/13/00	Thu	D	113.5	17:25	17:45			30.0	0:20	90.0	Pulled back B rods to 1550 tally = 1544 bgs		
Shift	04/13/00	Thu	N	114.5	18.00				0.0			Night shift - Scott, Alex, Roland prep to tremie 8/12,6/9		
Pump	04/13/00	Thu	N	114.5	18:10				0.0			Pump - B rods plugged from the start		
Visitor	04/13/00	Thu	N	114.5	18.20	18.28			0.0	0.08		Dave Broxton onsite to discuss last night's events		
Pulled	04/13/00	Thu	N	114.5	18.30				10.0			Pulled back B rods to 1490 tally; 1444' bgs.		
Tag	04/13/00	Thu	N	114.5					0.0			Tag - 1552 - 5.5 -1.5 = 1545		1545.0
Settle	04/13/00	Thu	N	114.5	18.45				0.0			Let hole rest		
Tag	04/13/00	Thu	N	114.5	19.50				0.0			Tag 1549 - 7 = 1542		1542.0

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Advise	04/13/00	Thu	N	114.5	20:20				0.0			Call Mr. Eddy - let sand set 1 -2 hrs - if stabilized pull up add 50 buckets of Pel Plug. Trip out and pour 10' cement plug		
Tag	04/13/00	Thu	N	114.5	22:15				0.0			Tag w tape = 1549 - 7 = 1542		1542.0
Pulled	04/13/00	Thu	N	114.5	23:00				1474.0			Pulled back to 1480 tally on B rods; 1474' bgs.		
Pelplug	04/13/00	Thu	N	114.5	23:08	0:35			0.0			Start w/ 20 buckets of Pel plug w/ EZ-MUD		
Pump	04/14/00	Fri	N	114.5	0:35				0.0			Pump lines		
Tag	04/14/00	Fri	N	114.5	1:00				0.0			Tag 1530 - 7 = 1523		1523.0
Water	04/14/00	Fri	N	114.5	1:05	2:30			0.0	1:25		Go for water		
Tag	04/14/00	Fri	N	114.5	2:35				0.0			Tag 1530.8 - 7 = 1523.8		1523.8
Prep	04/14/00	Fri	N	114.5	2:40				0.0			Prep to pour Pel plug		
Pelplug	04/14/00	Fri	N	114.5	2:45	4:09			0.0	1:24		Pour 25 buckets of Pel Plug w/ EZ-MUD		
Pump	04/14/00	Fri	N	114.5	4:09	4:16			0.0	0.07		Flush lines		
Prep	04/14/00	Fri	N	114.5	4:16				0.0			Set up to tag		
Tag	04/14/00	Fri	N	114.5	4:25				0.0			Tag = 1508.3 - 7 = 1501.3		1501.3
Tag	04/14/00	Fri	N	114.5	4:25				0.0			Tie of f to let settle then recheck		
Settle	04/14/00	Fri	N	114.5	5:00				0.0			Tag = 1508.3 - 7 = 1501.3		1501.3
Tag	04/14/00	Fri	N	114.5					0.0			1480 tally in the hole		
Shift	04/14/00	Fri	N	114.5	5:10				0.0			Depart to the FSF to meet day shift and fuel up		
Shift	04/14/00	Fri	D	115.5	5:30	6:00			0.0	0:30		Shift change at FSF		
Escorts	04/14/00	Fri	D	115.5					0.0			Escorts at gate ; Darrol, Rodney, Juan get fuel		
Adj	04/14/00	Fri	D	115.5					40.0			Lowered B rods to 1520 tally = 1514 bgs		
Tape	04/14/00	Fri	D	115.5					0.0			Run tape		
Tag	04/14/00	Fri	D	115.5	7:00				0.0			Tag = 1540.6-1.5		1532.5
Tag	04/14/00	Fri	D	115.5					0.0			Tag = 1530- 6-1.5		1522.5
Adj	04/14/00	Fri	D	115.5	7:10	7:20			16.0	0.10	96.0	Lowered B rods to 1530 tally = 1526 bgs		
Pump	04/14/00	Fri	D	115.5					0.0			Attach pumping head		
Advise	04/14/00	Fri	D	115.5					0.0			Call Mr. Eddy		
Trip out	04/14/00	Fri	D	115.5	7:25	8:00			240.0	0.35	411.4	Juan and Rodney start tripping out 12x 20 = 240'		
Advise	04/14/00	Fri	D	115.5					0.0			Eddy advises to unplug B rods in hole		
Tape	04/14/00	Fri	D	115.5					0.0			Run tape inside B rods		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Clear	04/14/00	Fri	D	115.5					0.0			No plug tag- tape to 1750' out of B rods = clear		
Tape	04/14/00	Fri	D	115.5	8.15	8.25			0.0	0:10		Pull tape sounder		
Trip In	04/14/00	Fri	D	115.5	8:25	8.55			240.0	0.30	480.0	Tripped in B's back to 1530 tally = 1524 bgs		
Pump	04/14/00	Fri	D	115.5	8.55	9.40			0.0	0.45		Pumped to clean out B rods		
Pelplug	04/14/00	Fri	D	115.5	9.20				0.0			Prep to tremie Pel Plug		
Tape	04/14/00	Fri	D	115.5	9:40				0.0			Run tape		
Tag	04/14/00	Fri	D	115.5	10.00				0.0			1551.6 + 6- 1.5		1544.1
Advise	04/14/00	Fri	D	115.5	10.24				0.0			Call Mr. Eddy - agrees with big sand to fill mouth		
Support	04/14/00	Fri	D	115.5					0.0			Rick reads caliper log holes; between 1500-1580'; at 1590 -1580 starts to deviate; at 1563 big spike, at 1548 nice spike; 1650 -1618 - 1626		
Break	04/14/00	Fri	D	115.5	10.40	10.50			0.0	0:10		Break		
Tag	04/14/00	Fri	D	115.5	10.55				0.0			Tag 1554.3 6 + 1.5		1546.8
Tape	04/14/00	Fri	D	115.5	10.56	11:04			0.0	0.08		Pull tape sounder		
Add	04/14/00	Fri	D	115.5	11:04	11:40			10.0	0.36	16.7	Lowered B rods to 1540 tally ;1534 bgs		
Tremie	04/14/00	Fri	D	115.5	11:40				36726.0			Tremied 24 bags of 8/12 sand with water		
Tremie	04/14/00	Fri	D	115.5					30684.0			Tremied 2 bags 6/9 sand with water		
Plug	04/14/00	Fri	D	115.5					0.0			Tremie plugged		
Pull	04/14/00	Fri	D	115.5	12:15	12.17			20.0	0.02	600.0	Pull B rods back to 1520 tally;1514GS		
Pump	04/14/00	Fri	D	115.5					0.0			Attach pumping head; pressured up		
Pull	04/14/00	Fri	D	115.5	12:33	12.35			20.0	0.02	600.0	Pull B rods back to 1500 tally; 1494GS		
Tape	04/14/00	Fri	D	115.5					0.0			Run tape inside B rods		
Tag	04/14/00	Fri	D	115.5					0.0			Tag 1475 inside B rods = 25' of sand in B rod		
Pull	04/14/00	Fri	D	115.5	12:45	13.00			20.0	0:15	80.0	Pull B rods to 1480		
Advise	04/14/00	Fri	D	115.5					0.0			Darrol felt B rods unplugged		
Pump	04/14/00	Fri	D	115.5	13.05				0.0			Attach pumping head		
Clear	04/14/00	Fri	D	115.5					0.0			Pump 250 gals; clear		
Add	04/14/00	Fri	D	115.5	13.12	13:15			20.0	0.03	400.0	Lowered B rods to 1500 tally = 1494GS		
Add	04/14/00	Fri	D	115.5	13:16	13:18			20.0	0.02	600.0	Lowered B rods to 1520 tally = 1514GS		
Add	04/14/00	Fri	D	115.5	13.22				0.0			Lowered B rods to tag at 1514+8 = 1532		1532.0

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Pull	04/14/00	Fri	D	115.5					0.0			Pull B rods to 1520 tally 1514		
Pump	04/14/00	Fri	D	115.5					0.0			Attach pumping head; pumping head, pressured up		
Pull	04/14/00	Fri	D	115.5	13.40	13.45			20.0	0.05	240.0	Pull b rod to 1500 tally; 1494 GS		
Support	04/14/00	Fri	D	115.5	13.50	14.25			0.0	0.35		JRM to access control to answer pages		
Pull	04/14/00	Fri	D	115.5	14.25	14.30			80.0	0.05	960.0	B rods pulled back to 1420 tally; 1414 GS		
Pull	04/14/00	Fri	D	115.5	14.30	14.32			20.0	0.02	600.0	B rods pulled back to 1400 tally; 1394 GS		
Trip out	04/14/00	Fri	D	115.5	14.32	14.40			100.0	0.08	750.0	B rods pulled back to 1300 tally ; 1294GS		
Break	04/14/00	Fri	D	115.5	14.40	14.48			0.0	0.08		Break		
Trip out	04/14/00	Fri	D	115.5	14.48	14.55			80.0	0.07	685.7	Trip out B rods to unplug; 88 - 26 = 62 x 20 = 1240 tally		
Pump	04/14/00	Fri	D	115.5					0.0			Attach pumping head		
Pump	04/14/00	Fri	D	115.5					0.0			Pump water and drop B line 2 ft		
Pump	04/14/00	Fri	D	115.5					0.0			Pressured up		
Pump	04/14/00	Fri	D	115.5					0.0			Removed pumping head		
Trip out	04/14/00	Fri	D	115.5	14.55	15:15	1220.0	780.0	440.0	0.20	1320.0	Trip out B rods from 1214 to 794; 800 tally		
Pump	04/14/00	Fri	D	115.5					0.0			Attach pumping head		
Pump	04/14/00	Fri	D	115.5					0.0			Pressured up ; still plugged		
Equip	04/14/00	Fri	D	115.5					0.0			Juan request a pressure pump and a good sounder		
Trip out	04/14/00	Fri	D	115.5	15:45	17.45	794.0	0.0	794.0	2.00	397.0	Trip out B rods from 794		
Trip out	04/14/00	Fri	D	115.5	17.45	18.00				0:15		Tremie plugged to 10' above bottom, Pelplug and big sand stuck in bottom below big sand, below pure Pelplug get at +10'.		
Shift	04/14/00	Fri	N	116.5	18.00	18.15			0.0	0.15		Shift change - all B rods out ; tailgate		
Trip in	04/14/00	Fri	N	116.5	18.15	20.13	0.0	1474.0	1474.0	1.58	749.5	Trip in 74 B rods; 1480tally - 6= 1474		
Support	04/14/00	Fri	N	116.5	19.00				0.0			Tally up waste water volumes - check black polys- empty		
Prep	04/14/00	Fri	N	116.5	20.13	20.20			0.0	0.07		Tag set up		
Tag	04/14/00	Fri	N	116.5	20.23				0.0			Tag =1496 - 7 = 1489'		1489.0
Advice	04/14/00	Fri	N	116.5	20.30				0.0			Depart to call Mr. Eddy		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Advice	04/14/00	Fri	N	116.5					0.0			Mr. Eddy at CdV well - advises to keep tagging through out the night watching for changes in sand level and adding lil drops		
Fuel	04/14/00	Fri	N	116.5	20:10				0.0			Roland stays at the CdV well to help; Turbo and Scott to get fuel		
onsite	04/14/00	Fri	N	116.5	20:15				0.0			Return R-19		
Tag	04/14/00	Fri	N	116.5	20:20				0.0			Tag 1496.6 - 5.5 - 1.5 = 1489.6		1489.6
Tag	04/14/00	Fri	N	116.5	23:50				0.0			Tag 1496 - 7 = 1489		1489.0
Tag	04/15/00	Sat	N	116.5	1:45				0.0			Tag 1494.6 - 7 = 1487.6		1487.6
Tag	04/15/00	Sat	N	116.5	3:30				0.0			Tag 1497.1 - 7 = 1490.1; have gone through logbook notes looking for explanation for differences in D/N shift readings - inconclusive		1490.1
Tag	04/15/00	Sat	N	116.5	5:25				0.0			Tag 1497 - 7 = 1490		1490.0
Support	04/15/00	Sat	D	117.5	5:30	14:00			0.0	8.30		JRM onsite.		
Dynatec	04/15/00	Sat	D	117.5	6:00	14:30			0.0	8.30		Dynatec crew: Darrol, Juan, & Rodney onsite		
Tailgate	04/15/00	Sat	D	117.5	6:00	6:20			0.0	0:20		Sign-in, daily tailgate safety meeting, and safety inspections.		
Tag	04/15/00	Sat	D	117.5	6:20				0.0			Tagged w/ tape at 1497' TOC (B rod) - 5' stickup -1.5' tape error = 1490.5; both crews confirmed and agreed on tagging procedure.		1490.5
Tag	04/15/00	Sat	D	117.5	8:00				0.0			Tagged w/ tape at 1497' TOC (B rod) - 5' stickup -1.5' tape error = 1490.5		1490.5
Tag	04/15/00	Sat	D	117.5	12:00				0.0			Tagged w/ tape at 1497' TOC (B rod) - 5' stickup -1.5' tape error = 1490.5		1490.5
Tremie	04/15/00	Sat	D	117.5	12:10	12:20			0.0	0:10		Tremied 2 buckets of Pelplug bentonite pellets with EZ-MUD.		
Chase	04/15/00	Sat	D	117.5	12:20	12:30			0.0	0:10		Pumped chase.		
Pull	04/15/00	Sat	D	117.5	12:30	12:32			0.0	0:02		Pulled back B rods to 1460' tally; 1454' bgs		
Pull	04/15/00	Sat	D	117.5	12:32	12:43			0.0	0:11		Attempt to tag with tape; didn't go out of B-rod.		
Pull	04/15/00	Sat	D	117.5	12:43	12:45			0.0	0:02		Attach pumping head;		
Pull	04/15/00	Sat	D	117.5	12:45	13:00			0.0	0:15		Pump 250 gallons of EZ-MUD to confirm that B rod is open.		
Add	04/15/00	Sat	D	117.5	13:00	13:02			0.0	0:02		Lowered B rods to 1490 tally; 1474 bgs.		
Add	04/15/00	Sat	D	117.5	13:02	13:04			0.0	0:02		Lowered B rods to 1490 tally; 1484 bgs.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Mix	04/15/00	Sat	D	117.5	13.10	13.20			0.0	0:10		Mixed 3 bags of ZIA Type II Portland cement w/ 5 gallons Water per bag		
Tremie	04/15/00	Sat	D	117.5	13.20	13.30			0.0	0.10		Tremied 3 bags of ZIA Type II Portland cement.		
Chase	04/15/00	Sat	D	117.5	13.30	13.44			0.0	0.14		Pumped chase to clean out B rods.		
Equip	04/15/00	Sat	D	117.5	14.00	14.30			0.0	0.30		Cleanup mud hog and pack up site		
Site	04/15/00	Sat	D	117.5	14:30				0.0			All personnel offsite.		
Cement	04/15/00	Sat	N	NA					0.0			No night shift; cement cures;		
Equip	04/16/00	Sun	D	118.5	10.30	12.30			0.0	2.00		Dynatec crew onsite performing maintenance on drill rig		
Support	04/16/00	Sun	D	118.5	12.25	16:20			0.0	3.55		Joe Sena onsite		
Tag	04/16/00	Sun	D	118.5	12.30				0.0			Tag at 1475.45 gs		1475.5
Prep	04/16/00	Sun	D	118.5					0.0			Prep to tremie 29 buckets of Pel Plug bentonite pellets.		
Tremie	04/16/00	Sun	D	118.5	14.25	15.55			0.0	1:30		Tremied 29 buckets of Pel Plug bentonite pellets with EZ-MUD.		
Tag	04/16/00	Sun	D	118.5	16.10				0.0			Tag at 1445.75 gs		1445.8
FSF	04/16/00	Sun	D	118.5	16.20	18.00			0.0	1:40		At FSF yard, performing maintenance		
Shift	04/16/00	Sun	N	119.5	17.35	18.00			0.0	0.25		Crew at FSF yard.		
Yield	04/16/00	Sun	N	119.5	18.00	21:15			0.0	3.15		Allow last Pel Plug pour to yield.		
Load	04/16/00	Sun	N	119.5	19.00	21:15			0.0	2:15		Dynatec crew loading more sand for backfilling		
Enroute	04/16/00	Sun	N	119.5	21:15	21:30			0.0	0.15		To gate 431		
Enroute	04/16/00	Sun	N	119.5	21:30	21.55			0.0	0.25		At site		
Tag	04/16/00	Sun	N	119.5	22.00				0.0			Tagged at 1453.0 TOC - 6-1.5=1445.5		1445.5
Pull	04/16/00	Sun	N	119.5	22:10	22.40			0.0	0.30		Pulled back rods to 1380' tally; 1374' GS.		
Prep	04/16/00	Sun	N	119.5	22.40	0.00			0.0	1:20		Prepared to pour a 50/50 mix of 8/12 and 6/9 sand.		
Tremie	04/16/00	Sun	N	119.5	0.05	1.00			0.0	0.55		Poured in 30 bags (15 8/12, 15 6/9) sand, letting sit over lunch before tagging		
Tremie	04/16/00	Sun	N	119.5					0.0					
Tremie	04/16/00	Sun	N	119.5	1.05	2.00			0.0	0.55		Going to pour 20 more bags (10 8/12, 10 6/9) and then sound		
Tremie	04/17/00	Mon	N	119.5					0.0					

