

NEAR SURFACE GROUNDWATER CHARACTERIZATION REPORT
November 2003

APPENDICES

- A Description of Environmental Programs at the SSFL
- B Daily Precipitation Data, October 2000 through September 2003
- C Boring Logs
- D Borehole Geophysical Logs
- E Piezometer Completion Logs
- F Piezometer Development Logs
- G Hydrographs of Near-Surface Groundwater Wells and Piezometers
 - G-1 Hand Measurements
 - G-2 Instrumented Measurements
- H Groundwater Sampling Logs
- I Data Validation Reports
- J Hydrographs of Surface Water in Ponds and Groundwater in Nearby Monitoring Wells

**APPENDIX A
REGULATORY PROGRAMS AND AGENCY OVERSIGHT AT THE SSFL**

1.0 OVERVIEW OF REGULATORY PROGRAMS AND AGENCY OVERSIGHT AT THE SSFL 1

1.1 RCRA PROGRAMS..... 1

 1.1.1 RCRA Corrective Action 1

 1.1.2 Closure of Inactive RCRA Units 2

 1.1.3 Compliance/Permitting of RCRA Units..... 2

1.2 GROUNDWATER CHARACTERIZATION AND REMEDIATION 3

1.3 OTHER PROGRAMS..... 3

 1.3.1 Environmental Permitting 3

 1.3.2 Landfills..... 4

 1.3.3 Fuel Tank Investigation/Closure 4

 1.3.4 Mixed and Radioactive Waste Monitoring and Closure Activities..... 4

2.0 REFERENCES..... 5

LIST OF ABBREVIATIONS

AOC	Areas of Concern
CAL-EPA	California Environmental Protection Agency
CAL-OSHA	California Occupational Safety and Health Administration
CMI	Corrective Measures Investigation
CMS	Corrective Measures Study
DHS-RHB	California Department of Health Services-Radiologic Health Branch
DOE	United States Department of Energy
DTSC	California Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
GWTS	groundwater treatment systems
NASA	National Aeronautics and Space Administration
NPDES	National Pollution Discharge Elimination System
PCB	polychlorinated biphenyls
RCRA	Resource Conservation and Recovery Act
RFA	RCRA facility assessment
RFI	RCRA facility investigation
RWQCB	Regional Water Quality Control Board
SSFL	Santa Susana Field Laboratory
SWMU	Solid Waste Management Unit
UST	underground storage tanks
VCAPCD	Ventura County Air Pollution Control District
VCEHD	Ventura County Environmental Health Division
VOC	volatile organic compounds
WDR	Waste Discharge Requirements

1.0 OVERVIEW OF REGULATORY PROGRAMS AND AGENCY OVERSIGHT AT THE SSFL

The Santa Susana Field Laboratory (SSFL) conducts comprehensive environmental programs under the jurisdiction of several regulatory agencies. Because it is an active facility, four environmental programs at the SSFL are being conducted under the authority of the Federal Resource Conservation and Recovery Act (RCRA). However, other federal, state, and county environmental programs are also being performed at the SSFL. Both RCRA- and non-RCRA-related programs are described in the following sections.

1.1 RCRA PROGRAMS

The RCRA-related activities include four major environmental programs at the SSFL, all with oversight by and under the jurisdiction of the California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC).

1.1.1 RCRA Corrective Action

This program includes the RCRA facility assessment (RFA), the RCRA facility investigation (RFI), corrective measures study (CMS), and corrective measures implementation (CMI) phases. The RCRA Corrective Action Program at the SSFL is being conducted in response to requirements specified in three Hazardous Waste Facility Permits issued to Boeing by the DTSC. The three permits governing the RCRA Corrective Action Program at the SSFL include (1) the Areas I and III Post-Closure Permit issued in 1995, (2) the Area II Post-Closure Permit issued in 1995, and (3) the Area IV Hazardous Waste Management Facility Operating Permit issued in 1993.

The first phase of the RCRA Corrective Action process, the RFA, was conducted for the United States Environmental Protection Agency (EPA) in 1989 by SAIC (1994). The RFA identified 122 Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) at the SSFL. These include units at the SSFL that have used, stored, or handled various hazardous materials.

The RCRA program at the SSFL is currently in the RFI phase. SWMUs and AOCs identified at the SSFL undergoing closure as part of the RFI program have been grouped by location, and are shown as 50 RFI sites on [Figure 1-4](#) of this report. Site investigation is being conducted under DTSC-approved work plans (Ogden 1996, 2000a, and 2000b). Since 1984, approximately 16,500 laboratory analyses have been performed on over 8,300 samples collected from surficial media during this program. RFI reports presenting these data and evaluating potential risks to human health and the environment are in progress and either have been or are being submitted to DTSC for review, comment and/or approval.

1.1.2 Closure of Inactive RCRA Units

This program includes the closure of 12 units used in the past to manage RCRA-regulated wastes. These units include 10 surface impoundments, a polychlorinated biphenyls (PCB) storage area, and a hazardous waste storage area. Nine of the surface impoundments have been issued Post-Closure Permits administered by the DTSC as described above. Two Post-Closure Permits have been issued for the surface impoundments at the SSFL. The first applies to five Boeing impoundments in Areas I and III, and the second to four National Aeronautics and Space Administration (NASA) impoundments in Area II. These Post-Closure Permits were finalized and issued to Boeing in May 1995. One of the surface impoundments has been clean-closed and hence does not require post-closure care.

1.1.3 Compliance/Permitting of RCRA Units

This program includes the permitting and compliance of active and inactive RCRA-regulated units at the SSFL, including storage areas and waste disposal practices. The three current permits issued by DTSC for active RCRA facilities at the SSFL include the Areas I and III Post-Closure Permit and the Area II Post-Closure Permit for groundwater treatment system operations, and the Operating Permit for the Area IV Hazardous Waste Management Facility. Interim status authorization has also been issued to Boeing by DTSC to operate the United States Department of Energy (DOE) owned Area IV Radioactive Materials Handling Facility.

1.2 GROUNDWATER CHARACTERIZATION AND REMEDIATION

This ongoing program consists of continuing groundwater monitoring and groundwater remediation. Approximately 381 wells, springs, and shallow piezometers are included in the monitoring program. As part of the site characterization program, Boeing monitors groundwater in these wells according to the DTSC-approved groundwater monitoring plan. To date, approximately 12,000 chemical analyses have been performed on over 7,800 samples collected from groundwater wells during this program. Groundwater monitoring and remediation are also performed in support of the surface impoundment Post-Closure Permits described above.

Thirty-two of the onsite wells serve as extraction wells for the eight RCRA-permitted groundwater treatment systems (GWTS) at the SSFL. Three of the GWTS are on stand-by. Effluent sampling at the GWTS locations has been conducted since 1986. To date, approximately 6,900 samples have been collected during this program. These samples are all regularly analyzed for volatile organic compounds (VOCs) and other chemicals as appropriate.

1.3 OTHER PROGRAMS

Environmental programs not related to RCRA include environmental permitting (including air and surface water discharges), other types of site investigation, and closure activities. These programs, under the jurisdiction of various agencies, include the activities described below.

1.3.1 Environmental Permitting

The SSFL is an active industrial facility with several types of environmental permits. Surface water discharge from the SSFL is regulated under a National Pollutant Discharge Elimination System (NPDES) permit issued by the Los Angeles Regional Water Quality Control Board (RWQCB), beginning in 1984. Surface water discharges from the site are monitored at eight outfall locations.

Historically, waste discharges from the SSFL have been regulated since 1959. Waste Discharge Requirements (WDR) were issued by the RWQCB to regulate sewage and industrial waste discharge onsite (i.e., nonhazardous leach fields). There are no longer any active sewage

discharge or leach fields at the SSFL, and the WDR permit was rescinded by the RWQCB in 1994.

Air discharge permits and asbestos compliance permits are under the jurisdiction of the Ventura County Air Pollution Control District (VCAPCD). Regular emissions monitoring for carbon monoxide, nitrogen and sulfur oxides, reactive organic compounds, particulate matter, and radiological components is performed by the SSFL in compliance with these permits. In addition, lead and asbestos abatement work at the facility is done under permits issued by the VCAPCD and/or California Occupational Safety and Health Administration (Cal-OSHA).

1.3.2 Landfills

Nonhazardous solid waste landfills are regulated by the RWQCB and the Ventura County Environmental Health Division (VCEHD). Currently, the SSFL has two inactive non-hazardous landfills, which are inspected quarterly by VCEHD. These landfills will be investigated as part of the RCRA Corrective Action Program under oversight of the DTSC, RWQCB, and VCEHD. Field work for the investigation of the Building 56 landfill in Area IV has been completed. Investigations of the Area I and II landfills were initiated in October and November 2003. There are no designated hazardous waste landfills at the SSFL.

1.3.3 Fuel Tank Investigation/Closure

The underground storage tank (UST) program includes soil investigation and cleanup associated with fuel USTs at the SSFL; fuel UST closures were under the jurisdiction of VCEHD. VCEHD transferred oversight and closure of fuel USTs at the SSFL to DTSC as part of the ongoing RCRA Corrective Action Program.

1.3.4 Mixed and Radioactive Waste Monitoring and Closure Activities

Radioactive materials have been used in Area IV of the SSFL. The only remaining nuclear-related activity at the SSFL is decontamination and decommissioning of former nuclear facilities. DOE owns some buildings and equipment in Area IV and has primary jurisdiction of

monitoring radioactive materials in this area. The California Department of Health Services-Radiologic Health Branch (DHS-RHB) oversees Boeing's Radioactive Materials License, radioactive facility cleanup, and environmental monitoring. SWMUs identified in the RFA with potential radioactive contamination (SAIC, 1994) are being addressed by the DOE site closure programs. Potential chemical contamination at these sites is being addressed under the RFI with oversight by the DTSC.

2.0 REFERENCES

Ogden Environmental and Energy Services Co., Inc. (Ogden), 1996. *RCRA Facility Investigation Workplan Addendum*, Santa Susana Field Laboratory, Ventura County, California. September.

Ogden, 2000a. *RCRA Facility Investigation Work Plan, Shallow Zone Groundwater Investigation Work Plan, Addendum Amendment*, Santa Susana Field Laboratory, Ventura County, California. June.

Ogden, 2000b *Shallow Zone Groundwater Investigation Work Plan Final*, Santa Susana Field Laboratory, Ventura County, California. December.

Science Applications International Corporation (SAIC), 1994. *Final RCRA Facility Assessment Report for Rockwell International Corporation*, Rocketdyne Division, Santa Susana Field Laboratory, Ventura County, California. May.

Appendix B
Daily Precipitation
Santa Susana Field Laboratory
Ventura County, CA
Page 1 of 12

FALL QUARTER 2000					
October		November		December	
Date	Precipitation (inches)	Date	Precipitation (inches)	Date	Precipitation (inches)
10/01/00	0.00	11/01/00	0.00	12/01/00	0.00
10/02/00	0.00	11/02/00	0.00	12/02/00	0.00
10/03/00	0.00	11/03/00	0.00	12/03/00	0.00
10/04/00	0.00	11/04/00	0.00	12/04/00	0.00
10/05/00	0.00	11/05/00	0.00	12/05/00	0.00
10/06/00	0.00	11/06/00	0.00	12/06/00	0.00
10/07/00	0.00	11/07/00	0.00	12/07/00	0.00
10/08/00	0.00	11/08/00	0.00	12/08/00	0.00
10/09/00	0.00	11/09/00	0.00	12/09/00	0.00
10/10/00	0.00	11/10/00	0.00	12/10/00	0.00
10/11/00	0.00	11/11/00	0.00	12/11/00	0.00
10/12/00	0.00	11/12/00	0.00	12/12/00	0.00
10/13/00	0.00	11/13/00	0.00	12/13/00	0.00
10/14/00	0.00	11/14/00	0.00	12/14/00	0.00
10/15/00	0.00	11/15/00	0.00	12/15/00	0.00
10/16/00	0.00	11/16/00	0.00	12/16/00	0.00
10/17/00	0.00	11/17/00	0.00	12/17/00	0.00
10/18/00	0.00	11/18/00	0.00	12/18/00	0.00
10/19/00	0.00	11/19/00	0.00	12/19/00	0.00
10/20/00	0.00	11/20/00	0.00	12/20/00	0.00
10/21/00	0.00	11/21/00	0.00	12/21/00	0.00
10/22/00	0.00	11/22/00	0.00	12/22/00	0.00
10/23/00	0.00	11/23/00	0.00	12/23/00	0.00
10/24/00	0.00	11/24/00	0.00	12/24/00	0.00
10/25/00	0.05	11/25/00	0.00	12/25/00	0.00
10/26/00	0.17	11/26/00	0.00	12/26/00	0.00
10/27/00	0.00	11/27/00	0.00	12/27/00	0.00
10/28/00	0.28	11/28/00	0.00	12/28/00	0.00
10/29/00	0.00	11/29/00	0.00	12/29/00	0.00
10/30/00	0.00	11/30/00	0.00	12/30/00	0.00
10/31/00	0.00			12/31/00	0.00
TOTAL PRECIPITATION	0.50		0.00		0.00

Appendix B
Daily Precipitation
Santa Susana Field Laboratory
Ventura County, CA
Page 2 of 12

WINTER QUARTER 2001					
January		February		March	
Date	Precipitation (inches)	Date	Precipitation (inches)	Date	Precipitation (inches)
01/01/01	0.00	02/01/01	0.00	03/01/01	0.00
01/02/01	0.00	02/02/01	0.00	03/02/01	0.00
01/03/01	0.00	02/03/01	0.00	03/03/01	0.00
01/04/01	0.00	02/04/01	0.00	03/04/01	0.81
01/05/01	0.00	02/05/01	0.00	03/05/01	1.70
01/06/01	0.00	02/06/01	0.00	03/06/01	0.96
01/07/01	0.00	02/07/01	0.04	03/07/01	0.00
01/08/01	0.13	02/08/01	0.00	03/08/01	0.00
01/09/01	0.00	02/09/01	0.00	03/09/01	0.00
01/10/01	2.41	02/10/01	0.14	03/10/01	0.00
01/11/01	1.38	02/11/01	0.66	03/11/01	0.00
01/12/01	0.75	02/12/01	0.86	03/12/01	0.00
01/13/01	0.00	02/13/01	1.38	03/13/01	0.00
01/14/01	0.00	02/14/01	0.00	03/14/01	0.00
01/15/01	0.00	02/15/01	0.00	03/15/01	0.00
01/16/01	0.00	02/16/01	0.00	03/16/01	0.00
01/17/01	0.00	02/17/01	0.00	03/17/01	0.00
01/18/01	0.00	02/18/01	0.00	03/18/01	0.00
01/19/01	0.00	02/19/01	0.22	03/19/01	0.00
01/20/01	0.00	02/20/01	0.00	03/20/01	0.00
01/21/01	0.00	02/21/01	0.00	03/21/01	0.00
01/22/01	0.00	02/22/01	0.00	03/22/01	0.00
01/23/01	0.00	02/23/01	0.03	03/23/01	0.00
01/24/01	0.41	02/24/01	0.48	03/24/01	0.00
01/25/01	0.00	02/25/01	1.49	03/25/01	0.00
01/26/01	0.73	02/26/01	0.60	03/26/01	0.00
01/27/01	0.00	02/27/01	0.14	03/27/01	0.00
01/28/01	0.00	02/28/01	0.10	03/28/01	0.00
01/29/01	0.00			03/29/01	0.00
01/30/01	0.00			03/30/01	0.00
01/31/01	0.00			03/31/01	0.00
TOTAL PRECIPITATION	5.81		6.14		3.47

Appendix B
Daily Precipitation
Santa Susana Field Laboratory
Ventura County, CA
Page 3 of 12

SPRING QUARTER 2001					
April		May		June	
Date	Precipitation (inches)	Date	Precipitation (inches)	Date	Precipitation (inches)
04/01/01	0.00	05/01/01	0.00	06/01/01	0.00
04/02/01	0.00	05/02/01	0.00	06/02/01	0.00
04/03/01	0.00	05/03/01	0.00	06/03/01	0.00
04/04/01	0.00	05/04/01	0.00	06/04/01	0.00
04/05/01	0.00	05/05/01	0.00	06/05/01	0.00
04/06/01	0.09	05/06/01	0.00	06/06/01	0.00
04/07/01	0.43	05/07/01	0.00	06/07/01	0.00
04/08/01	0.00	05/08/01	0.00	06/08/01	0.00
04/09/01	0.00	05/09/01	0.00	06/09/01	0.00
04/10/01	0.00	05/10/01	0.00	06/10/01	0.00
04/11/01	0.00	05/11/01	0.00	06/11/01	0.00
04/12/01	0.00	05/12/01	0.00	06/12/01	0.00
04/13/01	0.00	05/13/01	0.00	06/13/01	0.00
04/14/01	0.00	05/14/01	0.00	06/14/01	0.00
04/15/01	0.00	05/15/01	0.00	06/15/01	0.00
04/16/01	0.00	05/16/01	0.00	06/16/01	0.00
04/17/01	0.00	05/17/01	0.00	06/17/01	0.00
04/18/01	0.00	05/18/01	0.00	06/18/01	0.00
04/19/01	0.00	05/19/01	0.00	06/19/01	0.00
04/20/01	0.61	05/20/01	0.00	06/20/01	0.00
04/21/01	0.00	05/21/01	0.00	06/21/01	0.00
04/22/01	0.00	05/22/01	0.00	06/22/01	0.00
04/23/01	0.00	05/23/01	0.00	06/23/01	0.00
04/24/01	0.00	05/24/01	0.00	06/24/01	0.00
04/25/01	0.00	05/25/01	0.00	06/25/01	0.00
04/26/01	0.00	05/26/01	0.00	06/26/01	0.00
04/27/01	0.00	05/27/01	0.00	06/27/01	0.00
04/28/01	0.00	05/28/01	0.00	06/28/01	0.00
04/29/01	0.00	05/29/01	0.00	06/29/01	0.00
04/30/01	0.00	05/30/01	0.00	06/30/01	0.00
		05/31/01	0.00		
TOTAL PRECIPITATION	1.13		0.00		0.00

Appendix B
Daily Precipitation
Santa Susana Field Laboratory
Ventura County, CA
Page 4 of 12

SUMMER QUARTER 2001					
July		August		September	
Date	Precipitation (inches)	Date	Precipitation (inches)	Date	Precipitation (inches)
07/01/01	0.00	08/01/01	0.00	09/01/01	0.00
07/02/01	0.00	08/02/01	0.00	09/02/01	0.00
07/03/01	0.00	08/03/01	0.00	09/03/01	0.00
07/04/01	0.00	08/04/01	0.00	09/04/01	0.00
07/05/01	0.00	08/05/01	0.00	09/05/01	0.00
07/06/01	0.00	08/06/01	0.00	09/06/01	0.00
07/07/01	0.00	08/07/01	0.00	09/07/01	0.00
07/08/01	0.00	08/08/01	0.00	09/08/01	0.00
07/09/01	0.00	08/09/01	0.00	09/09/01	0.00
07/10/01	0.00	08/10/01	0.00	09/10/01	0.00
07/11/01	0.00	08/11/01	0.00	09/11/01	0.00
07/12/01	0.00	08/12/01	0.00	09/12/01	0.00
07/13/01	0.00	08/13/01	0.00	09/13/01	0.00
07/14/01	0.00	08/14/01	0.00	09/14/01	0.00
07/15/01	0.00	08/15/01	0.00	09/15/01	0.00
07/16/01	0.00	08/16/01	0.00	09/16/01	0.00
07/17/01	0.00	08/17/01	0.00	09/17/01	0.00
07/18/01	0.00	08/18/01	0.00	09/18/01	0.00
07/19/01	0.00	08/19/01	0.00	09/19/01	0.00
07/20/01	0.00	08/20/01	0.00	09/20/01	0.00
07/21/01	0.00	08/21/01	0.00	09/21/01	0.00
07/22/01	0.00	08/22/01	0.00	09/22/01	0.00
07/23/01	0.00	08/23/01	0.00	09/23/01	0.00
07/24/01	0.00	08/24/01	0.00	09/24/01	0.00
07/25/01	0.00	08/25/01	0.00	09/25/01	0.00
07/26/01	0.00	08/26/01	0.00	09/26/01	0.00
07/27/01	0.00	08/27/01	0.00	09/27/01	0.00
07/28/01	0.00	08/28/01	0.00	09/28/01	0.00
07/29/01	0.00	08/29/01	0.00	09/29/01	0.00
07/30/01	0.00	08/30/01	0.00	09/30/01	0.00
07/31/01	0.00	08/31/01	0.00		
TOTAL PRECIPITATION	0.00		0.00		0.00

Appendix B
Daily Precipitation
Santa Susana Field Laboratory
Ventura County, CA
Page 5 of 12