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tag	04/17/00	Mon	N	119.5	2:05				0.0			Sounded at 1415.4' -6' stickup + 1.5 tape error = 1407.9' gs		1407.9
Tremie	04/17/00	Mon	N	119.5	2:20	4:10			0.0	1.50		Poured 30 more bags (15 8/12, 15 6/9). Total 60 (40 each sand)		
Tremie	04/17/00	Mon	N	119.5					0 0					
Tag	04/17/00	Mon	N	119.5	4:20				0.0			Sounding hole at 1393 5' -6' stickup + 1.5' tape error = 1386' gs		1386.0
Haul	04/17/00	Mon	N	119.5	4:30	5:30			0 0	1.00		Dynatec crew to the FSF yard for water and Pelplug		
Water	04/17/00	Mon	N	119.5	5:30				0 0			Back on site. Did not get water.		
Tag	04/17/00	Mon	N	119.5	5:35				0 0			Sounding at same spot 1386' gs		1386 0
Tremie	04/17/00	Mon	N	119 5	3.45	5 50			0 0	2 05		Adding 12 bags of 8/12 sand. Total so far, 52 bags 8/12 sand, 40 bags 6/9 sand		
Shift	04/17/00	Mon	N	119 5	5.50	6 05			0 0	0.15		Back to the yard for shift change		
Tag	04/17/00	Mon	D	120.5	7:10				0 0			Tag backfill with tape sounder at 1386.1 TOC-6-1.5=1378 6		1378 6
Tag	04/17/00	Mon	D	120 5	7.25				0 0			Tag backfill with tape sounder at 1385.8 TOC-6-1.5=1378 3		1378 3
Tremie	04/17/00	Mon	D	120.5	7:45	8:15			0.0	0 30		Tremied 10 buckets of Pelplug bentonite pellets.		
Tag	04/17/00	Mon	D	120 5	8.30				0.0			Tag backfill with tape sounder at 1377 TOC-6-1.5=1369 5		1369.5
Yield	04/17/00	Mon	D	120 5	8 30	12:30			0 0	4 00		Allow bentonite to yield and set.		
Mix	04/17/00	Mon	D	120.5	12:30	13:30			0.0	1:00		Mix 6 bags of Zia Type II Portland cement with 5 gallons of water per bag.		
Tremie	04/17/00	Mon	D	120 5	13 30	14 00			0.0	0.30		Tremie 6 bags of Zia Type II Portland cement		
Equip	04/17/00	Mon	D	120.5	14:00	18 00			0 0	4 00		Tore down drill rig for change out with rig at TA-15 Plume Chasing Well.		
Cement	04/17/00	Mon	N		18 00	0.00			0 0	6 00		No night shift; cement cures;		
Cement	04/18/00	Tue	D	121.5	6:00	14:00			0.0	8 00		WOC Waiting on cement.		
Equip	04/18/00	Tue	D	121.5	6 00	8.00			0.0	2.00		Darrol, Juan, & Rodney prep auxiliary air compressor for transport to R-25.		
Support	04/18/00	Tue	D	121.5	8 30	9 30			0 0	1:00		JRM onsite preparing daily reports		
Equip	04/18/00	Tue	D	121.5	9.00	9:15			0.0	0.15		Travis and Doug onsite to haul away 22-20' B rods plus the B rod pumping head.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Support	04/18/00	Tue	D	121.5	9.30	11:30			0.0	2.00		JRM at SAIC office sending daily reports.		
Equip	04/18/00	Tue	D	121.5	13.45	14.00			0.0	0.15		Travis and Doug onsite to unload 22-20' B rods plus a different pumping head.		
Equip	04/18/00	Tue	D	121.5	14 00	16 30			0.0	2.30		Waiting on new sounder apparatus from FSF.		
Support	04/18/00	Tue	D	121.5	13.00	16:30			0 0	3 30		JRM onsite working on electronic FTL log		
Equip	04/18/00	Tue	D	121.5	16.30	17.30			0 0	1.00		Dynatec attempts sounding with new mechanical apparatus from FSF; failed to get counter to work properly.		
Shift	04/18/00	Tue	N						0 0			No crew; no night shift		
Shift	04/19/00	Wed	D	122.5	5:30	5 50			0.0	0 20		FSF - depart to R-19		
Enroute	04/19/00	Wed	D	122.5	5 50	6:15			0 0	0 25		Enroute to site		
Tailgate	04/19/00	Wed	D	122 5	6.15	6:30			0.0	0:15		Tailgate and inspections . 130 pipe tally in hole		
Equip	04/19/00	Wed	D	122.5	6:30	7:15			0 0	0.45		Attempt to get new sounder to work - failed. Secure site and return to FSF w/ cable counter		
Equip	04/19/00	Wed	D	122 5	8.40				0.0			Return to site		
Tag	04/19/00	Wed	D	122.5	9 00	9 25			0 0	0 25		Attempt to TAG		
Tag	04/19/00	Wed	D	122.5	9 25				0 0			1343 TOC = 6' rod - 6 5 ' stick up = 1342 5'		1342.5
Tag	04/19/00	Wed	D	122.5					0 0			Resound as 6 bags yielded 27' gain rather than the predicted 10' gain --possibly due to Pel Plug swell		
Tag	04/19/00	Wed	D	122 5	9.40				0.0			Same TAG 1343'		1342.5
Prep	04/19/00	Wed	D	122.5	9 50							Prep to pour Pel plug from 1342 5 to 1240.4		
DTW	04/19/00	Wed	D	122.5	10 05				0.0			DTW Tagged at 1066'	1066 0 0	
Pull	04/19/00	Wed	D	122.5	10 20							Pull 70 ft of B rods		
Prep	04/19/00	Wed	D	122.5					0.0			Prep to pour Pel Plug		
Equip	04/19/00	Wed	D	122 5	10 54				0 0			Need larger pump head at R-25; attempt to use hose w/out head unsuccessful - proceed to get larger pump head		
Equip	04/19/00	Wed	D	122.5					0.0			Return to FSF to get pump head		
Equip	04/19/00	Wed	D	122.5	11.54				0 0			Return w pump head		
Prep	04/19/00	Wed	D	122 5					0.0			Set up to pour		
Pelplug	04/19/00	Wed	D	122.5	11.56				0.0			Pour Pel plug		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Support	04/19/00	Wed	D	122.5	12:10				0.0			JRM onsite - Goetz departs		
Support	04/19/00	Wed	D	122.5					0.0			B rod at 1260 tally ; 1254 GS		
Pelplug	04/19/00	Wed	D	122.5	12:25	14:05			0.0	1:40		tremie 55 buckets of Pel Plug		
Support	04/19/00	Wed	D	122.5	14:25				0.0			Badge snafu; DX lowered access gate at mid-day to shool		
Support	04/19/00	Wed	D	122.5					0.0			Jim Leah onsite as new escort. JRM to DX-DO; Lucille Westerhold initialed Jim's name on Form 1812.		
Equip	04/19/00	Wed	D	122.5					0.0			Pump chase		
Haul	04/19/00	Wed	D	122.5					0.0			All personnel offsite to get water and Pel Plug		
Tag	04/19/00	Wed	D	122.5					0.0			1279		
Tag	04/19/00	Wed	D	122.5					0.0			1326		
Tag	04/19/00	Wed	D	122.5	16:00				0.0			1280 +6.6.5 = 1279.5 w/ mechanical sounder		1279.5
Pull	04/19/00	Wed	D	122.5	16:12	16:20				0:08		Pulled back B rods to 1240 tally ;1234 bgs		
Prep	04/19/00	Wed	D	122.5	16:20				0.0			Prepped to tremie more Pel plug		
Tag	04/19/00	Wed	D	122.5					0.0			Run mechanical sounder		
Tag	04/19/00	Wed	D	122.5					0.0			Counter stopped at 1212,ran 4' past 1234' = bottom B rods		
Tag	04/19/00	Wed	D	122.5					0.0			1254+4 = 1258;6 - 6.5 = 1257.5		1257.5
Support	04/19/00	Wed	D	122.5					0.0			Pull back		
									0.0					
Shift	04/19/00	Wed	N	123.5	18:00				0.0			Shift change - Turbo, Travis, Goetz		
Tailgate	04/19/00	Wed	N	123.5	18:00	18:30			0.0	0:30		Tailgate, SSHASP briefing for Travis, Inspections		
Pull	04/19/00	Wed	N	123.5	18:30	18:40				0:10		Trip out 10' B rods		
Prep	04/19/00	Wed	N	123.5					0.0			Prep to pour Pel Plug (15 buckets)		
Pelplug	04/19/00	Wed	N	123.5	19:00	20:09			0.0	1:09		Pour 15 buckets of Pel Plug w/ EZ-MUD		
Yield	04/19/00	Wed	N	123.5	20:09	20:40			0.0	0:31		Pump lines with EZ-MUD mix to clean lines and hydrate Pel Plug		
Tag	04/19/00	Wed	N	123.5	20:40				0.0			Set up to Tag		
DTW	04/19/00	Wed	N	123.5					0.0			TAG DTW after pumping approx. 2000 gals fluid = 1056'		
Yield	04/19/00	Wed	N	123.5	20:40	21:20			0.0	0:40		Allow Pel Plug to yield		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tag	04/19/00	Wed	N	123.5					0.0			TD material = 1255' seems off will recheck		
Tag	04/19/00	Wed	N	123.5	21:25				0.0			Recheck TAG = 163 +6 - 6.5 = 1262.5'		1262.5
Yield	04/19/00	Wed	N	123.5	21:25	22:39			0.0	1:14		Allow Pel Plug to yield		
Tag	04/19/00	Wed	N	123.5	22:39				0.0			TAG 1269.5 + 6- 6.5 = 1269		1269.0
Support	04/19/00	Wed	N	123.5	23:15	23:30			0.0	0:15		Break- discuss strategy		
Haul	04/19/00	Wed	N	123.5	23:39				0.0			Drillers depart for fuel and to pick up other sounder		
Equip	04/20/00	Thu	N	123.5	0:45				0.0			Drillers return - other sounder broken		
Fuel	04/20/00	Thu	N	123.5	0:45	0:52			0.0	0:07		Refuel equip; new batch of mud		
Tag	04/20/00	Thu	N	123.5	0:52				0.0			Tag 1269 +6-6.5 = 1268.5		1268.5
Prep	04/20/00	Thu	N	123.5	0:52	0:54			0.0	0:02		Prep to pour 10 buckets of Pel Plug- note 3/8" will be used (2-3 buckets were used in the last pour)		
Tremie	04/20/00	Thu	N	123.5	0:54	2:17			0.0	1:23		Pour Pel Plug		
Yield	04/20/00	Thu	N	123.5	2:17	2:30			0.0	0:13		Pump lines with EZ-MUD mix to clean lines and hydrate Pel Plug		
Tag	04/20/00	Thu	N	123.5	2:45	3:00			0.0	0:15		Tag 1259 +6-6.5 = 1258.5		1258.5
Yield	04/20/00	Thu	N	123.5	3:00	4:45			0.0	1:45		Yield		
Equip	04/20/00	Thu	N	123.5	3:21	4:45			0.0	1:24		Drillers depart to CdV well to get fuel tanks		
Tag	04/20/00	Thu	N	123.5	4:45				0.0			Tag 1256 +6 - 6.5 = 1255.5		1255.5
Yield	04/20/00	Thu	N	123.5					0.0			Allow Pel Plug to cont to yield		
Water	04/20/00	Thu	N	123.5	5:15				0.0			Return to FSF to fill water truck and passdown to day shift		
Tally	04/20/00	Thu	N	123.5					0.0			B rod tally at 1230, 1224GS		
Shift	04/20/00	Thurs	D	124.5	5:30	6:00			0.0	0:30		Shift change at FSF.		
Enroute	04/20/00	Thurs	D	124.5	6:00	6:15			0.0	0:15		To R-19		
Tailgate	04/20/00	Thurs	D	124.5	6:15	6:30			0.0	0:15		Tailgate safety meeting, inspections.		
Tagin	04/20/00	Thurs	D	124.5	6:30	6:44			0.0	0:14		Prep to tag with mechanical sounder		
Tag	04/20/00	Thurs	D	124.5	6:44				0.0			TAG 1259 + 6- 6.5 = 1258.5		1258.5
Tagout	04/20/00	Thurs	D	124.5	6:45	7:00			0.0	0:15		Pull sounder		
Prep	04/20/00	Thurs	D	124.5	7:00	7:20			0.0	0:20		Prep to pour more Pelplug		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tremie	04/20/00	Thurs	D	124.5	7:20	7:40			0.0	0.20		Tremied 16 buckets of Pelplug bentonite pellets with EZ-MUD		
Pump	04/20/00	Thurs	D	124.5	7:40	7.53			0.0	0:13		Pumped chase.		
Tagin	04/20/00	Thurs	D	124.5	7.53	8.15			0.0	0 22		Prep to run sounder		
Tag	04/20/00	Thurs	D	124.5	8.15				0 0			TAG 1259 + 6- 6.5 = 1258.5		1248.5
Support	04/20/00	Thurs	D	124.5	8.15	8 30			0.0	0:15		JRM paged by Rick Hutton; told to get daily reports out on following day		
Tag	04/20/00	Thurs	D	124.5	8 35				0.0			TAG 1259 + 6- 6 5 = 1258 5		1248.5
Support	04/20/00	Thurs	D	124.5	9.00	10:40			0 0	1:40		JRM to SAIC office to submit '4/19/00 daily report, as directed.		
Tag	04/20/00	Thurs	D	124.5	9.15				0.0			TAG 1259 + 6- 6 5 = 1258 5		1248.5
Tremie	04/20/00	Thurs	D	124.5	9.30	10.45			0 0	1:15		Tremied 9 buckets of Pelplug bentonite pellets with EZ-MUD		
Tag	04/20/00	Thurs	D	124.5	10.45				0.0			TAG 1241 + 6- 6 5 = 1240 5		1240.5
Tagout	04/20/00	Thurs	D	124.5	10.50	11:05			0.0	0:15		Pulled sounder		
Pull	04/20/00	Thurs	D	124.5	11:05	11:08			0.0	0.03		Pulled B rod back 10' to 1220 tally; 1214 bgs.		
Tremie	04/20/00	Thurs	D	124.5	11:08	11:30			0.0	0.22		Tremied 25 bags of 6/9/ sand		
Pull	04/20/00	Thurs	D	124.5	11:30	11:40			0.0	0:10		Pulled B rod back 40' to 1180 tally; 1174 bgs.		
Tremie	04/20/00	Thurs	D	124.5	11.55	12:30			0.0	0:35		Tremied 51 bags of 6/9 sand with water.		
Break	04/20/00	Thurs	D	124.5	12.30	12.40			0.0	0:10		Break		
Tagin	04/20/00	Thurs	D	124.5	12:40	13 00			0.0	0:20		Prep to run sounder		
Tag	04/20/00	Thurs	D	124.5	13.00				0 0			TAG 1193 + 6- 6.5 = 1192.5		1192 5
Tagout	04/20/00	Thurs	D	124.5	13.00	13.15			0.0	0:15		Pulled sounder		
Pull	04/20/00	Thurs	D	124.5	13:15	13:30			0.0	0:15		Pulled B rod back 40' to 1140 tally; 1134 bgs.		
Tremie	04/20/00	Thurs	D	124.5	13:30	14:20			0 0	0.50		Tremied 44 bags of 6/9 sand with water.		
Tremie	04/20/00	Thurs	D	124.5	14:20	14:30			0.0	0:10		Tremied 9 bags of 8/12 sand with water.		
Pump	04/20/00	Thurs	D	124.5	14:30	14.45			0.0	0:15		Pumped chase.		
Water	04/20/00	Thurs	D	124.5	14:45	15:05			0.0	0:20		Get water		
Tagin	04/20/00	Thurs	D	124.5	15:05	15:30			0 0	0:25		Prep to sound		
Tag	04/20/00	Thurs	D	124.5	15:30	16:10			0.0	0:40		TAG 1165 + 6- 6.5 = 1164.5		1164 5
Tremie	04/20/00	Thurs	D	124.5	16:10	16:40			0.0	0:30		Tremied 50 bags of 20/40 sand with water.		
Pump	04/20/00	Thurs	D	124.5	16:40	17:00			0.0	0 20		Pumped chase.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Shift	04/20/00	Thurs	D	124.5	17:00	18:00			0.0	1:00		All personnel offsite to FSF		
Shift	04/20/00	Thurs	N	125.5	17:30	18:00			0.0	0.30		Shift change at FSF - No Escorts		
Enroute	04/20/00	Thurs	N	125.5	18:00	18:30			0.0	0.30		Depart for R-19; Goetz to escort		
Tailgate	04/20/00	Thurs	N	125.5	18:30				0.0			Arrive at R-19; Tailgate inspections; SSHASP Mod briefing to Jones(SSHASP briefing at CdV)		
Strategy	04/20/00	Thurs	N	125.5	19:00				0.0			Set up for tonight's plan		
Tagin	04/20/00	Thurs	N	125.5	18:30	18:50			0.0	0:20		Set up to Tag		
Tag	04/20/00	Thurs	N	125.5	18:50				0.0			Tag 1114 - check again- sounder may be off pull and inspect		
Tag	04/20/00	Thurs	N	125.5	19:30				0.0			Tag attempt - line slacks at 1135.5 - sand is plugging off magnet connection doesn't beep		1135.0
Settle	04/20/00	Thurs	N	125.5					0.0			Sand Settles		
Tag	04/20/00	Thurs	N	125.5	20:05				0.0			Tag at 1154' - pt where line slacks - sounder beeps as hits rods but not at material level		1153.5
Advise	04/20/00	Thurs	N	125.5	20:15				0.0			Depart to call Mr. Eddy		
Advise	04/20/00	Thurs	N	125.5					0.0			Mr. Eddy instructs Turbo to add 5 bags of 6/9 to settle 20'40		
Escort	04/20/00	Thurs	N	125.5					0.0			Go to CdV to look for another escort - Mary Roybal only escort for both sites		
Enroute	04/20/00	Thurs	N	125.5	20:50				0.0			return to R-19		
Tag	04/20/00	Thurs	N	125.5	20:53				0.0			tag 1174 +6 - 6.5 = 1173.5		1173.5
Sand	04/20/00	Thurs	N	125.5					0.0			No 6/9 onsite		
Tagout	04/20/00	Thurs	N	125.5	20:53	21:00			0.0	0:07		Pull up sounder - lower 1' missing		
Pull	04/20/00	Thurs	N	125.5	21:05	21:10	1120.0	1110.0	10.0	0:05	120.0	Pull up B rods 10' to 1110 tally; 1104 bgs		
Advise	04/20/00	Thurs	N	125.5	21:20				0.0			Depart to FSF		
FSF	04/20/00	Thurs	N	125.5	21:30				0.0			Call Mr. Eddy to inform of sounder ; advises to tape end and cont adding sand		
Water	04/20/00	Thurs	N	125.5					0.0			Get sand and water		
Haul	04/20/00	Thurs	N	125.5	22:55				0.0			return to R-19		
Equip	04/20/00	Thurs	N	125.5					0.0			Prep sounder - sounder length is 5ft		
Sand	04/20/00	Thurs	N	125.5	23:00	23:10			0.0	0:10		Pour 5 bags 6/9 sand		
Pump	04/20/00	Thurs	N	125.5	23:10	23:12			0.0	0:02		chase with water		
Settle	04/20/00	Thurs	N	125.5	23:12				0.0			Settle		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tag	04/20/00	Thurs	N	125.5	23:25				0.0			Tag 1130 +5 - 6 (remeasured stickup)		1129.0
Tag	04/20/00	Thurs	N	125.5	23:35				0.0			Tag 1130 + 5 - 6		1129.0
Tag	04/20/00	Thurs	N	125.5	23:45				0.0			Tag 1130.5 +5 - 6		1129.5
Tag	04/21/00	Fri	N	125.5	0:09				0.0			Tag 1129.5 +5- 6		1128.5
Tag	04/21/00	Fri	N	125.5	0:48				0.0			Tag 1129.5 + 5 - 6		1128.5
Pull	04/21/00	Fri	N	125.5	1:05				0.0			Pull B rod 10' to 1100 tally, 1094 bgs.		
Pelplug	04/21/00	Fri	N	125.5	1:10	1:50			0.0	0:40		Pour 20 buckets of Pel plug - numbers in Jon's brain will not have cement bracket collar; however, insufficient Pel Plug to reach next collar - possible that will still bracket 1112' collar.		
Yield	04/21/00	Fri	N	125.5	1:50				0.0			Benton yields		
Tagprep	04/21/00	Fri	N	125.5	2:15				0.0			Attempt to tag - too disturbed; resume site cleanup		
Tag	04/21/00	Fri	N	125.5	3:05				0.0			Tag 1110 +5 - 6 = 1109		1109.0
Waste	04/21/00	Fri	N	125.5	3:05	3:25			0.0	0:20		Resume site cleanup - switch sorbent drum(NM SW) per Bohn request to put in 55gal drum		
Tag	04/21/00	Fri	N	125.5	3:30				0.0			Tag1108.5 +5 - 6 = 1107.5		1107.5
Mix	04/21/00	Fri	N	125.5	3:35	4:15				0:40		Prep to pour 6 bags of Portland cement; pull 20'		
Pull	04/21/00	Fri	N	125.5	4:15	4:30				0:15		Pulled back B rod 20' to 1080 tally; 1074 bgs.		
Cement	04/21/00	Fri	N	125.5	4:30	4:40			0.0	0:10		Pour 6 bags cement		
Pump	04/21/00	Fri	N	125.5	4:40	5:00			0.0	0:20		Chase with water and flush lines		
Shift	04/21/00	Fri	N	125.5	5:00	5:20			0.0	0:20		Secure site		
Shift	04/21/00	Fri	N	125.5	5:20				0.0			Depart to FSF to unload trash		
Shift	04/24/00	Mon	D	126.5	6:00	7:00			0.0	1:00		Crew convenes at FSF; discuss strategy with John Eddy.		
Dynatec	04/24/00	Mon	D	126.5	7:00	7:30			0.0	0:30		JRM & Dynatec crew (Casey & Doug) onsite.		
Equip	04/24/00	Mon	D	126.5	7:30	8:30			0.0	1:00		Dynatec crew took auxiliary air compressor to R-25.		
Tailgate	04/24/00	Mon	D	126.5	8:30	8:45			0.0	0:15		Tailgate and inspections.		
Tagin	04/24/00	Mon	D	126.5	8:45	9:20			0.0	0:35		Run sounder		
Fuel	04/24/00	Mon	D	126.5	9:15	10:00			0.0	0:45		Jack Eddy onsite to fuel.		
Tag	04/24/00	Mon	D	126.5	9:20				0.0			Tag 1113 +5.8 - 6 = 1112.8		1112.8