FALL QUARTER 2001					
October		November		December	
Date	Precipitation (inches)	Date	Precipitation (inches)	Date	Precipitation (inches)
10/01/01	0.00	11/01/01	0.00	12/01/01	0.00
10/02/01	0.00	11/02/01	0.00	12/02/01	0.10
10/03/01	0.00	11/03/01	0.00	12/03/01	0.13
10/04/01	0.00	11/04/01	0.00	12/04/01	0.00
10/05/01	0.00	11/05/01	0.00	12/05/01	0.00
10/06/01	0.00	11/06/01	0.00	12/06/01	0.00
10/07/01	0.00	11/07/01	0.00	12/07/01	0.00
10/08/01	0.00	11/08/01	0.00	12/08/01	0.00
10/09/01	0.00	11/09/01	0.00	12/09/01	0.00
10/10/01	0.00	11/10/01	0.00	12/10/01	0.00
10/11/01	0.00	11/11/01	0.18	12/11/01	0.00
10/12/01	0.00	11/12/01	0.74	12/12/01	0.00
10/13/01	0.00	11/13/01	0.01	12/13/01	0.00
10/14/01	0.00	11/14/01	0.00	12/14/01	0.11
10/15/01	0.00	11/15/01	0.00	12/15/01	0.00
10/16/01	0.00	11/16/01	0.00	12/16/01	0.00
10/17/01	0.00	11/17/01	0.00	12/17/01	0.00
10/18/01	0.00	11/18/01	0.00	12/18/01	0.00
10/19/01	0.00	11/19/01	0.00	12/19/01	0.00
10/20/01	0.00	11/20/01	0.00	12/20/01	0.51
10/21/01	0.00	11/21/01	0.00	12/21/01	0.07
10/22/01	0.00	11/22/01	0.00	12/22/01	0.00
10/23/01	0.00	11/23/01	0.00	12/23/01	0.01
10/24/01	0.00	11/24/01	0.84	12/24/01	0.00
10/25/01	0.00	11/25/01	0.00	12/25/01	0.00
10/26/01	0.00	11/26/01	0.00	12/26/01	0.00
10/27/01	0.00	11/27/01	0.00	12/27/01	0.00
10/28/01	0.00	11/28/01	0.00	12/28/01	0.00
10/29/01	0.00	11/29/01	0.36	12/29/01	0.42
10/30/01	0.16	11/30/01	0.00	12/30/01	0.06
10/31/01	0.00			12/31/01	0.02
TOTAL PRECIPITATION	0.16		2.13		1.43

Appendix B
Daily Precipitation
Santa Susana Field Laboratory
Ventura County, CA
Page 6 of 12

WINTER QUARTER 2002					
January		February		March	
Date	Precipitation (inches)	Date	Precipitation (inches)	Date	Precipitation (inches)
01/01/02	0.00	02/01/02	0.00	03/01/02	0.00
01/02/02	0.16	02/02/02	0.00	03/02/02	0.00
01/03/02	0.01	02/03/02	0.00	03/03/02	0.00
01/04/02	0.00	02/04/02	0.00	03/04/02	0.00
01/05/02	0.00	02/05/02	0.00	03/05/02	0.00
01/06/02	0.00	02/06/02	0.00	03/06/02	0.07
01/07/02	0.00	02/07/02	0.00	03/07/02	0.15
01/08/02	0.00	02/08/02	0.00	03/08/02	0.00
01/09/02	0.00	02/09/02	0.00	03/09/02	0.00
01/10/02	0.00	02/10/02	0.00	03/10/02	0.00
01/11/02	0.00	02/11/02	0.00	03/11/02	0.00
01/12/02	0.00	02/12/02	0.00	03/12/02	0.00
01/13/02	0.00	02/13/02	0.00	03/13/02	0.00
01/14/02	0.00	02/14/02	0.00	03/14/02	0.00
01/15/02	0.00	02/15/02	0.00	03/15/02	0.00
01/16/02	0.01	02/16/02	0.00	03/16/02	0.00
01/17/02	0.28	02/17/02	0.28	03/17/02	0.04
01/18/02	0.00	02/18/02	0.00	03/18/02	0.01
01/19/02	0.00	02/19/02	0.00	03/19/02	0.00
01/20/02	0.00	02/20/02	0.00	03/20/02	0.00
01/21/02	0.00	02/21/02	0.00	03/21/02	0.00
01/22/02	0.00	02/22/02	0.00	03/22/02	0.00
01/23/02	0.00	02/23/02	0.00	03/23/02	0.00
01/24/02	0.00	02/24/02	0.00	03/24/02	0.00
01/25/02	0.00	02/25/02	0.00	03/25/02	0.00
01/26/02	0.00	02/26/02	0.00	03/26/02	0.00
01/27/02	0.80	02/27/02	0.00	03/27/02	0.00
01/28/02	0.00	02/28/02	0.00	03/28/02	0.00
01/29/02	0.00	03/01/02	0.00	03/29/02	0.00
01/30/02	0.00	03/02/02	0.00	03/30/02	0.00
01/31/02	0.00			03/31/02	0.00
TOTAL PRECIPITATION	1.26		0.28		0.27

Appendix B
Daily Precipitation
Santa Susana Field Laboratory
Ventura County, CA
Page 7 of 12

SPRING QUARTER 2002					
April		May		June	
Date	Precipitation (inches)	Date	Precipitation (inches)	Date	Precipitation (inches)
04/01/02	0.00	05/01/02	0.00	06/01/02	0.00
04/02/02	0.00	05/02/02	0.00	06/02/02	0.00
04/03/02	0.00	05/03/02	0.00	06/03/02	0.00
04/04/02	0.00	05/04/02	0.00	06/04/02	0.00
04/05/02	0.00	05/05/02	0.00	06/05/02	0.00
04/06/02	0.01	05/06/02	0.00	06/06/02	0.00
04/07/02	0.00	05/07/02	0.00	06/07/02	0.00
04/08/02	0.00	05/08/02	0.00	06/08/02	0.00
04/09/02	0.00	05/09/02	0.00	06/09/02	0.00
04/10/02	0.00	05/10/02	0.00	06/10/02	0.00
04/11/02	0.00	05/11/02	0.00	06/11/02	0.00
04/12/02	0.00	05/12/02	0.00	06/12/02	0.00
04/13/02	0.00	05/13/02	0.00	06/13/02	0.00
04/14/02	0.00	05/14/02	0.00	06/14/02	0.00
04/15/02	0.02	05/15/02	0.00	06/15/02	0.00
04/16/02	0.00	05/16/02	0.00	06/16/02	0.00
04/17/02	0.00	05/17/02	0.00	06/17/02	0.00
04/18/02	0.00	05/18/02	0.00	06/18/02	0.00
04/19/02	0.00	05/19/02	0.00	06/19/02	0.00
04/20/02	0.00	05/20/02	0.14	06/20/02	0.00
04/21/02	0.00	05/21/02	0.00	06/21/02	0.00
04/22/02	0.00	05/22/02	0.00	06/22/02	0.00
04/23/02	0.00	05/23/02	0.00	06/23/02	0.00
04/24/02	0.00	05/24/02	0.00	06/24/02	0.00
04/25/02	0.00	05/25/02	0.00	06/25/02	0.00
04/26/02	0.00	05/26/02	0.00	06/26/02	0.00
04/27/02	0.00	05/27/02	0.00	06/27/02	0.00
04/28/02	0.00	05/28/02	0.00	06/28/02	0.00
04/29/02	0.00	05/29/02	0.00	06/29/02	0.00
04/30/02	0.00	05/30/02	0.00	06/30/02	0.00
		05/31/02	0.00		
TOTAL PRECIPITATION	0.03		0.14		0.00

Appendix B
Daily Precipitation
Santa Susana Field Laboratory
Ventura County, CA
Page 8 of 12

SUMMER QUARTER 2002					
July		August		September	
Date	Precipitation (inches)	Date	Precipitation (inches)	Date	Precipitation (inches)
07/01/02	0.00	08/01/02	0.00	09/01/02	0.00
07/02/02	0.00	08/02/02	0.00	09/02/02	0.00
07/03/02	0.00	08/03/02	0.00	09/03/02	0.00
07/04/02	0.00	08/04/02	0.00	09/04/02	0.00
07/05/02	0.00	08/05/02	0.00	09/05/02	0.00
07/06/02	0.00	08/06/02	0.00	09/06/02	0.00
07/07/02	0.00	08/07/02	0.00	09/07/02	0.00
07/08/02	0.00	08/08/02	0.00	09/08/02	0.00
07/09/02	0.00	08/09/02	0.00	09/09/02	0.00
07/10/02	0.00	08/10/02	0.00	09/10/02	0.00
07/11/02	0.00	08/11/02	0.00	09/11/02	0.00
07/12/02	0.00	08/12/02	0.00	09/12/02	0.00
07/13/02	0.00	08/13/02	0.00	09/13/02	0.00
07/14/02	0.00	08/14/02	0.00	09/14/02	0.00
07/15/02	0.00	08/15/02	0.00	09/15/02	0.00
07/16/02	0.00	08/16/02	0.00	09/16/02	0.00
07/17/02	0.00	08/17/02	0.00	09/17/02	0.00
07/18/02	0.00	08/18/02	0.00	09/18/02	0.00
07/19/02	0.00	08/19/02	0.00	09/19/02	0.00
07/20/02	0.00	08/20/02	0.00	09/20/02	0.00
07/21/02	0.00	08/21/02	0.00	09/21/02	0.00
07/22/02	0.00	08/22/02	0.00	09/22/02	0.00
07/23/02	0.00	08/23/02	0.00	09/23/02	0.00
07/24/02	0.00	08/24/02	0.00	09/24/02	0.00
07/25/02	0.00	08/25/02	0.00	09/25/02	0.00
07/26/02	0.00	08/26/02	0.00	09/26/02	0.00
07/27/02	0.00	08/27/02	0.00	09/27/02	0.00
07/28/02	0.00	08/28/02	0.00	09/28/02	0.00
07/29/02	0.00	08/29/02	0.00	09/29/02	0.00
07/30/02	0.00	08/30/02	0.00	09/30/02	0.00
07/31/02	0.00	08/31/02	0.00		
TOTAL PRECIPITATION	0.00		0.00		0.00

Appendix B
Daily Precipitation
Santa Susana Field Laboratory
Ventura County, CA
Page 9 of 12

FALL QUARTER 2002					
October		November		December	
Date	Precipitation (inches)	Date	Precipitation (inches)	Date	Precipitation (inches)
10/01/02	0.00	11/01/02	0.00	12/01/02	0.00
10/02/02	0.00	11/02/02	0.00	12/02/02	0.00
10/03/02	0.00	11/03/02	0.00	12/03/02	0.00
10/04/02	0.00	11/04/02	0.00	12/04/02	0.00
10/05/02	0.00	11/05/02	0.00	12/05/02	0.00
10/06/02	0.00	11/06/02	0.00	12/06/02	0.00
10/07/02	0.00	11/07/02	0.42	12/07/02	0.00
10/08/02	0.00	11/08/02	2.34	12/08/02	0.00
10/09/02	0.00	11/09/02	0.59	12/09/02	0.00
10/10/02	0.00	11/10/02	0.00	12/10/02	0.00
10/11/02	0.00	11/11/02	0.00	12/11/02	0.00
10/12/02	0.00	11/12/02	0.00	12/12/02	0.00
10/13/02	0.00	11/13/02	0.00	12/13/02	0.00
10/14/02	0.00	11/14/02	0.00	12/14/02	0.00
10/15/02	0.00	11/15/02	0.00	12/15/02	0.13
10/16/02	0.00	11/16/02	0.00	12/16/02	1.82
10/17/02	0.00	11/17/02	0.00	12/17/02	0.00
10/18/02	0.00	11/18/02	0.00	12/18/02	0.00
10/19/02	0.00	11/19/02	0.00	12/19/02	0.32
10/20/02	0.00	11/20/02	0.00	12/20/02	1.03
10/21/02	0.00	11/21/02	0.00	12/21/02	0.13
10/22/02	0.00	11/22/02	0.00	12/22/02	0.00
10/23/02	0.00	11/23/02	0.00	12/23/02	0.00
10/24/02	0.00	11/24/02	0.00	12/24/02	0.00
10/25/02	0.01	11/25/02	0.00	12/25/02	0.00
10/26/02	0.01	11/26/02	0.00	12/26/02	0.00
10/27/02	0.00	11/27/02	0.00	12/27/02	0.00
10/28/02	0.00	11/28/02	0.00	12/28/02	0.11
10/29/02	0.00	11/29/02	0.15	12/29/02	0.00
10/30/02	0.00	11/30/02	0.19	12/30/02	0.00
10/31/02	0.00			12/31/02	0.00
TOTAL PRECIPITATION	0.02		3.69		3.54

Appendix B
Daily Precipitation
Santa Susana Field Laboratory
Ventura County, CA
Page 10 of 12

WINTER QUARTER 2003					
January		February		March	
Date	Precipitation (inches)	Date	Precipitation (inches)	Date	Precipitation (inches)
01/01/03	0.00	02/01/03	0.00	03/01/03	0.00
01/02/03	0.00	02/02/03	0.00	03/02/03	0.00
01/03/03	0.00	02/03/03	0.00	03/03/03	0.00
01/04/03	0.00	02/04/03	0.00	03/04/03	0.08
01/05/03	0.00	02/05/03	0.00	03/05/03	0.00
01/06/03	0.00	02/06/03	0.00	03/06/03	0.10
01/07/03	0.00	02/07/03	0.00	03/07/03	0.00
01/08/03	0.00	02/08/03	0.00	03/08/03	0.00
01/09/03	0.00	02/09/03	0.00	03/09/03	0.00
01/10/03	0.00	02/10/03	0.00	03/10/03	0.00
01/11/03	0.00	02/11/03	0.77	03/11/03	0.10
01/12/03	0.00	02/12/03	5.34	03/12/03	0.00
01/13/03	0.00	02/13/03	0.01	03/13/03	0.00
01/14/03	0.00	02/14/03	0.00	03/14/03	0.00
01/15/03	0.00	02/15/03	0.02	03/15/03	2.55
01/16/03	0.00	02/16/03	0.00	03/16/03	0.00
01/17/03	0.00	02/17/03	0.00	03/17/03	0.00
01/18/03	0.00	02/18/03	0.00	03/18/03	0.00
01/19/03	0.00	02/19/03	0.05	03/19/03	0.00
01/20/03	0.00	02/20/03	0.00	03/20/03	0.00
01/21/03	0.00	02/21/03	0.00	03/21/03	0.00
01/22/03	0.04	02/22/03	0.00	03/22/03	0.00
01/23/03	0.00	02/23/03	0.00	03/23/03	0.00
01/24/03	0.00	02/24/03	0.57	03/24/03	0.00
01/25/03	0.00	02/25/03	0.37	03/25/03	0.00
01/26/03	0.00	02/26/03	0.00	03/26/03	0.00
01/27/03	0.00	02/27/03	0.11	03/27/03	0.00
01/28/03	0.00	02/28/03	0.00	03/28/03	0.00
01/29/03	0.00			03/29/03	0.00
01/30/03	0.00			03/30/03	0.00
01/31/03	0.00			03/31/03	0.00
TOTAL PRECIPITATION	0.04		7.24		2.83

Appendix B
Daily Precipitation
Santa Susana Field Laboratory
Ventura County, CA
Page 11 of 12

SPRING QUARTER 2003					
April		May		June	
Date	Precipitation (inches)	Date	Precipitation (inches)	Date	Precipitation (inches)
04/01/03	0.00	05/01/03	0.00	06/01/03	0.00
04/02/03	0.00	05/02/03	1.59	06/02/03	0.00
04/03/03	0.00	05/03/03	2.43	06/03/03	0.00
04/04/03	0.00	05/04/03	0.00	06/04/03	0.00
04/05/03	0.00	05/05/03	0.00	06/05/03	0.00
04/06/03	0.00	05/06/03	0.00	06/06/03	0.00
04/07/03	0.00	05/07/03	0.15	06/07/03	0.03
04/08/03	0.00	05/08/03	0.00	06/08/03	0.00
04/09/03	0.00	05/09/03	0.00	06/09/03	0.04
04/10/03	0.00	05/10/03	0.00	06/10/03	0.02
04/11/03	0.00	05/11/03	0.00	06/11/03	0.00
04/12/03	0.00	05/12/03	0.00	06/12/03	0.00
04/13/03	1.58	05/13/03	0.00	06/13/03	0.00
04/14/03	1.72	05/14/03	0.00	06/14/03	0.00
04/15/03	0.00	05/15/03	0.00	06/15/03	0.00
04/16/03	0.00	05/16/03	0.00	06/16/03	0.53
04/17/03	0.00	05/17/03	0.00	06/17/03	0.00
04/18/03	0.00	05/18/03	0.00	06/18/03	0.00
04/19/03	0.00	05/19/03	0.00	06/19/03	0.06
04/20/03	0.00	05/20/03	0.00	06/20/03	0.02
04/21/03	0.00	05/21/03	0.00	06/21/03	0.00
04/22/03	0.00	05/22/03	0.00	06/22/03	0.00
04/23/03	0.00	05/23/03	0.00	06/23/03	0.00
04/24/03	0.00	05/24/03	0.03	06/24/03	0.00
04/25/03	0.00	05/25/03	0.00	06/25/03	0.00
04/26/03	0.00	05/26/03	0.00	06/26/03	0.00
04/27/03	0.00	05/27/03	0.00	06/27/03	0.00
04/28/03	0.00	05/28/03	0.00	06/28/03	0.00
04/29/03	0.00	05/29/03	0.00	06/29/03	0.00
04/30/03	0.00	05/30/03	0.00	06/30/03	0.00
		05/31/03	0.00		
TOTAL PRECIPITATION	3.30		4.20		0.70

Appendix B
Daily Precipitation
Santa Susana Field Laboratory
Ventura County, CA
Page 12 of 12

SUMMER QUARTER 2003					
July		August		September	
Date	Precipitation (inches)	Date	Precipitation (inches)	Date	Precipitation (inches)
07/01/03	0.00	08/01/03	0.00	09/01/03	0.00
07/02/03	0.00	08/02/03	0.00	09/02/03	0.00
07/03/03	0.00	08/03/03	0.00	09/03/03	0.00
07/04/03	0.00	08/04/03	0.00	09/04/03	0.00
07/05/03	0.00	08/05/03	0.00	09/05/03	0.00
07/06/03	0.00	08/06/03	0.00	09/06/03	0.00
07/07/03	0.00	08/07/03	0.00	09/07/03	0.00
07/08/03	0.00	08/08/03	0.00	09/08/03	0.00
07/09/03	0.00	08/09/03	0.00	09/09/03	0.00
07/10/03	0.00	08/10/03	0.00	09/10/03	0.00
07/11/03	0.00	08/11/03	0.00	09/11/03	0.00
07/12/03	0.00	08/12/03	0.00	09/12/03	0.00
07/13/03	0.00	08/13/03	0.00	09/13/03	0.00
07/14/03	0.00	08/14/03	0.00	09/14/03	0.00
07/15/03	0.00	08/15/03	0.00	09/15/03	0.00
07/16/03	0.00	08/16/03	0.00	09/16/03	0.00
07/17/03	0.00	08/17/03	0.00	09/17/03	0.00
07/18/03	0.00	08/18/03	0.00	09/18/03	0.00
07/19/03	0.00	08/19/03	0.00	09/19/03	0.00
07/20/03	0.00	08/20/03	0.00	09/20/03	0.00
07/21/03	0.00	08/21/03	0.00	09/21/03	0.00
07/22/03	0.00	08/22/03	0.00	09/22/03	0.00
07/23/03	0.00	08/23/03	0.00	09/23/03	0.00
07/24/03	0.00	08/24/03	0.00	09/24/03	0.00
07/25/03	0.00	08/25/03	0.00	09/25/03	0.00
07/26/03	0.00	08/26/03	0.00	09/26/03	0.00
07/27/03	0.00	08/27/03	0.00	09/27/03	0.00
07/28/03	0.00	08/28/03	0.00	09/28/03	0.00
07/29/03	0.00	08/29/03	0.00	09/29/03	0.00
07/30/03	0.00	08/30/03	0.00	09/30/03	0.02
07/31/03	0.00	08/31/03	0.00		
TOTAL PRECIPITATION	0.00		0.00		0.02

FIELD LOG OF BORING

10

4
3

BORING NUMBER **P2001**

SHEET **1** OF **3**

PROJECT NAME NASA		PROJECT NUMBER 313150003	ELEVATION AND DATUM	LOCATION RD-9 Area, Point PT 040
DRILLING COMPANY Layne		DRILLER Ruben	DATE AND TIME STARTED 10/31/00 0800	DATE AND TIME COMPLETED 10/31/1640
DRILLING EQUIPMENT CME 95/Boyles 37		DRILLING METHOD HSA/Air Rotary	COMPLETION DEPTH 58' 60'	TOTAL NO. OF SAMPLES 21
SIZE AND TYPE OF BIT 8" carbide	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK	SS
DRILLING FLUID None	DRILLING ANGLE Vert.	WATER LEVEL	FIRST 29.5'	AFTER _____ HOURS

SAMPLE HAMMER N/A	DRIVING WT. 140#	DROP 30"	HYDROGEOLOGIST / DATE T. Burton 10/31/00	CHECKED BY / DATE
TYPE Down the Side				

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
					Surface: Bare soils, dry grass					
	1				Hand Augered to 5' bgs					
	2									
	3									
	4									
	5									
			0							
			20							
			100							
		X			Sandy silt (silt w/sand (ML), dark brown (10YR3/3), dry, v. soft, non-plastic, v.f sand	ML	25	75		@ 0900 Cφ1
		X			As above, m. stiff - stiff	ML	25	75		@ 0905 - Cφ2
	10									
			15							
		X	100		Becomes dk. grayish brown 10YR4/2, mottled dk. brown					@ 0915 Cφ3
		X								@ 0920 Cφ4
	15				Sandy silt (ML), as above, hard	ML	30	70		