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tagout	04/24/00	Mon	D	126.5	9:20	9:30			0.0	0.10		Pull sounder; Counter off 5'; read 9995 upon withdrawal to zero point.		
Tagin	04/24/00	Mon	D	126.5	9:30	9:45			0.0	0.15		Prep to redo sound.		
Support	04/24/00	Mon	D	126.5	9:42	10:00			0.0	0:18		JRM paged by SAIC office; left site to Access control.		
Tag	04/24/00	Mon	D	126.5	9:50				0.0			Tag 1116.5 + 5.8 - 6 = 1116.3		1116.3
Tagout	04/24/00	Mon	D	126.5	9:50	10:15			0.0	0.25		Pull sounder;		
Prep	04/24/00	Mon	D	126.5	10:15	10:50			0.0	0.35		Prep to tremie HOLEPLUG		
Tremie	04/24/00	Mon	D	126.5	10:50	11:30			0.0	0.40		Tremied 5 bags of HOLEPLUG bentonite chips.		
Equip	04/24/00	Mon	D	126.5	11:30	11:35			0.0	0.05		Bean pump not working right		
Equip	04/24/00	Mon	D	126.5	11:35	11:40			0.0	0.05		Hook up other pump on Mud Hog trailer.		
Tremie	04/24/00	Mon	D	126.5	11:40	12:55			0.0	1:15		Tremied 15 bags of HOLEPLUG bentonite chips.		
Pull	04/24/00	Mon	D	126.5	12:55	13:00			0.0	0.05		Pulled back B rods 20' to 1060 tally; 1054 bgs.		
Tremie	04/24/00	Mon	D	126.5	13:00	14:15			0.0	1:15		Tremied 15 bags of HOLEPLUG bentonite chips.		
Pump	04/24/00	Mon	D	126.5	14:15	14:25			0.0	0.10		Pumped chase		
Pull	04/24/00	Mon	D	126.5	14:25	14:30			0.0	0.05		Pulled back B rods 30' to 1030 tally; 1024 bgs.		
Count	04/24/00	Mon	D	126.5	14:30	14:35			0.0	0.05		Rod count, 36 20' + 1 10' rod on ground from 88 total = 51.5 in string = 1030'; 1024 bgs.		
Equip	04/24/00	Mon	D	126.5	14:35	14:40			0.0	0.05		Moved boom truck, water truck, and mix trailer to make room for frac tank.		
Lunch	04/24/00	Mon	D	126.5	14:40	15:05			0.0	0.25		Lunch		
Waste	04/24/00	Mon	D	126.5	15:05	15:30			0.0	0.25		Frac tank arrives (#3).		
Water	04/24/00	Mon	D	126.5	15:30	16:45			0.0	1:15		Water and gas run.		
Tagin	04/24/00	Mon	D	126.5	16:45	16:50			0.0	0.05		Prep to sound		
Tagin	04/24/00	Mon	D	126.5	16:50	17:02			0.0	0.12		Run sounder		
DTW	04/24/00	Mon	D	126.5	17:02				0.0			Measured DTW at 921 + 5.8 - 6 - 1.4 = 919.4	919.40	
Tag	04/24/00	Mon	D	126.5	17:03				0.0			Tag 1062 + 5.8 - 6 = 1061.8		1061.8
Tagout	04/24/00	Mon	D	126.5	17:03	17:20			0.0	0.17		Pull sounder		
Pull	04/24/00	Mon	D	126.5	17:20	17:25			0.0	0.05		Pulled back B rods 10' to 1020 tally; 1014 bgs.		
Tremie	04/24/00	Mon	D	126.5	17:25				0.0			Tremied 9 bags of HOLEPLUG bentonite chips		
Shift	04/24/00	Mon	N	127.5	17:25	18:00			0.0	0.35		Shift change at site		
Tailgate	04/24/00	Mon	N	127.5					0.0			Tailgate		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Tremie	04/24/00	Mon	N	127.5	18:30	19:15			0.0	0.45		Finish pouring 11 bags of HOLEPLUG		
Pump	04/24/00	Mon	N	127.5	19:15	19:20			0.0	0:05		Chase with EZ-MUD		
Pull	04/24/00	Mon	N	127.5	19:20	19:25			0.0	0:05		Trip 40' to 980 tally -974 gs		
Tremie	04/24/00	Mon	N	127.5	19:30	20:05				0:35		Pour 20 bags HOLEPLUG		
Prep	04/24/00	Mon	N	127.5	20:05	20:25			0.0	0:20		Prep to pour additional 20		
Pull	04/24/00	Mon	N	127.5	20:25	20:30				0:05		Trip out 20' B rod tally 960		
Tremie	04/24/00	Mon	N	127.5	20:30	21:00				0:30		Pour 20 bags HOLEPLUG		
Pull	04/24/00	Mon	N	127.5	21:00	21:09				0:09		Trip out 20' B rod; tally 940'		
Water	04/24/00	Mon	N	127.5	21:10	22:24			0.0	1:14		Return from water trip and picking up 6/9 sand		
Tag	04/24/00	Mon	N	127.5	22:30	22:50			0.0	0:20		Tag 986' +5.8 - 6 = 985.8		985.8
Strategy	04/24/00	Mon	N	127.5					0.0			Strategy -computer estimates 35 bags		
Prep	04/24/00	Mon	N	127.5					0.0			Set up to pour 35 bags		
Pull	04/24/00	Mon	N	127.5								Trip out 20' B rod =920; 914 gs		
Tremie	04/24/00	Mon	N	127.5	23:30	0:30				1:00		Pour 35 bags HOLEPLUG		
Tag	04/25/00	Tues	N	127.5	0:30	0:52			0.0	0:22		Tag 945.5 + 5.8 - 6.3 = 945		945.0
Yield	04/25/00	Tues	N	127.5	0:30	2:00			0.0	1:30		Yield		
Tag	04/25/00	Tues	N	127.5	1:45	1:55			0.0	0:10		Tag 945 + 5.8 - 6.3 = 944.5		944.5
Water	04/25/00	Tues	N	127.5	1:55				0.0			Water truck returns - set up to pour		
Tremie	04/25/00	Tues	N	127.5	2:00	2:43				0:43		Pour 13 bags of HOLEPLUG		
Tag	04/25/00	Tues	N	127.5	2:43	2:55			0.0	0:12		Tag 931.5 + 5.8- 6.3 = 931		931.0
Yield	04/25/00	Tues	N	127.5	2:55				0.0			Yield; Prep to pour 6 buckets		
Tag	04/25/00	Tues	N	127.5	3:30				0.0			Tag 931.5 +5.8 - 6.3 = 931		
Tremie	04/25/00	Tues	N	127.5	3:30	3:43				0:13		pour 6 buckets of Pel Plug		
Pump	04/25/00	Tues	N	127.5	3:43	3:45			0.0	0:02		Chase		
Tag	04/25/00	Tues	N	127.5	3:45	3:55			0.0	0:10		Tag 926.5 + 5.8 - 6.3 = 926		926.0
Yield	04/25/00	Tues	N	127.5	3:55	5:14			0.0	1:19		Yield		
Tag	04/25/00	Tues	N	127.5	5:14				0.0			Tag 926.5 + 5.8 - 6.3 = 926		926.0
Water	04/25/00	Tues	N	127.5	5:20				0.0			Return to FSF for shift change and water		
Shift	04/25/00	Tues	D	128.5	6:00	6:30			0.0	0:30		Shift change; B rod tally 920'		
Enroute	04/25/00	Tues	D	128.5	6:30	7:00			0.0	0:30		To R-19; sign in at access control		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Crew	04/25/00	Tues	D	128 5	7.00				0 0			Arrived onsite ; 2 escorts, JRM and Dynatec (Casey and Doug)		
Tailgate	04/25/00	Tues	D	128 5	7.00	7.10			0 0	0.10		Tailgate and inspections		
Tagin	04/25/00	Tues	D	128 5	7.10	7:20			0.0	0.10		Run sounder		
Tag	04/25/00	Tues	D	128 5	7 20	7 20			0 0	0 00		Tag at 927 + 5.8 - 6 0		926 8
Tagout	04/25/00	Tues	D	128 5	7:20	7.40			0 0	0 20		pull sounder		
Support	04/25/00	Tues	D	128 5	7.40	9 40			0 0	2.00		JRM offsite to SAIC to submit daily report		
Pull	04/25/00	Tues	D	128 5					0 0			Pulled B rod 40' to 880tally ; 874gs		
Tremie	04/25/00	Tues	D	128 5					0 0			Tremied 30 bags of 6/9 ; 30 bags of 8/12 = 60 total		
Tremie	04/25/00	Tues	D	128 5					0.0			Sand came up in the B rods confirming Casey's suspension that the B rods has always been 10' longer than we thought		
Pull	04/25/00	Tues	D	128 5					0 0			Pulled B rod back 10' to 880 tally 874 gs		
Tremie	04/25/00	Tues	D	128 5					0 0			Finished tremie 60 total bags		
Tag	04/25/00	Tues	D	128 5	9 30				0 0			Tag at 882 + 5 8 - 6 0 = 881.8		881 8
Pull	04/25/00	Tues	D	128 5	9 45	9 50			0 0	0 05		Pulled B rod back 10' to 870 tally ; 864' gs		
Tremie	04/25/00	Tues	D	128 5	9 50	10 05			0 0	0.15		tremied 18 bags total (9 of 6/9 & 9 of 8/12 sand)		
Tag	04/25/00	Tues	D	128 5	10 20				0 0			Tag at 870 + 5 8 - 6 0		869 8
Tagout	04/25/00	Tues	D	128 5	10 20	10 40			0 0	0 20		Pull sounder		
Pull	04/25/00	Tues	D	128 5	10.40	10.45			0 0	0 05		Pulled B rod back 20' to 850 tally, 844 GS		
Add	04/25/00	Tues	D	128 5	10 45	10 50			0 0	0 05		Added 5' B rod to 855 tally ; 849' gs		
Mix	04/25/00	Tues	D	128 5	10 50	10 55			0 0	0 05		Mix EZ-MUD to tremie Pel Plug		
Pump	04/25/00	Tues	D	128 5	10 55	11.05			0 0	0.10		Pump EZ-MUD to wet B rod		
Tremie	04/25/00	Tues	D	128 5	11:05	12.10			0 0	1 05		Tremie 9 buckets of Pel Plug		
Support	04/25/00	Tues	D	128 5	12.15				0 0			JRM to access control to answer page from Roy Bohn		
Pump	04/25/00	Tues	D	128 5	12.10	12 25			0 0	0.15		Pumped chase		
Prep	04/25/00	Tues	D	128 5	12 25	12.45			0 0	0 20		Prepped to tremie sand RE: screen #1		
Lunch	04/25/00	Tues	D	128 5	12.45	13 05			0 0	0 20		Lunch		
Tally	04/25/00	Tues	D	128 5	13 15				0 0			B rod tally 840 in string		
Sand	04/25/00	Tues	D	128 5	13 15	14.45			0 0	1:30		Dynatec crew to FSF to get more sand		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Support	04/25/00	Tues	D	128 5	14 30	16.15			0 0	1:45		JRM to SAIC to get sample #s for Roy Bohn		
Support	04/25/00	Tues	D	128 5					0 0			Development at R-19 will be double shifts to start mid next weekend- Probably will not need support this weekend		
Pull	04/25/00	Tues	D	128 5	14 50	15 00			0 0	0:10		Pulled 40' B rods back to 800 tally;794 gs		
Tag	04/25/00	Tues	D	128 5	14.45				0.0			Tag 857.5 + 5 8 - 6 0		857.3
Tremie	04/25/00	Tues	D	128 5					0 0			tremied 42 bags sand total ; 21 of 6/9: 21 of 8/12		
Tagin	04/25/00	Tues	D	128 5	16:15				0 0			Prep to run sounder		
Tag	04/25/00	Tues	D	128 5	16 23				0.0			Tag 829.5 + 5 8 - 6 0		
Tagout	04/25/00	Tues	D	128 5	16:23	16 36			0 0	0.13		Prep to tremie sand		
Tremie	04/25/00	Tues	D	128 5	16 36	16 46			0 0	0.10		Tremie 10 bags total, 5 of 6/9 and 5 of 8/12		
Pull	04/25/00	Tues	D	128 5	16.46	16 48			0 0	0 02		Pulled back B rod to 780 tally 774 gs		
Tremie	04/25/00	Tues	D	128 5	16.48	17.10			0 0	0 22		Tremied 20 bags of 20/40 sand		
Pump	04/25/00	Tues	D	128 5	17:10	17 20			0 0	0:10		Pumped chase		
Tagin	04/25/00	Tues	D	128 5	17:20				0.0			Run sounder		
Tag	04/25/00	Tues	D	128 5	17:27				0 0			810.5 + 5 8 - 6 0		810 3
Shift	04/25/00	Tues	D	128 5	17.30				0 0			Depart to meet night shift		
Shift	04/25/00	Tues	N	129 5	17.45				0 0			Shift change on road to R-19		
Crew	04/25/00	Tues	N	129 5	18 00				0 0			Arrive on site- Goetz, Darrol, Rodney, Juan and escort Juan Lopez		
Tailgate	04/25/00	Tues	N	129 5	18 00	18.15			0.0	0.15		Tailgate inspections, strategy		
Tally	04/25/00	Tues	N	129 5					0 0			Confirmed that rod count was not 10' off by driller - recounted rod and read through logbook and retallied numbers		
Tag	04/25/00	Tues	N	129.5	18.15	18.45				0 30		Tag 810 + 5 8 -6= 809 8		809 8
Prep	04/25/00	Tues	N	129 5	18.45				0.0			Prep to pour HOLEPLUG - plan to pour open hole - free fall		
Pull	04/25/00	Tues	N	129 5	18.45	19.45				1:00		Trip out B rods to 320 tally plus 10' hanging in mast - new stick up only 2.3' w/o table		
Tremie	04/25/00	Tues	N	129 5	19.45	20.50			0 0	1:05		Pour 130 bags of HOLEPLUG - free fall		
Prep	04/25/00	Tues	N	129 5	20.50	21:05			0.0	0:15		Prep to pour HOLEPLUG - 120 bags		
Tremie	04/25/00	Tues	N	129 5	21:05	21:48			0.0	0.43		Pour 120 bags		
Tag	04/25/00	Tues	N	129 5	21:48				0 0			Tag 574 + 5 8 - 6 = 573 2		573 8

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Hydrate	04/25/00	Tues	N	129.5	21.50	22:10			0.0	0.20		Prep to hydrate; gained approx 235' from 250 bags		
Hydrate	04/25/00	Tues	N	129.5	22.10				0.0			Hydrate with approx 1000 gals - straight water		
Holeplug	04/25/00	Tues	N	129.5	22:20	23.20			0.0	1:00		Depart to get more HOLEPLUG		
Tally	04/25/00	Tues	N	129.5	23:20	23.40				0.20		10' pulled off of mast; tally still 320' in hole		
Prep	04/25/00	Tues	N	129.5	23.40	23.50			0.0	0.10		Prep to pour 4 pallets of HOLEPLUG = 240 ags		
Tremie	04/25/00	Tues	N	129.5	23.50	0.00			0.0	0.10		Pour 40 bags		
Tremie	04/26/00	Wed	N	129.5	0.00	0.50			0.0	0.50		Pour 200 bags		
Tagin	04/26/00	Wed	N	129.5	0.50	1:05			0.0	0.15		Set to Tag		
Tag	04/26/00	Wed	N	129.5	1:05	1:14			0.0	0.09		Tag 362 + 5.8 - 6 = 361.8		361.8
Hydrate	04/26/00	Wed	N	129.5	1:15	4:15			0.0	3.00		Hydrate with water Approx. 1,500 gals		
Trash	04/26/00	Wed	N	129.5	1:35	1:40			0.0	0.05		Drillers load up trash		
Trash	04/26/00	Wed	N	129.5	1:40				0.0			Crew to FSF to unload trash and helpers to depart for short shift due to tomorrow's safety meeting		
Trash	04/26/00	Wed	N	129.5	1:40	6.00			0.0	4:20		Darrol and Cathy Goetz haul trash		
Shift	04/26/00	Wed	D	130.5	6.00	6:15			0.0	0.15		Shift change		
Load	04/26/00	Wed	D	130.5	6:15	7.00			0.0	0.45		Casey, Doug and Alex load more HOLEPLUG		
Enroute	04/26/00	Wed	D	130.5	7.00	7:20			0.0	0.20		To DX		
Support	04/26/00	Wed	D	130.5	7.20	7:30			0.0	0.10		JRM checked with Michelle Cash re: tomorrow's planned evacuation		
Tailgate	04/26/00	Wed	D	130.5	7.45	8.00			0.0	0.15		Tailgate; Inspections		
Support	04/26/00	Wed	D	130.5	8.00	11:45			0.0	3.45		JRM offsite to SAIC to submit daily report		
Trip out	04/26/00	Wed	D	130.5	8.15	9.15			0.0	1:00		Tripped out B rods tally up		
Prep	04/26/00	Wed	D	130.5					0.0			Prep to Trip out '3" casing		
Support	04/26/00	Wed	D	130.5					0.0			JRM ordered 7 yds3 of 3000/3/4 cement with Fiberlock to be delivered to R-19 at 10 30 Friday from LA transit mix		
Support	04/26/00	Wed	D	130.5					0.0			LATA is processing admin through contracts		
Tally	04/26/00	Wed	D	130.5					0.0			B rod tally is on ground 88 20ft rods including 10er w/ hanging bracket + 1 5ft		
Install	04/26/00	Wed	D	130.5					0.0			Cut stainless steel well casing from metal skillet		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Support	04/26/00	Wed	D	130.5	13:00	13:15			0.0	0:15		JRM to AC to answer LATA page. Check for cement to be at LATA tom afternoon		
Safety	04/26/00	Wed	D	130.5	13:40				0.0			All personnel offsite to FSF for safety meeting		
Shift	04/26/00	Wed	N	131.5	17:30				0.0			Night shift departs FSF - Darrol, Juan, Rodney, Goetz, Lopez escort		
Enroute	04/26/00	Wed	N	131.5	17:30	18:00			0.0	0:30		Arrive at R-19		
Tailgate	04/26/00	Wed	N	131.5	18:30				0.0			Tailgate; strategy; inspections		
Escort	04/26/00	Wed	N	131.5					0.0			Juan Lopez offsite to get ice for drinking water coolers		
Equip	04/26/00	Wed	N	131.5	18:30	18:50			0.0	0:20		Go to CdV well to get part		
Trip out	04/26/00	Wed	N	131.5	18:50	22:25	125.0	0.0	125.0	3:35	34.9	Set up and pull 13" casing		
Prep	04/26/00	Wed	N	131.5	22:25	22:40			0.0	0:15		Set up to pour HOLEPLUG		
Equip	04/26/00	Wed	N	131.5	22:40	23:10			0.0	0:30		Return part to CdV well		
Prep	04/26/00	Wed	N	131.5	23:20	23:45			0.0	0:25		Prep to pour 120 bags of HOLEPLUG - add 10 ft of 13" casing to allow for easier pouring		
Pour	04/26/00	Wed	N	131.5	23:45	0:10			0.0	0:25		Pour 120 bags of HOLEPLUG - free fall		
Trash	04/27/00	Thu	N	131.5	0:10	0:20			0.0	0:10		Pack up trash		
Equip	04/27/00	Thu	N	131.5	0:15	0:45			0.0	0:30		Darrol departs to get the other sounder		
Tag	04/27/00	Thu	N	131.5	0:45	0:50			0.0	0:05		Tag 258.5 + 8.5 (rod) - 5.5(table)		261.5
Yield	04/27/00	Thu	N	131.5	0:50	1:00			0.0	0:10		Hydrate w/200 - 300 gals of water		
Prep	04/27/00	Thu	N	131.5	1:00	1:25			0.0	0:25		Prep to pour - pour 120 bags of HOLEPLUG		
Tag	04/27/00	Thu	N	131.5	1:25	1:30			0.0	0:05		Tag 165 + 8.5 - 5.5 = 168		168.0
Yield	04/27/00	Thu	N	131.5	1:30	1:45			0.0	0:15		Hydrate w/ 500 gals water		
Prep	04/27/00	Thu	N	131.5	1:30	2:00			0.0	0:30		Set up to pour HOLEPLUG		
Pour	04/27/00	Thu	N	131.5	2:00	2:08			0.0	0:08		Pour 60 bags of HOLEPLUG - free fall		
Tag	04/27/00	Thu	N	131.5	2:08	2:15			0.0	0:07		Tag 105 + 8.5 - 5.5 = 108		108.0
Haul	04/27/00	Thu	N	131.5	2:15	3:15			0.0	1:00		Depart to FSF to get more HOLEPLUG		
Prep	04/27/00	Thu	N	131.5	3:15	3:18			0.0	0:03		Prep to pour 60 bags of HOLEPLUG		
Tremie	04/27/00	Thu	N	131.5	3:18	3:30			0.0	0:12		Pour 60 bags		
Tag	04/27/00	Thu	N	131.5	3:30	3:40			0.0	0:10		Tag 70 + 8.5 - 5.5 = 73		73.0
Chase	04/27/00	Thu	N	131.5	3:40	3:43			0.0	0:03		Hydrate w/ water		
Trip out	04/27/00	Thu	N	131.5	3:43	3:47			0.0	0:04		Pull casing / load trash		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Chase	04/27/00	Thu	N	131.5	3 50	4 00			0 0	0.10		Hydrate w/ 500 gas		
Trash	04/27/00	Thu	N	131.5	4.00	4.45			0 0	0.45		Depart to FSF to haul trash take in boom truck - helpers will depart a little early ass they have been on shift since 3 00 for the safety meeting		
Shift	04/27/00	Thu	N	131 5		6 00			0.0	6.00		Darrol and Goetz will stay until shift change		
	4/27/00	Thu	D	132 0	6 00	6:30			0 0	0 30		At FSF		
	4/27/00	Thu	D	132 0	6 30	7.00			0.0	0.30		Casey, Alex, & Doug load cement		
	4/27/00	Thu	D	132 0	7.00	7.10			0 0	0.10		To R-19.		
	4/27/00	Thu	D	132 0	7.10	7:20			0.0	0.10		Tailgate and safety inspections.		
	4/27/00	Thu	D	132.0	7.20	8 00			0 0	0.40		Prep to mix cement.		
	4/27/00	Thu	D	132 0	8.00	11:15			0 0	3.15		JRM offsite to SAIC to do paperwork.		
	4/27/00	Thu	D	132 0	8 00	9 00			0 0	1.00		Fished for hose in borehole.		
	4/27/00	Thu	D	132 0	9.00	10.00			0 0	1.00		Mixed cement		
	4/27/00	Thu	D	132.0	10 00	11:05			0.0	1:05		Tremied 53 nags of cement : 5 gal. water per bag		
	4/27/00	Thu	D	132 0	11:15	11:15			0 0	0.00		All personnel offsite for DX-wide evacuation drill.		
	4/27/00	Thu	N	133 0	17:30	18 00			0 0	0.30		At FSF, load equipment		
	4/27/00	Thu	N	133 0	18 00	18 30			0 0	0 30		To R-19.		
	4/27/00	Thu	N	133.0	18 30				0 0			Arrive at R-19, Darrol, Juan, Rodney, Paul Martinez, Cathy Goetz.		
	4/27/00	Thu	N	133 0	18 30	18.45			0 0	0.15		Tailgate and safety inspections.		
	4/27/00	Thu	N	133 0	18.45				0 0			Phase 2 demobilization starts.		
	4/27/00	Thu	N	133 0	18.45	21:30			0 0	2 45		Pull steel vault and jacks.		
	4/27/00	Thu	N	133 0	22 30	0.00			0 0	1:30		Load and haul 13" casing		
	4/28/00	Fri	N	133 0	0 00	0.45			0 0	0 45		Load and haul 13" casing		
	4/28/00	Fri	N	133 0	0.45	5:10			0 0	4 25		Depart to FSF to meet dayshift and offload equipment.		
	4/28/00	Fri	D	134 0	6 00	11:00			0 0	5 00		Demobilization continued.		
	4/28/00	Fri	D	134 0	11:00	11:40			0 0	0.40		Cement truck arrived from LA Transit mix		
	4/28/00	Fri	D	134 0	11:20	11:40			0 0	0 20		Poured concrete; took - 6 3 cubic yards to fill hole.		
	4/28/00	Fri	N	135 0	18 00	0 00			0 0	6 00		Demobilization continued.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
	4/29/00	Sat	N	135.0	0:00	6.00			0.0	6.00				
	4/29/00	Sat	D	136.0	6.00	18.00			0.0	12.00		Demobilization continued.		
	4/29/00	Sat	N	137.0	18.00	0.00			0.0	6.00		Demobilization continued.		
	4/30/00	Sun	N	137.0	0.00	6.00			0.0	6.00		Demobilization continued.		
	4/30/00	Sun	D	138.0	6.00	18.00			0.0	12.00		Demobilization continued.		
	4/30/00	Sun	N	139.0	18.00	0.00			0.0	6.00		Demobilization continued.		
	5/1/00	Mon	N	139.0	0.00	6.00			0.0	6.00		Demob completed.		
	5/1/00	Mon	N	139.0					0.0			Dynatec operations suspended pending availability of UDR development rig installing Westbay at R-25.		
	5/2/00	Tue	D		11:30	12:30			0.0	1:00		Cathy Goetz returns with drum ring; found Roy Bohn, Troy Eshleman, Steve Veeris, Clarita Trujillo, & 3 others w/ LANL oversight.		
	5/2/00	Tue	D		11:31				0.0			Inform Goetz that NM waste will tour site; need to drain pond to frac tank, clean up plastic & general housekeeping; shovel stained soil		
	5/2/00	Tue	D		11:32				0.0			& add to NM special waste drum; Goetz adds drum ring to NM special waste drum.		
									0.0					
	5/3/00	Wed	D		11:45	12:50			0.0	1:05		Cathy Goetz onsite to put up safety stations, etc.; checks radio communications with DX.		
	5/3/00	Wed	D		15:40	16:10			0.0	0:30		Waste management; pick up computer, keys & radio.		
	5/4/00	Thu	D		12:30	12:35			0.0	0:05		Cathy Goetz onsite to pick up H&S records.		
	5/5/00	Fri	D		11:20	11:25			0.0	0:05		Cathy Goetz onsite to pick up water forms for Pat Longmire.		
									0.0			The Cerro Grande wild fire caused Los Alamos and White Rock to be evacuated from 5/10-5/16; the subsequent recovery halted all ER programmatic work.		
Visit	5/30/00	Tue	D		9:00	10:30			0.0	1:30		Visit to Cdv-15-3 to access fire damage (Hickmott, Broxton, Skalski, Bohn, Thoren, Woodward, Price, JRM); no damage onsite, phone line dead; real close though.		
Visit	5/30/00	Tue	D		10:30	11:15			0.0	0:45		Visit to R-19 to access fire damage (Broxton, Skalski, Bohn, & JRM); no damage		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Visit	5/30/00	Tue	D		11:15	12:00			0 0	0 45		Visit to R-25 to access fire damage (Broxton, Skalski, Bohn, Thoren, Woodward, Price, JRM); limited damage; DR rig should be able to finish development at R-25 to move to R-19		
Support	5/30/00	Tue	D		14 00	14:15			0 0	0.15		Called Charles Trujillo, FMU 80; he said yes modify SSHASP for activities at R-15.		
Dev	5/31/00	Wed	D		11:15	12 00			0 0	0.45		Asked Joe if he planned more frac tanks for water storage at R-19, he said no; hope to get approval to discharge before need		
Dev	5/31/00	Wed	D		13 00	13 30			0 0	0 30		Restart kickoff meeting for R-19 and Cdv-15-3, MK did SSHASP mod, at DX now for signatures.		
Dev	5/31/00	Wed	D		13 30	13.45			0 0	0 15		Michelle Cash stated all DX burn permits are void, must be reapplied for on an individual basis.		
Dev	6/1/00	Thu	D		10.00	12.00			0 0	2.00		Ron Trueblood worked on core curation.		
Dev	6/1/00	Thu	D		12.00				0 0			DX aggregate well SSHASP mod signed and approved		
Dev	6/1/00	Thu	D		12.00	16:30			0 0	4 30		JRM updated electronic FTL log		
Dev	6/1/00	Thu	D		16:30	17:30			0 0	1.00		JRM received approved NOI to discharge from Roy Bohn through Joe Skalski.		
Dev	6/2/00	Fri	D	140 0	7 00	8 00			0 0	1.00		At FSF preparing to go to R-19 to sprinkle water per NOI		
Enroute	6/2/00	Fri	D	140.0	9 00	10.00			0 0	1.00		At R-19, Larry Daryl Kadrmas, Gary Larson, JRM		
Tailgate	6/2/00	Fri	D	140 0	9 00	9.15			0 0	0.15		Tailgate		
Dev	6/2/00	Fri	D	140 0	9 00	10 00			0 0	1:00		Dynatec unloaded sprinkler pipe and pump		
Dev	6/2/00	Fri	D	140 0	9 00	10 00			0 0	1:00		Dynatec deployed sprinkler pipe in cleared area		
Dev	6/2/00	Fri	D	140 0	10 00	10 30			0 0	0 30		Dynatec to Cdv-15-3 to get pipe fittings.		
Dev	6/2/00	Fri	D	140 0	10.30	11.00			0 0	0 30		Dynatec starts sprinkling water per NOI.		
Dev	6/2/00	Fri	D	140 0	11.00	12.00			0 0	1.00		JRM picked up copy of signed SSHASP mod at MK.		
									0 0					
Dev	6/5/00	Mon	D	141 0	6 00	10 00			0 0	4 00		Mobilized UDR drill rig from R-15 to R-19		
Dev	6/5/00	Mon	D	141 0	10 00	18 00			0 0	8 00		Continued discharge of staged borehole water per approved NOI.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Dev	6/6/00	Tue	D	142.0	6 00	18 00			0 0	12 00		Washed screens 1, 2, & 3.		
Dev	6/7/00	Wed	D	143 0	6 00	14 00			0 0	8 00		Washed screens 4, 5, 6, & 7		
Dev	6/7/00	Wed	D	143 0	14 00	18 00			0 0	4 00		Removed 10" casing		
Dev	6/8/00	Thu	D	144 0					0 0			H rods at 1875'; B rods at 1870'		
Dev	6/8/00	Thu	D	144 0	8.00	11:30			0 0	3 30		Airlifting on sump		
Dev	6/8/00	Thu	D	144 0	11:30	11:30				0 00		300 gallons airlifted total		
Devsam	6/8/00	Thu	D	144 0	12.50	12 50				0 00		750 gallons airlifted total		
Dev	6/8/00	Thu	D	144 0	13 26	13 29			0 0	0.03		Pumped 150 gallons from holding tank to storage.		
rate	6/8/00	Thu	D	144 0	13 29	13.40				0:11		40 gal. at 3 64 gpm		
rate	6/8/00	Thu	D	144.0	13 29	14:10				0.41		120 gal. at 3 9 gpm		
Dev	6/8/00	Thu	D	144 0	14:10	14:11			0 0	0 01		Pumped 180 gallons from holding tank to storage.		
Dev	6/8/00	Thu	D	144 0					0 0			930 gallons total		
Devsam	6/8/00	Thu	D	144 0	14.18				0 0			950 gallons airlifted total		
rate	6/8/00	Thu	D	144 0	14:18	14:40				0 22		100 gal. at 4 5 gpm		
Dev	6/8/00	Thu	D	144 0	14.40	14.42			0 0	0 02		Pumped 140 gallons from holding tank to storage.		
Dev	6/8/00	Thu	D	144.0					0 0			1070 gallons total		
Dev	6/8/00	Thu	D	144 0	14:42	15 08				0 26		110 gal. at 4 2 gpm		
Devsam	6/8/00	Thu	D	144 0	15:18				0.0			1160 gallons airlifted total		
rate	6/8/00	Thu	D	144 0	14:42	15 32				0 50		220 gal. at 4.4 gpm		
Dev	6/8/00	Thu	D	144.0	15:32	15:34			0.0	0 02		Pumped 220 gallons from holding tank to storage; 1290 gallons total.		
Dev	6/8/00	Thu	D	144.0	15:34	16:35						260 gal.		
Dev	6/8/00	Thu	D	144 0	16:35	16:40			0 0	0.05		Pumped 260 gallons from holding tank to storage; 1600 gallons total.		
Dev	6/8/00	Thu	D	144 0	16:40	17:00			0 0	0 20		Shutdown		
Dev	6/8/00	Thu	D	144 0	17.00	17:30			0 0	0:30		FSF		
									0 0					
Dev	6/9/00	Fri	D	145 0	17:00	17:30			0 0	0 30		Airlifted water from well sump.		
									0 0					