4.4/5

BORING NUMBER PZ001

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS	
							GR	SA	FI		
4A/5	15.0 ⁰⁹²¹		80		Silt w/sand (ML), as above, grayish	ML	0	15	85		
		X	100		br (NG-N5), mottled w/iron oxide (dk. yellowish brown), dry, v. soft, non-plastic, grades to sandy silt @ 18.5'	↓	↓	↓	↓	@0933 CØ5	
			100								
		X								@0936 CØ6	
						Coarsening downward, becomes m. stiff @ 20'	ML		35	65	
		20.0 ⁰⁹²⁵		0							
		20.0 ⁰⁹²⁶		0							
				60							
			X	100		As above (Sandy silt)	ML		45	55	@0941 CØ7 22.5'
											Hard drilling @ 26-28'
3.8 4A/5					Silty sand (SM), dry, loose, vf-fine, micaceous, FeO ₂ mottling, grayish brown	SM		55	45		
		X								@0944 CØ8 24.5'	
		25.0 ⁰⁹²⁹		0							
		25.0 ⁰⁹³¹		0							
				100		Higher plasticity silt, Silty sand as above, mostly fine gr.	SM		65	35	
			X			@27' Becomes moist; vf sands, no mottling, dk. grayish brown-gray, well sorted, grades to SP-SM, micaceous, loose	SM		75	25	@0952 CØ9 27.5'
						Becomes v. dk. gray, wet, vf-med gr. (Weathered Chatworth FM)	SP-SM		90	10	Alluvium / weathered Bedrock contact (appx)
		30.0 ⁰⁹⁴⁴	X	90							@0954 CØ 29.5'
		30.0 ⁰⁹⁴⁵		100		Silty sand (SM), v. dk. yellowish bn (OYR #13), wet, v. loose, competent at 31'-31.25', vf-fine	SM		70	30	@1008 CØ 31.25'
	YR GY		X			Sharp contact	SM		60	40	@32' Hard Drilling
		X			SGY 5/1 dk. greenish gray staining (32.5' - 34.5')					@1010 CØ12 32.75'	
					As above, FeO ₂ stains, m. dense					@613 CØ13 34.5'	
										@1015 CØ14 34.75'	
GY N		35.0 ¹⁰⁰²	X			Gray N5-6					PID: Ø ppm

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZ001

SHEET 4 OF 4

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
 shale	55		100		Fine grained sandstone, no micas, olive gray					
		X			Poss. fracture, shale < 2" thick					@ 1625 C21 55.75'
					Fracture Mudstone + shale					
	58 1613									
					Bottom of Borehole					
					REAMED TO 60' USING AIR ROTARY METHODS					

FIELD LOG OF BORING

BORING NUMBER **PZ002**

SHEET **1** OF **5**

PROJECT NAME Rocketdyne	PROJECT NUMBER 313150002	ELEVATION AND DATUM TBD	LOCATION CTL III North, PT 026
DRILLING COMPANY Layne	DRILLER Juan/Ruben	DATE AND TIME STARTED 11/1/00 1030	DATE AND TIME COMPLETED 11/2/00 0910
DRILLING EQUIPMENT CME 95	DRILLING METHOD HSA	COMPLETION DEPTH 80' 82'	TAK TOTAL NO. OF SAMPLES 2 (Geotech)
SIZE AND TYPE OF BIT 8" Carbide	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK SS DRIVE PITCHER
DRILLING FLUID None	DRILLING ANGLE Vert	WATER LEVEL	FIRST ≈ 30' AFTER 1 HOURS 11'

SAMPLE HAMMER TYPE None	DRIVING WT.	DROP	HYDROGEOLOGIST / DATE T. Burton 11/1/00	CHECKED BY / DATE
-----------------------------------	-------------	------	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
					Surface: Asphalt					
	1									
	2				Hand Augered to 3' bgs					
	3	1041	100		Contact: Road Base/Alluvium grades to weathered siltstone (sandy), stiff, dk. yellowish brown, becomes sandstone					Alluvium/Bedrock Contact
	4				Weathered - Fe oxide staining heavy @ 4'					
	5	1043 1048	100		Weathered sandstone & siltstone, heavy iron oxide mottling, moist, grades to v. loose sand @ 9.5', vf-f grained	SM	80	20		
						ML	35	65		
						SM	70	30		
	10	1055 1104	100		Silty sand (SM), grayish brown, dry, v. loose in sample	SM	75	25		
					v. weathered sandstone, vf-fine, dk. yellowish brown - dk. grayish brown					
					Coarse sand 13.5-13.75, fining downward					
	15	1109			Clay interbed @ 14.5'					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2002

SHEET 2 OF 5

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
N6	15	1118	0		Weathered sandstone to SP-SM,					
			100		fr. v. f. sand, dk. yellowish brown 10YR 9/3, SP-SM	-	90	10		
					moist, loose in sample, coarsens down to 17'					
					More competent 17-17.5, grades to siltstone, sandy	SW	95	5		
					silty sandstone, moist, m. dense, v. f. fine, some med. sand,	SM/ML				
?	20	1124 1128	0		Shale 19.5-19.75, 19.9-20', inter-bedded w/ sandstone					Shoe wet @ 19.5'
			0							No recovery
N6			100		Poorly graded sand w/ silt (SP-SM)					
			100		dk. grayish brown wet, low-med. becomes cemented / weathered @ 22', fine sands	SP-SM	90	10		
						ML	5	100		
						SM	60	40		
					Silty sand (SM), med. dense, dk. grayish brown, moist-wet as above	SM	70	30		
N6	25	1142 1149	100		Weathered sandstone, loose-m. dense in sample, v. med., wet, moderately cemented, to 27.5'	SW-SM	90	10		Harder Drilling
					30% coarse, subround sand grains from 27.5-28.5, SW grades to SW-SM, no coarse sand	SW	95	5		
						SW-SM	90	10		
					SW-SM as above					
N6	30	1154 1207	0							
			0							
			10							
			100		SW-SM as above, dk. grayish brn-yellow brn. mottling, becomes siltstone as above, then contact w/ gray silt (poor cementation), then well-cemented silty sandstone SS: 10YR 5/2-4/2	ML				
N6	35	1219								Competence increasing

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **PZ002**

SHEET **4** OF **41**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
NR	55 1425		100		Gray (N5), wet, v. loose sands (F-10), sharp color contact to dk. reddish brown (7.5' & 3/4), then yellowish brown, varying competence (cementation)	SW - SP -	95	5		Hard Drilling
	1440				Gray N4 to S9'	SP - SM	90	10		
	1460		0		Dark grayish-yellowish brown (10' & 4/2 - 10' & 5/4), wet	SP - SM	90	10		
	1500		100		As above to 62.75, wet					
					(Color contact)					
					Becomes Fe-oxide yellowish brown, angular fractures, dense, olive in fractured zones	SW				
	65 1522		0			SP -				
			100		As above to 67', silty, vf-fine	SP - SM	90	10		
					Dark gray silty (sandy)	SM - ML -	65	35		
					Loose-med dense sand as above	SP -	95	5		
				Very dark gray shale (2") interbedded						
70 1539 1720			100		Well-cemented sandstone (SP), gray (N5) oxidized to 70.25	SP -	95	5		
				Alternating silt + sandy silts, wet, m. stiff, gray N4 to dk. yellowish brown to vdk. grayish brn	ML - ML -	35	65		Fractured shale	
				increasing competence 74.5' - 75'		5	95			
75 1738			100		Silty sand (SM), mottled vdk. grayish-yellowish brn, wet, vf-fine, m. dense	SM -	60	40		Possible fracture zone

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZ002

SHEET 5 OF 5

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	75	0756			Fractured shale oxidized					
					Silt (ML), olive gray, wet, soft, low-med. plasticity	ML	-	10	90	
					Sand, gray, oxidized in fracture, v.f.	SM	-	70	30	
					Mottled silt (ML)	ML				
					Sand, gray, as above, no fracture	S				Geotech @ 79.5 G2
		80	0806	X						
					Bottom of boring 80'					
					BORING WAS REAMED TO 82' WITH HSA RIG. HOLE SLOUGHED BACK IN TO 81'					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZ 003

SHEET 3 OF 4

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
[Hand-drawn lithology column showing sandstone and shale layers]	35		90		Sandstone: very fine - fine, moist to wet					
			100							
	40		70	55/100	Sandstone very fine, micaceous					
					Highly oxidized FeO ₂ + MnO ₂ staining along fracture, silty (wet) in fracture					Fracture - high angle
	45	0864	100	25/100	Very fine sandstone, alternating siltstone, + shale interbeds @ 48'					Highly fractured, dark staining
					Silty, competent	SM	60	40		
						SP-SM	90	10		
	50	0830 0734	100	43/100	Sandstone - well-cemented	SP-SM	90	10		Fracture
					4" Thick siltstone					
					Lith change at fracture: Siltstone coarsens downward to SP vf-fine, then to SW, vf-med. grained	ML	40	60		Fracture
						SP	95	5		
						SP	95	5		
						SW	95	5		
	55	0904		55/100	Slight iron oxidation, then heavier					Fracture

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2003

SHEET 4 OF 4

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS	
							GR	SA	F		
	55		100		in lower frx. @ 54.9'						
					Oxidized zone 55.3-56'	SP	-	75	5	Harder Drilling @ 56'	
					MnO ₂ staining + wet silt in frx. zone @ 56.3						
						SM	-	85	15		
					siltier, vf sand 56.3-56.6	SM	-	85	15		
						SP	-	75	5		
	60		45/100		Dry, competent SP sandstone very fine						
					Total Depth = 60' bgs						
					REAMED WITH AIR ROTARY TO 53'. SLOUGH FILLED LOWER COREHOLE FROM 53'-60'. BENTONITE ADDED 27'-53'.						

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **PZΦΦ4B**

SHEET **2** OF **3**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	KΦ BLOW POINT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS	
							GR	SA	FI		
	15	1029	100		well-cemented, competent sandstone					Drilling w/Air Rotar	
	16	1033 1034	100 0	24/24	Becomes wet @ 15.3'	SP	-	95	5	↓	
		X	35 100			Sandstone, as above, well-cemented, some med. + coarse sand	SP	-	95	5	F ₈ @ 17'
		X									
		20				Becomes dry @ 20.3'					
		1052 1058		52/52		No recovery in shoe - oxidized @ bottom of run (broken sfc. face)					Harder Drilling @ 20.5
		1109		100	24/24 12/12						Refusal w/cutting shoe @ 22' (some water added)
			X	100		As above, to contact @ 23' (sharp contact w/ less-well-cemented sands)	SP	-	95	5	* Drilling w/ ^{Diamond} bit + H ₂ O
			X			Moderately well cemented, oxidized fine sands, silty @ 24.3 along frx sfc.	SM	-	80	20	KΦ 23.5'-23.6' G2 23.8-24' (Geotech Fractures 2)
	25	X								LΦ 25.3'-25.4' NΦ 25.4-25.5' Fracture	
	1287 1305		14/49		Oxidized zone to 27', color change to gray N6, well cemented to 27.7'	SP	-	95	5	Φ 26.4-26.6' PΦ 26.8-26.9' G3 27-27.4' Geote	
		X			dark gray 27.5' → 31', mod. well cemented, broken up in sample					Φ 29-29.2'	
						SP	-	95	5		
	30										
	1312 1318			37/60						Very Hard Drilling core	
	35										

wet dry

contact

FIELD LOG OF BORING

BORING NUMBER **PZ 0015**

SHEET **2** OF **3**

PROJECT NAME		PROJECT NUMBER	ELEVATION AND DATUM		LOCATION	
DRILLING COMPANY		DRILLER	DATE AND TIME STARTED		DATE AND TIME COMPLETED	
DRILLING EQUIPMENT		DRILLING METHOD	COMPLETION DEPTH		TOTAL NO. OF SAMPLES	
SIZE AND TYPE OF BIT		HOLE DIAMETER	NO. OF SAMPLES	BULK	SS	DRIVE
DRILLING FLUID		DRILLING ANGLE	WATER LEVEL	FIRST	AFTER _____ HOURS	

SAMPLE HAMMER TYPE		DRIVING WT.	DROP	HYDROGEOLOGIST / DATE	CHECKED BY / DATE
--------------------	--	-------------	------	-----------------------	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	8.57	0	0		5. Hg SAND - (v.f.s) ^{brown} gray/red brown		90	10		wet at 15'
		0	0		ok. wet becoming gasua/depth					
		0	0		2.5 YR s/s increasing in cement					
		100	100		slim-					
										Geo Tech (61)
										17.5' (15:15)
										Alluvium/Bedrock contact
	19				weathered sandstone gray/red brown					Handed drilling 19
					moderately becomes s/s stone @ 19.5					
	20				yellow brown 2.5 YR 7/6					wet
		0								
		0			Same as above but					
		0	25/80		moist					
		10								
										Possible fracture @ 27
	25									moist - H ₂ O leachings
		0								switch to air
		0	35/							
		60	60		Same as above to 27.8					
		100			sandstone fine to med. brown 10YR 4/4					Fracture at 27
					shale at 27.9 - 27.95					Fracture at 27.7
					Sandstone from 27.9 (f-med)					Fracture at 27.91
					brown - moist - well cemented					Fracture at 27.9

1324
1323

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER 9706

SHEET 2 OF 2

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	15.940 1008	X	100	100	Same as above to 16-ft.					Switch to Air Rotary
		X			Sand					
					Sandstone (f-med) grey-moist to 12.4. Shale bed at 12.5					Fracture at 15.5
		X			Grey oxidation at fractures Red Brown. to 19.4 2.5Y 6/1					Fracture 17.6 Sample # 3-15.11-16.
					Sandstone (f-med) grey moist from 19.4					Sample # 4-17.5-17.7 Fracture at 19
	20.10:22 10:23	X	100	17 1/2	Same as above Shale Lens at 26.8 - 26.9 grey moist.					Fracture at 19.3 Sample # 5 17.9-17.10
					Sandstone (f-med) grey tan 26.9 - multiple fractures horizontal and vertical to grade 25' Red Base and green oxidation along fractures becoming drier.					Fracture 26.8 Sample # 8 19.3-19.5 DRILLER REPORTED DRAINING HARDER LAST 2 FEET
		X								Sample # 10 22.0-22.2 No Drilling 10:20-11:50 Sample # 11- 23.5-23.6
		X								Fracture 25.6 Sample # 12 23.6-23.7 Sample # 13 27.4-27.5 Sample # 14 27.5-27.7
	25.9:51 10:23		60	3 1/2	Same as above to 25.6 - weathered shale 25.6 to 25.7 Black-moist (possibly in transition) Sandstone (f-f) 25.7 to 26.7 grey					Fracture at 27.4
		X			Shale 26.7 to 27.7 dark grey Sandstone (f-us) at 27.7 grey becoming dry 2.5Y 6/1					
	30 N/A 12:58		0	4 1/2						
			0							
			0							
			100		Same as above.					
			100							
		X			REAMED WITH 6" AIR ROTARY METHOD TO 36.5'.					LAST 1 FOOT HAND DRILLING G2 34-34.5 Bottom of hole

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PE007

SHEET 3 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	R	
	38' 9.8		0	1/45	remained sandstone (same)					Switch to air-remove
	1030		0		as above becoming more compact					AUGER - well depth 35'
			60		at 36.5' (1030) (N40) moist					initial. AFTER pulling
			100		becoming to f.m. with depth					1st Flight - Hole = 34'
										2nd Flight 34'
										Fracture 37.8°
										Sample # V1 37.8°
										@ 2 37.9
	40 1020			37/42						
	1185		0							Harder drilling 41'
			30							
			100		Same as above becoming					
					well cemented. Becoming					
					lt gray with depth. N6					Sample 6 ² 42.
										Geotech G2 42.1-42.
										drilling becoming
										progressively harder
										sample Fr 44.2
										change bit
	45 11:05									END OF BORING
					Total depth 45' bgs					
					Reamed to 46' bgs WITH					
					6" DIAMETER AIR ROTARY					
					METHOD					

FIELD LOG OF BORING

BORING NUMBER **PZ 008**

SHEET **1** OF **4**

PROJECT NAME Rocketdyne	PROJECT NUMBER 3315005	ELEVATION AND DATUM TBD	LOCATION LETF PT 016
DRILLING COMPANY Layne	DRILLER Riben	DATE AND TIME STARTED 11/8/00 1425	DATE AND TIME COMPLETED 12/6/00
DRILLING EQUIPMENT CME 95 /	DRILLING METHOD HSA	COMPLETION DEPTH 72'	TOTAL NO. OF SAMPLES 25
SIZE AND TYPE OF BIT 5" Carbide Auger Bit	HOLE DIAMETER 5"	NO. OF SAMPLES	BULK
DRILLING FLUID None	DRILLING ANGLE Vert	WATER LEVEL	SS
		FIRST	AFTER _____ HOURS

SAMPLE HAMMER TYPE N/A	DRIVING WT.	DROP	HYDROGEOLOGIST / DATE T. Burton 11/8/00	CHECKED BY / DATE
----------------------------------	-------------	------	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	0 (1432)	0			Sfc: Bare soil Hand Augered to 5' bgs					
					Silty sand (SM), dk. brown (10YR3/3) moist, v. loose, micaceous, v. fine sand					
		10				SM	70	30		
		100								
	5 (1435)	0		N/A						
	5 (1439)	0								
		0			As above, less silt w/ depth					
		100				SM	80	20		
										Alluvium/Weather. Chats contact 7-9'
						SP-SM	70	10		
	10 (1444)	0		N/A						
	10 (1525)	0								
		20								
		100			Weathered ss, mottled; moist, v. dk grayish brn, becomes v. dk gray @ 14.5	SP-SM	90	10		A2 12' 1540
										B2 14' 1545
						SP				
	15 (1531)	0		N/A						

BORING NUMBER **PZ008**

SHEET **4** OF **4**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
			100			SP	tr	100	-	
	55				As above, moist, well cemented, some coarse sand 53-55'					
		X								X2 @ 56'
	1108 1122		53/60 100		Well-cemented sandstone As above, moist, more fractured via compression in sample, poorly well sorted v-f-fine sand, some med & coarse sand	SP	-	100	-	Fracture @ 59.2' Fracture @ 60' (vert) V2, A3 Fracture @ 61, high
	60	XX			dark oxidized staining along frx.					
	1149 1202		28/60 100		Highly fractured + oxidized 63.5-67, more mottled gray & reddish brown, moist	SP	-	95	5	Harder Drilling @ 63.5' B3, C3 @ frx
	65	X								D3, E3 @ frx
	1224 1329		10/60 100		Dark oxidized staining along frx.	SP	-	95	5	Geotech G2 674-67
	70	X			Highly fractured 69-72					
	1352		10/60			SP	-	100	-	
					Total Depth of Boring 72' REAMED TO 72' WITH AIR, NATIVE SLOUGH FILLED HOLE FROM 71'-72'.					

vertical frx.

vert. frx.