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Dev	6/10/00	Sat							0.0			No ops; DX lockout.		
									0.0					
Dev	6/11/00	Sun							0.0			No ops; DX lockout.		
									0.0					
Dev	6/12/00	Mon	D	146.0	6.00	18.00			0.0	12.00		Airlifted water from well sump.		
Dev	6/13/00	Tue	D						0.0			No activities		
Dev	6/14/00	Wed	D						0.0			No activities		
Dev	6/15/00	Thu	D	147.0					0.0			Airlifted water from well sump.		
Dev	6/16/00	Fri	D	148.0					0.0			Airlifted water from well sump.		
Dev	6/19/00	Mon	D	149.0					0.0			Airlifted water from well sump.		
Dev	6/20/00	Tue	D	150.0	6.00	6.30			0.0	0.30		Drillers at FSF discuss schedule		
Dev	6/20/00	Tue	D	150.0	6.30	6.45			0.0	0.15		Enroute		
Dev	6/20/00	Tue	D	150.0	6.45	7.00			0.0	0.15		On site - tailgate, inspection		
Dev	6/20/00	Tue	D	150.0	7.00	11:00			0.0	4.00		Reset B and H rods		
Dev	6/20/00	Tue	D	150.0	10.20	11:15			0.0	0.55		Goetz and Benak on site - set up for sampling and calibrate Horiba and NTU meter		
Dev	6/20/00	Tue	D	150.0	11:15	11:20			0.0	0.05		Bs 1830 tally; Hs 1842 tally		
Dev	6/20/00	Tue	D	150.0	11:20	11:40			0.0	0.20		Drillers offsite to get water for equipment		
Dev	6/20/00	Tue	D	150.0	11:40	12:25			0.0	0.45		Lunch		
Dev	6/20/00	Tue	D	150.0	12.25	12.26			0.0	0.01		Starting up, no water yet		
Dev	6/20/00	Tue	D	150.0	12.26	12.30			0.0	0.04		Water coming out, hose not secure		
Dev	6/20/00	Tue	D	150.0	12.30	12.45			0.0	0.15		Securing hose		
Dev	6/20/00	Tue	D	150.0	12.45	12.50			0.0	0.05		Starting development - water pressure is high, 60 gallons out		
Dev	6/20/00	Tue	D	150.0	12.50	13.05			0.0	0.15		~ 20 gpm, waiting to complete circulation, 80 gallons out		
Dev	6/20/00	Tue	D	150.0	13.05	13.20			0.0	0.15		First sample		
Dev	6/20/00	Tue	D	150.0	13.30	13.35			0.0	0.05		gpm down to 10 gpm		
Dev	6/20/00	Tue	D	150.0	13.40	13.50			0.0	0.10		gpm back up to approx. 25 gpm		
Dev	6/20/00	Tue	D	150.0	13.55	14.00			0.0	0.05		Turned off compressor. Radiator is too hot. Drillers will spend rest of the day removing and cleaning it.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Equip	6/20/00	Tue	D	150.0	14 00	18.00			0.0	4 00		Turned off compressor, Radiator is too hot. Drillers will spend rest of the day removing and cleaning it.		
Dev	6/21/00	Wed	D	151.0	6.00	6:30			0.0	0 30		FSF, depart FSF		
Dev	6/21/00	Wed	D	151.0	6:30	7.00			0 0	0 30		Enroute		
Dev	6/21/00	Wed	D	151.0	7.00	7:15			0 0	0:15		Tailgate, inspection. Calibrate Horiba for pH cond. Ok Turbidity seems off		
Dev	6/21/00	Wed	D	151.0	7:15	7:25			0 0	0:10		Warm equipment, calibrate ESD turbidity meter		
Dev	6/21/00	Wed	D	151.0	7:25				0 0			Going to depart for replacement		
Dev	6/21/00	Wed	D	151.0	7:35				0 0			Initial day #2 Screen #7; collected 2nd titration, estimate gpm @ 20 gpm		
Dev	6/21/00	Wed	D	151.0	7.50				0 0			Collected 3rd titration on NTUs higher (will have Pat Longmire determine which sample to run)		
Dev	6/21/00	Wed	D	151.0	8 05				0.0			Air compressor fluctuating, acts as surge, taking another titration - #4. Michelle on site		
Dev	6/21/00	Wed	D	151.0	8:35				0 0			Turbidity up		
Dev	6/21/00	Wed	D	151.0	9 00				0.0			Pumping at ~ 15 gpm, small fluctuations in the compressor		
Dev	6/21/00	Wed	D	151.0	10.30				0 0			Pumping up to ~ 20 gpm		
Dev	6/21/00	Wed	D	151.0	11:10				0 0			Checking turbidity meter calibration with 10 NTU standard		
Dev	6/21/00	Wed	D	151.0	12 05				0.0			Completion of air lift development on screen #7		
Dev	6/21/00	Wed	D	151.0	12:15				0.0			Collected 3 (40 ml) VOAs		
Dev	6/21/00	Wed	D	151.0	12:20				0 0			Compressor off		
Dev	6/21/00	Wed	D	151.0	12:30				0.0			Starting to Trip out rods - B's were at 1830' tally, tripping out Bs.		
Dev	6/21/00	Wed	D	151.0	13.45				0.0			Tripped out 61 30' Bs were at 1830 tally		
Dev	6/21/00	Wed	D	151.0	14.00				0.0			Tripping back in rods		
Dev	6/21/00	Wed	D	151.0	14:10				0.0			Tally Bs 1730, Hs 1742		
Dev	6/21/00	Wed	D	151.0	14:15				0.0			Larry Thoren off site		
Dev	6/21/00	Wed	D	151.0	14:30				0 0			Bones and Gary on site - Bill Stone on site		
Dev	6/21/00	Wed	D	151.0	15:15				0.0			Compressor on and pumping water out ~ 10 to 15 gpm		
Dev	6/21/00	Wed	D	151.0	15:30				0 0			Initial titration and parameters		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Dev	6/21/00	Wed	D	151.0	16:10				0 0			Stopped to exchange escort's badge with access control. Shut compressor off		
Dev	6/21/00	Wed	D	151.0	16:25				0 0			Back on site and compressor on - letting water flush out		
Dev	6/21/00	Wed	D	151.0	17:00				0 0			Last reading Shutting down and leaving for the FSF		
Dev	6/22/00	Thu	D	152.0	6.00	8 30			0.0	2.30		At the FSF.		
Dev	6/22/00	Thu	D	152.0	8.30				0 0			Enroute to the site		
Dev	6/22/00	Thu	D	152.0	8.45				0 0			On site		
Dev	6/22/00	Thu	D	152.0	8 50				0.0			Calibrated Horiba pH, cond. Ect.		
Dev	6/22/00	Thu	D	152.0	8 55				0.0			Safety tailgate and inspections		
Dev	6/22/00	Thu	D	152.0	9.15				0.0			Calibrated the NTU meter, seems o k.		
Dev	6/22/00	Thu	D	152.0	9 20				0.0			Starting up compressor		
Dev	6/22/00	Thu	D	152.0	9.25				0.0			Started to lift water out, gpm approx. 10 gpm		
Dev	6/22/00	Thu	D	152 0	9 30				0 0			Removed about 40 gallons		
Dev	6/22/00	Thu	D	152 0	9.40				0 0			Sampled. Took another titration, #2 from screen #6		
Dev	6/22/00	Thu	D	152.0	10.30				0.0			Larry Thoren off site to the FSF		
Dev	6/22/00	Thu	D	152 0	11.25				0.0			re-calibrating the NTU meter		
Dev	6/22/00	Thu	D	152.0	12.40				0.0			Gpm still around 10gpm		
Dev	6/22/00	Thu	D	152 0	12.55				0.0			Drillers are washing out one of the frac tanks		
Dev	6/22/00	Thu	D	152.0	13.30				0.0			Turned off the air compressor and stopped washing out frac tank		
Dev	6/22/00	Thu	D	152.0	13 50				0.0			Starting to Trip out B rods, next H rods		
Dev	6/22/00	Thu	D	152 0	15 50				0 0			Tripping rods back in. B rods.		
Dev	6/22/00	Thu	D	152 0	16 50				0 0			Finished tripping in the B rods		
Dev	6/22/00	Thu	D	152 0	17 00				0.0			Shutting down and heading back to the FSF		
									0 0					
Dev	6/23/00	Fri	D	153 0	6.00	6 30			0 0	0.30		At the FSF		
Dev	6/23/00	Fri	D	153 0	6 30	6.45			0 0	0.15		Enroute to the site		
Dev	6/23/00	Fri	D	153 0	6.45				0 0			On site		
Dev	6/23/00	Fri	D	153 0	7.00				0 0			Refueling the compressor		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Dev	6/23/00	Fri	D	153.0	7:10				0.0			Calibrating the Horiba, letting the NTU meter warm up. Starting on screen #5		
Dev	6/23/00	Fri	D	153.0	7:20				0.0			Rod tally: Bs at 1580, Hs at 1592 - one of the lift rods was pulled out		
Dev	6/23/00	Fri	D	153.0	7:30				0.0			Calibrating the NTU meter		
Dev	6/23/00	Fri	D	153.0	7:35				0.0			Starting to lift water out. About 10 gpm		
Dev	6/23/00	Fri	D	153.0	7.50				0.0			1st sample, took initial titration		
Dev	6/23/00	Fri	D	153.0	8.05				0.0			Recalibrated Horiba, o.k.		
Dev	6/23/00	Fri	D	153.0	8.20				0.0			Drillers are washing out a frac tank		
Dev	6/23/00	Fri	D	153.0	10.50				0.0			Larry and Daryl off site for water		
Dev	6/23/00	Fri	D	153.0	12.35				0.0			Larry and Daryl back on site		
Dev	6/23/00	Fri	D	153.0	13:30				0.0			Turning off compressor		
Dev	6/23/00	Fri	D	153.0	13:40				0.0			Tripping out B rods		
Dev	6/23/00	Fri	D	153.0	14.40				0.0			Finished B rods, now tripping H rods		
Dev	6/23/00	Fri	D	153.0	15:15				0.0			Starting to trip back in		
Dev	6/23/00	Fri	D	153.0	16:10				0.0			Finished tripping in the B rods, B tally at 1410, H tally at 1420		
Dev	6/23/00	Fri	D	153.0	16:20				0.0			Starting the air compressor, re-calibrating the Horiba and NTU meter		
Dev	6/23/00	Fri	D	153.0	16:30				0.0			Starting to airlift 4th screen		
Dev	6/23/00	Fri	D	153.0	16:45				0.0			Took initial titration and parameters		
Dev	6/23/00	Fri	D	153.0	17:15				0.0			Shutting down and heading back to the FSF		
Dev	6/23/00	Fri	D	153.0	17:25				0.0					
Dev	6/24/00	Sat	D	154.0	6.00	7:20			0.0	1:20		At the FSF, getting fuel		
Dev	6/24/00	Sat	D	154.0	7:20	7:40			0.0	0.20		Enroute to the site		
Dev	6/24/00	Sat	D	154.0	7:40	7.50			0.0	0:10		On site. Re-fueling the compressor, safety tailgate and inspections		
Dev	6/24/00	Sat	D	154.0	7:50	8.00			0.0	0:10		Calibrating the Horiba and warming up the NTU meter. Air compressor on		
Dev	6/24/00	Sat	D	154.0	8.00	8:10			0.0	0:10		Starting to air lift water. Letting stagnant water clear out of pipes		
Dev	6/24/00	Sat	D	154.0	8:10	8:15			0.0	0.05		Calibrating the NTU meter		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list fast drilling/borehole activity)	DTW	Borehole TD/Tag
Dev	6/24/00	Sat	D	154 0	8.15	8 30			0.0	0.15		Pumping at about 5 gpm, taking another (#2) titration		
Dev	6/24/00	Sat	D	154 0	8 30	11.50			0.0	3 20		Drillers are cleaning out a frac tank		
Dev	6/24/00	Sat	D	154 0	11.50	12.45			0 0	0.55		Turning the compressor off and starting to Trip out the B rods		
Dev	6/24/00	Sat	D	154 0	12.45	13 05			0.0	0 20		Tripping H rods out		
Dev	6/24/00	Sat	D	154.0	13.05	13 55			0.0	0.50		Tripping H and B rods back in		
Dev	6/24/00	Sat	D	154 0	13 55	14 00			0 0	0.05		Finished tripping in and connecting to the compressor		
Dev	6/24/00	Sat	D	154 0	14 00	14 20			0 0	0 20		Started to airlift - rod tally Bs 1245, Hs 1250		
Dev	6/24/00	Sat	D	154 0	14 20	14 30			0 0	0.10		Some initial water but now just air		
Dev	6/24/00	Sat	D	154 0	14 30	14 35			0.0	0 05		Recalibrated the NTU meter		
Dev	6/24/00	Sat	D	154 0	14 35	14.40			0 0	0 05		Water lifting out		
Dev	6/24/00	Sat	D	15-1 0	14.40	15 00			0 0	0 20		Collected titration and parameters for screen #3		
Dev	6/24/00	Sat	D	154 0	15 00	15:10			0 0	0.10		Water production is very low – 1/4 gallon per minute. Stopping the compressor and raising the Bs up another 5' so they are 10' away from the Hs		
Dev	6/24/00	Sat	D	154.0	15:10	15.50			0 0	0.40		Water lifting out - pipe tally Bs 1240, Hs 1250		
Dev	6/24/00	Sat	D	154 0	15.50	16 30			0 0	0.40		Water production very low to none, sampled the last amount. Turbidity is extremely high, took titration #2. Letting the water recharge.		
Dev	6/24/00	Sat	D	154 0	16 30	17.35			0 0	1.05		Keeping the airflow low		
Dev	6/24/00	Sat	D	154 0	17.35	18 00			0 0	0 25		Shutting down and heading back to the FSF		
Dev	6/25/00	Sun	D	156 0	6 00	6:15			0 0	0.15		At the FSF		
Dev	6/25/00	Sun	D	156 0	6 30	6 35			0 0	0 05		Arrive on site		
Dev	6/25/00	Sun	D	156 0	6 35	6.45			0.0	0.10		Filling out tailgate and inspections. Calibrating the Horiba and NTU meter		
Dev	6/25/00	Sun	D	156 0	6 45	7.00			0.0	0.15		Starting the air compressor		
Dev	6/25/00	Sun	D	156 0	7.00	7 25			0 0	0 25		Taking sample and titration (#3). Water initially came out at a good rate, but has now slowed < 1/4 gallon per minute		
Dev	6/25/00	Sun	D	156 0	7.25	7.30			0 0	0.05		No water coming out. Playing with the air to try and get some stability		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Dev	6/25/00	Sun	D	156.0	7:30	10:50			0.0	3:20		Getting about 1 cupful of water per minute		
Dev	6/25/00	Sun	D	156.0	10:50	13:00			0.0	2:10		Volume is small and turbidity is falling slightly - take another sample in 1/2 hour		
Dev	6/25/00	Sun	D	156.0	13:00	13:15			0.0	0:15		Shutting off air compressor		
Dev	6/25/00	Sun	D	156.0	13:15	18:00			0.0	4:45		Drillers will Trip out H and B rods. The rods will be tripped back in to air lift the sump again. Benak off site.		
Dev	6/26/00	Mon	D	157.0	6:00	6:40			0.0	0:40		At the FSF		
Dev	6/26/00	Mon	D	157.0	6:40	7:00			0.0	0:20		Enroute		
Dev	6/26/00	Mon	D	157.0	7:00	7:10			0.0	0:10		On site. Safety tailgate and inspections. Going to airlift the sump, H rods at 1875, B rods at 1870		
Dev	6/26/00	Mon	D	157.0	7:10	7:20			0.0	0:10		Calibrating Horiba, starting compressor		
Dev	6/26/00	Mon	D	157.0	7:20	7:35			0.0	0:15		Lifting water out		
Dev	6/26/00	Mon	D	157.0	7:35	9:45			0.0	2:10		Taking a filration sample		
Dev	6/26/00	Mon	D	157.0	9:45	10:00			0.0	0:15		Dave Broxton and Dave Vaniman on site		
Dev	6/26/00	Mon	D	157.0	10:00	10:15			0.0	0:15		Jon Marin on site		
Dev	6/26/00	Mon	D	157.0	10:15	10:35			0.0	0:20		Took samples from the tanks that store the development water - filled 2 (1 liter) bottles from each tank and will fill the appropriate bottles later. Need a sample for semi-vol. And HE from each tank		
Dev	6/26/00	Mon	D	157.0	10:35	13:00			0.0	2:25		Driller turned air down and water is cloudy with higher turbidity when the air is turned back up		
Dev	6/26/00	Mon	D	157.0	13:00	13:30			0.0	0:30		Pressure dropped on the compressor, bringing back up air pressure - raised turbidity by pushing out stagnant water		
Dev	6/26/00	Mon	D	157.0	13:30	14:15			0.0	0:45		Bill Hardesty called to get paperwork ready for water samples (development) for disposal of the water. Called Jon Marin to ask for rad screening. Should be able to pick up paperwork this afternoon		
Dev	6/26/00	Mon	D	157.0	14:15	14:30			0.0	0:15		Dave Broxton and Dave Vaniman off site		
Dev	6/26/00	Mon	D	157.0	14:30	15:30			0.0	1:00		Cut back on the compressor - will turn the pressure up to see if turbidity increases		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Dev	6/26/00	Mon	D	157.0	15:30	15:50			0.0	0:20		Called about the higher turbidity - will airlift the rest of the day. Turned off compressor to take out 10' of B rods and continue lifting		
Dev	6/26/00	Mon	D	157.0	15:50	17:05			0.0	1:15		Compressor back on		
Dev	6/26/00	Mon	D	157.0	17:05	17:35			0.0	0:30		Turbidity up. Water stopped lifting		
Dev	6/26/00	Mon	D	157.0	17:35	18:00			0.0	0:25		Shutting down and heading to the FSF		
Dev	6/27/00	Tue	D	158.0	6:00	6:40			0.0	0:40		At the FSF		
Dev	6/27/00	Tue	D	158.0	6:40	6:50			0.0	0:10		Enroute		
Dev	6/27/00	Tue	D	158.0	6:50	7:05			0.0	0:15		On site - turned on the NTU meter and calibrating Horiba		
Dev	6/27/00	Tue	D	158.0	7:05	7:20			0.0	0:15		Started up the compressor - going to airlift and clean out from the sump - still was dirty		
Dev	6/27/00	Tue	D	158.0	7:20	7:40			0.0	0:20		Calibrated NTU meter		
Dev	6/27/00	Tue	D	158.0	7:40	8:10			0.0	0:30		Took a titration sample - #3		
Dev	6/27/00	Tue	D	158.0	8:10	9:00			0.0	0:50		Turbidity at 94.3		
Dev	6/27/00	Tue	D	158.0	9:00	10:00			0.0	1:00		Turbidity at 171.5		
Dev	6/27/00	Tue	D	158.0	10:00	10:45			0.0	0:45		NTU 21.5		
Dev	6/27/00	Tue	D	158.0	10:45	11:15			0.0	0:30		NTU 9.62		
Dev	6/27/00	Tue	D	158.0	11:15	11:30			0.0	0:15		NTU 12.55		
Dev	6/27/00	Tue	D	158.0	11:30	12:05			0.0	0:35		NTU 14.74		
Dev	6/27/00	Tue	D	158.0	12:05	12:25			0.0	0:20		Air compressor off		
Dev	6/27/00	Tue	D	158.0	12:25	16:30			0.0	4:05		Tripping out the rods		
Dev	6/27/00	Tue	D	158.0	16:30	18:00			0.0	1:30		Back to the FSF		
Dev	6/28/00	Wed	D	159.0	6:00	15:30			0.0	9:30		Fabricate tools and equipment in preparation to run pump in well		
Dev	6/28/00	Wed	D	159.0	15:30	16:30			0.0	1:00		Arrive R-19 site, conduct pipe tally: 93 - 20-ft jts N rods w/ 2 misc pieces (20.8 ft & 15.85 ft bad jts)		
Dev	6/28/00	Wed	D	159.0	16:30	17:15			0.0	0:45		Rig up pump / packer assembly and insert into well		
Dev	6/28/00	Wed	D	159.0	17:15	17:30			0.0	0:15		Inflate packer inside casing near surface to pressure test line/packer assembly, let sit over night		
Dev	6/28/00	Wed	D	159.0	17:30				0.0			Depart site for FSF		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Dev	6/29/00	Thurs	D	160.0	6:00	14:30			0.0	8.30		Prep equipment at FSF, Wait on driller (Bones) to conduct personal business.		
Dev	6/29/00	Thurs	D	160.0	14:30	15:00			0.0	0:30		FSF to R-19		
Dev	6/29/00	Thurs	D	160.0	15:00	15:25			0.0	0.25		Pull pump/packer assembly from well, packer test held 200 psi successfully, prep for Water level		
Dev	6/29/00	Thurs	D	160.0	15:25	15:25			0.0	0.00		TOC 1.2 ft AGL (cement pad), measured 1179.5 - 1.2 = 1178.3 ft BGS. Used new cable spool FSF put together		
Dev	6/29/00	Thurs	D	160.0	15:25	15:50			0.0	0.25		Prepare to Trip in pump/packer assembly		
Dev	6/29/00	Thurs	D	160.0	15:50	17:30			0.0	1:40		Trip in pump/packer assembly to 1000 ft		
Dev	6/29/00	Thurs	D	160.0	17:30	18:00			0.0	0.30		Depart R-19 for FSF		
Dev	6/30/00	Fri	D	161.0	6:00	6:30			0.0	0:30		FSF		
Dev	6/30/00	Fri	D	161.0	6:30	7:30			0.0	1:00		Arrive FSF, RJK to WR office to get out reports, continue tripping in well to 1220 ft w/ pump/pkr		
Dev	6/30/00	Fri	D	161.0	7:30	7:45			0.0	0:15		Finish Trip in total of 61 - 20 ft jts to 1220 ft. Stick up is 3.5 ft. pump is 11.5 ft, top of packer at 1228 ft BGS at Screen No. 3		
Dev	6/30/00	Fri	D	161.0	7:45	8:48			0.0	1:03		Driller wires generator to cable		
Dev	6/30/00	Fri	D	161.0	8:48	9:00			0.0	0:12		Water level before inflate packers 1108.9 - 3.5 ft TOT = 1177.4 ft BGS		
Dev	6/30/00	Fri	D	161.0	9:00	9:15			0.0	0:15		Inflate packer, packer set at 1228 ft BGS		
Dev	6/30/00	Fri	D	161.0	9:15	9:20			0.0	0.05		WL after inflate packer		
Dev	6/30/00	Fri	D	161.0	9:20	9:40			0.0	0:20		Prepare flow line from tubing		
Dev	6/30/00	Fri	D	161.0	9:40	10:35			0.0	0.55		Driller Bones off site to get part for flow line connection		
Dev	6/30/00	Fri	D	161.0	10:35	10:50			0.0	0:15		WL packer still inflated, 1178.9, 3.5 Ft TOT = 1175.4 ft BGS. Calibrate NTU and Horiba Meters		
Dev	6/30/00	Fri	D	161.0	10:50	11:00			0.0	0:10		Driller on site with parts, make up flow line		
Dev	6/30/00	Fri	D	161.0	11:00	11:30			0.0	0:30		Water level after inflate packers 11787.8 - 3.5 TOT = 1175.3 BGS		
Dev	6/30/00	Fri	D	161.0	11:30	12:10			0.0	0:40		Turn pump on, Coyolo kicks pump off / overload. Raise amps of adjustable current breaker		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Dev	6/30/00	Fri	D	161.0	12.10	12.15			0.0	0.05		Turn pump on, water to surface, continues to run, flow gage reads 47,200 gallons, pumping 14.5+ gpm		
Dev	6/30/00	Fri	D	161.0	12.15	12.22			0.0	0.07		Collect prelim sample for TOC		
Dev	6/30/00	Fri	D	161.0	12.22	14:10			0.0	1:48		Screen #3 pump development continues		
Dev	6/30/00	Fri	D	161.0	14:10	14:30			0.0	0.20		Pump shut down, blew fuse, replace fuse		
Dev	6/30/00	Fri	D	161.0	14:30	14:41			0.0	0.11		Pump on		
Dev	6/30/00	Fri	D	161.0	14.41	15:00			0.0	0.19		Pump on and off several times		
Dev	6/30/00	Fri	D	161.0	15.00	16:04			0.0	1:04		Pump Episode #2 at Screen #3		
Dev	6/30/00	Fri	D	161.0	16.04	16.10			0.0	0.06		Pump shut down at 16.04, work on electric box, thunderstorm shuts down activity		
Dev	6/30/00	Fri	D	161.0	16:10	16:30			0.0	0.20		10-second lightning		
Dev	6/30/00	Fri	D	161.0	16.30	16:45			0.0	0.15		rain, shut down		
Dev	6/30/00	Fri	D	161.0	16.45	18.00			0.0	1:15		Skalski on site to work on electric box		
Dev	6/30/00	Fri	D	161.0	18.00				0.0			Work on electronic box, depart site		
Dev	7/1/00	Sat	D	161.5	6:00	7:20			0.0	1:20		Meet at FSF, pick up equipment to repair cable and pick up foot check valve for tubing		
Dev	7/1/00	Sat	D	161.5	7:20	9.00			0.0	1.40		R-19 Site. Prepare to Trip out pump/packer assembly		
Dev	7/1/00	Sat	D	161.5	9.00	9.30			0.0	0.30		Tripped out 360 ft of N rods tubing Ball broke and dropped 860 ft of tubing, pump assembly and packer assembly into well		
Fish	7/1/00	Sat	D		9.30	11:00			0.0	1:30		At FSF to get fisherman and fishing tools		
Fish	7/1/00	Sat	D		11:00	12.00			0.0	1:00		At R-19 site w/ video logging trailer. Ran video log to a depth of 330', where top of tubing located		
Fish	7/1/00	Sat	D		12.00	13.00			0.0	1.00		At FSF to review video log w/ Skalski		
Fish	7/1/00	Sat	D		13.00	18.00			0.0	5.00		Make arrangements for fishing tools and fisherman (John Eddy) to arrive from out of state.		
Fish	7/2/00	Sun	D		6.00	7.30			0.0	1:30		Meet at FSF, prepare fishing tools		
Fish	7/2/00	Sun	D		7.30	8.00			0.0	0.30		At R-19 site, prepare to run into well to retrieve lost tubing and pump and packer assemblies		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Fish	7/2/00	Sun	D		6:00	11:00			0.0	3:00		Run in well with fishing tools. Locate tubing at 390 ft and retrieve all tubing from well, 860 ft of tubing recovered		
Fish	7/2/00	Sun	D		11:00	13:00			0.0	2:00		Finish pulling tubing from well, several joints badly damaged and some over-slid onto others		
Fish	7/2/00	Sun	D		13:00	14:15			0.0	1:15		Go to FSF to get video logging trailer		
Fish	7/2/00	Sun	D		14:15	14:30			0.0	0:15		At R-19 site with video trailer, prep to run video log		
Fish	7/2/00	Sun	D		14:30	15:00			0.0	0:30		Start into well with video camera		
Fish	7/2/00	Sun	D		15:00	15:10			0.0	0:10		Screen #1 dry, Screen #2 has small amount of water entering and running down casing		
Fish	7/2/00	Sun	D		15:10	15:15			0.0	0:05		Video at 1008 shows wire in well		
Fish	7/2/00	Sun	D		15:15	15:20			0.0	0:05		Video camera blocked in well by balled up electrical cable at 1055 ft		
Fish	7/2/00	Sun	D		15:20	15:30			0.0	0:10		Start pulling video camera out of well		
Fish	7/2/00	Sun	D		15:30	16:00			0.0	0:30		Out of well with video camera, move video logging trailer away to position boom truck		
Fish	7/2/00	Sun	D		16:00	16:15			0.0	0:15		Attempt to roll electric cable onto drum. Electric motor to drum burned out, remove motor to hand-roll cable onto drum		
Fish	7/2/00	Sun	D		16:15	17:15			0.0	1:00		Start pulling electric cable out of well using rig and boom truck		
Fish	7/2/00	Sun	D		17:15	17:20			0.0	0:05		Remove all cable from well, pig tail at end indicates cable parted at pump connection		
Fish	7/2/00	Sun	D		17:20	17:40			0.0	0:20		Run in well with video camera for video #2 of day		
Fish	7/2/00	Sun	D		17:40	18:00			0.0	0:20		Depth to water from video log #2, 11779.4 from TOC - 1.2 ft = 1178.2		
Fish	7/2/00	Sun	D		18:00	18:30			0.0	0:30		Top of fish located at 1236' - 2" 1236.2 ft, cloudy, can't see clearly, water movement up well around fish		
Fish	7/2/00	Sun	D		18:30	18:50			0.0	0:20		Pull out of well with video camera		
Fish	7/2/00	Sun	D		18:50	19:00			0.0	0:10		Depart R-19 site		
Fish	7/3/00	Mon	D		6:00	8:00			0.0	2:00		Meet at FSF, prepare fishing tools		
Fish	7/3/00	Mon	D		8:00	8:20			0.0	0:20		arrive R-19 site, prepare to fish for pump/packer assembly at 1236.2 ft		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Fish	7/3/00	Mon	D		8:20	9:30			0.0	1:10		Run in Well with fishing tools		
Fish	7/3/00	Mon	D		9:30	12:00			0.0	2:30		Spear and turn onto fish at 1236 ft		
Fish	7/3/00	Mon	D		12:00	12:30			0.0	0:30		Pull out of well with part of fish - recover about 10' of subs and cross-overs to pump and shelby tube		
Fish	7/3/00	Mon	D		12:30	13:30			0.0	1:00		Run video of well. Locate top of fish at 1244 ft from TOC. Probably 4" via shelby tube		
Fish	7/3/00	Mon	D		13:30	14:00			0.0	0:30		Pull out of well with video camera		
Fish	7/3/00	Mon	D		14:00	14:30			0.0	0:30		Depart R-31 site to prepare fishing tools for pump/packer assembly		
Fab	7/3/00	Mon	D		14:30	18:00			0.0	3:30		Fabricate fishing tools at FSF.		
Fish	07/04/00	Tue	D						0.0			Fish for lost development tools; Dynatec's cost.		
Fish	07/05/00	Wed	D						0.0			Fish for lost development tools; Dynatec's cost.		
Fish	07/06/00	Thu	D						0.0			Fish for lost development tools; Dynatec's cost.		
Fish	07/07/00	Fri	D						0.0			Fish for lost development tools; Dynatec's cost.		
Fish	07/10/00	Mon	D						0.0			Fish for lost development tools; Dynatec's cost.		
Fish	07/11/00	Tue	D						0.0			Fish for lost development tools; Dynatec's cost.		
Fish	07/12/00	Wed	D						0.0			Fish for lost development tools; Dynatec's cost.		
Fish	07/13/00	Thu	D						0.0			Fish for lost development tools; Dynatec's cost.		
Fish	07/14/00	Fri	D						0.0			Fish for lost development tools; Dynatec's cost.		
Fish	07/15/00	Sat	D						0.0			Fish for lost development tools; Dynatec's cost. Got all stuck tools from well.		
Off	07/16/00	Sun	D						0.0			Off.		
Dev	07/17/00	Mon	D						0.0			Prep to re-wash screens and airlift sump; Dynatec's cost until well back to status before lost packer assembly.		
Dev	07/18/00	Tue	D						0.0			Wash screens; Dynatec's cost until well back to status before lost packer assembly.		
Dev	07/19/00	Wed	D						0.0			Wash screens; Dynatec's cost until well back to status before lost packer assembly.		
Dev	07/20/00	Thu	D						0.0			Airlift sump; Dynatec's cost until well back to status before lost packer assembly.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Dev	07/21/00	Fri	D						0.0			Airlift sump and run video log of well; video showed clear water down to screen 5; Dynatec's cost until well back to status before lost packer assembly.		
Dev	07/22/00	Sat	D	162.5					0.0			Prep to airlift water from screen 5;		
Dev	07/22/00	Sat	D	162.5	9.00	10.30			0.0	1:30		Tripped in pump to 1610 ft.		
Dev	07/22/00	Sat	D	162.5	10.30	11:00			0.0	0.30		Prepped to airlift screen # 5.		
Dev	07/22/00	Sat	D	162.5	11:00	11:00			0.0	0.00		Start pumping; turbidity measurement.		
Dev	07/22/00	Sat	D	162.5	11:00	13.15			0.0	2.15		Pumped 550 gallons.		
Dev	07/22/00	Sat	D	162.5	13.15	13.15			0.0	0.00		End pumping; turbidity measurement.		
Lunch	07/22/00	Sat	D	162.5	13:15	13:45			0.0	0:30		Lunch		
Dev	07/22/00	Sat	D	162.5	13.45	14.00			0.0	0.15		Tripped in pump to 1750 ft.		
Dev	07/22/00	Sat	D	162.5	14.00	14:15			0.0	0.15		Prepped to airlift screen # 6.		
Dev	07/22/00	Sat	D	162.5	14:15	14:30			0.0	0:15		Start pumping; turbidity measurement after 190 gallons pumped.		
Dev	07/22/00	Sat	D	162.5	14:30	14:45			0.0	0.15		Turbidity measurement after 70 gallons pumped.		
Dev	07/22/00	Sat	D	162.5	14.45	15:00			0.0	0.15		Turbidity measurement after 90 gallons pumped.		
Dev	07/22/00	Sat	D	162.5	15:00	15:15			0.0	0.15		Turbidity measurement after 70 gallons pumped.		
Dev	07/22/00	Sat	D	162.5	15:15	15:30			0.0	0:15		Turbidity measurement after 90 gallons pumped.		
Dev	07/22/00	Sat	D	162.5	15:30	16.00			0.0	0.30		Turbidity measurement after 20 gallons pumped.		
Dev	07/22/00	Sat	D	162.5	16.00	16:15			0.0	0:15		Tripped in pump to 1850 ft.		
Dev	07/22/00	Sat	D	162.5	16:15	16:30			0.0	0:15		Prepped to airlift screen # 7.		
Dev	07/22/00	Sat	D	162.5	16:30	16:45			0.0	0:15		Start pumping; turbidity measurement after 90 gallons pumped.		
Dev	07/22/00	Sat	D	162.5	16.45	17.00			0.0	0:15		Turbidity measurement after 110 gallons pumped.		
Dev	07/23/00	Sun	D	163.0	6.00	6:15			0.0	0:15		To R-19.		
Dev	07/23/00	Sun	D	163.0	6:15	6:30			0.0	0:15		Tailgate and safety inspections.		
Dev	07/23/00	Sun	D	163.0	6:30	7:00			0.0	0:30		Warm up turbidity meter.		
Dev	07/23/00	Sun	D	163.0	7.00	7:10			0.0	0:10		Prep to resume airlifting screen # 7.		
Dev	07/23/00	Sun	D	163.0	7:10	7:15			0.0	0.05		Turbidity measurement on first water pumped.		
Dev	07/23/00	Sun	D	163.0	7:15	7.45			0.0	0.30		Turbidity measurement after 180 gallons pumped.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Dev	07/23/00	Sun	D	163 0	7.45	8.15			0.0	0.30		Turbidity measurement after 180 gallons pumped.		
Dev	07/23/00	Sun	D	163 0	8.15	8.45			0.0	0 30		Turbidity measurement after 180 gallons pumped.		
Dev	07/23/00	Sun	D	163 0	8.45	9.15			0.0	0 30		Turbidity measurement after 180 gallons pumped.		
Dev	07/23/00	Sun	D	163 0	9.15	10.00			0 0	0.45		Called Dave Broxton & Joe Skalski with results; no answer from Dave; Joe agreed with John Eddy to trip out pump; find out from Bill Stone tomorrow morning if he wants any more testing such as slug testing .		
Hydro	07/24/00	Mon	D	164 0	9.15	10.00			0 0	0 45		R-19 development complete; Bill Stone wants to perform hydrologic packer tests on screens 4 through 7.		
Hydro	07/24/00	Mon	D	164 0	10.00	18.00			0 0	8 00		Dynatec prep for packer tests.		
Hydro	07/25/00	Tue	D	165 0	6 00	18 00			0 0	12.00		Dynatec performs packer tests.		
Hydro	07/25/00	Tue	D	165 0	7.00	7.20			0 0	0 20		At R-19, John Eddy, Larry Thoren, Darly Kadrmas, Larry Glick, Mary Roybal, JRM.		
Tally	07/25/00	Tue	D	165 0	7 20	7.30			0 0	0.10		JRM counted N rods; 57-30', 7-20', 1-10' = 1860' total, agrees with John Eddy's tally.		
Visitors	07/25/00	Tue	D	165 0	7.30	12.30			0 0	5 00		Bill Stone, Steve McLin, & Neil Tapia onsite to perform hydro testing		
Support	07/25/00	Tue	D	165 0	7.45	10.10			0.0	2 25		JRM offsite; to DP tank Farm drilling to do daily safety meeting; then SAIC.		
Trip in	07/25/00	Tue	D	165 0	7.45	10.15	0 0	1855 5	1855.5	2.30	742 2	Tripped in packer assembly on N rods from surface to 1855 5'.		
Rigup	07/25/00	Tue	D	165 0	10.15	10 20			0 0	0 05		Rig up DTW meter.		
DTW	07/25/00	Tue	D	165 0	10 20	10 20			0 0	0 00		Depth to water	1179.3	
Hydro	07/25/00	Tue	D	165 0	10 20	11.00			0 0	0 40		Installed ESH-18 transducer.		
Hydro	07/25/00	Tue	D	165 0	11 00	12.00			0 0	1 00		Inflate packers		
Lunch	07/25/00	Tue	D	165 0	11:30	12.00			0 0	0 30		Lunch		
Support	07/25/00	Tue	D	165 0	12 00	13.15			0 0	1:15		JRM offsite to escort John Eddy and get towels for office trailer.		
Hydro	07/25/00	Tue	D	165 0	12 20	12 20			0 0	0 00		Packers failed to inflate; bad leak in Teflon tubing		
Visitors	07/25/00	Tue	D	165 0	12.30	12 30			0 0	0 00		Bill Stone, Steve McLin, & Neal Tapia offsite.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Trip out	07/25/00	Tue	D	165.0	12.30	14 04	1855.5	0 0	1855 5	1:34	1184.4	Tripped out N rods with packers		
Support	07/25/00	Tue	D	165.0	14:15	17.00			0 0	2.45		JRM offsite to SAIC.		
Hydro	07/25/00	Tue	D	165 0	14:30	14:45			0.0	0:15		Dynatec to FSF to get new spool of Teflon tubing		
Enroute	07/25/00	Tue	D	165 0	14:45	15:00			0 0	0:15		Back to R-19		
Hydro	07/25/00	Tue	D	165 0	15 00	15:10			0.0	0:10		Attached new Teflon tubing to packers.		
Dev	07/25/00	Tue	D	165 0	15:10	17:00	0 0	1855.5	1855.5	1.50	1012.1	Tripped in packer assembly on N rods from surface to 1855.5'.		
Hydro	07/25/00	Tue	D	165 0	17.00	17:45			0 0	0:45		Inflate packers		
Rigup	07/25/00	Tue	D	165 0	17.45	17.50			0 0	0.05		Rig up DTW meter.		
DTW	07/25/00	Tue	D	165 0	17.55	18.00			0.0	0.05		Depth to water	1176 0	
Shift	07/25/00	Tue	D	165 0	18 00	18.15			0.0	0.15		Secure site; all personnel offsite		
Shift	07/26/00	Wed	D	166 0	6.00	7.00			0 0	1:00		At FSF		
Equip	07/26/00	Wed	D	166.0	6 30	7.30			0.0	1.00		Dynatec loading steam cleaner and racks		
Enroute	07/26/00	Wed	D	166 0	7:30	8 00			0 0	0.30		To R-19		
Tailgate	07/26/00	Wed	D	166 0	8 00	8.15			0 0	0.15		Tailgate and safety inspections.		
DTW	07/26/00	Wed	D	166.0	8.15	8 20			0 0	0.05		Attempt DTW; failed due to meter shorting out.	failed	
Hydro	07/26/00	Wed	D	166 0	8 20	8.25			0 0	0.05		Pulled DTW meter.		
DTW	07/26/00	Wed	D	166.0	8 25	8 30			0 0	0 05		Depth to water with stainless steel cable meter.	1175 7	
Support	07/26/00	Wed	D	166.0	8.30	8.35			0 0	0.05		JRM called Steve McLin & Bill Stone; Bill said Neil Tapia is on way to R-19		
Decon	07/26/00	Wed	D	166 0	8.35	8.43			0 0	0.08		Dynatec prep to steam clean downhole tools.		
Hydro	07/26/00	Wed	D	166 0	8:43	8 55			0.0	0:12		Pulled DTW meter.		
Hydro	07/26/00	Wed	D	166 0	8.55	9.00			0.0	0.05		Install transducer to 1100'.		
Visitor	07/26/00	Wed	D	166 0	9.00	17.50			0 0	8.50		Neil Tapia, ESH-18 onsite.		
Hydro	07/26/00	Wed	D	166 0	9.15	10:45			0 0	1:30		Allow water level to stabilize.		
Support	07/26/00	Wed	D	166 0	10:20	11:12			0.0	0.52		JRM offsite to FSF to get sand paper for Dynatec.		
Hydro	07/26/00	Wed	D	166.0	10:45	11:30			0.0	0:45		Slug test on screen # 7		
Hydro	07/26/00	Wed	D	166.0	11:30	12.45			0.0	1:15		Had to redo because transducer cable slipped.		
Hydro	07/26/00	Wed	D	166.0	12.45	13.00			0 0	0:15		Reposition packers at screen # 6.		
Hydro	07/26/00	Wed	D	166 0	13 00	13:10			0.0	0:10		Depth to water with stainless steel cable meter.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Hydro	07/26/00	Wed	D	166 0	13.10	13.45			0.0	0.35		Inflate packers at screen # 6.		
Hydro	07/26/00	Wed	D	166 0	13.45	14.00			0.0	0.15		Inject water into screen # 6		
Hydro	07/26/00	Wed	D	166 0	14 00	16 00			0 0	2.00		Perform slug test at screen # 6.		
Hydro	07/26/00	Wed	D	166 0	16 00	16:15			0 0	0.15		Pull back packers to screen # 5		
Hydro	07/26/00	Wed	D	166 0	16:15	17:00			0.0	0.45		Inflate packers at screen # 5.		
Hydro	07/26/00	Wed	D	166 0	17:00	17:15			0 0	0.15		Inject water into screen # 5		
Hydro	07/26/00	Wed	D	166 0	17:15	17:30			0.0	0.15		Water level never stabilized, kept dropping		
Hydro	07/26/00	Wed	D	166 0	17.30	17:40			0 0	0.10		Lowered transducer another 20'.		
Depart	07/26/00	Wed	D	166 0	17.45	18 00			0 0	0:15		Packed up and left site.		
Shift	07/27/00	Thu	D	167.0	6 00	7.00			0 0	1.00		At FSF		
Enroute	07/27/00	Thu	D	167.0	7.00	7:30			0 0	0 30		To R-19		
Hydro	07/27/00	Thu	D	167.0	7:30	9.45			0 0	2.15		Neal Tapia, ESH-18, onsite to perform slug test for screen # 5.		
Trip out	07/27/00	Thu	D	167.0	9.45	10.45	1600.0	0 0	1600 0	1:00	1600 0	Tripped out N rods from with packers from 1600' to surface.		
Demob	07/27/00	Thu	D	167.0	10.45	12.15			0 0	1:30		Load core rods on boom truck; start to demob to Cdv-15-3.		
Lunch	07/27/00	Thu	D	167.0	12:15	12.45			0 0	0.30		Lunch		
Trip In	07/27/00	Thu	D	167.0	12.45	14.45	0.0		0.0	2.00		Tripped in submersible pump and N rods from surface to 1843'.		
Support	07/27/00	Thu	D	167.0	13.00	14.45			0 0	1:45		JRM offsite to FSF to get duct tape for Dynatec.		
Rigup	07/27/00	Thu	D	167.0	14.45	15:05			0.0	0 20		Rigged up to pump well.		
Hydro	07/27/00	Thu	D	167.0	15 05				0 0			Pumped well at 11 gpm.		
Break	07/27/00	Thu	D	167.0	15:05	15:20			0 0	0.15		Break		
Demob	07/27/00	Thu	D	167.0	15:20				0 0			Dynatec start demobing development/hydro testing equipment to R-25.		
Turb	07/27/00	Thu	D	167.0	16.10				0 0			Turbidity measurement, 10 3		
Demob	07/27/00	Thu	D	167.0					0 0			Dynatec demobed development and hydro testing equipment to		
Turb	07/27/00	Thu	D	167.0	16 50				0 0			Turbidity measurement, 4 98		
Turb	07/27/00	Thu	D	167.0	17.00				0 0			Dynatec to FSF; pump will run overnight.		
Turb	07/27/00	Thu	D	167.0	17:15				0 0			JRM offsite.		

Activity Description	Date	Day	Shift	Shift #	From (time)	To (time)	Production From (ft)	Production To (ft)	Production (ft)	Time (hr:min)	Rate (ft/hr)	Activity (for DTWs, list last drilling/borehole activity)	DTW	Borehole TD/Tag
Turb	07/28/00	Fri	D	168.0	6.00	7.00			0.0	1:00		At FSF.		
Turb	07/28/00	Fri	D	168.0	7.00	7:15			0.0	0:15		At R-19; tailgate and safety inspections.		
Turb	07/28/00	Fri	D	168.0	7:15	7:45			0.0	0:30		Turbidity measurement, 4.5.		
Turb	07/28/00	Fri	D	168.0	7:45	7.50			0.0	0.05		Collect final TOC sample for Dale Counce.		
Turb	07/28/00	Fri	D	168.0	7.50	10.30	1849.0	0.0	1849.0	2:40	693.4	Tripped out N rods with pump from 1849' to surface.		
Turb	07/28/00	Fri	D	168.0	10.30	18.00			0.0	7.30		Demobilized development and hydro testing equipment to Cdv-15-3.		
Demob	07/29/00	Sat	D	169.0	6.00	18.00			0.0	12.00		Demobilized development and hydro testing equipment to Cdv-15-3.		
Support	07/31/00	Mon	D		11:00	12.00			0.0	1:00		JRM attached lock to R-19 well head; gave keys to Joe Skalski at FSF.		