FIELD LOG OF BORING

BORING NUMBER **PZ010**

SHEET **1** OF **3**

PROJECT NAME NASA	PROJECT NUMBER 313158005	ELEVATION AND DATUM TBD	LOCATION RD-9 Area PT-0393
DRILLING COMPANY Layne	DRILLER Ruben	DATE AND TIME STARTED 11/14/00 0900	DATE AND TIME COMPLETED 11/15/00
DRILLING EQUIPMENT CME95 / Boyles	DRILLING METHOD HSA / Air Rotary	COMPLETION DEPTH 75	TOTAL NO. OF SAMPLES 6
SIZE AND TYPE OF BIT 8" Carbide	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK
DRILLING FLUID None w/HSA,	DRILLING ANGLE Vert.	WATER LEVEL	SS
SAMPLE HAMMER TYPE N/A	DRIVING WT.	DROP	DRIVE
			PITCHER
			FIRST
			AFTER _____ HOURS
			CHECKED BY / DATE
			HYDROGEOLOGIST / DATE T. Burton 11/14/00

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	0	0924	0		SFC: Concrete pad adj. to UV/peroxide system @ RD-9					
	1		0		Hand Augered to 5' bgs.					
	2		0							
	3		0		Silty sand (SM), dk. brn (OYR 3/3), moist, v. loose in sample, vf grained					
	4		0	20						
	5	0929	100			SM	60	40		
		0941	0							
			100							
			100		As above	SM	60	40		
			100							
					oxidized stain @ contact	SM	60	40		
										Alluvium/weath. Bdrk.
	8.25	0946	↓		Weathered sandstone, H. grayish brown, vf-fine, moist, med-dense in sample, weathers to SP-SM	SP-SM	90	10		Contact @ 8.25' No core 9-10'
	9-10	0948	N/A							Harder drilling @ above contact
		0944	N/A							
		1014	100							
					Weathered sandstone, as above, poorly sorted, yellowish brown, moist, vf-coarse sands, compression fracturing	SP-SM	90	10		
					less coarse + medium sand	SP-SM				
	10.24		↓							

BORING NUMBER PZ 010

SHEET 2 of 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
[Hand-drawn lithology column showing various sedimentary textures]	15 1040		100		Weathered sandstone, moist, dk. yellowish brown, some oxidation of Fe-rich sand, dense in sample, varying med. & coarse sand, mod-well cemented (downward coarsening to SW + GP-GM) coarser sands	SP - SW	95	5		
					Poorly graded gravel w/sand + silt, Gravelly sand w/silt (SW), poorly cemented, vf-fine subangular granitic gravels, weathered conglomerate (GP-GM), vf-fine sands	GM 70 30 tr				
	20 1050 1101		100		Poorly graded gravel w/sand + silt, Gravelly sand w/silt (SW), poorly cemented, vf-fine subangular granitic gravels, weathered conglomerate (GP-GM), vf-fine sands	SP - SW	35	55	10	
					weathered sandstone:	GP-GM	85	15	10	Harder drilling 20-25 oxidized zone
	108 1110				Poorly graded sands, vf-fine, well sorted, dk. yellowish brn, mod-well cemented, very well cemented 23-24.5'					
	25 1119 1128		100		Weathered ss, as above, decreasing oxidation to 26.3', color change to v. dk. gray (N3), lith. change to siltstone @ oxidized fracture well cemented, moist (frx. shale) Grades to vf grained sandstone	ML - SP	10	90		Softer drilling 25-30 Fracture Possible Fracture (oxidized)
					Lith. change + color change back to dk. yellowish brown sandstone vf grained, moist, mod. cemented	SP - SM	90	10		
	30 1137 1188		50		(dk. yell-brn) (gray) Interbedded vf sandstone + siltstone	ML - SP	90	10		
			100		Siltstone coarsens downward to Fine grained sandstone, gray N6, moist, mod-well cemented	SP - SP	100	-		
	35 1157					SP - SM	90	10		Switch to air rotary

BORING NUMBER P2010

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	25 8.4		100	57/80	Same as above - becoming more compact - Shale beds at 36.6-37.5 and 38.5-38.6 moist Est water used 5 gal Fractures oxidized. Sandstone f-med grade - gray - N6	SP	100			Air/water Fracture @ 37 Fracture @ 37.4
	42.5 42.5		100	60/80	SAME as above Est. water use 5 gal Sandstone f-med - dark gray 6N - moist	SP	100			CT01-501 42.2-42.7
	45 9.2				END OF BORING REAMED WITH 6"-DIAM AIR ROTARY METHOD TO 45'. NATIVE SLOUGH FILLED HOLE TO 44.5'					

FIELD LOG OF BORING

BORING NUMBER PZ011

SHEET 1 OF 4

PROJECT NAME <u>Rocketdune SMO</u>	PROJECT NUMBER <u>313150005</u>	ELEVATION AND DATUM <u>TBD</u>	LOCATION <u>IEL PT008</u>
DRILLING COMPANY <u>Wayne</u>	DRILLER <u>Ruben</u>	DATE AND TIME STARTED <u>11/14/00</u>	DATE AND TIME COMPLETED <u>12/5/00</u>
DRILLING EQUIPMENT <u>OME 95</u>	DRILLING METHOD <u>HSA</u>	COMPLETION DEPTH <u>58</u>	TOTAL NO. OF SAMPLES <u>0</u>
SIZE AND TYPE OF BIT <u>8" Carbide</u>	HOLE DIAMETER <u>8"</u>	NO. OF SAMPLES	BULK
DRILLING FLUID	DRILLING ANGLE <u>vert.</u>	WATER LEVEL	SS
		FIRST	AFTER _____ HOURS

SAMPLE HAMMER TYPE <u>N/A</u>	DRIVING WT.	DROP	HYDROGEOLOGIST / DATE <u>T. Burton 11/14/00</u>	CHECKED BY / DATE
----------------------------------	-------------	------	--	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	0	1509			Sfc: Asphalt					
	1				Hand Augered to 4.5' bgs					
	2									
	3				Silty sand (sm), dk. brown - yellowish brown (O/R 3-4/3), moist, loose, vf, micaceous	SM -	65	35		
	4									
	5	1513								
		1509	0							
			0							
			0							Alluvium
			100							↓
					Silty sand, as above, mottled oxidized reddish brown, lt. grayish brown otherwise	SM -	60	40		
										1.4 ppm
	10	1527	✓							
		1540	0							Drilling stop/start
			0		As above, v. loose in sample, vs-fine, some med. sand					3x during 5-10' run
			100							
					Oxidized mottling throughout Trace med & coarse sand e. 12.5 @ 13.7' becomes more competent, dry	SM -	70	30		
	15	1547	✓							

BORING NUMBER PZΦ11

SHEET 2 OF 4

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
[Hand-drawn lithology sketch showing various sedimentary layers with different textures and patterns]	16.1556		0							
			0							
			10							
			100		16.5-18.5'					
					Very weathered bedrock: silty sand w/ pebbly ss clasts, v. loose in sample (conglomerate), grades to lt. gray ss as above, with (18.5-20') oxidized mottling	SM	-	75	25	φ.6 QPM
		1603				SP	-	90	10	
		1614		100						
						SM				
						As above, ^{very} weathered conglomerate (small pebble, med-coarse sand) grades to mottled weathered sandstone, poorly cemented w/ sand + silt	SM	-	80	20
	1621									
	1642		100		25-28' weathered conglomerate as above, grades to mottled weathered sandstone (SM), v. fine	SM	-	80	20	
						SM	-	70	30	
					Oxidized fracture contact, lith change					
	1649				Competent sandstone, light yellowish brn, dry moist, v. dense, v. fine, some med. sand 2.5 Y 7/3	SP		90	10	Hard Drilling 30-32 CME Refusal @ 32
	0735									
	12:32		0 90/50		weathered sandstone - f. of some med.	SP		100		Air/water
			30		Very compact - Lt. Brown					
			100		2.5 Y 7/3 moist					
					Est. water 5 gal. some mottling					GT-01-S01
					Red-brown oxidized					33-34.5'

BORING NUMBER PZ01

SHEET 3 OF 4

LITHOLOGY	DEPTH (FEET)	SAMPLES RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
						GR	SA	FI	
		100							
	37	20	5 1/2	weathered Sandstone f-med/Some SP coarse & very competent - moist Lt Brown 2.5 YR 7/2 Est water 10 gal Fractures highly oxidized dr rd RAW to nearly black; Fracture at 39.8 nearly venticle.	SP	100	0		Fracture @ 39.8 Fracture @ 41.0
	42	50	1 1/2	weathered Sandstone f-med highly fractured from 42.8 to 47.0. Heavily oxidized throughout run - Some material highly weathered at the fracture Lt Brown (2.5 Y 7/2) in non-oxidized areas Est water 10 gal Highly weathered material Siltstone? (at approx. 45')	SP	100			Fractures 42.8-47'
	47	100		Weathered Sandstone f-med Lt Brown competent to 50.6 Becoming highly fractured 51.6- 56.6 Sandstone continues 58.6 to 57. modeling with grey sark rd Est. Water 15 gal	SP	100			Fractures 50.6- 51.6
	52	100	3 1/2	weathered Sand Stone f-med. Coars some grain increasing Lt brown - modeled gray & dr rd Moist	SP	100			

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2012

SHEET 2 OF 2

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS	
							GR	SA	FI		
[Lithology sketch: sandstone with some shale beds]	15 1031 1093		0	12	Top 4 feet very weathered		50	20		Drill very soft from 15-17' don't "droped."	
			0		Sandstone becoming mod competent at 16.4' v-f-f					Hard at 17'	
			50		with some coarse-moist.						
			100		outside of core wet for 17-19. (Same as above)					I 3-17'-17.2'	
											GTO1 18-18.5'
											J3 19'-19.2'
		11:32									
				100	40	Weathered Sandstone v-f-f med moist. more competent. Lt Blue 2.5' 6/3 shale beds at 22.9, 23.4-23.5 and 23.7-24	SP	90	10		Adding water BLEW out air hose @ 11:40. Restarted 12:15 K3 22.1'-22.3"
						Fracture at 23.8 highly weathered Est water 5 gal Lower fracture heavily oxidized sand becoming finer (less med) with depth Same as above					Fracture @ 22.9 @ 23.4 23.8 23.9 Highly Fractured 24.5-25
		13:10		100	72	weathered Sandstone v-f-f moist Lt Blue. Beds of v-f-f sand interspersed with v-f-f with med. moist very competent mottled with Rd Blue dk. Less competent zone 26.75-27.25	SP	80	10		L3 m3 24.5" 24.8" Fracture 25.4" N 3.03-28.3' @ 28.5 27.3 28.4 28.5 28.8 29.6
					Est water 10 gal (Same as above)					P3 Q3 29.5-29.9	
	13:58 14:05		100	118	Weathered Sandstone v-f-f med moist to at 30 becoming dark grey N5. moist-very competent rd Blue med to 30 modeling through to 35	SP	90	10		53 31.9-32	
										GTO2 33.6-34' Temp casing @ 29' 1' near	
	14:28				End of Boring. REAMED TO 37' WITH AIR ROTARY (6"-DIAM)						

FIELD LOG OF BORING

BORING NUMBER **P2013**

SHEET **2** OF **4**

PROJECT NAME		PROJECT NUMBER		ELEVATION AND DATUM		LOCATION				
DRILLING COMPANY		DRILLER		DATE AND TIME STARTED		DATE AND TIME COMPLETED				
DRILLING EQUIPMENT		DRILLING METHOD		COMPLETION DEPTH		TOTAL NO. OF SAMPLES				
SIZE AND TYPE OF BIT		HOLE DIAMETER		NO. OF SAMPLES	BULK	SS	PITCHER			
DRILLING FLUID		DRILLING ANGLE		WATER LEVEL	FIRST	AFTER _____ HOURS				
SAMPLE HAMMER TYPE		DRIVING WT.		DROP		HYDROGEOLOGIST / DATE				
LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
[Hand-drawn lithology sketch showing various soil and rock layers]	10:00		100	60/100	Same as above to 16.5 v.f.-f with med sand becoming finer	SP	98	10		
					v.f.-v with depth with becoming gray with mottling 16' to 17.4 (R14) becoming med BROWN 2.5-5/4 oxidized at 17.4-20. moist very compacted Est water 10	SP	100			A4 16.7"-16.9"
	10:14		100	50/100	weathered sandstone (same as above) v.f.-f sand with med clayey with depth - med Bed 2.5-5/4 moist - very compacted. Fractures oxidized fracture at 24 very weathered Est water 15	SP	90	10		B4 19-19.2" C4 20.11"-21 fracture 22.6 fracture 22.8 fracture 24. D4, E4 22.11" 23.2"
	10:27		100	40/100	weathered sandstone (same as above) v-f becoming med at 25.4 coarse sand to 25.9. becomes gray N 26-26.9 med BROWN 26.9-28. mottled gray 28-30 heavily oxidized bed 29.1-29.4 moist. Bed @ 26-26.9 less compacted becomes very compacted at 27. Est water 10 gal	SP	90	10		Handed at 26' daily. fracture 25.4 27.6 28.4 28.5 F4 26.1"-26.2" G4 H4 28.1"-28.4"

20 1053

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **PZ013**

SHEET **3** OF **4**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
[Hand-drawn lithology sketch]	1122		100	51	weathered sandstone (same as above)	SP 6	90	10		
					vt-f with some med sands. Gray mottled. Becoming less competent at 32.8. Fine coarse sand and gravel 2.5 Y 5/6 at 32.5 to 33.				I4 31'-31.2"	
					vt-f sands at 33-33.5. vt-f. Sand with fine gravel 33.5-34.5				J4 33.5"-33.7"	
					gray. vt-f with med sands 34.5-40 becoming dryer at 34'. very competent through out est water 15 gal		40	60		
		1123 1127		100			SP	100	00	
[Hand-drawn lithology sketch]					some weathered sandstone. vt-f with med sands gray. becoming vt-f and oxidized (red ben. Bed of gray vt-f sand at 37.5, 38.7 39.00 mottled throughout the run				Fracture 35.8 36.0 Fracture 36.8 38.45 39.5	
					crackles at 35.8 & 36 highly weathered. Est water 10 gal				K4 L4 38.3" 38.7" Fracture 37.4	
					(same as above)					
		1134 1132		700	50/60	weathered sandstone vt-f med sp to 40.3 shale bed 40.3 to 41.4 weathered sandstone vt-f 41.4-45. moist very competent. ^{med} Ben 2.5 Y 4/3	SP	100		Fracture 40.2 40.8 41. 43 43.9 44.7
										M4-N4 41'-41.4" O4-P4 43.10"-44 GTO2- 40.2" 40.8
[Hand-drawn lithology sketch]	1201 1304		100	50/60	weathered sandstone vt-f med sandstone Lt Brown 2.5 Y 6/5 mottled gray at 49.2 Gray 50. NY Est water 15 gal	SP	100		R4 46.11" 47.1" S4 49-49.2"	

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **PZ013**

SHEET **4** OF **4**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	R	
	SA 1289		100	57	Weathered Sandstone 14-f-m	SP		100		
	X				becoming more coarse sand from 51.1 to 53.6 grain size very compact					GT 03 SOL 50-50.6
					Est water 15 ft					
	SS 1250				END of BORING					TEMP casing to 50 TOC - Ground level
					Reamed to 56.4' bgs with 6" AIR ROTARY METHOD					

FIELD LOG OF BORING

BORING NUMBER **PZ014**

SHEET 1 OF 3

PROJECT NAME SEEL smou	PROJECT NUMBER 31315005	ELEVATION AND DATUM TBD	LOCATION PZ014 PTO 81 COMP A
DRILLING COMPANY Layne	DRILLER Juan	DATE AND TIME STARTED 11/18/00 8:52	DATE AND TIME COMPLETED 11/30/00
DRILLING EQUIPMENT Boyle	DRILLING METHOD AIR	COMPLETION DEPTH 08 TO 42'	TOTAL NO. OF SAMPLES
SIZE AND TYPE OF BIT 5" carbide	HOLE DIAMETER 5"	NO. OF SAMPLES	BULK SS DRIVE PITCHER
DRILLING FLUID Air/water	DRILLING ANGLE Vert.	WATER LEVEL	FIRST AFTER _____ HOURS

SAMPLE HAMMER TYPE	DRIVING WT.	DROP	HYDROGEOLOGIST / DATE R. SINGER	CHECKED BY / DATE
--------------------	-------------	------	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	0				Asphalt over Rockhill Hand Auger to 6" below asphalt - Refusal. Recm. hole to 5' area has been reworked for building & parking					Alluvium / weathered bed rock interface 5-5'
	5	852	100 3/4		weathered bed rock - sandstone v.f. & dense, compacted, moist, med Basal 2.5' 5/4. Fractures moderately weathered and oxidized	SP	90	10		Fracture 6' T404 3 9" - 6 1"
					Est H2O 10 gal					Fracture 8-6' V4 W4 9 1" - 9-5"
	10	902 905	100 5/4		weathered sandstone same as above. v.f. - v.f. med sand @ 11' coarse sand @ 12.5 Shale bed 14.5 - 14.8 highly fractured and weathered. Some weathered sandstone 14.8' to 15 med brown with red oxid.					Fracture 10.3 GTO1 501 10.2 - 10.8
	15				Est H2O 10 gal					Fracture 14.5 Y4 2# 14 7" N 11"

BORING NUMBER P2014

SHEET 3 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	38	113	100	59/6	Weathered sandstone - 1/4" - 1/2" fine gravel (to 3/4") in as per 35'-35.8' - coarse sand in as per 35'-38'-40'. Moist very compact becoming lg gray / depth 11.5	SP		100	0	
					EST 1420 / 10 gal					
					End of Boring					GT02 SOL 37.7-38 Temp CASING 40' TOC - ground level
	40	113			Reamed to 42' bgs with 6" AIR ROTARY METHOD. NATIVE SLOUGH FROM 41'-42.					

FIELD LOG OF BORING

BORING NUMBER **PZ015**

SHEET **1** OF **3**

PROJECT NAME SMDH		PROJECT NUMBER 31315005	ELEVATION AND DATUM TBD	LOCATION SSFL PZ015 PT084	
DRILLING COMPANY Layne		DRILLER Duende	DATE AND TIME STARTED 4/19/00	DATE AND TIME COMPLETED 12/4/00	
DRILLING EQUIPMENT Boyle		DRILLING METHOD AIR	COMPLETION DEPTH 49.5'	TOTAL NO. OF SAMPLES	
SIZE AND TYPE OF BIT 5" carbide		HOLE DIAMETER 5"	NO. OF SAMPLES	BULK	SS
DRILLING FLUID AIR/WATER		DRILLING ANGLE Vert.	WATER LEVEL	FIRST	AFTER _____ HOURS

SAMPLE HAMMER TYPE		DRIVING WT.	DROP	HYDROGEOLOGIST / DATE R. SINGER	CHECKED BY / DATE
-----------------------	--	-------------	------	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	0				Hand Auger to 1' Refusal Compacted backfill/alluv. @ Bottom to 5' Backfill to approx. 2'					Alluvial material bedrock contact 1-5'
	5				weathered sandstone v-f-f with coarse, moist med. clay compact med. hard 2.5-5/6	SM	80	20		Fracture at 6.1 NS 5' 11" 6-1" SS 6' 1" 6-3" Fracture at 6.9
					Est. water 5 gal					FS-9-9-2"
	10				weathered sandstone (same as above) v-f-f coarse sand granular more compact - moist. Fracture at 12 and 12.4 weathered less coarse sand at 14.5. Est water 10 gal Possible thin shale @ 14.5	SP	90	10		FS-SS 10.8" 10.11" Fracture West 10.4-11 Fracture at 12 Fracture @ 12.4 T5 13-5" 13.2"

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2015

SHEET 2 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
[Hand-drawn lithology sketch showing sandstone layers with fractures]	15.4	X	100	160	weathered sandstone (same as above)	SP	90	10		OF 15 12'-2" 15'-4"
					less coarse sand - moist - compacted					
					med bar 2.54 615					
					Est. H ₂ O used 10 ml					Fracture 17.4
		X								V5 W5 - 17.5" - 17.5"
										Fracture 18.4
		X								Fracture 19.4
		X								Fracture 20.4
		X								Fracture 21.4
		X								Fracture 22.4
	25	X	100	37.5	weathered sandstone (same as above)	SP	90	10		GTOL 501 19-19.5
					15-16 - coarse sand at 21.5					
					increasing with depth. Coarse					X5, Y5 21.8" - 22'
	X				areas less compact than med.					Fracture 22.4
					coarse zones. Fractures highly					Fracture 22.5
					oxidized moist					22.65
					Est. H ₂ O 10 gal.					
	X									25 24.4" - 24.4"
	25	X	70	59	weathered sandstone (same as above)	SP	90	10		Fracture 25.6
					coarse sand becoming fine gravel					25.7
	X				25-26. 15-16 sand 26-30. med					25.8
					bar 2.54 512 to 26.5 gray N6					26.5
					27.5 to 29. Lt bar with gray					26.7
	X				stratification 29-30. moist.					26.8
					very compact 27.5					27.1
										27.8
					Est H ₂ O 10 gal					29.8
	30	X	100	43	(Same as above) weathered sandstone					A6 B6 26' 26.4"
					15-16 sand with some coarse gravel					C6 D6 27.7" - 11"
	X				throughout. multiple fractures.					E6 F6 30.4" - 8"
					Zones of oxidation around fractures					Fracture 30.5, 31.8
					Lt bar with gray zone 30.8-31					32.2, 32.9, 33.2
					and 32.4-32.5. Very compact					34.3 and 34.6
	X				moist. Shale at 40' Fracture					H6 HT 33'-33.4"
					mod-high rd bar med clay					
					Est H ₂ O 10 gal					

BORING NUMBER PZ015

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	35.1200		100%	31	Shale continues to 35.1. Lt. Blue oxidized weathered sandstone vt. f. sand to 38' gray N& very dense, at 35.3 very competent	SP	100			J6 36 10" 37'
	39.1215 124		100%	60	weathered sandstone vt. f. sand to 39' med and coarse sand at 39-43. Gray N& moist very competent	SP	100			Step to switch bit (Diamond) drilling much harder than drilling at 39
	40									K6 40 10" - 41
	43.1233 1257		100%	60	weathered Sandstone (same as above) fine gravel throughout at base oxidized 43-44.3 2.54 712 Gray N& 44.3-48	SP	100			Switch to diamond fracture 43.7
										L6 45-45 2"
										GT02 501 45.1-45.7
	48 (311)				End of Boring Reamed to 49.5' bgs WITH 6" AIR ROTARY METHOD.					Temp casing 48' TOC - 45 24" above ground

FIELD LOG OF BORING

BORING NUMBER **PZ016**

SHEET **1** of **4**

PROJECT NAME SMDU	PROJECT NUMBER 31315005	ELEVATION AND DATUM TBD	LOCATION PZ016 PTO19
DRILLING COMPANY LATNE	DRILLER Duenez	DATE AND TIME STARTED 11/20/00	DATE AND TIME COMPLETED 12/7/00
DRILLING EQUIPMENT Boyes	DRILLING METHOD AIR	COMPLETION DEPTH 68'	TOTAL NO. OF SAMPLES
SIZE AND TYPE OF BIT 5" Diamond	HOLE DIAMETER 5"	NO. OF SAMPLES	BULK SS DRIVE PITCHER
DRILLING FLUID Air/Water	DRILLING ANGLE Vert.	WATER LEVEL	FIRST AFTER _____ HOURS