Appendix B

Lithologic Log

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 1 of 22
DRILLING COMPANY: Stewart Bro./Dynatec	PHASE 1: 1/7/00 - 1/13/00	PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown,Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
0	7075	1(2.5/2.5)					ALLUVIUM: (0-2.7 ft) Very dry, light to dark brown, organic, silt and sand, soft, rounded sanidine and quartz grains.		Qal
		2(2.5/2.5)							Qbt 4
5	7070	3(2.5/2.5)			Moisture Protected HSA Core (4.9-5.0')	R-19-4.5			
		4(2.5/2.5)					Qbt 4 TSHIREGE MEMBER, BANDELIER TUFF: (2.7-5 ft) Light pinkish gray, moderately welded, moderately indurated.		
10	7065	5(2.5/2.5)			Moisture Protected HSA Core (13.4-13.9')	R-19-9.5			
		6(1.6/2.5)							
15	7060	7(2.5/2.5)			Moisture Protected HSA Core (19.7-20')	R-19-14.1			
		8(2.5/2.5)					Qbt 3 TSHIREGE MEMBER, BANDELIER TUFF: (5-117.5 ft) Light gray to light pinkish gray, moderately to poorly welded, slightly indurated, local oxidation.		
20	7055	9(2.5/2.5)			Moisture Protected HSA Core (19.7-20')	R-19-19.7			
		10(2.5/2.5)							
25	7050	11(2.5/2.5)			Moisture Protected HSA Core (24.8-25')	R-19-24.8			
		12(2.5/2.5)							
30	7045	13(2.5/2.5)							
		14(1.8/2.5)							
35	7040	15(2.5/2.5)				R-19-35.2			
		16(1.4/2.5)				R-19-38.9			
40	7035	17(2.5/2.5)				R-19-41.1			
		18(1.8/2.5)							
45	7030	19(1.7/2.5)				R-19-46.8			
		20(2.5/2.5)							
50	7025	21(2.5/2.5)							
		22(2.5/2.5)							
55	7020	23(2.5/2.5)				R-19-55			
		24(2.5/2.5)							
60	7015	25(2.5/2.5)				R-19-60			
		26(2.5/2.5)							
65	7010	27(2.5/2.5)				R-19-65			
		28(2.5/2.5)							
70	7005	29(2.5/2.5)				R-19-70			Qbt 3
		30(2.5/2.5)							
75	7000	31(2.5/2.5)				R-19-75			
		32(2.5/2.5)				R-19-77.5			
80	6995	33(2.5/2.5)							
		34(2.5/2.5)				R-19-82.5			
85	6990	35(2.5/2.5)							
		36(2.5/2.5)				R-19-87.5			
90	6985								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 2 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown,Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
90	6985	37(2.5/2.5)					Qbt 3 TSHIREGE MEMBER, BANDELIER TUFF: (5-117.5 ft) Light gray to light pinkish gray, moderately to poorly welded, slightly indurated, local oxidation.		
		38(2.5/2.5)				R-19-92.5			
95	6980	39(2.5/2.5)							
		40(2.5/2.5)				R-19-97.5			
100	6975	41(2.5/2.5)							Qbt 3
		42(2.5/2.5)				R-19-102.5			
105	6970	43(2.5/2.5)							
		44(1.4/2.5)				R-19-107.5			
110	6965	45(2.5/2.5)							
		46(2.5/2.5)				R-19-112.5			
115	6960	47(2.5/2.5)							
		48(2.5/2.5)				R-19-117.5	Qbt 2 TSHIREGE MEMBER, BANDELIER TUFF: (117.5-230 ft) Light pinkish gray, slightly welded, moderately indurated.		
120	6955	49(2.5/2.5)							
		50(2.5/2.5)				R-19-122.5			
125	6950	51(1.5/1.5)			Moisture Protected HSA Core (125.9-126.3')	R-19-126.5			
130	6945								
135	6940								
140	6935								
145	6930								
150	6925								Qbt 2
155	6920								
160	6915								
165	6910								
170	6905								
175	6900								
180	6895								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19 | TA/OU: TA-36 | Page 3 of 22

DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00 | PHASE 2: 1/25/00 - 8/16/00

DRILLING EQ/METHOD: Failing F-10/Foremost DR24 | SAMPLING EQ/METHOD: Wireline core barrel sampling

GROUND ELEVATION: 7075 ft | GEOLOGY P.I.: Vaniman | TOTAL DEPTH = 1902.5 ft bgs

DRILLER: Johnson/Brown,Thoren, Wilson, Woodward | SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
180	6895						Qbt 2 TSHIREGE MEMBER, BANDELIER TUFF: (117.5-230 ft) Light pinkish gray, slightly welded, moderately indurated.		Qbt 2
185	6890								
190	6885								
195	6880								
200	6875								
205	6870								
210	6865								
215	6860								
220	6855								
225	6850								
230	6845						Qbt 1v TSHIREGE MEMBER, BANDELIER TUFF: (230-285 ft) Light gray to light pinkish gray, nonwelded, non indurated.		Qbt 1v
235	6840								
240	6835								
245	6830								
250	6825								
255	6820								
260	6815								
265	6810								
270	6805								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19 | TA/OU: TA-36 | Page 4 of 22

DRILLING COMPANY: Stewart Bros/Dynatec PHASE 1: 1/7/00 - 1/13/00 | PHASE 2: 1/25/00 - 8/16/00

DRILLING EQ/METHOD: Failing F-10/Foremost DR24 | SAMPLING EQ/METHOD: Wireline core barrel sampling

GROUND ELEVATION: 7075 ft | GEOLOGY P.I.: Vaniman | TOTAL DEPTH = 1902.5 ft bgs

DRILLER: Johnson/Brown, Thoren, Wilson, Woodward | SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
270	6805						Qbt 1v TSHIREGE MEMBER, BANDELIER TUFF: (230-285 ft) Light gray to light pinkish gray, nonwelded, non-indurated.		
275	6800								
280	6795								
285	6790						Qbt 1g TSHIREGE MEMBER, BANDELIER TUFF: (285-379 ft) Dry, grayish orange pink (5 YR 7/2), vitric pumice lapilli to 1 cm in non-indurated vitric ash matrix, estimated 20% quartz and sanidine phenocrysts and 5-10% oxidized lithics.		
290	6785								
295	6780								
300	6775								
305	6770								
310	6765								
315	6760								
320	6755								
325	6750								
330	6745								Qbt 1g
335	6740								
340	6735								
345	6730								
350	6725								
355	6720								
360	6715								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 5 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown, Thoren, Wilson, Woodward		SITE GEOLOGIST: Mann/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
360	6715						Qbt 1 g TSHIREGE MEMBER, BANDELIER TUFF: (285-379 ft) Dry, grayish orange pink (5 YR 7/2), vitric pumice lapilli to 1 cm in non-indurated ash matrix, estimated 20% quartz and sanidine phenocrysts and 5-10% oxidized lithics.		Qbt 1g
365	6710								
370	6705								
375	6700								
380	6695				Geologic (380-382')		TSANKAWI PUMICE BED: (379-380 ft) Chalky pumice lapilli 70% up to 1 cm in ash matrix.		Qbt t
385	6690						CERRO TOLEDO INTERVAL: (380-646 ft) Red-brown ash with estimated 30% pumice lapilli and lithics.		
390	6685								
395	6680								
400	6675								Qct
405	6670								
410	6665								
415	6660								
420	6655								
425	6650								
430	6645								
435	6640								
440	6635								
445	6630								
450	6625								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 6 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown, Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
450	6625						CERRO TOLEDO INTERVAL: (380-646 ft) Red-brown ash with estimated 30% pumice lapilli and lithics.		
455	6620								
460	6615								
465	6610								
470	6605								
475	6600								
480	6595								
485	6590								
490	6585								
495	6580								
500	6575								Qct
505	6570								
510	6565								
515	6560				Geologic (510-615')				
520	6555								
525	6550								
530	6545								
535	6540								
540	6535								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 7 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown,Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
540	6535						CERRO TOLEDO INTERVAL: (380-646 ft) Red-brown ash with estimated 30% pumice lapilli and lithics.		Qct
545	6530								
550	6525								
555	6520								
560	6515								
565	6510								
570	6505								
575	6500								
580	6495								
585	6490								
590	6485								
595	6480								
600	6475								
605	6470								
610	6465								
615	6460								
620	6455								
625	6450								
630	6445								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19 | TA/OU: TA-36 | Page 8 of 22

DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00 | PHASE 2: 1/25/00 - 8/16/00

DRILLING EQ/METHOD: Failing F-10/Foremost DR24 | SAMPLING EQ/METHOD: Wireline core barrel sampling

GROUND ELEVATION: 7075 ft | GEOLOGY P.I.: Vaniman | TOTAL DEPTH = 1902.5 ft bgs

DRILLER: Johnson/Brown,Thoren, Wilson, Woodward | SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
630	6445						CERRO TOLEDO INTERVAL: (380-646 ft) Red-brown ash with estimated 30% pumice lapilli and lithics.		Qct
635	6440								
640	6435				Geologic (635-640')				
645	6430						OTOWI MEMBER OF BANDELIER TUFF: (646-830 ft) Ash flow tuff, nonwelded, vitric, moderate reddish brown (10 R 6/6), pumice lapilli up to 8 cm (2%), intermediate composition volcanic rock lithics to 5%.		Qbo
650	6425								
655	6420								
660	6415								
665	6410								
670	6405								
675	6400								
680	6395								
685	6390								
690	6385								
695	6380								
700	6375								
705	6370								
710	6365								
715	6360								
720	6355								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 9 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown,Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
720	6355						OTOWI MEMBER OF BANDELIER TUFF: (646-830 ft) Ash flow tuff, nonwelded, vitric, moderate reddish brown (10 R 6/6), pumice lapilli up to 6 cm (2%), intermediate-composition volcanic rock lithics to 5%.		Qbo
725	6350								
730	6345								
735	6340								
740	6335								
745	6330								
750	6325								
755	6320								
760	6315								
765	6310								
770	6305								
775	6300								
780	6295								
785	6290								
790	6285								
795	6280								
800	6275								
805	6270								
810	6265								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 10 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown,Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
810	6265						OTOWI MEMBER OF BANDELIER TUFF: (646-830 ft) Ash flow tuff, nonwelded, vitric, moderate reddish brown (10 R 6/6), pumice lapilli up to 8 cm (2%), intermediate composition volcanic rock lithics to 5%.		Qbo
815	6260								
820	6255								
825	6250								
830	6245						GUAJE PUMICE BED: (830-840 ft) Light tannish white to very pale orange (10 YR 8/2) vitric pumice lapilli aggregate.		Qbog
835	6240				Geologic (834-838')				
840	6235						PUYE FORMATION: (840-925 ft) Tschicoma Fm intermediate-composition volcanic gravel and cobbles in silty sand matrix.		Tpf
845	6230								
850	6225								
855	6220								
860	6215								
865	6210								
870	6205								
875	6200								
880	6195								
885	6190								
890	6185								
895	6180								
900	6175								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19 | TA/OU: TA-36 | Page 11 of 22

DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00 PHASE 2: 1/25/00 - 8/16/00

DRILLING EQ/METHOD: Failing F-10/Foremost DR24 SAMPLING EQ/METHOD: Wireline core barrel sampling

GROUND ELEVATION: 7075 ft GEOLOGY P.I.: Vaniman TOTAL DEPTH = 1902.5 ft bgs

DRILLER: Johnson/Brown,Thoren, Wilson, Woodward SITE GEOLOGIST: Mann/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
900	6175						PUYE FORMATION: (840-925 ft) Tschicoma Fm intermediate-composition volcanic gravel and cobbles in silty sand matrix.		Tpf
905	6170				Geologic (900-905')				
910	6165								
915	6160								
920	6155								
925	6150						BASALT OF THE CERROS DEL RIO VOLCANIC FIELD: (925-996 ft) Massive basalt.		Tb
930	6145								
935	6140								
940	6135								
945	6130								
950	6125								
955	6120								
960	6115								
965	6110				Geologic (960-965')				
970	6105								
975	6100								
980	6095								
985	6090								
990	6085								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19 | TA/OU: TA-36 | Page 12 of 22

DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00 | PHASE 2: 1/25/00 - 8/16/00

DRILLING EQ/METHOD: Failing F-10/Foremost DR24 | SAMPLING EQ/METHOD: Wireline core barrel sampling

GROUND ELEVATION: 7075 ft | GEOLOGY P.I.: Veniman | TOTAL DEPTH = 1902.5 ft bgs

DRILLER: Johnson/Brown, Thoren, Wilson, Woodward | SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
990	6085						BASALT OF THE CERROS DEL RIO VOLCANIC FIELD: (925-996 ft) Massive basalt.		Tb
995	6080								
1000	6075				Geologic (996-1000')		BASALT OF THE CERROS DEL RIO VOLCANIC FIELD: (996-1017 ft) Flow-base rubble from 996 to to 1006 ft and massive, poorly bedded scoria from 1006 to 1017 ft.		
1005	6070								
1010	6065								
1015	6060						BASALT OF THE CERROS DEL RIO VOLCANIC FIELD: (1017-1063 ft) Massive vesicular flow.		
1020	6055								
1025	6050								
1030	6045				Geologic (1025-1030')				
1035	6040								
1040	6035								
1045	6030								
1050	6025								
1055	6020								
1060	6015				Geologic (1055-1060')				
1065	6010						BASALT OF THE CERROS DEL RIO VOLCANIC FIELD: (1063-1067 ft) Flow-base rubble.		
1070	6005						BASALT OF THE CERROS DEL RIO VOLCANIC FIELD: (1067-1074 ft) Scoria and basaltic sedimentary deposits.		
1075	6000						BASALT OF THE CERROS DEL RIO VOLCANIC FIELD: (1074-1080 ft) Basaltic sand deposits.		

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 13 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown,Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
1080	5995				Geologic (1075-1080')		BASALT OF THE CERROS DEL RIO VOLCANIC FIELD: (1074-1080 ft) Basaltic sand deposits.		Tpf
1085	5990						PUYE FORMATION: (1080-1101 ft) Intermediate-composition volcanic clasts 90% to 98%; light to medium gray dacite with some rhyolites; very coarse sands and gravels.		
1090	5985								
1095	5980								
1100	5975				Geologic (1095-1100')		PUYE FORMATION: (1101-1105 ft) Coarse sand, reworked dacitic materials.		
1105	5970						PUYE FORMATION: (1105-1130 ft) Very coarse sands and gravels, monolithologic.		
1110	5965								
1115	5960								
1120	5955								
1125	5950								
1130	5945						PUYE FORMATION: (1130-1145 ft) Coarse sands and gravels, monolithologic with some reddish brown dacite (?)		
1135	5940								
1140	5935								
1145	5930						PUYE FORMATION: (1145-1155 ft) Coarse sand consisting of light to medium gray rhyolite (?) Dacitic fragments plus reddish-brown dacite from 1150 to 1155 ft, free quartz crystals up to 1 - 2 mm.		
1150	5925								
1155	5920						PUYE FORMATION: (1155-1159 ft) Tuffaceous sand and gravel; pumice fragments typically < 2mm = 20%.		
1160	5915						PUYE FORMATION: (1159-1165 ft) No recovery.		
1165	5910						PUYE FORMATION: (1165-1180 ft) Coarse sand and gravel consisting of light to medium gray rhyolite and dacite.		
1170	5905								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 14 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown, Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
1170	5905						PUYE FORMATION: (1165-1180 ft) Coarse sand and gravel consisting of light to medium gray rhyolite and dacite.		
1175	5900				Geologic (1170-1175')				
1180	5895						PUYE FORMATION: (1180-1185 ft) Gravel consisting of light to medium gray rhyolite and dacite.		
1185	5890						PUYE FORMATION: (1185-1190 ft) Coarse sand with dark reddish gray (purple) andesitic (?) volcanic clasts.		
1190	5885						PUYE FORMATION: (1190-1205 ft) Very coarse sands and gravels, lithologies same as above.		
1195	5880								
1200	5875								Tpf
1205	5870						PUYE FORMATION: (1205-1210 ft) Gravel, heterogeneous lithologies consist of light to medium gray rhyolite/dacite plus reddish brown dacite (?) clasts.		
1210	5865				Geologic (1205-1210')				
1215	5860						PUYE FORMATION: (1210-1220 ft) Medium coarse sand consisting of dacitic fragments with some quartz phenocrysts.		
1220	5855								
1225	5850						PUYE FORMATION: (1220-1230 ft) Very coarse sands consisting of dacitic clasts.		
1230	5845						PUYE FORMATION: (1230-1240 ft) Gravel, lithology same as above.		
1235	5840								
1240	5835						PUYE FORMATION: (1240-1275 ft) Coarse to very coarse sands and gravels; light to medium gray rhyolite/dacite plus reddish brown dacite (?)		
1245	5830								
1250	5825								
1255	5820								
1260	5815								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19 | TA/OU: TA-36 | Page 15 of 22

DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00 | PHASE 2: 1/25/00 - 8/16/00

DRILLING EQ/METHOD: Failing F-10/Foremost DR24 | SAMPLING EQ/METHOD: Wireline core barrel sampling

GROUND ELEVATION: 7075 ft | GEOLOGY P.I.: Vaniman | TOTAL DEPTH = 1902.5 ft bgs

DRILLER: Johnson/Brown,Thoren, Wilson, Woodward | SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
1260	5815						PUYE FORMATION: (1240-1275 ft) Coarse to very coarse sands and gravels; light to medium gray rhyolite/dacite plus reddish brown dacite (?)		
1265	5810								
1270	5805								
1275	5800						PUYE FORMATION: (1275-1290 ft) Gravel dominated by light gray rhyolite (?) or dacite fragments with rare black perlite and white pumice fragments.		
1280	5795								
1285	5790								
1290	5785						PUYE FORMATION: (1290-1295 ft) Medium to coarse sand consisting of 80% light to medium gray rhyolite/dacite clasts, 20% white vitric pumice with small biotite phenocrysts.		
1295	5780								
1300	5775						PUYE FORMATION: (1295-1300 ft) Same as above except pumice up to 50%.		Tpf
1305	5770								
1310	5765						PUYE FORMATION: (1300-1330 ft) Gravel dominated by light to medium gray rhyolite (?) or dacite lava clasts with subordinate pinkish red to reddish-brown dacite (?) lava clasts.		
1315	5760								
1320	5755								
1325	5750								
1330	5745						PUYE FORMATION: (1330-1335 ft) No recovery.		
1335	5740				Geologic (1330-1335')		PUYE FORMATION: (1335-1350 ft) Gravel, same lithologies as above, rare pumice.		
1340	5735								
1345	5730								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 16 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24		SAMPLING EQ/METHOD: Wireline core barrel sampling
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown, Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
1350	5725						PUYE FORMATION: (1335-1350 ft) Gravel, same lithologies as above, rare pumice.		
1355	5720						PUYE FORMATION: (1350-1360 ft) Gravels mixed with very coarse sands, rare white pumice.		
1360	5715						PUYE FORMATION: (1360-1370 ft) Gravel with rare white pumice.		
1365	5710								
1370	5705						PUYE FORMATION: (1370-1380 ft) Very coarse sands and gravels consisting of heterogeneous intermediate-composition lava clasts.		
1375	5700								
1380	5695						PUYE FORMATION: (1380-1393 ft) Tan ash, fine-grained, reworked, tuffaceous, abundant sanidine crystals and medium to dark gray mafic lithics in light colored tuffaceous matrix.		
1385	5690				Geologic (1380-1385')				
1390	5685								
1395	5680						PUYE FORMATION: (1393-1396 ft) Mixture of volcanic ash and coarse sands and gravels.		
1400	5675						PUYE FORMATION: (1396-1400 ft) Gravel, possible Rendija Canyon rhyolite (?).		Tpf
1405	5670						PUYE FORMATION: (1400-1420 ft) Very coarse sands and gravels.		
1410	5665								
1415	5660				Geologic (1410-1415')				
1420	5655						PUYE FORMATION: (1420-1425 ft) Heterogeneous intermediate volcanic clasts, not monolithologic as at top of Puye in this borehole.		
1425	5650								
1430	5645						PUYE FORMATION: (1425-1455 ft) Same as above except altered andesite with medium green epidote noted at 1425 ft.		
1435	5640								
1440	5635								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 17 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown,Thoren, Wilson, Woodward		SITE GEOLOGIST: Mann/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
1440	5635						PUYE FORMATION: (1425-1455 ft) Same as above except altered andesite with medium green epidote noted at 1425 ft.		
1445	5630								
1450	5625						PUYE FORMATION: (1445-1460 ft) Same as above except oxidized altered euhedral hornblende relict crystal as in Keres Group but not in Tschicoma volcanics.		
1455	5620								
1460	5615						PUYE FORMATION: (1460-1480 ft) Very coarse sand consisting of heterogeneous intermediate-composition volcanic clasts and pumice up to 20%.		
1465	5610								
1470	5605								
1475	5600								
1480	5595						PUYE FORMATION: (1480-1500 ft) Gravels, heterogeneous intermediate-composition volcanic clasts, rare pumice, 1.5 mm biotite books in gray lava. Possible reworked fragments noted at 1492 ft, very coarse sands from 1495 ft to 1500 ft.		Tpf
1485	5590								
1490	5585								
1495	5580								
1500	5575						PUYE FORMATION: (1500-1515 ft) Coarse to very coarse sands, heterogeneous volcanic lithologies, pumice-poor, many free quartz crystals.		
1505	5570								
1510	5565								
1515	5560						PUYE FORMATION: (1515-1520 ft) Medium to coarse sands and gravels.		
1520	5555				Geologic (1515-1520')		PUYE FORMATION: (1520-1530 ft) Same as above, pumice up to 5%.		
1525	5550								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 18 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24		SAMPLING EQ/METHOD: Wireline core barrel sampling
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown, Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
1530	5545						PUYE FORMATION: (1520-1530 ft) Same as above, pumice up to 5%.		
1535	5540						UNASSIGNED SEDIMENTARY DEPOSITS: (1530-1535 ft) Coarse to very coarse sands, heterogeneous volcanics, pumice-rich.		
1540	5535								
1545	5530						UNASSIGNED SEDIMENTARY DEPOSITS: (1535-1550 ft) Same as above, poor to no recovery.		
1550	5525						UNASSIGNED SEDIMENTARY DEPOSITS: (1550-1555 ft) Coarse to very coarse sands, heterogeneous intermediate-composition volcanics including andesite, pinkish red to light gray or dull black, pumice-rich.		
1555	5520								
1560	5515				Geologic (1555-1560')		UNASSIGNED SEDIMENTARY DEPOSITS: (1555-1560 ft) Same as above with up to 20% very pale orange 10 YR 8/2 vitric rounded pumice lapilli, many free quartz and sanidine crystals.		Tp?
1565	5510								
1570	5505						UNASSIGNED SEDIMENTARY DEPOSITS: (1560-1581 ft) Gravel of heterogeneous volcanics, pumice rare.		
1575	5500								
1580	5495						UNASSIGNED SEDIMENTARY DEPOSITS: (1581-1595 ft) Pumice fall (?), 95 to 100% very pale orange 10 YR 8/2 vitric pumice lapilli and fragments with 0.5 to 1% minute mafic inclusions and subhedral ferro-magnesian phenocrysts. Pumice are rounded to well rounded, mostly 2 to 5 mm, maximum to 1 cm.		
1585	5490								
1590	5485				Geologic (1585-1590')				
1595	5480				Geologic (1590-1595')		UNASSIGNED SEDIMENTARY DEPOSITS: (1595-1605 ft) Heterogeneous volcanic clasts consist of three predominant lithologies, all with varying amounts of Fe staining: 20 to 50% white vitric pumice lapilli, 10 to 40% light to medium gray dacite, and 10 to 40% pale grayish red flow-banded andesite (?) or rhyolite (?)		
1600	5475								
1605	5470								
1610	5465						UNASSIGNED SEDIMENTARY DEPOSITS: (1605-1610 ft) Coarse to very coarse sand of heterogeneous volcanics.		

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 19 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown,Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
1610	5465						UNASSIGNED SEDIMENTARY DEPOSITS: (1610-1615 ft) Medium to coarse sand with some pumice lapilli.		
1615	5460						UNASSIGNED SEDIMENTARY DEPOSITS: (1615-1640 ft) Very coarse sands and gravels, "salt and pepper" gray and white coloration, tuffaceous reworked material with abundant clasts of gray and pink dacites and pumice lapilli up to 50%.		
1620	5455								
1625	5450								
1630	5445								
1635	5440								
1640	5435						UNASSIGNED SEDIMENTARY DEPOSITS: (1640-1645 ft) No recovery.		
1645	5430						UNASSIGNED SEDIMENTARY DEPOSITS: (1645-1650 ft) Medium to coarse tuffaceous sand dominated by white vitric pumice fragments, free crystals of biotite, quartz, and sanidine; 5 to 10% dacitic clasts, 90 to 95% pumice lapilli.		Tp?
1650	5425								
1655	5420								
1660	5415						UNASSIGNED SEDIMENTARY DEPOSITS: (1650-1660 ft) Two populations; 1) same as above; 2) gravel consisting of heterogeneous volcanics including dacite and some flow banded rhyolite.		
1665	5410								
1670	5405						UNASSIGNED SEDIMENTARY DEPOSITS: (1660-1665 ft) Same as above with glassy lava fragments.		
1675	5400						UNASSIGNED SEDIMENTARY DEPOSITS: (1665-1680 ft) Coarse sand and gravel with abundant volcanic ash, broken crystal-poor pumice clasts, glassy and crystal-poor dacitic and rhyolitic fragments.		
1680	5395								
1685	5390						UNASSIGNED SEDIMENTARY DEPOSITS: (1680-1690 ft) No recovery.		
1690	5385								
1695	5380						UNASSIGNED SEDIMENTARY DEPOSITS: (1690-1700 ft) Pumice fall (?), white glassy pumice lapilli, notably crystal-poor, sparse phenocrysts of quartz, sanidine, and biotite, less than 5% fragments of rhyolitic and dacitic volcanic clasts.		
1700	5375								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 20 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24		SAMPLING EQ/METHOD: Wireline core barrel sampling
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown,Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
1700	5375						UNASSIGNED SEDIMENTARY DEPOSITS: (1700-1705 ft) Gravel, light gray to reddish-brown dacitic fragments.		Tp?
1705	5370						UNASSIGNED SEDIMENTARY DEPOSITS: (1705-1710 ft) Tuffaceous sediment with mixture of white volcanic ash, small white vitric pumice fragments (crystal poor), and gray to reddish-brown dacitic clasts.		
1710	5365						UNASSIGNED SEDIMENTARY DEPOSITS: (1710-1715 ft) Medium-grained tuffaceous tan to white sand, abundant pumice fragments and free quartz, sanidine and biotite crystals, some small rhyolite and dacite lava clasts.		
1715	5360								
1720	5355								
1725	5350				Geologic (1720-1725')		UNASSIGNED SEDIMENTARY DEPOSITS: (1715-1720 ft) Same as above, tuffaceous sand and gravel, 50% volcanic ash and small pumice fragments, 50% gray dacitic and rhyolitic clasts.		
1730	5345								
1735	5340				Geologic (1730-1735')		UNASSIGNED SEDIMENTARY DEPOSITS: (1720-1725 ft) Tan fine- to medium-grained tuffaceous sand or ash fall, dominated by volcanic ash and vitric pumice fragments, free quartz and sanidine crystals, < 2% dacitic lava fragments.		
1740	5335				Geologic (1735-1740')				
1745	5330						UNASSIGNED SEDIMENTARY DEPOSITS: (1725-1780 ft) Tuffaceous gravels with white pumice lapilli (50 to 70%) and gray to reddish-brown lava clasts. Pumice is phenocryst-poor with sparse quartz, sanidine, and minute biotite minerals.		
1750	5325								
1755	5320								
1760	5315								
1765	5310								
1770	5305								
1775	5300								
1780	5295						UNASSIGNED SEDIMENTARY DEPOSITS: (1780-1785 ft) No recovery.		
1785	5290								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 21 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown,Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
1785	5290						UNASSIGNED SEDIMENTARY DEPOSITS: (1785-1800 ft) Coarse-grained tuffaceous sand consisting of light tan volcanic ash and pumice fragments with free crystals of quartz, sanidine, and biotite, rhyolitic and dacitic clasts are < 2%.		Tp?
1790	5285								
1795	5280								
1800	5275						UNASSIGNED SEDIMENTARY DEPOSITS: (1800-1805 ft) No recovery.		
1805	5270						UNASSIGNED SEDIMENTARY DEPOSITS: (1805-1820 ft) Gravels and coarse-grained sands consisting of 50:50 mixture of light to medium gray and reddish-brown dacitic and rhyolitic clasts, white vitric crystal poor pumice fragments same as above.		
1810	5265								
1815	5260								
1820	5255						UNASSIGNED SEDIMENTARY DEPOSITS: (1820-1830 ft) No recovery.		
1825	5250								
1830	5245						UNASSIGNED SEDIMENTARY DEPOSITS: (1830-1835 ft) Gravel, 60 to 70% of clasts are light gray dacites and rhyolites, and light reddish-brown dacites, rest is white vitric pumice fragments.		
1835	5240				Geologic (1830-1835')				
1840	5235				Geologic (1835-1840')		UNASSIGNED SEDIMENTARY DEPOSITS: (1835-1855 ft) Tuffaceous sequence consists of very coarse-grained white vitric pumice fragments and gray reddish-brown rhyolitic and dacitic fragments.		
1845	5230								
1850	5225								
1855	5220						UNASSIGNED SEDIMENTARY DEPOSITS: (1855-1860 ft) Gravel, 80 to 90% light gray glassy and devitrified rhyolite fragments, medium gray and reddish-brown dacitic fragments.		
1860	5215								

LOS ALAMOS NATIONAL LABORATORY
REGIONAL HYDROGEOLOGIC CHARACTERIZATION PROJECT
ENVIRONMENTAL RESTORATION, CANYONS FOCUS AREA
BOREHOLE LOG

BOREHOLE ID: R-19	TA/OU: TA-36	Page 22 of 22
DRILLING COMPANY: Stewart Bro./Dynatec PHASE 1: 1/7/00 - 1/13/00		PHASE 2: 1/25/00 - 8/16/00
DRILLING EQ/METHOD: Failing F-10/Foremost DR24	SAMPLING EQ/METHOD: Wireline core barrel sampling	
GROUND ELEVATION: 7075 ft	GEOLOGY P.I.: Vaniman	TOTAL DEPTH = 1902.5 ft bgs
DRILLER: Johnson/Brown,Thoren, Wilson, Woodward		SITE GEOLOGIST: Marin/Goetz

Depth (ft)	Elevation (ft)	Core Run # (amt.-recov./amt. attemp.)	Core Run	Cuttings Collected	Geologic Property (Geologic) and Archived (Moisture Protected HSA Core)	Moisture/Matric Pot. R19-depth (ft)	Lithology	Graphic Log	Lithologic Symbol
1860	5215						UNASSIGNED SEDIMENTARY DEPOSITS: (1860-1870 ft) Light tan tuffaceous deposit consists of white pumice lapilli, quartz, sanidine, and biotite crystals, light to medium gray intermediate composition volcanic clasts, and some reddish brown volcanic clasts (dacite?).		Tp?
1865	5210								
1870	5205						UNASSIGNED SEDIMENTARY DEPOSITS: (1870-1875 ft) Poor recovery.		
1875	5200						UNASSIGNED SEDIMENTARY DEPOSITS: (1875-1902.5 ft) Light tan tuffaceous sequence same as above.		
1880	5195								
1885	5190								
1890	5185								
1895	5180						UNASSIGNED SEDIMENTARY DEPOSITS: (1895-1902.5 ft) Coarse light tan pumice, up to 2 cm. Moderate clay coatings, vitric.		
1900	5175				Geologic (1895-1900')				

Appendix C

Moisture and Matric-Potential Results

Sample ID	Upper Depth (ft)	Lower Depth (ft)	Geologic Unit	Gravimetric Moisture (%)	Activity (H_2O)	Temperature (°C)	Matric Potential (cm)
R19-4.5	4.2	4.5	Tshirege Qbt 4	7.70	0.960	26.82	-5.83E+04
R19-9.5	9.3	9.5	Tshirege Qbt 3	5.63	0.992	26.89	-1.20E+04
R19-14.1	13.9	14.1	Tshirege Qbt 3	6.53	0.993	26.94	-1.06E+04
R19-19.7	19.5	19.7	Tshirege Qbt 3	3.78	0.986	27.07	-1.99E+04
R19-24.6	24	24.6	Tshirege Qbt 3	4.73	0.988	27.02	-1.77E+04
R19-35.2	35	35.2	Tshirege Qbt 3	3.12	0.985	26.77	-2.13E+04
R19-38.9	38.6	38.9	Tshirege Qbt 3	2.58	0.987	26.88	-1.85E+04
R19-44.1	43.9	44.1	Tshirege Qbt 3	2.59	0.988	26.91	-1.77E+04
R19-46.6	46.4	46.6	Tshirege Qbt 3	2.63	0.985	27.14	-2.18E+04
R19-55	54.8	55	Tshirege Qbt 3	5.68	0.991	26.24	-1.27E+04
R19-60	59.7	60	Tshirege Qbt 3	3.18	0.993	26.21	-9.88E+03
R19-65	64.8	65	Tshirege Qbt 3	3.79	0.994	26.06	-8.46E+03
R19-70	69.8	70	Tshirege Qbt 3	3.67	0.992	26.00	-1.13E+04
R19-75	74.8	75	Tshirege Qbt 3	3.53	0.995	25.84	-7.04E+03
R19-77.5	77.3	77.5	Tshirege Qbt 3	2.87	0.994	26.08	-9.17E+03
R19-82.5	82.4	82.5	Tshirege Qbt 3	2.30	0.992	26.01	-1.20E+04
R19-87.5	87.3	87.5	Tshirege Qbt 3	3.15	0.992	26.27	-1.20E+04
R19-92.5	92.3	92.5	Tshirege Qbt 3	3.76	0.995	26.02	-7.05E+03
R19-97.5	97.3	97.5	Tshirege Qbt 3	3.50	0.995	26.21	-7.76E+03
R19-102.5	102.3	102.5	Tshirege Qbt 3	4.27	0.995	26.07	-7.05E+03
R19-107.5	107.3	107.5	Tshirege Qbt 3	3.09	0.994	26.13	-8.46E+03
R19-112.5	112.3	112.5	Tshirege Qbt 3	2.73	0.993	26.10	-9.88E+03
R19-117.5	117.3	117.5	Tshirege Qbt 3	3.15	0.994	26.26	-9.18E+03
R19-122.5	122.3	122.5	Tshirege Qbt 2	2.63	0.993	26.43	-9.89E+03
R19-126.5	126.3	126.5	Tshirege Qbt 2	3.16	0.993	26.54	-1.06E+04

Appendix D

Westbay's MP55 Well Components Installed in R-19

Summary Casing Log

Company: LANL
Well: R19
Site:
Project: Hydrogeology Characterization

Job No: WB777
Author: DL

Well Information

Reference Datum: ground level
Elevation of Datum: 0.00 ft.
MP Casing Top: 0.00 ft.
MP Casing Length: 1869.67 ft.

Borehole Depth: 1886.00 ft.
Borehole Inclination: vertical
Borehole Diameter: 10.00 in.

Well Description:
Plastic MP55 System
Other References:
4.5 in ID SS casing+screens: LANL31-07
Backfill after LANL 31-07-00
MagneticCollars 2.5 ft below port top