SAMPLE HAMMER TYPE	DRIVING WT.	DROP	HYDROGEOLOGIST / DATE R. SINGER	CHECKED BY / DATE
--------------------	-------------	------	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	0				Hard auger to 1' and back - area was dazed to clean space for the rig - Reamed to 5'					Alluvium / bedrock interface 1-5' (1'?)
	5	1430	0	23/48						
			0							
			100		weathered sandstone vf-f	sm		10	20	
					Small fine gravel 6.5-7' med brown med sand 8.4-10.					Fracture 7.2
		X			Highly oxidized 8.6-10' 2.5 Y 4M. moist. moderately competent					Fracture 8.8 K6-L6 7.8" 8'
					EST H2O 5 gal					
		1497		100		sm		10	20	N K6-M6
		X			weathered sandstone (same as above) vf-f. med sand decreasing with depth coarser gravel consistent heavy oil med brown 2.5 Y 4M moist becoming more compact, dense with depth. Fractures dark red					Fracture 10.7 Fracture 13.8 Fracture 17.9 STOI 501 12.4-12.8
		X			Red					06 P6
		151457			EST H2O 5 gal					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZD16

SHEET 2 OF 4

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	15.000		0	1/2			SP	70	10	
X			100		weathered sandstone (same as above) heavily oxidized beds from 17.7-18.6 one more oxidized bed (gray) 18.4 moist - competent					Q6 16-5" 15 Fracture 16.6 17.4 18.0/18.1 18.5/18.6 18.5 19.0 19.9
X	20 15.20		100	3/4	Some weathered sandstone same as above v.f.-f with med (fine grained) 20.1-20.5 moist, very competent. med B.M. 2.5 Y 5/4 Fracture at 24.8 highly weathered Fracture at 24.9 near vertical, no					19-19.2 21.6 21.6 21.8 23.4(?) 24.3 21.5" - 22 x 6 yd
X	25 15.30 15.29		100		weathered sandstone (same as above) coarse sand decreasing with depth but still present 30' med B.M. 2.5 Y 5/4. moist competent	SP	90	10		Est. H ₂ O 20 yd Fracture 25.1 25.3 25.4 25.6 26.0 27.5 26 27'4" - 27'6" 27 27'6" - 27'8"
X	30 15.50 15.54		100		weathered sandstone (same as above) v.f.-f. with coarse sand to 32'. no v.f.-f. and 33' to 34.1 becoming v.f.-f. with med 34.1 to 35. no oxidized zone 31.6 to 32.6 gray N4B.M. 32.6 to 35 2.5 Y 5/4 with gray nodules at 33. moist competent	SP	90	10		B7 30'4" - 6" C730R Fracture 30.5 33.0 33.3 33.5 33.9
	35 16.03				Est. H ₂ O 30 yd					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **P2016**

SHEET **4** OF **4**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
[Hand-drawn lithology sketch]	55.25		100%	60	Weathered sandstone (some on stone) w/ f with med sand gray at 55.5 (N.S.) Some fine gravel 60-60.5. Area around fracture oxidized. most very compact	SP	100	0	Fracture 55.4?	
					Est H ₂ O 10				Fracture 59.7 K767 59-4"-59"	
	60.00 81.5			100%	100	Weathered sandstone (some on stone) w/ f with med sand (no gravel) oxidized zone. med BW (2.5 x 5/4) 62.4-64.5. Gray NS to 65.5	SP	100	0	Fracture 63.3 63.4 64.4 64.7(?)
					Est H ₂ O 10				M7N7 64 1" 64.6 6703 SD1 65-65.5	
	65				End of Boring				TEMP Casting to 60. Rise 4" above end level	
					Reamed to 68' bgs with 6" AIR ROTARY METHOD.					

FIELD LOG OF BORING

BORING NUMBER **P2017B1A**

SHEET **1** OF **3**

PROJECT NAME SMITH		PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION COCA PT-100-Sp. Hwy	
DRILLING COMPANY Layne		DRILLER Duenhez	DATE AND TIME STARTED 11/21/00 1400		DATE AND TIME COMPLETED 12/12/00
DRILLING EQUIPMENT Borers		DRILLING METHOD Air	COMPLETION DEPTH 50		TOTAL NO. OF SAMPLES
SIZE AND TYPE OF BIT 5" Diamond		HOLE DIAMETER 5"	NO. OF SAMPLES	BULK	SS
DRILLING FLUID Air/water		DRILLING ANGLE Vert.	WATER LEVEL	FIRST AFTER _____ HOURS	
SAMPLE HAMMER TYPE		DRIVING WT.	DROP		HYDROGEOLOGIST / DATE R. SINGER
					CHECKED BY / DATE

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	0				Severe thick concrete 8-10 inches. Tai Heddle 5'					
										Strong Hydrocarbon (1st test) 1 dom. MAX ppm: 12.2 in Breathing Zone OK Hk 15:30 11/21 Resume 11/27.
	5				NO Recovery - cutting this has concrete may have ^{partially} collection of sample. Early drilled ALLUVIUM(?) Est H ₂ O used 5 gal					
										Hydrocarbon smell emanating from cutting bin PID = 0.0
	410	1019	0	420	weathered sandstone FV-P sm	sm	80	10		Water (?) at 12' appears to have Hydrocarbon content.
			0		with some med sands					
			0		faintly competent. starts to					
			0		very moist (wet?). dr brown					
			0		from 12.6 2.54 414.					
		X80			Heavily staining from 12.7					7-12.9 12 11"
		100			to 13. dark gray becoming					
					less gray 13-13.6 staining					
					appears Hydrocarbon					
	15	1095			NO H ₂ O added					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **PT0178A**

SHEET **2** OF **3**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS	
							GR	SA	FI		
[Hand-drawn lithology sketch showing various sediment layers]	15	X	70%	48	weathered sandstone vt-f with med to coarse sand, very moist, fairly compact med BAN 2.54-4/4 15-19.1	SM	20			GT 01 501 15.7% 1 P 17 16.6" 16.8" N 7 16.8" 16.4" Fracture @ 17'	
	19.1	X			At 19.1 becomes highly weathered and color is gray/white modeling, sweet(?) odor. Becoming med BAN at 19.7. Contamination 19.1-19.7?						
	19.8				no H ₂ O added					Fracture @ 19.8 GT 01 501 well plug	
	20										
	20	X	100%	100%	weathered sandstone - vt-f sand highly fractured and highly weathered gray to highly mottled - wet	SM	70	30		67 22-22.2" 75 22-22.2"	
											no H ₂ O added
	26	X	20	100%	weathered sandstone vt-f sand. Some med sand with depth. med to BAN with gray and dark rd. BAN modeling Fracture at 28.5-29.4 has depositional layer (calc. to?) compact med. moist. 2.54 8/3	SP	90	10		Fracture 26.4 26.6 26.8 27.5 veinlets 28.5-29.4 N 7-27.2" 27.4" N 7 27.4" 27.6"	
	29.4	X									
	30										
	30	X	0	0	100	weathered sandstone vt-f with coarse sand med to BAN (L ⁺) 31-32.2. Becoming gray at 32.2 to 35 Fracture area highly modeled rd. BAN. very weathered, moist compacted N7. Becoming less moist	SP	90	10	Fracture (v. l.) 33.8-34.8 N 7 34.4" 34.6" N 7 34.6" 34.8"	
	X									no H ₂ O added	

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER 920178A

SHEET 3 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	36 1440 1500		100	5 1/2	weathered Sandstone vt-f-med sand gray very competent moist.	SP	100	0		47 36-8" 36-10"
					no H ₂ O added					
	410 1500 1505		100	5 1/2	weathered Sandstone vt-f-med SP Some coarse sand 42-43.9 very competent moist. need Fractures		100	0		Fracture 39.4
					no H ₂ O added					41.8 42.8 43.7 47.8 49.3
										43 27 43 10.44
	445 1530 1530		100		weathered Sandstone vt-f-med with fine gravel 47.3-48.3 gray NL with Lt brown fractures. Shale Beds at 46.4 and 47.1. Shale inclusion 44.5-44.8. very competent moist					GT02 S01 44.5-48 Fracture 45.8 46.4 47.7 47.1 48.8 47.8 48.2
					no H ₂ O added					A8 47 8" 47 10"
	*50 1540				End of Boring					
					REAMED TO 31' WITH 6"-DIAM AIR ROTARY METHOD.					

FIELD LOG OF BORING

BORING NUMBER **P2018**

SHEET 1 of 2

PROJECT NAME Rocketdyne Smou		PROJECT NUMBER 313150005		ELEVATION AND DATUM TBD		LOCATION AIISTP PT073	
DRILLING COMPANY Layne		DRILLER Layne		DATE AND TIME STARTED 11/29/00 0820		DATE AND TIME COMPLETED 11/29/00 1430	
DRILLING EQUIPMENT CME 75		DRILLING METHOD HSA		COMPLETION DEPTH 26'		TOTAL NO. OF SAMPLES 10 (9 drives)	
SIZE AND TYPE OF BIT 8" Carbide		HOLE DIAMETER 8"		NO. OF SAMPLES		BULK 1	
DRILLING FLUID None		DRILLING ANGLE Vert		WATER LEVEL		FIRST 15-16'	
SAMPLE HAMMER TYPE N/A		DRIVING WT.		DROP		AFTER _____ HOURS	

SAMPLE HAMMER TYPE N/A				DRIVING WT.				DROP				HYDROGEOLOGIST / DATE T. Burton 11/29/00				CHECKED BY / DATE			
-------------------------------	--	--	--	-------------	--	--	--	------	--	--	--	--	--	--	--	-------------------	--	--	--

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	RED BLOW POINT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
-	0.523		0		Sfc: Top of drainage slope; adj. to Area III Sewage Treatment Plant					
	1		100		← Well ES-30					
	2									
	3				Alluvium: sandy silt (ML), dk. grayish brown (10/24/2), dry, soft-med. stiff, w/ sand	ML	35	65		
	4									
	5									
	6									
	7					Sandy silt as above	ML	20	80	
	8									B8 7.9-8.0' Std. Harder Drilling @ 8.5'
	9									
10					Lith change to SP: moist w/ f sand; very loose in sample, some med + coarse	SP	95	5		
11									C8 9.5-9.6 BOL	
12					Slightly cemented sandstone in shoe, dark oxidized surface @ bottom of shoe (10')					
13					Siltstone, dk. gray N4, dry					
14					Possible Fracture @ 11.5 (oxidized etc)					
15									D8 11.4-11.5 TOF, TOL	
16					Siltstone as above, oxidized in places, dry					
17									E8 11.6-11.7 BOF, BOL	
18									F8 12.9-13.1 DI	
19									Possible Fractures	
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										
46										
47										
48										
49										
50										
51										
52										
53										
54										
55										
56										
57										
58										
59										
60										
61										
62										
63										
64										
65										
66										
67										
68										
69										
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
80										
81										
82										
83										
84										
85										
86										
87										
88										
89										
90										
91										
92										
93										
94										
95										
96										
97										
98										
99										
100										

15
1014

H

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **PEφ18**

SHEET 2 OF 2

contact

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	15-1025		100		Siltstone, dk. oxidized brown					Very hard (15x6') drilling
	1028		↓		mottling, dk. olive gray 2.5x4/2, wet					φ.1 ppm in sample
	1042	X	100							JS 16.4-16.5 TOF, BOF
		X	↓		As above, numerous fractures					JS 16.9-17.0 TOF, BOF
	1057	X	↓							
	1105	X	100		Fracture @ lith change 17.7' oxidized (sandstone → siltstone)					GTφ (SP) 17.5-17.7
	1108		↓		Shale - sandstone interbeds, v. dense					
	1127		800							
	1132	X	100		Fracture;					KS 19.7-19.8 TOF
	1136	X	100							LS 19.8-19.9 BOF
	1196		90							
	1252		100		Friable fine sandstone in shoe-					Fracture
	1252-1257		100/3'		gray N4, wet, qtz.-rich, no mottling/staining					Refusal w/ core + auger
	1340									Refusal @ 20' w/ hammer
										Auger w/o sampler
					Hard drilling - no samples					
	25									
					Refusal @ 26'					@ 1430

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZ 020

SHEET 2 OF 2

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	15									No change in drilling rate 15-20'
					Becomes sandy - very weathered sandstone	SM	75	25		
	20				Increased cementation, becomes slightly cemented sandstone					Harder drilling @ 21'
					water in hole					
	25				Weathered bedrock - no cementation well					No change in drill rate 25-30'
		X 40	n/a		Poorly graded sand (SW), moist	SW				
		X 100				SW				
		X 150				SW	95	5		
					H ₂ O in bore hole					
	30	X 100	n/a		Poorly graded vf sand, wet	SP	95	5		Harder drilling @ 31'
		X 100			slightly					(from split spoon)
		X 100			Poorly cemented siltstone, stiff, gray, oxidized alk. reddish brown					
					Total depth of boring 31.5'					
					Backfilled w/ sand, bentonite, + cement grout upon installation of Piezometer					
					NATIVE MATERIAL SLOUGHED IN TO 29.5'					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER R2021

SHEET 2 OF 2

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	15 0839				Color/Lith change to very weathered sandstone (dk. yellowish brown) @ 15'					
	20 0942 0844				Soft drilling 15-20					
					Hard siltstone layer @ 22'					
	25 0851 0924				Drive spoon 24.5 - 25 dk. yellow brown Well cemented sandstone, v. dense in sample 24.5 - 24.6, grades to SW, v. loose in sample 24.6 - 25					2" split spoon
	27				Harder drilling @ 27'; Color change to grayish brown					
	30 0921				5/16" Drive spoon 29.5 - 30' Very dense vf sand + silt, gray #5, dry Total Depth of Boring ⁰⁸ 30' 29.5' Backfilled w/sand, bentonite, + cement grout as piezometer installed					

FIELD LOG OF BORING

BORING NUMBER PZ022

SHEET 1 OF 2

PROJECT NAME NASA	PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION RD-9 Area PT 038
DRILLING COMPANY Layne	DRILLER Enrique	DATE AND TIME STARTED 11/30/00 1330	DATE AND TIME COMPLETED 11/30/00 1600
DRILLING EQUIPMENT CME 750	DRILLING METHOD HSA	COMPLETION DEPTH 29.5'	TOTAL NO. OF SAMPLES 3
SIZE AND TYPE OF BIT 8" Carbide	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK 3
DRILLING FLUID None	DRILLING ANGLE Vert	WATER LEVEL	SS 3
		FIRST	DRIVE
		AFTER _____ HOURS	PITCHER

SAMPLE HAMMER TYPE Hydraulic	DRIVING WT. 140#	DROP 30"	HYDROGEOLOGIST / DATE T. Burton 11/30/00	CHECKED BY / DATE
--	----------------------------	--------------------	--	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	1				Sfc: slope adj. to Area II road, exposed weathered bedrock					
	2				Hand-Angered to 1' bgs					
	3									
	4				Cuttings: Silty sand (SM), dk yellowish brown (10YR 6/4), dry, vf-med sand	SM	75	25		
	6									
	60				Harder drilling @ 9.5'; cuttings slightly darker yellowish brown					
					Drilling rate unchanged					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **PZ022**

SHEET **2** OF **2**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	15				Cuttings: As above					
					Drilling rate unchanged					
					Drive spoon 19.5 - 19.75'					
	20	X	100	100/3"	Slightly cemented sandstone, as above					
					Harder Drilling @ 21'					
					Drive spoon 24.5 - 24.8'					
	25		100	1/4"	Slightly cemented sandstone, as above, more coarse sand & biotite					
					Harder Drilling @ 27'					
					Drive Spoon 29.5 - 29.6					
	30				Sandstone, as above, less oxidized color, grayish brown, mod. cementation					
					Total Depth of Boring ^{29.8} 29' 29.5'					
					Backfilled w/sand, bentonite, & cement grout as piezometer installed					

FIELD LOG OF BORING

BORING NUMBER **P2925**

SHEET 1 OF 2

PROJECT NAME Rockeddyne	PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION ECL Area PT-066
DRILLING COMPANY Layne	DRILLER Enrique	DATE AND TIME STARTED 12/4/00 1445	DATE AND TIME COMPLETED 12/5/00 0845
DRILLING EQUIPMENT CME 150	DRILLING METHOD Hollow Stem Auger	COMPLETION DEPTH 27'	TOTAL NO. OF SAMPLES 5
SIZE AND TYPE OF BIT 8" Carbide	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK
DRILLING FLUID None	DRILLING ANGLE Vert.	SS 5	DRIVE
		WATER LEVEL	PITCHER
		FIRST	AFTER _____ HOURS

SAMPLE HAMMER TYPE Hydraulic	DRIVING WT. 140#	DROP 30"	HYDROGEOLOGIST / DATE T. Burton 12/4/00	CHECKED BY / DATE
--	-------------------------	-----------------	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	0				Surface: Soil adg to pipelines + fmr. asphalt road near fmr. ECL					
	1									
	2				Hand Augered to 3.5'					
	3				Weathered sandstone					Alluvium/Bedrock contact
	4				Cuttings: Silty sand (sm), fragments of sandstone, poorly cemented; oxidized strong brown (7.5y/R 5/8), dry	SM	-60	40		
	5									
	10	X	100%		Sandstone, poorly cemented, moist, lt. olive brown (2.5y 5/4), very fine sand, micaceous	SM	-75	25		
					becomes grayish brown					Drill rate unchanged
	15	X	100%		Sandstone, as above, darker (oxidized)	SP	-95	5		

BORING NUMBER Q2025

SHEET 2 OF 2

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	15				Fine & medium sands, stronger cementation, sub & qtz. grains					
										Drill rate unchanged
	20	X	100	100/4	Sandstone, gray (N5), moist, moderately well cemented, vf sand.	SM - 85	15			
					Becomes grayish brown (2.5/5/2), Cuttings: siltstone & shale stone fragments, mod. well - well cemented. "powdery" (may not be from 20-25')					Harder drilling @ 22' Color is darker @ 22'
	25	X	100	100/12	Sandstone, well-cemented, fine, gray (N4)					
					110/6 Cuttings: siltstone, dk. gray N4 (from higher up acc. to driller) Refusal @ 27'					Very hard drilling
	30				Backfilled w/ sand, bentonite, & cement grout as piezometer installed NATIVE MATERIAL SLOUGHED IN TO 25.5'					

FIELD LOG OF BORING

BORING NUMBER **PZ027**

SHEET 1 OF 2

PROJECT NAME Rocketdyne		PROJECT NUMBER 313/50005		ELEVATION AND DATUM T&D		LOCATION ECL Area PT-064		
DRILLING COMPANY Layne		DRILLER Enrique		DATE AND TIME STARTED 12/5/00 1300		DATE AND TIME COMPLETED 12/5/00 1445		
DRILLING EQUIPMENT CME 750		DRILLING METHOD HSA		COMPLETION DEPTH 23'		TOTAL NO. OF SAMPLES 4		
SIZE AND TYPE OF BIT 8.25" Carbide		HOLE DIAMETER 8"		NO. OF SAMPLES	BULK SS	SS 4	DRIVE	PITCHER
DRILLING FLUID None		DRILLING ANGLE Vert		WATER LEVEL	FIRST 19'3"		AFTER <u>1.5</u> HOURS 15.5'	
SAMPLE HAMMER TYPE Hydraulic DRIVING WT. 140# DROP 30"				HYDROGEOLOGIST / DATE T. Burton 12/5/00		CHECKED BY / DATE		

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Sfc: Disturbed soils South of fmr. ECL, flat, bare Hand-Augered to 6" bgs					Thin alluvium
	2				Dark gray siltstone, very weathered					
	3				(Alluvium)					Color change
	4				Brown-reddish brown siltstone, weathered as above, some cementation					
	5									Color change
					Cuttings: Becomes silty sand (sm), weathered oxidized sandstone, dk. yellowish brown (OYR 6/4); vf-med sands, slightly cemented, moist, micaceous	Silt-Sand	-	90	10	Approx. silt-sand contact, color change
		X 100	50							
		X 100	70%							
					Interbedded vf sandstone (poorly cemented) siltstone, + shale stone, poor-slightly cemented; fractured + oxidized dk. gray-yellowish brown, moist, micaceous					
				19						
				10%						

FIELD LOG OF BORING

BORING NUMBER PZ 028

SHEET 1 OF 3

PROJECT NAME <u>Rocketdyne</u>	PROJECT NUMBER <u>31315005</u>	ELEVATION AND DATUM <u>TBD</u>	LOCATION <u>ECL/CWLL PT-067</u>
DRILLING COMPANY <u>Larve</u>	DRILLER <u>Enrique</u>	DATE AND TIME STARTED <u>12/6/00 0730</u>	DATE AND TIME COMPLETED <u>12/6/00 1030</u>
DRILLING EQUIPMENT <u>CME 750</u>	DRILLING METHOD <u>HSA</u>	COMPLETION DEPTH <u>44'</u>	TOTAL NO. OF SAMPLES <u>5</u>
SIZE AND TYPE OF BIT <u>8" Carbide</u>	HOLE DIAMETER <u>8"</u>	NO. OF SAMPLES	BULK <input type="checkbox"/> SS <input checked="" type="checkbox"/> <u>5</u>
DRILLING FLUID <u>None</u>	DRILLING ANGLE <u>Vert</u>	WATER LEVEL	FIRST _____ AFTER _____ HOURS

SAMPLE HAMMER TYPE <u>Hydraulic</u>	DRIVING WT. <u>140" DROP 30"</u>	HYDROGEOLOGIST / DATE <u>T. Burton 12/6/00</u>	CHECKED BY / DATE
--	-------------------------------------	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Sfc: dry grass, bare slope behind CWLL facility					
	2				Hand-Augered to 6" - refusal on bedrock					
	3				Siltstone, light yellowish brown	ML	30	70		
	4				(2.5 Y 6/4), dry, some vf + fine sand, poorly cemented					
	5									
										Drill rate unchanged
	10	X	100	100/6"	Siltstone, as above, grades to micaceous vf sandstone, silty, oxidized, poorly cemented, brown (7.5 Y 4/4), slightly moist					
					(olive yellow)					
					Cuttings: fragments of vf sandstone + siltstone (dk gray), mod. cemented					
										Same Drill rate
	15	X	100	100/3"	Interbedded vf sandstone + siltstone, poorly-slightly cemented, moist					

BORING NUMBER PZ028

SHEET 2 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	15									
										Same drill rate
	20	X 80	27		^{mudstone} Siltstone + shale, fractured + oxidized,					Softer drilling 20 - 24'
		X 100	49		becomes moist @ 21', dk. gray,					
		X 100	50%		friable					
										Drill rate harder (as above)
	25	X 100	50%		Siltstone - shale, as above, mod. well to well cemented, oxidized on frx. surface, dk. gray otherwise					Harder Very hard drilling 27' - 29.5'
	30	X 0	50/3		No recovery, gray N/6 powder in shoe; cuttings showed fragments of competent sandstone @ 28'					
					Cuttings: Dark gray shale + vf qtz. sand					
	35									

rate

rate

rate

color

FIELD LOG OF BORING

BORING NUMBER PZ 029

SHEET 1 OF 2

PROJECT NAME Rocketdyne		PROJECT NUMBER 313150005	ELEVATION AND DATUM +85	LOCATION P2 Area/EEL PT 074	
DRILLING COMPANY Layne		DRILLER Enrique	DATE AND TIME STARTED 12/6/00 1320		DATE AND TIME COMPLETED 12/6/00 1530
DRILLING EQUIPMENT CME 75D		DRILLING METHOD HSA	COMPLETION DEPTH 31'		TOTAL NO. OF SAMPLES 5
SIZE AND TYPE OF BIT 8" Carbide		HOLE DIAMETER 8"	NO. OF SAMPLES	BULK 5	SS
DRILLING FLUID None		DRILLING ANGLE Vert.	WATER LEVEL	FIRST —	AFTER _____ HOURS
SAMPLE HAMMER TYPE Hydraulic		DRIVING WT. 140#	DROP 30"	HYDROGEOLOGIST / DATE T. Butler 12/6/00	
				CHECKED BY / DATE	

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
					Sfc: dry grass, oak trees					
					Hard Augered to 4' (Ref. @ sandstone)					
					Weathered sandstone, vf grained, oxidized in cuttings, strong brown to yellowish brown					
	5									
					Color becomes yellowish brown					Harder Drilling @ 8'
					Color is lt. yellowish brown 10/16/00					
I	10	X	100	100/4"	Poorly cemented vf sandstone, weathered to silty sand, some micaceous, dry	SM	-	70	30	
					Slough in sampler: frags. of med. well cemented siltstone + vf sandstone, dry					
II	15	X		100/2"						

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **PZ 029**

SHEET **2** OF **2**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	15				Color ch. to olive yellow					
					Cuttings: 1" fragments of well-cemented, oxidized sandstone, fine gr., micaceous, lt. olive brown, moist					
					Color ch. to olive gray some interbedded dk. gray siltstone					
	20	X	100	100/2	Slightly cemented sandstone, color olive gray, vf-fine grained, silty interbeds, moist					
					Well-cemented sandstone, vf, micaceous					
	25	X	50	100/2	oxidized, black					
					Cuttings: Gray N6					Very Hard drilling @ 28' → TD
	30	X			Shale, gray N5, dry, well-cemented					
					Total Depth = 31' Backfilled w/sand, bentonite chips, & cement grout upon piezometer installation					

color rate

rate

FIELD LOG OF BORING

BORING NUMBER **PZ 030**

SHEET **1** OF **2**

PROJECT NAME Rocketdyne		PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION P2 Area South, PT-075	
DRILLING COMPANY Layne		DRILLER Enrique	DATE AND TIME STARTED 12/7/00 0730		DATE AND TIME COMPLETED 12/7/00 1045
DRILLING EQUIPMENT CME 750		DRILLING METHOD HSA	COMPLETION DEPTH 32.5		TOTAL NO. OF SAMPLES 4
SIZE AND TYPE OF BIT 8" Carbide		HOLE DIAMETER 8"	NO. OF SAMPLES	BULK SS	SS 4
DRILLING FLUID None		DRILLING ANGLE VERT	WATER LEVEL FIRST —		AFTER — HOURS

SAMPLE HAMMER TYPE Hydraulic DRIVING WT. 140* DROP 30"			HYDROGEOLOGIST / DATE T. Euston 12/7/00	CHECKED BY / DATE
--	--	--	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Surface: dry grass + leaves near oak trees, low slope					
	2				Hand-Auger to 4' bgs - refusal @ bedrock					
	3									
	4									Alluvium/Bedrock
	5				Cuttings: Siltstone, pale yellow 5Y 7/4, dry, well cemented mod.					
	10				Cuttings: As above, fragments of siltstone are olive gray (5Y 4/2), moderately well cemented					
	14				Cuttings: color ch. to olive (5Y 5/3), frags of siltstone are gray N4					Harder Drilling @ 14' w/ color change
	15	X	100	100/4	Sample: gray N4, some moisture					End of oxidized zone

FIELD LOG OF BORING

BORING NUMBER **P2P31**

SHEET 1 OF 2

PROJECT NAME Rocketdyme	PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION P2 South PT-076
DRILLING COMPANY Layne	DRILLER Enrique	DATE AND TIME STARTED 12/7/00 1100	DATE AND TIME COMPLETED 12/7/00 1430
DRILLING EQUIPMENT CME 750	DRILLING METHOD HSA	COMPLETION DEPTH 30'	TOTAL NO. OF SAMPLES 5
SIZE AND TYPE OF BIT 5" Carbide	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK <input type="checkbox"/> SS <input checked="" type="checkbox"/> DRIVE <input type="checkbox"/> PITCHER <input type="checkbox"/>
DRILLING FLUID None	DRILLING ANGLE Vert.	WATER LEVEL	FIRST <input type="checkbox"/> AFTER _____ HOURS

SAMPLE HAMMER TYPE Hydraulic	DRIVING WT. 140#	DROP 30"	HYDROGEOLOGIST / DATE T. Brafton 12/7/00	CHECKED BY / DATE
--	-------------------------	-----------------	--	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
					Sfc: Sandstone outcrop					
	1				HA to 6" bgs					
	2				Concrete bit used to 2'					Hard drilling
	3									
	4									Very hard 4-5' (May be boulder)
	5									Hard Drilling ↓
					Cuttings: siltstone, oxidized dk. grayish brown (2.5Y 4/2), dry, med. well cemented					
I	10	X	100 ⁵⁰ / ₃		Very fine sandstone, micaceous, grayish brown - lt. dk. brown (2.5Y 5/2-3), moist + silty in sample					
										Same rate
					Cuttings: Oxidized f-med. sandstone, poorly cemented, micaceous					
I	15	X	100 ¹⁰⁰ / ₄							End oxidized zone color change - gray

BORING NUMBER PZ 031

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
-	15				Sample: dark gray siltstone, mod. to med. well cemented, friable in sample					
										Harder Drilling 19'
.	20	X	100%		Very fine sandstone, gray NG, micaceous					
					Cuttings: fine sandstone, gray as above					Very hard 22.5'
.	25	X	100%		Very fine sandstone, some fine					
.	30	X	100%		Very fine sandstone, as above					
					Total Depth: 30' Backfilled w/ sand, bentonite, & cement grout as piezometer installed					
					BENTONITE ADDED 24'-30'					

FIELD LOG OF BORING

BORING NUMBER **PZΦ32**

SHEET 1 OF 2

PROJECT NAME Rocketdyne	PROJECT NUMBER 312150005	ELEVATION AND DATUM TBD	LOCATION Compound A PT 076
DRILLING COMPANY Layne	DRILLER Enrique	DATE AND TIME STARTED 12/7/00 1530	DATE AND TIME COMPLETED 12/7/00 1715
DRILLING EQUIPMENT CME 750	DRILLING METHOD HSA	COMPLETION DEPTH 22'	TOTAL NO. OF SAMPLES 2
SIZE AND TYPE OF BIT 8" Carbide	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK 2
DRILLING FLUID None	DRILLING ANGLE Vert.	WATER LEVEL	SS 2
SAMPLE HAMMER TYPE Hydraulic		DRIVING WT. 140#	DROP 30"
		HYDROGEOLOGIST / DATE T. Burton 12/7/00	CHECKED BY / DATE

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	1				Sfc: dry grassy soil adj. from well ES-25					
	2									
	3				Hard Augered to 4' bgs.					Alluv / Bedrock cont.
	4				Highly weathered vf sandstone: Silty sand (SM), yellowish brown (10YR 5/6) moist, loose in sample	SM	65	35		
	5									
	10				Cuttings: As above, frags of vf-fine sandstone, poorly cemented, oxidized, micaceous, very thin siltstone interbeds	SM	70	30		
										Hard Drilling 11-13' Lith. change Lighter color
										Soft 13-14'
	15				Sample: Mottled silt + sand, ^{interbeds} loose, olive yellow to oxidized brown, highly weathered					

FIELD LOG OF BORING

BORING NUMBER **PZ 033**

SHEET **1** OF **2**

PROJECT NAME Rockeddyne SMOU	PROJECT NUMBER 313150005	ELEVATION AND DATUM TSD	LOCATION Comp A PT-082
DRILLING COMPANY Kayne	DRILLER Enrique	DATE AND TIME STARTED 12/8/00 0915	DATE AND TIME COMPLETED 12/8/00 1140
DRILLING EQUIPMENT CME 750	DRILLING METHOD HSA	COMPLETION DEPTH 29'	TOTAL NO. OF SAMPLES 5
SIZE AND TYPE OF BIT 8" Carbide	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK
DRILLING FLUID None	DRILLING ANGLE VERT	WATER LEVEL	SS 5
SAMPLE HAMMER TYPE Hydraulic	DRIVING WT. 140#	DROP 30"	DRIVE
			PITCHER
		HYDROGEOLOGIST / DATE T. Burton 12/8/00	CHECKED BY / DATE

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Sfc: thin alluvium adj. to sandstone outcrops					Alluvium/Bedrk. contact
	2				oxidized ^{quartz} sandstone fragments					
	3				Cuttings: (Below 3.5') Siltstone, dark frags, brownish yellow cuttings @ surface					Hard @ 3.5'
	4	X	100	100/4	Oxidized, interbedded vf sand + silt, slightly cemented in sample, light brownish grey siltstone + reddish yellow sandstone, well-cemented in places					
	5									same drill rate
	10	X	100	100/1	Moderately well-cemented sandstone, vf-fine, micaceous, little to no oxidation, some moisture, light olive gray					
					Cuttings: olive brown 2.5x4/4, vf + fine sand, some silt, moisture increasing					Same drill rate
	15	X	100	100/2	As above, fine sandstone, moist, more oxidized - brownish yellow, less cemented					

BORING NUMBER PZ #33

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
					Cuttings: olive (5y 5/4), fine ss as above					Color change - Same rate
	20	X	100	100/2	Fine sandstone as above, slightly cemented in sample, light gray N7					Harder Drilling - Color change to gray
										Very Hard Drilling 23'
	25	X	100	100/3	Fine gray sandstone, as above, more cemented in sample (well), some med. sand, moisture prob. from auger heat					
					Cuttings: same as 25'					Water in hole @ end of run
					Cuttings: olive gray (5y 5/2), fragments of siltstone/shale stone of same color					Color change
	30				Total Depth = 29' Backfilled w/sand, bentonite, & cement grout as piezometer installed BENTONITE EMPLACED FROM 22' - 29'.					

FIELD LOG OF BORING

BORING NUMBER **PZ034**

SHEET **1** OF **1**

PROJECT NAME Rocketdyne SMOV		PROJECT NUMBER 313150005		ELEVATION AND DATUM TBD		LOCATION Camp A drainage PT-080				
DRILLING COMPANY Layne		DRILLER Enrique		DATE AND TIME STARTED 12/8/00 1305		DATE AND TIME COMPLETED 12/8/00 1510				
DRILLING EQUIPMENT CME 750		DRILLING METHOD HSA		COMPLETION DEPTH 12'		TOTAL NO. OF SAMPLES 2				
SIZE AND TYPE OF BIT 8" Carbide		HOLE DIAMETER 8"		NO. OF SAMPLES 2		DRIVE 2				
DRILLING FLUID None		DRILLING ANGLE Vert.		WATER LEVEL 6-7'		AFTER 2 HOURS				
SAMPLE HAMMER TYPE Hydraulic		DRIVING WT. 140#		DROP 30"		HYDROGEOLOGIST / DATE T. Boston 12/8/00				
						CHECKED BY / DATE				
LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Sfc: low slope adj. to drainage SE of Camp A; poison oak + oak leaves					Alluvium/Bedrock contact @ 3.5'
	2				HA to 4' Loose alluvium, silty					
	3				Cuttings: oxidized reddish brown vf sandstone & siltstone fragments					
	4									
	5									
										Water Table 6-7'
					Cuttings: well-graded sand w/silt, vf-med, some coarse, wet, trace # gray (10R5/1)	SW- SM			90/10	
	10	X 90	65/6		Poorly cemented sandstone, vf + fine, alternating oxidized zones of gray/greenish gray + H. olive brown, rootlets, wet					
	12	X 100	100/8		Competent sandstone, gray, vf + fine, wet					Hard Drilling 12' Very Hard
					Refusal @ 12' Backfilled w/sand bentonite chips as piezometer installed					

FIELD LOG OF BORING

BORING NUMBER **P2036**

SHEET 1 OF 2

PROJECT NAME Rocketdyne	PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION STL II PT-089
DRILLING COMPANY Layne	DRILLER Enrique	DATE AND TIME STARTED 12/11/00 1055 1135	DATE AND TIME COMPLETED 12/11/00 1530
DRILLING EQUIPMENT CME 750	DRILLING METHOD HSA	COMPLETION DEPTH 29' 28.9	TOTAL NO. OF SAMPLES 5
SIZE AND TYPE OF BIT 8" Carbide	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK 5
DRILLING FLUID None	DRILLING ANGLE Vert.	WATER LEVEL	SS 5
		FRST 27'	AFTER <u>1</u> HOURS 21.9'

SAMPLE HAMMER TYPE **Hydraulic** DRIVING WT. **140*** DROP **30"** HYDROGEOLOGIST / DATE **T. Burton 12/11/00** CHECKED BY / DATE

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Surface: Brush area off asphalt parking lot, adj. to wells 55 A+B					
	2				HA refusal @ 3" (hard alluvium)					
	3									
	4									
	5									
										Alluvium/Bedrock cont.
					Cuttings: yellowish brown w/ sand & silt					
	10	X	100%		Sample: Moderately cemented siltstone, oxidized from grayish brown - strong brown, friable, with some gray w/ sand layers, moist					"Normal" Drilling (Not hard or soft)
										Hard Drilling 12'
	15	X	80%		Very fine sandstone, mod. well cemented, moist, micaceous, grayish brown					Very Hard 14-16'

FIELD LOG OF BORING

BORING NUMBER **PZ 037**

SHEET **1** OF **2**

PROJECT NAME Rocketdyne SMOU		PROJECT NUMBER 313150005		ELEVATION AND DATUM TBD		LOCATION STL II PT-090		
DRILLING COMPANY Layne		DRILLER Enrique		DATE AND TIME STARTED 12/12/00 0740		DATE AND TIME COMPLETED 12/12/00 1025		
DRILLING EQUIPMENT CME 750 All-Terrain		DRILLING METHOD HSA		COMPLETION DEPTH 29.5'		TOTAL NO. OF SAMPLES 5		
SIZE AND TYPE OF BIT 5" Carbide		HOLE DIAMETER 8"		NO. OF SAMPLES	BULK	SS 5	DRIVE	PITCHER
DRILLING FLUID None		DRILLING ANGLE Vert.		WATER LEVEL		FRST	AFTER _____ HOURS	
SAMPLE HAMMER TYPE Hydraulic		DRIVING WT. 140#		DROP 30"		HYDROGEOLOGIST / DATE T. Burton 12/12/00		CHECKED BY / DATE

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	1				Sfc: Asphalt; Road Base to 1' HA Refusal @ 1'					Alluvium / bedrock contact
	2				Color: dark yellowish brown; cuttings contain vf sandstone fragments, moist, grayish brown					
	3									Hard @ 3'
I	4	X 80	100/4		Slightly cemented vf sandstone, moist, pale brown, some oxidation, weathered to silty sand					
	5									
										Same Drill rate → 9'
II	10	X 100	100/3		Fine sandstone, cementation increasing, some med. & coarse sand, some oxidation as above, lt. grayish brown					
					Cuttings lighten to yellowish brown					
										Same drill rate → 14'
III	15	X 100	100/3		vf - fine sandstone slightly cemented, color as above, moisture increasing, trace med & coarse sand					

FIELD LOG OF BORING

BORING NUMBER **PZ Ø39**

SHEET **1** OF **2**

PROJECT NAME Rocketdyne SMOU	PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION STL IV PT. Ø86
DRILLING COMPANY Layne	DRILLER Enrique	DATE AND TIME STARTED 12/13/00 0730	DATE AND TIME COMPLETED 12/13/00 1000
DRILLING EQUIPMENT CME 750	DRILLING METHOD HSA	COMPLETION DEPTH 29'	TOTAL NO. OF SAMPLES 5
SIZE AND TYPE OF BIT 8" Carbide w/ Bullets	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK 5 SS
DRILLING FLUID None	DRILLING ANGLE Vert.	WATER LEVEL	FIRST 28.5' AFTER 0.5 HOURS

SAMPLE HAMMER TYPE Hydraulic	DRIVING WT. 140 #	DROP 30"	HYDROGEOLOGIST / DATE T. Burton 12/13/00	CHECKED BY / DATE
--	--------------------------	-----------------	--	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Sfc: dry grass + brush adj. to drainage confluence N of STL IV impoundment					
	2				HA to 6"; Refusal on hard siltstone					
	3									
	4				Cuttings: Olive yellow, siltstone frags are dk. olive gray, mod. well cemented					
	5									Hard Drilling @ 5'
	10	X	100%	47	Light yellowish brown to dk. gray siltstone, friable, partial cementation, moist, oxidized, f-med sands in shoe					
		X	100%	5/2						
					Cuttings: darker, to olive brown, siltstone fragments w/ black oxidized layers					Same Drill rate
	15	X	100%	5	Heavily oxidized + mottled siltstone, as above w/ coarser micas + trace of sand					Harder @ 15'

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZ 039

SHEET 2 OF 2

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	15				Cuttings contain siltstone + vf sandstone fragments, by slightly cemented reddish oxidation, micaceous, yellow (2.549/b)				(Harder drilling @ 15) Possible silt/sandstone contact	
	↓	X	100	100%	Olive yellow sandstone, slight to no cementation in sample, moist, very fine, well sorted, micaceous (5%)				Color is becoming grayish (bottom of oxidized zone)	
	20								Gradually harder 20-22	
						Cuttings: dk. olive gray, siltstone + vf sandstone interbeds				↓
	↓	X	100	100%	Mod. well cemented, ^{gray to} dk. gray siltstone					
	25					Becomes well cemented @ ≈ 26-27.5 Cuttings: gray - dk. gray siltstone/shale				
		↓	X	100	100%	Fractured siltstone/shale; dk. gray to olive/dark olive along frx. surfaces, wet, well cemented, parallel frx. in sample				Fractures
	30					Total Depth 29' Back filled w/sand, bent. chips, & cement grout as piezometer installed				

FIELD LOG OF BORING

BORING NUMBER **RZ040**

SHEET **1** OF **2**

PROJECT NAME Rocketdyne SMDU		PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION STLIV Buffer Zone PT 091	
DRILLING COMPANY Layne		DRILLER Enrique	DATE AND TIME STARTED 12/13/00 1500		DATE AND TIME COMPLETED 12/14/00 0850
DRILLING EQUIPMENT CME 750		DRILLING METHOD HSA	COMPLETION DEPTH 31.5		TOTAL NO. OF SAMPLES 4
SIZE AND TYPE OF BIT 8" Carbide w/ Bullets		HOLE DIAMETER 8"	NO. OF SAMPLES	BULK	SS 4
DRILLING FLUID None		DRILLING ANGLE Vert.	WATER LEVEL	FIRST	AFTER _____ HOURS