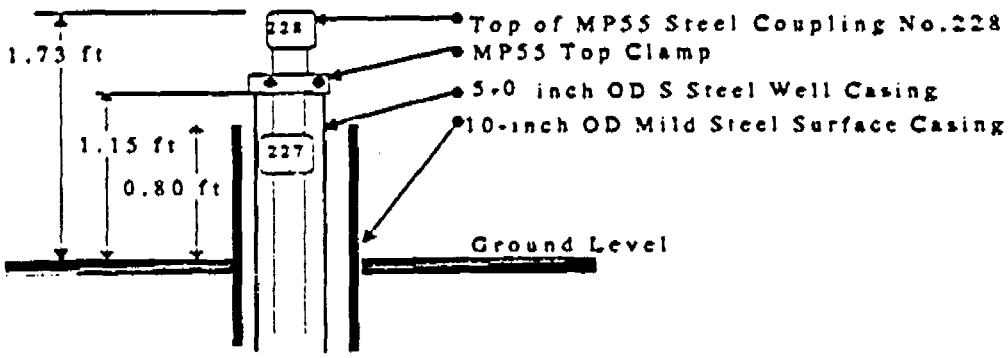
File Information

File Name: 777_R19.WWD
Report Date: Mon Sep 18 22:03:46 2000

File Date: Sep 16 18:33:14 2000

Sketch of Wellhead Completion

R19 Surface Completion



Summary MP Casing Log
LANL

Job No: WB777
Well: R19

Legend

(Qty) MP Components

(2) 0603 - MP55 End Plug

(157) 0601M30 - MP55 Casing, PVC, 3.0m

(22) 0612M15 - MP55 Packer with stiffeners

(31) 0601M15 - MP55 Casing, PVC, 1.5m

(17) 0601M10 - MP55 Casing, PVC, 1.0m

(190) 0602 - MP55 Regular Coupling

(31) 0605 - MP55 Measurement Port

(8) 0607 - MP55 Hydraulic Pumping Port

(12) 0608 - MP55 Magnetic Location Collar

Geology

Backfill/Casing

Concrete

Bentonite

Sand Fine

Sand Coarse

Grout

Bentonite, Sand

Stainless Steel

Well Screen

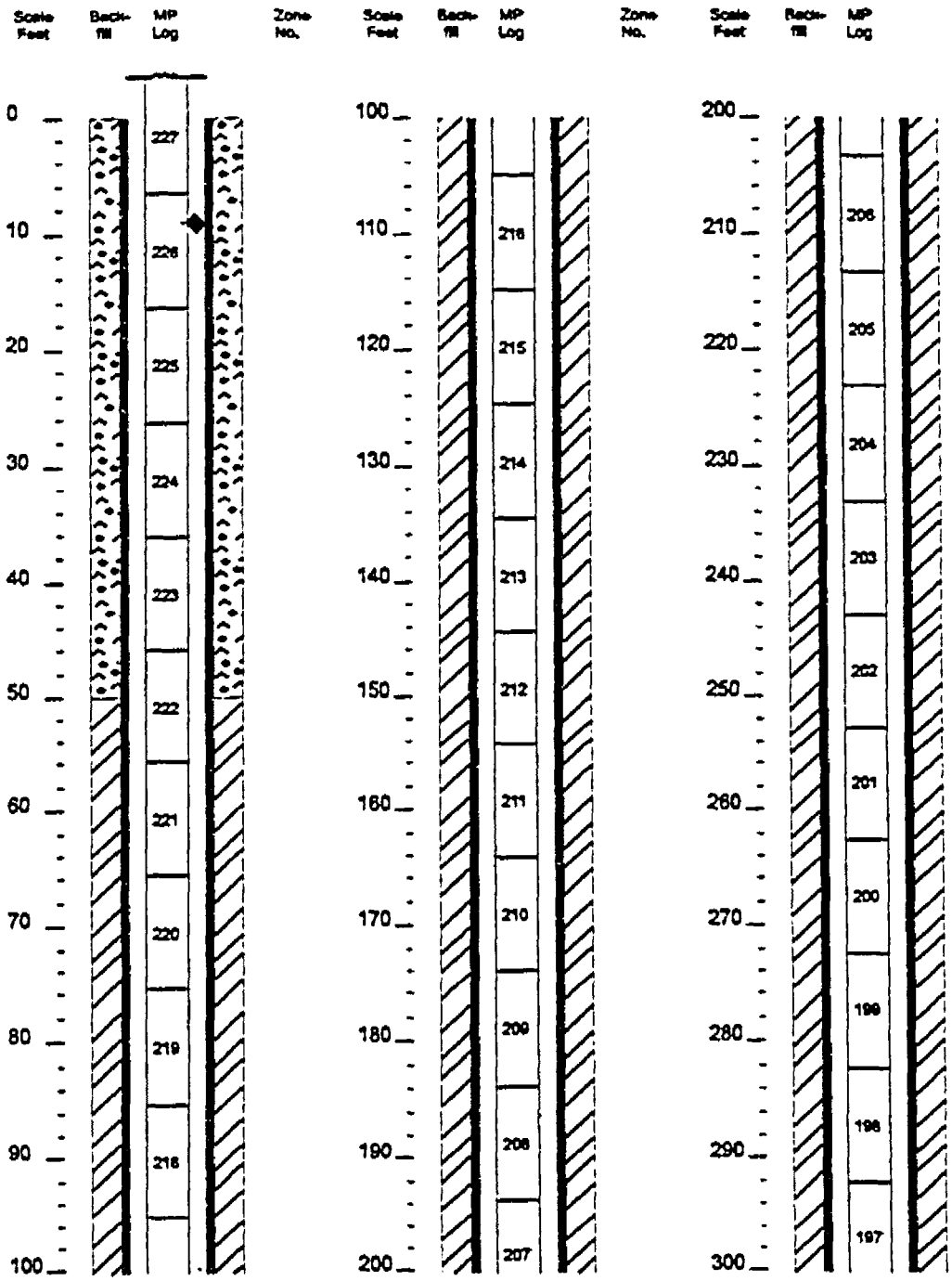
(c) Westbay Instruments Inc. 1998

Mon Sep 18 22:03:46 2000

Page: 0

Summary MP Casing Log
LANL

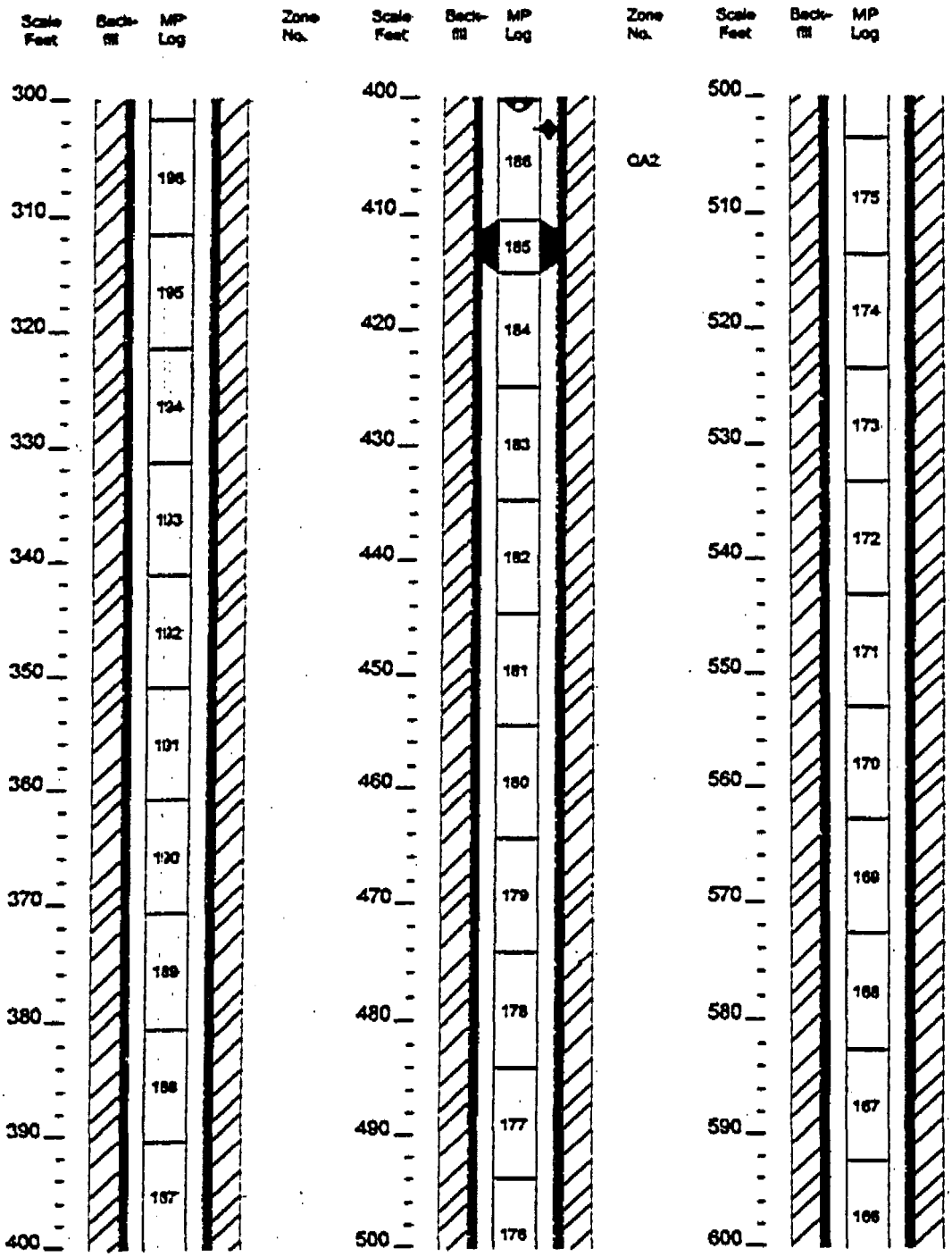
Job No: WB777
Well: R19



(c) Westbay Instruments Inc. 1998 Mon Sep 18 22:03:46 2000 Page: 1

Summary MP Casing Log
LANL

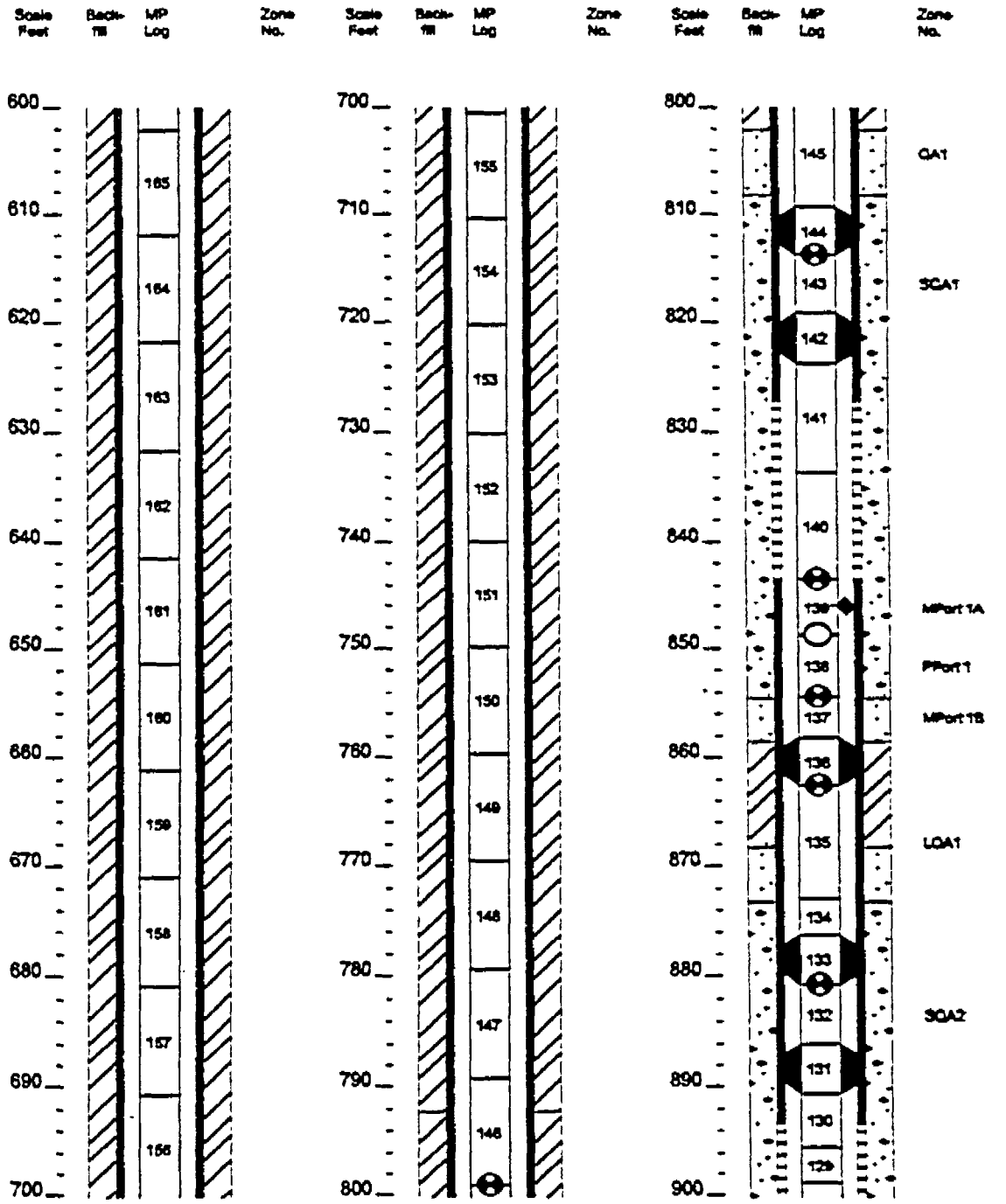
Job No: WB777
Well: R19



(c) Westbay Instruments Inc. 1998 Mon Sep 18 22:03:53 2000 Page: 2

Summary MP Casing Log
LANL

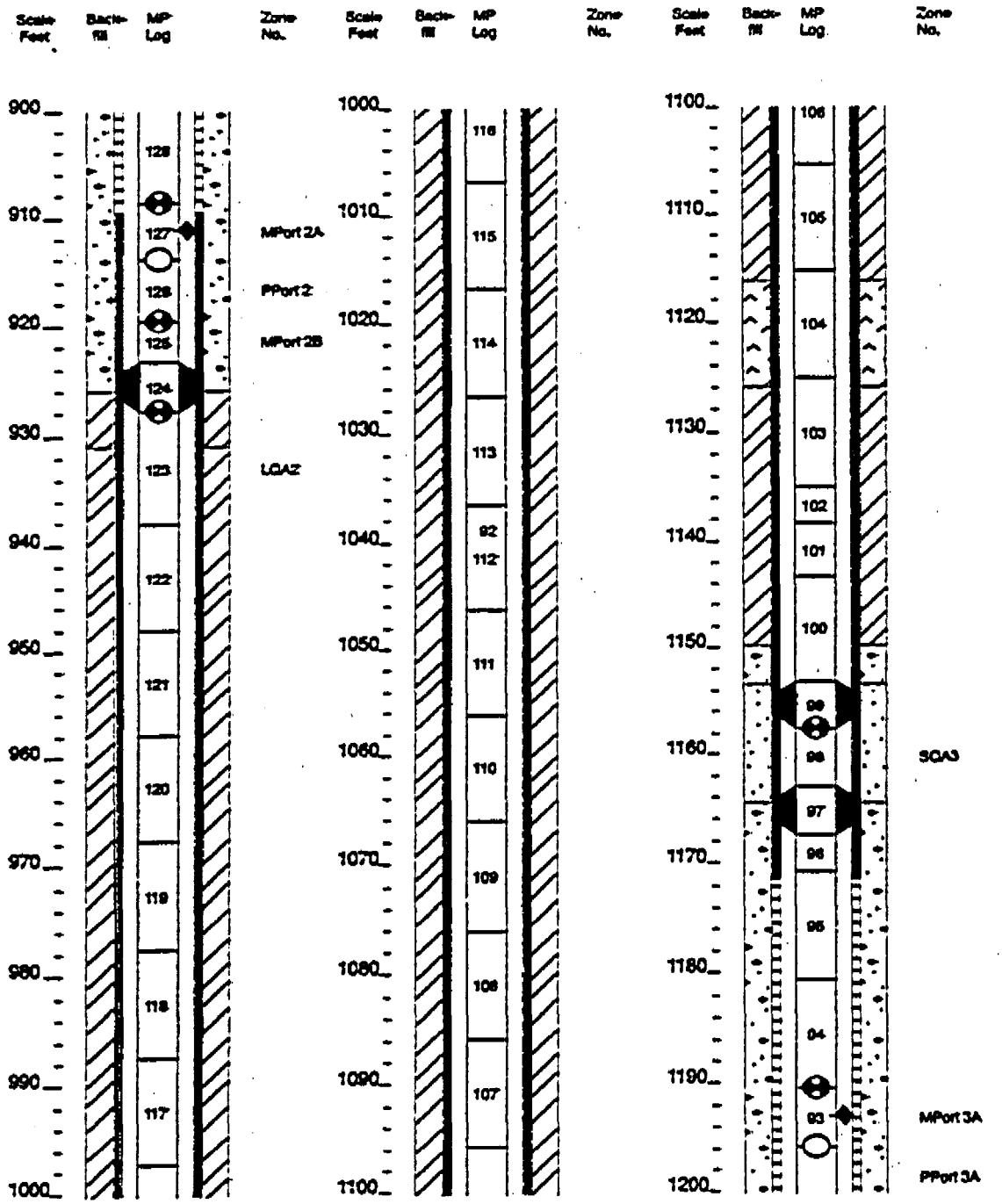
Job No: WB777
Well: R19



(c) Westbay Instruments Inc. 1998 Mon Sep 18 22:04:00 2000 Page: 3

Summary MP Casing Log
LANL

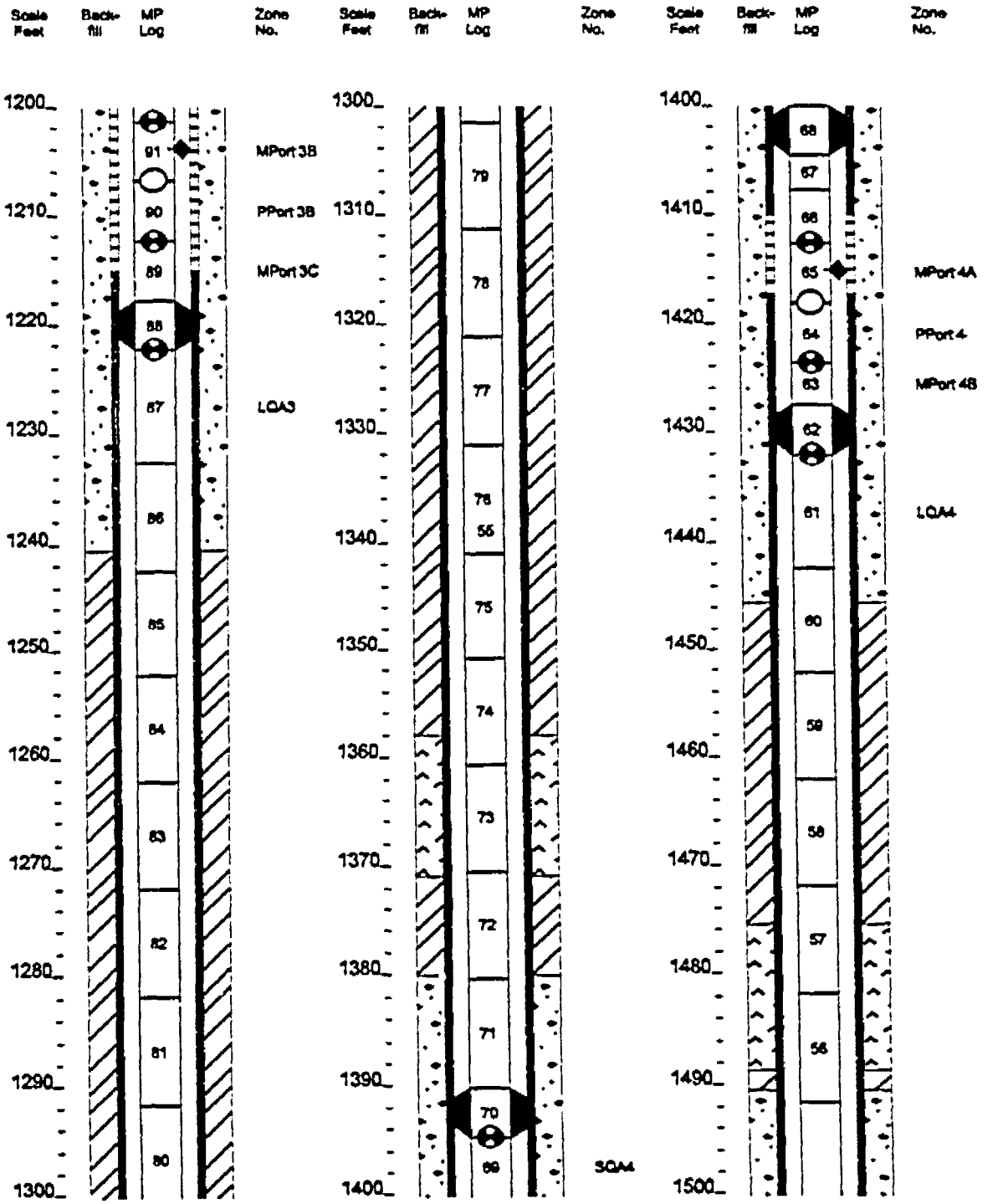
Job No: WB777
Well: R19



(c) Westbay Instruments Inc. 1998 Tue Sep 19 19:28:01 2000 Page: 4

Summary MP Casing Log
LANL

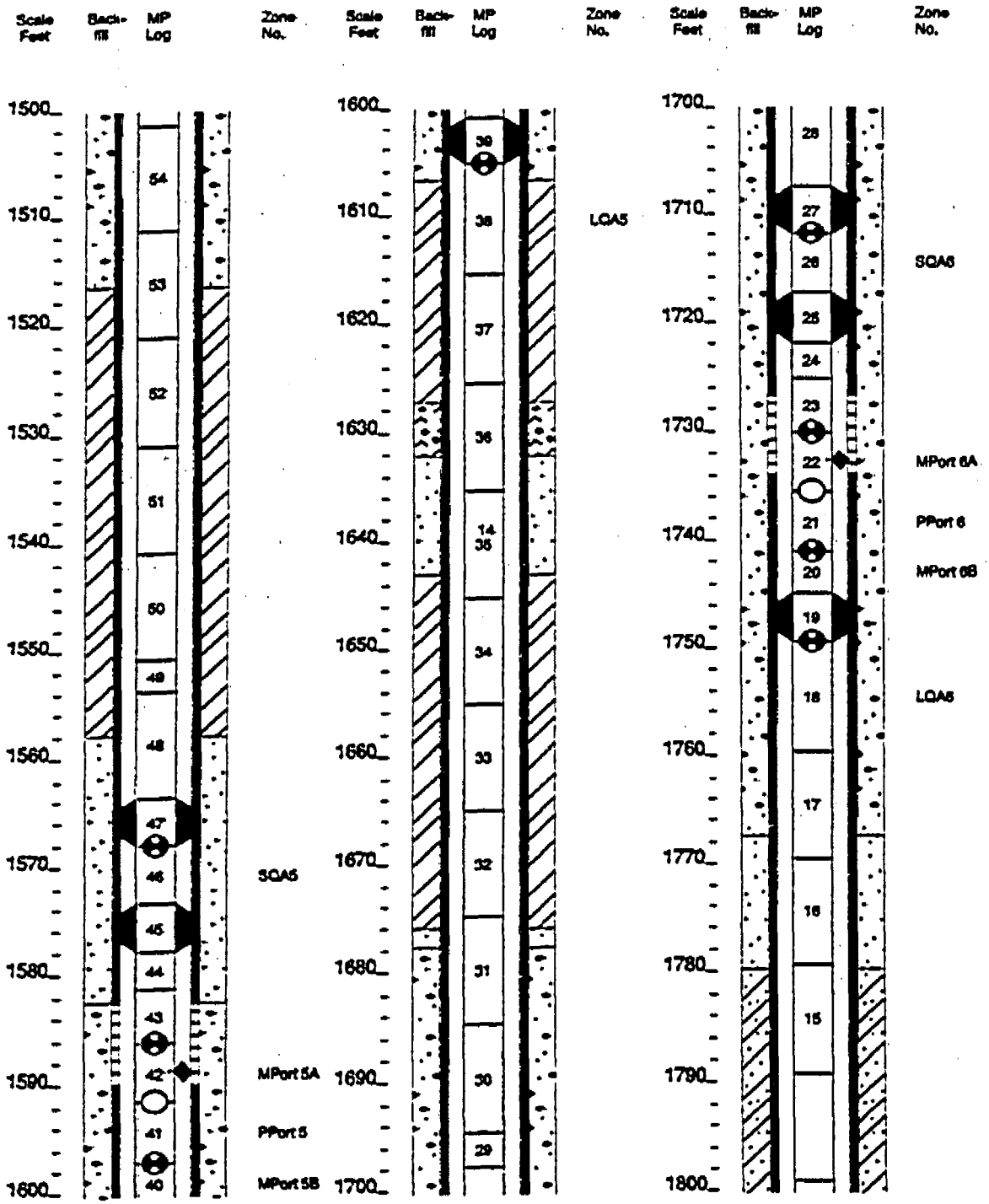
Job No: WB777
Well: R19



(c) Westbay Instruments Inc. 1998 Tue Sep 19 19:28:08 2000 Page: 5

Summary MP Casing Log
LANL

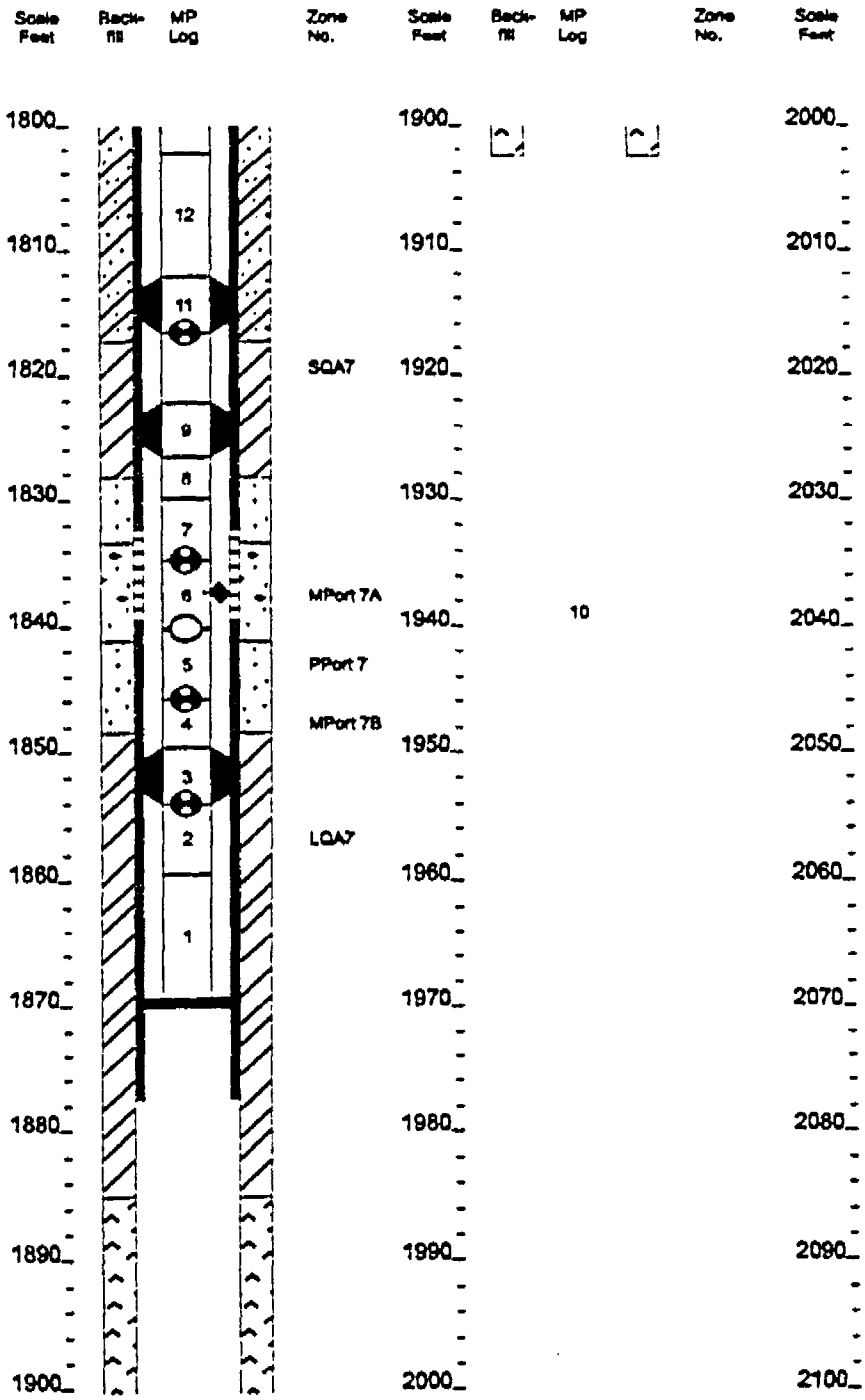
Job No: WB777
Well: R19



(c) Westbay Instruments Inc. 1998 Tue Sep 19 19:28:16 2000 Page: 6

Summary MP Casing Log
LANL

Job No: WB777
Well: R19



(c) Westbay Instruments Inc. 1998 Tue Sep 19 19:28:23 2000 Page: 7

ER Document Signature Form Read/Write Access Person Making Entry is ppc/151216/Torline, Jan (Created on 8/8/2000)

Home | Update | Delete | Reset | Bottom

Document Catalog Number ER2000-0398 (Please prefix the name of all electronic versions of this document with this number.)

* Required Field

*Document Title / Subject	Characterization Well R-19 Completion Report
PRSs	None
Associated Document Catalog Number(s)	None
*Author	Broxton, Dave 667-2492 broxton@lanl.gov
*Author Organization	Groundwater Investigations Focus Area
Document Team	None
*Document Type	Technical Papers/Report Former OU N/A
Date Due	Date Final Complete Date Sent to DOE
Date Sent to NMED	Date Sent to RPF (Paper & Electronic)
Received Per RPF	RPF ER ID Number
CT No	LA-UR Number
Performance Measure No	
AA Deliverable ☐	Certification Required ☐ Force Peer Review ☐
Distribution TO:	
Distribution FROM:	
Distribution COPY:	

Distribution THRU:	
Attachment Notes	
Status/Comments	

Reviewer Signatures: (By signing, the reviewer indicates that he/she reviewed and approves the document.)

Reviewer (Print reviewer's name under title)	Signature	Date
Author D Broxton	David Broxton	9/19/00
Peer Review Chair Ann Lee	[illegible]	9/21/00
ESH-19 Reviewer H. Wheeler-Benson	Paul Bellin	9/15/00
Reg. Compliance Deployed Reviewer Ray Bohn	Ray Bohn	9/14/00
Team Leader D. Broxton	David Broxton	9/19/00
Legal Reviewer E. Lauderbaugh		
DOE/LAAO Reviewer GENE TURNER	Gene Turner	9/27/00
Focus Area Leader/Designee D. Daymon	D. Daym	2/26/00
ER Program Manager		
DOE/LAAO Program Manager		

Document Catalog Number ER2000-0398

Top

Distribution THRU:	[redacted]
Attachment Notes	[redacted]
Status/Comments	[redacted]

Reviewer Signatures: (By signing, the reviewer indicates that he/she reviewed and approves the document.)

Reviewer (Print reviewer's name under title)	Signature	Date
Author D. Broxton		
Peer Review Chair Ann Lee		
ESH-19 Reviewer H. Wheeler-Burson	Paul Bohlen	9/15/00
Reg. Compliance Deployed Reviewer Ray Bohn	Ray Bohn	9/14/00
Team Leader		
Legal Reviewer E. Lauderbaugh	Ellen T. Lauderbaugh	9/21/00
DOE/LAAO Reviewer		
Focus Area Leader/Designee		
ER Program Manager		
DOE/LAAO Program Manager		

Document Catalog Number ER2000-0398

[redacted]