SAMPLE HAMMER TYPE Hydraulic		DRIVING WT. 140"	DROP 30"	HYDROGEOLOGIST / DATE T. Burton 12/13/00	CHECKED BY / DATE
--	--	-------------------------	-----------------	--	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
					Sfc: Dry grass + shrub in dry drainage					
	1				HA refusal @ 9" bgs; silty bedrock					
	2									
	3				Cuttings: Fragments of vf ^{fine} sandstone light olive brown, dry, poorly cemented some oxidation					Hard Drilling @ 3'
	4									
	5									
					Cuttings: As above					Very Hard @ 6' (on 1st attempt)
	10	X	100	100/3	As above, moist, mostly fine sand, some med. grains, light yellowish brown (2.5Y 6/4), moderate cementation					
					Cuttings: more olive brown					
	15	X	100	100/2	Sandstone, as above, cementation med/well (increasing), moist, vf-med, med-sorting					

FIELD LOG OF BORING

BORING NUMBER **P2041**

SHEET 1 of 2

PROJECT NAME <i>SSEK Smou</i>	PROJECT NUMBER <i>313150005</i>	ELEVATION AND DATUM <i>TBD</i>	LOCATION <i>PT-105</i>
DRILLING COMPANY <i>Layne</i>	DRILLER <i>Ruben</i>	DATE AND TIME STARTED <i>01-16-01</i>	DATE AND TIME COMPLETED <i>1-16-01</i>
DRILLING EQUIPMENT <i>CME-98</i>	DRILLING METHOD <i>Hollow stem Aug.</i>	COMPLETION DEPTH <i>29.6</i>	TOTAL NO. OF SAMPLES
SIZE AND TYPE OF BIT <i>6"</i>	HOLE DIAMETER <i>6"</i>	NO. OF SAMPLES	BULK SS DRIVE PITCHER
DRILLING FLUID <i>None</i>	DRILLING ANGLE <i>Vert.</i>	WATER LEVEL	FIRST AFTER _____ HOURS

SAMPLE HAMMER TYPE	DRIVING WT.	DROP	HYDROGEOLOGIST / DATE R. SINGER	CHECKED BY / DATE
--------------------	-------------	------	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
					<i>Hard Auger - Breakfall - 2.5</i>			<i>30</i>	<i>70</i>	<i>Soft</i>
					<i>Alluvium at 3" sandy silt</i>					
					<i>lt gray 10 yr (18) moist</i>					<i>COMPACT</i>
					<i>Alluvium / Redrock 4.5-6'</i>					
	<i>5</i>		<i>100%</i>		<i>weathered sandstone K-f</i>			<i>40</i>	<i>20</i>	
					<i>sand lt gray 2.5 Y 5/6 moist some cementation heavily weathered</i>					
	<i>10</i>		<i>100%</i>		<i>weathered sandstone K-f</i>			<i>40</i>	<i>20</i>	<i>COMPACT</i>
					<i>sand 100 with some</i>					
					<i>siltstone interbedded and above</i>					
					<i>lt gray 2.5 Y 5/6 moist some cementation - highly weathered</i>					

BORING NUMBER PZ 041

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS	
							GR	SA	FI		
	15			100 6	Weathered Sandstone with interbedded siltstone & sand. Bl. Gr. 2.5 V S/G moist. Some cementation - highly weathered.		75	25		Horizon @ 17'	
					oxidized / non oxidized 17-20					continuation	
	20			110 3	Weathered Sandstone V-F sand gray N6 - moist - well cemented - fairly competent		90	10			Horizon @ 20'
										continuation	
	25			100 3	weathered Sandstone V-F sand Gray N6 - moist - well cemented somewhat competent less than above		90	10			
	30			120 2	Weathered Sandstone - V-F sand Gray N6 - moist well cemented fairly competent						End of boring 29.6

FIELD LOG OF BORING

BORING NUMBER P2042

SHEET 1 of 3

PROJECT NAME <u>SSFL SMOU</u>	PROJECT NUMBER <u>313100005</u>	ELEVATION AND DATUM <u>TBD</u>	LOCATION <u>DELTA - PT-095</u>
DRILLING COMPANY <u>LAYNE</u>	DRILLER <u>R. Gonzalez</u>	DATE AND TIME STARTED <u>12-13-06</u>	DATE AND TIME COMPLETED <u>12-13-06</u>
DRILLING EQUIPMENT <u>CME-95</u>	DRILLING METHOD <u>Hole Hammer Auger</u>	COMPLETION DEPTH <u>40</u>	TOTAL NO. OF SAMPLES
SIZE AND TYPE OF BIT <u>6"</u>	HOLE DIAMETER <u>6"</u>	NO. OF SAMPLES	BULK SS DRIVE PITCHER
DRILLING FLUID <u>None</u>	DRILLING ANGLE <u>Vert.</u>	WATER LEVEL	FIRST AFTER _____ HOURS

SAMPLE HAMMER TYPE	DRIVING WT.	DROP	HYDROGEOLOGIST / DATE <u>R. SINGER</u>	CHECKED BY / DATE
--------------------	-------------	------	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
Alluvium	3				Hand Auger to 3' - Alluvium Sandy loam - med br					5.0 ft
	5			42/10	weathered sandstone - 1/4" - moderately cemented. med br 2.5 Y 7/3		80	20		5.0 ft
	10			62/10	weathered sandstone - 1/4" - F sand a little more moist with depth med br 2.5 Y 6/4 moderately comp		80	20		5.0 ft

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2042

SHEET 2 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	15			60	weathered sandstone v-f		80	20		Harder at 16'
					moist med BAN 2.5 Y 6/4					Soft again 17'
	20			46	weathered sandstone v-f sand		80	20		Soft
					some med sand with depth					
					moist, oxidized (dk BAN) at 21					
					2.5 Y 6/4 - med competent					
	25			100	weathered sandstone v-f sand		80	20		Soft
					moist med competent med BAN					
					2.5 Y 6/4					
										Harder at 28'
	30			100	cuttings becoming LGAY		90	10		
					@ 29.5'					
					weathered sandstone - v-f					
					sand competent. LGAY					
					SN					Soft at 32'
					weathered sandstone - v-f		90	10		
	35			100	LGAY - oxidized core 35, 9' very comp					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P204B

SHEET 3 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	35									Soft - (same as above) at 36'
	40				Weathered sandstone v.f. sand Ls GRAY SL.			100		Drilling same as above End Borehole @ 40.5'
					BENTONITE EMPLACED FROM 31' - 40.5'					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **P2043**

SHEET **3** OF **3**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	37			100%	weathered sandstone - v-f sand well GRA 2.54 G16 - moist competent		85	15		consistent softer 37'
	40			100%	weathered sandstone v-f SAND GRAY becoming oxidized moist competent					consistent
	45			100%	weathered sandstone v-f sand GRAY NGK competent.		70	10		End of Boring
					BENTONITE EMPLACED FROM 41'-45'					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2044

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	35			100/3	weathered sandstone vf-f moist lt brn 2.5Y 5/4 fairly comp.		85	15		consistent Softer 37'
	40			100/3	Weathered sandstone vf-f moist lt brn 2.5Y 5/4 fairly comp.		85	15		consistent Softer 43 ↓ Harder 44'
	45			100/1	Weathered sandstone - vf-f GRAY comp. moist		90	10		End boring NATIVE MATERIAL SLOUGHED IN FROM 44.5' - 45'

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2045

SHEET 2 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	25			40/18	weathered sandstone v-f. sand more moisture. mod. comp. - fairly competent.		50	20		CONSISTENT Harder 18'
										softer 19'
	26			24/18	weathered sandstone v-f. moist med-dk. gray - 2.5 Y 5/4 fairly competent. Red and mottling.		75	25		CONSISTENT Harder 22'
					fill / sandstone interlayer 22-23'					softer 23'
	25			53/18	weathered sandstone v-f-s sand lt gray 2.5 Y 6/3 with red brown mottling less moist - slightly more comp.		80	20		CONSISTENT Harder 26'
					fill / sandstone interlayer 25-27' (?)					CONSISTENT
	30			100/5	weathered sand v-f-v moist lt gray 2.5 Y 6/3 moist comp.		80	20		CONSISTENT Harder 33'

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2045

SHEET 3 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	35			100/3	weathered sandstone v-f. moist - competent - med Brn 2.5 YR 6/6				CONSISTENT	
	40			100/3	weathered sandstone v-f sand moist med Brn - gray mottled very competent		90	10	HARDER 39 CONSISTENT	
	44			100/2	weathered sand stone v-f sand moist - GRAY M7. very competent.				Harder 44'	
					TD = 45'					
					NATIVE MATERIAL SLOUGHED IN FROM 43.5' - 45'					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **P204**

SHEET **2** OF **3**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	15			10/3	weathered sandstone H-F sand LH BEN 2.5 Y 6/4 with rd Ben mottling more competent		80	20		CONSISTANT Harder, 16'
					fill/Bedrock interface 15-' 17' (P.)					CONSISTANT surface 18'
	20			10/4	weathered sandstone H-F SAND LH BEN 2.5 Y 6/4 moist fairly comp		80	20		CONSISTANT
	25			10/4	Weathered Sandstone H-F sand moist med BEN 2.5 Y 5/6 with red Ben mottling - more competent		80	20		CONSISTANT
	30			10/4	Weathered Sandstone H-F sand moist med Ben 2.5 Y 5/6 with red Ben mottling - Less competent		80	20		CONSISTANT

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2647

SHEET 2 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	15			100%	weathered Sandstone v-f sand moist - 2d brn-grn 2.5 Y 7/1 competent (less than above) contaminated		85	15		CONSISTANT
	20			100%	weathered Sandstone v-f sand med Brn 2.5 Y 6/6 moist competent (more oxidized than above)		90	10		softer 23' CONSISTANT
	25			100%	weathered Sandstone v-f sand med Brn 2.5 Y 6/6 moist competent					Hander 26 CONSISTANT
	30				weathered Sandstone v-f sand med Brn 2.5 Y 6/6 moist competent		90	10		HANDER 31 CONSISTANT

FIELD LOG OF BORING

BORING NUMBER P2048

SHEET 1 OF 3

PROJECT NAME <u>ESEL SMALL</u>	PROJECT NUMBER <u>313100005</u>	ELEVATION AND DATUM <u>TBD</u>	LOCATION <u>COCA PT-116</u>
DRILLING COMPANY <u>Layne</u>	DRILLER <u>R. Gonzalez</u>	DATE AND TIME STARTED <u>12/19/00</u>	DATE AND TIME COMPLETED <u>12/19/00</u>
DRILLING EQUIPMENT <u>CME-95</u>	DRILLING METHOD <u>Hollow Stem Aug</u>	COMPLETION DEPTH <u>49</u>	TOTAL NO. OF SAMPLES
SIZE AND TYPE OF BIT <u>6"</u>	HOLE DIAMETER <u>6"</u>	NO. OF SAMPLES	BULK SS DRIVE PITCHER
DRILLING FLUID <u>None</u>	DRILLING ANGLE <u>Vert.</u>	WATER LEVEL	FIRST AFTER _____ HOURS

SAMPLE HAMMER TYPE	DRIVING WT.	DROP	HYDROLOGIST / DATE <u>R. SINGER</u>	CHECKED BY / DATE
--------------------	-------------	------	--	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
					Hand Auger 12"-16" Backfill with gravel-soil becoming grey 2' Alash @ 4. Heavy Release (set-fuel) order					soft
					Alluvium					CONSTANT
	4			10/18	ALLUVIUM - Sandy silt BLACK (contaminated) very moist.		20	80		
					Alluvium / Bedrock					CONSTANT
	9			17/18	weathered sandstone ALLUVIUM - SANDY-SILT contamination continues moist		35	65		
	14			16/18	weathered sandstone ALLUVIUM - SANDY SILT contaminated moist		35	65		CONSTANT

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2648

SHEET 2 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	15									CON START
	19				Althorion Bedrock Inter. (P)					Harder 18
	23			25/6	weathered sandstone - V-f-f moist med BAN 2.5 Y 6/5 highly weathered - water on spoon - cutting med ab 28'		70	30		CON START
	24				cutting med 19-23					
	27			100/9	weathered sandstone - V-f-f med med - to BAN - 2.5 Y 6/4 - moist (but dryer than above) some competence (poor cementation)		80	20		CONS START
	28									
	29			100/9	weathered sandstone V-f-f sand med - to BAN 2.5 Y 6/4 moist fairly competent (still poorly cemented)		80	20		CONS START
	34			100/4	weathered sandstone V-f-f sand med BAN 2.5 Y 6/4 moist fairly competent poorly cemented		80	20		

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZ 048

SHEET 3 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	35									CONSISTENT
	39			100/13	Weathered Sandstone, Vt-f (?) NO RECOVERY					Softer 41
										Harder
	44			100/13	weathered Sandstone Vt-f med band 2.5' 6.6' - moist fairly competent.		10	20		CONSISTENT
	49				weathered Sandstone - vt-f sand Gray Nb moist competent.					Harder 49
										end of boring -
					NATIVE MATERIAL SLOUGHED IN TO 42'. BENTONITE EMPLACED FROM 20' - 42'.					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2049

SHEET 2 OF 2

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	15				cuttings dryer					Harder 15'
										CONSISTENT
	19			100/3	weathered sandstone - f-f sand moist - poorly cemented			85	15	CONSISTENT
										CONSISTENT
	24			100/3	Weathered sandstone v-f - f sand gray/brown mottled - moist - fairly competent - poorly cemented			85	15	CONSISTENT
										CONSISTENT
	29				weathered sandstone v-f - f sand gray/red mottled moist more competent - still poorly cemented			85	15	CONSISTENT
										CONSISTENT
	34				weathered sandstone v-f - gray the bit more competent more cemented. BENTONITE EMPLACED FROM 17'-34'			90	10	End of Boring

FIELD LOG OF BORING

BORING NUMBER 92050

SHEET 1 OF 2

PROJECT NAME Rocketdyne SMOU	PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION EEL PT 072
DRILLING COMPANY Layne	DRILLER Enrique	DATE AND TIME STARTED 12/14/00 1030	DATE AND TIME COMPLETED 12/14/00 1415
DRILLING EQUIPMENT CME 750	DRILLING METHOD HSA	COMPLETION DEPTH 24'	TOTAL NO. OF SAMPLES 4
SIZE AND TYPE OF BIT 5" Carbide w/ Bullets (2)	HOLE DIAMETER 5"	NO. OF SAMPLES	BULK SS
DRILLING FLUID None	DRILLING ANGLE Vert.	WATER LEVEL	DRIVE 34
SAMPLE HAMMER TYPE Hydraulic	DRIVING WT. 140#	DROP 30"	PITCHER
HYDROGEOLOGIST / DATE T. Boston 12/14/00		CHECKED BY / DATE	

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Sfc: Asphalt, adj. to front of EEL fence line, 8' off S6 W Road					
	2				Hand-Augered to 0.5' bgs					
	3				Alluvium in cuttings, dk. brn, moist, sandy silt					
	4									
	5									
					Cuttings: weathered siltstone, olive brown, moist					Harder @ 7' = Alluvium / Bedrock contact
		X	100	11	Alternating 1-4" beds of vf sandstone, yellowish brown, poorly cemented, moist; and siltstone, dk. gray, moderately cemented, friable	ML	-	-	100	
		X	100	5/6		SP	-	90	10	
		X	5/4		Poorly cemented vf-fine sand, moist, oxidized yellowish brown, trace med. grains	SP	-	90	10	



FIELD LOG OF BORING

PZ-051

BORING NUMBER

PZ-051

SHEET 1 of 2

PROJECT NAME <i>Rocketdyne SMOU</i>	PROJECT NUMBER <i>313150005</i>	ELEVATION AND DATUM <i>TBD</i>	LOCATION <i>EEL Drainage Area IV, PT 071</i>
DRILLING COMPANY <i>Layne</i>	DRILLER <i>Enrique</i>	DATE AND TIME STARTED <i>12/14/00 1500</i>	DATE AND TIME COMPLETED <i>12/15/00 0815</i>
DRILLING EQUIPMENT <i>CME 750</i>	DRILLING METHOD <i>HSA</i>	COMPLETION DEPTH <i>27'</i>	TOTAL NO. OF SAMPLES <i>5</i>
SIZE AND TYPE OF BIT <i>8" Carbide w/ Bullet (2)</i>	HOLE DIAMETER <i>8"</i>	NO. OF SAMPLES	BULK SS <i>5</i>
DRILLING FLUID <i>None</i>	DRILLING ANGLE <i>Vert.</i>	WATER LEVEL	FIRST 23' <i>23'</i>
SAMPLE HAMMER TYPE <i>Hydraulic</i> DRIVING WT. <i>140#</i> DROP <i>30"</i>		HYDROGEOLOGIST / DATE <i>T. Burton 12/14/00</i>	CHECKED BY / DATE <i>21.5' / 13</i> <i>8.95'</i>

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Sfc: flat terrace adj. to drainage; dry grasses					Very thin alluvium
	2				HA to 1' bgs; Refusal @ sandstone					Hard @ 1'
	3				Light yellowish brown, changes to olive brown (silty fragments, partial cementation)					
	4									
	5									
					Cuttings: vf + fine sand, silty, moist, light olive brown					Water level in adjacent well (approx.)
										Same Drill rate
I	10	X	100	50/3	Light yellowish brown sandstone, vf-fine, some med. sand, moist, micaceous, poorly to slightly cemented					
					Cuttings: fragments of mod. well cemented siltstone/mudstone (moist, olive gray), and partially cemented sandstone					Same Drill Rate
I	15	X	100	50/3	Light olive brown sandstone, slightly cemented, moist, fine grained, some v. med.					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZ051

SHEET 2 OF 2

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	15									
										Same Drill rate
										Softer drilling
	↓	20	X 100	90/3	Sandstone, as above, slightly finer grained (vf/fine), v. moist					↓
					Cuttings: moist, silty vf sand, olive brown, few fragments; becomes poorly sorted vf-med sand, olive gray					
	↓	25	X 100	90/4	Sandstone, wet, olive gray, poorly sorted vf-med, some coarse					(Harder Drilling)
										Oxidized/Gray Contact
										Very Hard 26.5'
	↓	27	X 100	50/4	Sandstone, as above, gray, competent (well cemented)					Refusal @ 27'
	30				BENTONITE EMPLACED FROM 16' - 27'.					

FIELD LOG OF BORING

BORING NUMBER **PZ052**

SHEET 1 OF 2

PROJECT NAME Rocketdyne smou		PROJECT NUMBER 313150005		ELEVATION AND DATUM TBD		LOCATION A IV Burro Flats, PT-079	
DRILLING COMPANY Layne		DRILLER Enrique		DATE AND TIME STARTED 12/15/00 0900		DATE AND TIME COMPLETED 12/15/00 1100	
DRILLING EQUIPMENT CME 150		DRILLING METHOD HSA		COMPLETION DEPTH 30'		TOTAL NO. OF SAMPLES 5	
SIZE AND TYPE OF BIT 5" Carbide w/ Bullets (2)		HOLE DIAMETER 5"		NO. OF SAMPLES		BULK SS 5	
DRILLING FLUID None		DRILLING ANGLE Vert.		WATER LEVEL		FIRST AFTER _____ HOURS	
SAMPLE HAMMER TYPE Hydraulic		DRIVING WT. 140#		DROP 30"		HYDROGEOLOGIST / DATE T Burton 12/15/00	
CHECKED BY / DATE							

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
					Sfc: low slope, dry grass, oak trees					
	1				Hand augered to 2.5'					
	2									
	3				Color ch. to olive yellow (2.5y 6/8), silty vf sand, dry - sl. moist					Alluvium / Bedrock contact @ 3'
	4									
	5									
					Cuttings: As above, yellowish brown, dry, frags of dk. gray siltstone, moderately cemented					Hard Drilling 8' Color change
	10	X 100	50/5		light yellowish brown sandstone, vf, moist, micaceous, slightly cemented ↳ fine micas					
					Cuttings: dark yellowish brown sandy silt, moist, vf-fine sand (pass. alluvium)					(13.5')
	15	X 100	50/2		vf-fine sandstone, cementation is partial (better), moist, micaceous, oxidized 1/4 yellowish brown					Slightly harder drilling Color change

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZ 052

SHEET 2 OF 2

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS	
							GR	SA	FI		
I	15										
					Cuttings: more gray, w/ fragments of vf-fine sandstone as above @ 14'					Color change	
										Slightly harder 14-19'	
		19.5	X 50	50/3	As above, grayish brown (10YR 5/2)					Harder @ 19.5' to 22'	
		20									
						Cuttings: gray to lt. olive gray					Slightly softer
		25	X 100	50/3	vf-fine sandstone, as above, mod. well cemented, dk. gray, heavy oxidation in places (dk. reddish brown), wet						
						Cuttings: frags of sandstone, as above, moist, well-cemented					Very hard @ 27.5' oxidized/gray contact
		30	X 10	50/2	Sandstone, gray, well-cemented, wet						
					TD = 30'						

FIELD LOG OF BORING

BORING NUMBER **PZ053**

SHEET 1 OF 2

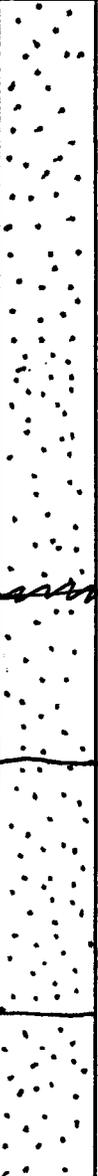
PROJECT NAME NASA		PROJECT NUMBER 313/50005		ELEVATION AND DATUM TBD		LOCATION R2 Ponds PT093	
DRILLING COMPANY Layne		DRILLER Enrique		DATE AND TIME STARTED 12/15/00 1255		DATE AND TIME COMPLETED 12/18/00 0900	
DRILLING EQUIPMENT CME 750		DRILLING METHOD HSA		COMPLETION DEPTH 29'		TOTAL NO. OF SAMPLES 4	
SIZE AND TYPE OF BIT 8" Carbide (2 shovels, 2 bolts)		HOLE DIAMETER 8"		NO. OF SAMPLES 4		DRIVE SS	
DRILLING FLUID None		DRILLING ANGLE Vert.		WATER LEVEL —		FIRST —	
SAMPLE HAMMER TYPE Hydraulic		DRIVING WT. 140 #		DROP 30"		HYDROGEOLOGIST / DATE T. Burton 12/15/00	
						CHECKED BY / DATE	

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
					Sfc: grass, dry vegetation adj. to R2 A-B spillway					
					HA to 2.5'					Alluvium/Bedrock contact
	5	X	100	50/3	Light yellowish brown sandstone, poor to slight cementation					
	10	X	100	60/2	Moderately sorted sandstone vf-med, moist, olive brown, some siltstone fragments below in cuttings					
					Cuttings become dark olive gray, cementation increased, some mod. cemented fragments of sandstone					Color change, plus Harder Drilling 12'
	15	X	100	50/3	Vf sandstone, wet, slightly cemented, some mod. cementation, olive yellow, ... well sorted					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **RZ953**

SHEET **2** OF **2**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS	
							GR	SA	FI		
	15				No cuttings (wet?)					Same Drill rate	
	↓	X	100	50/3	Sandstone, wet, poorly sorted vf-medium grained, moderately well cemented, mod. micas, light brownish yellow						
	20				As above					Harder Drilling @ 24'	
										↙	
	25										
						Cuttings: well-cemented sandstone, dk. gray, vf-fine					Harder Drilling 27'
											Color change -
											Gray zone begins @ 26-28'
						Total Depth = 29'					
						Backfilled w/sand, bentonite, & cement grout as piezometer installed					

FIELD LOG OF BORING

BORING NUMBER **PZ054**

SHEET **1** of **2**

PROJECT NAME NASA	PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION R2 Bnds PT-092
DRILLING COMPANY Layne	DRILLER Enrique	DATE AND TIME STARTED 12/18/00 0945	DATE AND TIME COMPLETED 12/18/00
DRILLING EQUIPMENT CME 760	DRILLING METHOD Hollow Stem Auger	COMPLETION DEPTH 28'	TOTAL NO. OF SAMPLES 5
SIZE AND TYPE OF BIT 8" diam. shovel (2), bullet (2)	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK SS
DRILLING FLUID None	DRILLING ANGLE Vertical	WATER LEVEL	DRIVE 5
SAMPLE HAMMER TYPE Hydraulic	DRIVING WT. 140#	DROP 30"	PITCHER
HYDROGEOLOGIST / DATE T. Burton 12/18/00		CHECKED BY / DATE	

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
					Surface: Thick vegetation (cleared)					Alluvium/Bedrock contact @ 1-1.5"
	1				Weathered sandstone, silty in places, mottled grayish brown to oxidized dk. reddish brown, from vf-fine sand to well graded sand w/gravel 3-4'	SM	-	75	25	
	2				wet at 3.5'	SW	10	90	0	
	3				Hand Augered to 4' bgs					
	4				Cuttings: dk. gray sand, fragments of highly oxidized sandstone, friable, moist					very Hard Drilling 7' - R.P.U. on 12/18/00
	5				Cuttings: well-cemented sandstone, light brownish gray (2.5y/6/2), vf-fine, biotite-rich, dry					Organic odor in borehole: 20 ppm
	10	X no 50%			Note: Boring re-drilled 5' away Sample: vf-fine sandstone, moist, - wet, slightly cemented, oxidized dk. yellowish brown (10YR 4/6)					Harder @ -9'
					[oxidized]					
										Same drill rate
	15	X 100 50%			As above, moderately cemented, dk. yellow-brn. 10YR 4/6, micaceous					

FIELD LOG OF BORING

BORING NUMBER **P2055**

SHEET 1 OF 2

PROJECT NAME SSFL SMOU		PROJECT NUMBER 713150005		ELEVATION AND DATUM TBD		LOCATION PT-057	
DRILLING COMPANY Layne		DRILLER Riben		DATE AND TIME STARTED 01-02-01 13:50		DATE AND TIME COMPLETED 1/2/01 1630	
DRILLING EQUIPMENT Cmc 95		DRILLING METHOD Rotary Mudstone Aug.		COMPLETION DEPTH 29.5		TOTAL NO. OF SAMPLES	
SIZE AND TYPE OF BIT 6"		HOLE DIAMETER 6"		NO. OF SAMPLES		BULK SS DRIVE PITCHER	
DRILLING FLUID None		DRILLING ANGLE Vert.		WATER LEVEL		FIRST AFTER _____ HOURS	

SAMPLE HAMMER TYPE			DRIVING WT.			DROP			HYDROGEOLOGIST / DATE R. SINGER			CHECKED BY / DATE		
-----------------------	--	--	-------------	--	--	------	--	--	---	--	--	-------------------	--	--

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
					all terrain is refused @ 1' weathered sandstone w/ f sand with gravel. Orange BAN. 254 615 weathered. Augured to 10' to insure Auger will work (no air), moist		8	20		soft
	5				Alluvium to weathered sandstone 3'-4' no split spoon cuttings becoming lighter BAN. 254 712					Harder
	10				weathered sandstone w/ usual with some med. Gray-717 no cemented - fairly compact moist		98	10		compact

FIELD LOG OF BORING

BORING NUMBER **PZ 056**

SHEET **1** OF **2**

PROJECT NAME Rockedyne SMOU		PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION Between SPA + New Con PT 053	
DRILLING COMPANY Layne		DRILLER Enrique	DATE AND TIME STARTED 12/19/00 0745		DATE AND TIME COMPLETED 12/19/00 1100
DRILLING EQUIPMENT GME 750		DRILLING METHOD HSA	COMPLETION DEPTH 28'		TOTAL NO. OF SAMPLES 4
SIZE AND TYPE OF BIT 8" Carbide billet (2) + shovel		HOLE DIAMETER 8"	NO. OF SAMPLES	BULK 4	SS
DRILLING FLUID None		DRILLING ANGLE Vertical	WATER LEVEL	FIRST	AFTER _____ HOURS
SAMPLE HAMMER TYPE Hydraulic DRIVING WT. 140# DROP 30"			HYDROGEOLOGIST / DATE T. Burton 12/19/00		CHECKED BY / DATE

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Sfc: thin alluvium, dry grasses, sandstone outcrops exposed nearby					Alluv./Bedr. contact Hard drilling 6" ↓
	2				Cuttings: lt. yellowish brown					
	3									
	4									Harder drilling
	5									
					Cuttings: olive yellow matrix w/ frags of well-cemented siltstone, olive yellow, dk. gray mudstone					
	10	X 100	50/4		Vert Fine sandstone, slightly cemented in sample, moist, olive yellow, well sorted					Color change
					Cuttings: light olive brown matrix, well-cemented vf sandstone with thin mudstone interbeds					
		X 100	12		vf sandstone, mod. well cemented,					Softer 14-17'
		X 100	35		grades to siltstone & claystone,					Possible fault gouge
	15	X 100	50/4		oxidized olive + yellowish brown, soft, gray NS clays, wet, w/ wood tissues					material (slickensides)

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZ 056

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	15									Poss. fracture zone
					Cuttings: fragments of mod. well cemented siltstone, dk. gray, dry					Bottom soft zone Hard drilling 17'
	↓	X	100	5/5	Olive siltstone, well-cemented, dry					
	20									
					Cuttings: as above, dk. olive gray					
	↓	X	100	5/3	Fine sandstone, oxidized yellowish brown, moist, some med. sand, micaceous, slight to moderate cementation					Very Hard Drilling 23.5'
	25									
					Cuttings: interbedded fine ss + gray siltstone, becomes gray at 27-28', competent w/ sandstone					Re-fusal w/ Auger
					Total Depth 28'					
	30				Backfilled w/ sand, bentonite chips, & cement grout as piezometer					

FIELD LOG OF BORING

BORING NUMBER **PZ057**

SHEET **1** OF **2**

PROJECT NAME NASA		PROJECT NUMBER 313150005	ELEVATION AND DATUM +80	LOCATION SEA PT-051	
DRILLING COMPANY Layne		DRILLER Enrique	DATE AND TIME STARTED 12/19/00 1300		DATE AND TIME COMPLETED 12/19/00 1500
DRILLING EQUIPMENT CME 750		DRILLING METHOD HSA	COMPLETION DEPTH 32.5		TOTAL NO. OF SAMPLES 6
SIZE AND TYPE OF BIT 8" Carbide Bullet(2), Shovel(2)		HOLE DIAMETER 8"	NO. OF SAMPLES	BULK 6	SS 6
DRILLING FLUID None		DRILLING ANGLE Vertical	WATER LEVEL	FIRST 22	AFTER <u>0.5</u> HOURS 21.5
SAMPLE HAMMER TYPE Hydraulic DRIVING WT. 140# DROP 30"			HYDROGEOLOGIST / DATE T. Buffon 12/19/00		CHECKED BY / DATE

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Sfc: flat, dry soils w/ dry grasses adj. to sandstone outcrop & concrete drainage					<3" Alluvium
	2									
	3									
	4									
	5				Fine sandstone, oxidized yellowish brown, dry, slightly cemented in cuttings.					Gradually harder drilling
	10	X 100	5/5		As above, moist, micaceous, with vt sand					Harder @ 9-10'
					Cuttings: As above, w/ med. & coarse sand, med. well cemented, less oxidation					
	15	X 100	5/3		Fragments are well-cemented, poorly sorted sandstone; sample is same, moist, olive brown, some yellowish brown oxidation					

FIELD LOG OF BORING

BORING NUMBER **PZ 058**

SHEET 1 OF 1

PROJECT NAME NASA	PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION SPA PT-052
DRILLING COMPANY Layne	DRILLER Enrique	DATE AND TIME STARTED 12/20/00 0735	DATE AND TIME COMPLETED 12/20/00 1000
DRILLING EQUIPMENT Layne CME 750	DRILLING METHOD HSA	COMPLETION DEPTH 16'	TOTAL NO. OF SAMPLES 2
SIZE AND TYPE OF BIT 8" Bullet(2), Shovel(2) Carbide	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK <input type="checkbox"/> SS <input checked="" type="checkbox"/> DRIVE <input type="checkbox"/> PITCHER <input type="checkbox"/>
DRILLING FLUID None	DRILLING ANGLE Vertical	WATER LEVEL	FIRST <input type="checkbox"/> AFTER <u>1</u> HOURS

SAMPLE HAMMER TYPE Hydraulic	DRIVING WT. 140*	DROP 30"	HYDROGEOLOGIST / DATE T. Burton 12/20/00	CHECKED BY / DATE
--	-------------------------	-----------------	--	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Sfc: low slope near drainage, oak trees + dry grass, shrubs					
	2				Hand Augered to 3.5' bgs.					
	3									Alluvium/Bedrock contact
	4									
	5				Weathered sandstone, color varies from grayish brown to olive brown, dry, vf-med. sands					Hard drilling Very hard drilling Intermittent hard + soft zones
					Color ch. again @ 6' to light brownish gray, mod. well cemented sandstone fragments, vf-med. as above					5-10'
	10	X	100%	50/2	Moderately well cemented sandstone, oxidized olive brown, moist, poorly sorted (fine-coarse) → saturated					
					Cuttings: color ch. to olive gray, frags. of sandstone, as above					Very hard @ 12' Oxidized/Gray contact (approx)
	15	X	100%	50/	Color ch. to gray N6 well-cemented sandstone vf-med. saturated					Overdrilled to 16' (TD)

NATIVE MATERIAL SLOUGHED IN TO 15.5'

FIELD LOG OF BORING

BORING NUMBER **PZ 059**

SHEET 1 OF 2

PROJECT NAME NASA	PROJECT NUMBER 313190005	ELEVATION AND DATUM TBD	LOCATION Bravo Pond PT-049
DRILLING COMPANY Layne	DRILLER Enrique	DATE AND TIME STARTED 12/20/00 1045	DATE AND TIME COMPLETED 12/20/00 1405
DRILLING EQUIPMENT CME 750	DRILLING METHOD HSA	COMPLETION DEPTH 24'	TOTAL NO. OF SAMPLES 4
SIZE AND TYPE OF BIT 8" Carbide Bullet(2), Shovel(2)	HOLE DIAMETER 8"	NO. OF SAMPLES	BULK SS 4
DRILLING FLUID None	DRILLING ANGLE Vertical	WATER LEVEL	FIRST AFTER _____ HOURS
SAMPLE HAMMER TYPE Hydraulic	DRIVING WT. 140*	DROP 30"	HYDROGEOLOGIST / DATE T. Burton 12/20/00
			CHECKED BY / DATE

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	1				Sfc: Thick brush; dry, loose soils at drainage inlet to Bravo Pond					
	2									Alluvium / Bedrock contact
	3									
	4				Cuttings: yellowish brown siltstone, mod. cementation					
	5									
					Cuttings: oxidized sandstone					
					Dark greenish gray cuttings, Jet Fuel odor					dk. greenish gray olive green
	10	X 100	10		Medium sandstone, moist-wet, with fine granitic gravel + coarse sand, moderately cemented					Lith/Color change
					Cuttings are silty, moist, light olive brown (11'), dk. gray fragments of poorly cemented siltstone					
	15	X 100	50/3		Oxidized sandstone, slightly cemented, vf-coarse, moist, yellowish brown					Hard Drilling 13.5'

FIELD LOG OF BORING

BORING NUMBER **P2060**

SHEET **1** OF **3**

PROJECT NAME SSFL smou		PROJECT NUMBER 31310005	ELEVATION AND DATUM TBD	LOCATION ALPHA PT 045	
DRILLING COMPANY Layne		DRILLER R. Gonzalez	DATE AND TIME STARTED 12-26-00		DATE AND TIME COMPLETED 12/26/00
DRILLING EQUIPMENT CME-95		DRILLING METHOD Hollow stem Aug	COMPLETION DEPTH 49'		TOTAL NO. OF SAMPLES
SIZE AND TYPE OF BIT 6"		HOLE DIAMETER 6"	NO. OF SAMPLES	BULK	SS
DRILLING FLUID None		DRILLING ANGLE Vert.	WATER LEVEL	FIRST	AFTER _____ HOURS

SAMPLE HAMMER TYPE		DRIVING WT.	DROP	HYDROGEOLOGIST / DATE R. SINGER	CHECKED BY / DATE
--------------------	--	-------------	------	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
					Hand Auger - Back-fill - silty sand with crushed rock					soft
										CONSISTENT
	8				80% fill to 4.2 - shale - gray/blue highly weathered. 5B 06/1 (shale 4" bottom of spoon) moist					CONSISTENT
	9				100% weathered bedrock? shale? NO recovery					HARDEN 9'
										CONSISTENT
	14				100% shale - gray/blue 5B 4/1 moist - weathered (more compact than 4')					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P-2060

SHEET 2 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	15									CONSISTENT
										Softer 12'
	19			100%	Shale - Gray/Blue 5B411 moist - can weathered - (same as 14')					CONSISTENT
	24			100%	Shale - Gray Blue 5B611 - moist more weathered than above					CONSISTENT
	29			100%	Shale - Gray Blue 5B611 moist - weathered as above					CONSISTENT
	34			100%	Shale? weathered Bedrock? NO RECOVERY					CONSISTENT

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER **PZ060**

SHEET **9** OF **3**

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	35									Header 35
										CONSISTENT
	39			100/67	Shale Gray Blue SB 6/1 weathered as above moist					co
										CONSISTENT
	44			1/2	Shale Gray Blue SB 6/1 weathered as above moist					
										CONSISTENT
	49			100/8	Shale - Gray Blue SB 6/1 moist more compact.					End boring

BORING NUMBER P2062

SHEET 2 OF 2

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	15			100 1/2	POOR RECOVERY - weathered sandstone V-f-f - Lt Brn 2.5 Y 6/4, moist - cemented - some what competent.		80	20		CONSTITUTION 50 ft to 18'
	20			100 2	weathered sandstone V-f-f sand gray - Brn 2.5 Y 6/3, moist cemented fairly competent		80	20		CONSTITUTION Harder @ 23'
	25			100 2	weathered sandstone V-f-f sand gray TN, moist well cemented very comp dense					Harder @ 24' End Boring 27.3'
					oxidized weathered sandstone & more oxidized (gray) sand weathered sandstone 23-25'					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZ #63

SHEET 3 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	38			30	weathered sandstone fv-f with some med sand - red Lt Brn 2.5 Y 5/6 with dk red Brn mottling - moist slight cementation		85	15	CONSISTANT	
	40			10 1/2	weathered sandstone vf-s. sand. Lt Brn 2.5 Y 6/6 moist slight cementation				CONSISTANT	
	45			10 1/2	weathered sandstone vf-f sand Lt Brn 2.5 Y 5/6 moist highly weathered - little cementation		85	15	Harder 4/6' CONSISTANT	
	50			11 1/2	weathered sandstone vf-f sand Lt Brn 2.5 Y 5/6 Red Brn mottling - moist - little cementation		85	15	TD = 50'	

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2064

SHEET 4 OF 4

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	55			100%	weathered sandstone N7-S and LT part 2.5' 4/6 moist - well cemented - fairly competent		80	20		55-58' 15-16'
										Harder 58'
										58-61' 15-16'
	61			100%	weathered sandstone FV-Sm Gray N7 - well cemented very competent		90	10		End of boring

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	35			1/2	weathered sandstone - K-f sandy - 1/4 Brn. Highly fractured some cementation highly weathered		80	20		CONTINUED
										Hardens @ 38
	40				weathered shale - gray ^{SB} silt moist fairly compact					CONTINUED
										Hardens 44
	45		100%		NO RECOVERY					end of Boring
					BENTONITE EMPLACED FROM 40' - 45'					

FIELD LOG OF BORING

BORING NUMBER **P2066**

SHEET **1** OF **4**

PROJECT NAME SSFL SMOU		PROJECT NUMBER 3131500005	ELEVATION AND DATUM TBD	LOCATION PT-006 IEL	
DRILLING COMPANY LAYNE		DRILLER Ruber	DATE AND TIME STARTED 01-09-01		DATE AND TIME COMPLETED 1/12/01
DRILLING EQUIPMENT CME-95		DRILLING METHOD Hollow Stem Auger	COMPLETION DEPTH 55		TOTAL NO. OF SAMPLES
SIZE AND TYPE OF BIT 6"		HOLE DIAMETER 6"	NO. OF SAMPLES	BULK	SS
DRILLING FLUID None		DRILLING ANGLE Vert.	WATER LEVEL	FIRST	AFTER _____ HOURS
SAMPLE HAMMER TYPE			DRIVING WT.		DROP
HYDROGEOLOGIST / DATE R. SINGER			CHECKED BY / DATE		

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
					Hand Auger - Alluvium sandy silt rd BRN 10YR 4/6 - becoming lt brn with depth - 10 YR - 6/8 - moist		70	80		Soft
					Alluvium / Bedrock 4'-5'					Hard @ 4'
	5			100/6	weathered sandstone vf-f sand lt brn 2.5 Y 6/6 - moist some cementation - highly weathered		75	25		CONDENSATION
	10			100/6	weathered sandstone vf-f sand lt brn 2.5 Y 6/6 moist some cementation - highly weathered		70	20		

BORING NUMBER PZP6L

SHEET 3 OF 4

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	35				weathered sandstone U-F sand - 1/2 bar 6/16 - moist some cementation - highly weathered, some rd bar mottling		80	20		
										Harder @ 38.5
	40			100 12	weathered sandstone U-F sand 1/2 bar 2.5 x 6/16 moist some cementation highly weathered		80	20		
										Harder @ 44
	45			180 3	weathered sandstone U-F sand 1/2 bar 2.5 x 6/16 with rd bar mottling - moist some cementation - highly weathered		80	20		5 2 4 1 5 FT softer @ 47
										Harder @ 49
	50			100 2	weathered sandstone U-F sand 1/2 bar 2.5 x 6/16 with rd bar mottling - moist some cementation - highly weathered		85	15		CONTINUED

P2067B

FIELD LOG OF BORING

BORING NUMBER **P2067B**

SHEET 1 OF 4

PROJECT NAME <i>SSFL smou</i>	PROJECT NUMBER <i>313150005</i>	ELEVATION AND DATUM <i>TBD</i>	LOCATION <i>P1009 B</i>
DRILLING COMPANY <i>Layne</i>	DRILLER <i>Ruber</i>	DATE AND TIME STARTED <i>01-15-01</i>	DATE AND TIME COMPLETED <i>01-15-01</i>
DRILLING EQUIPMENT <i>cm2-95</i>	DRILLING METHOD <i>No flow stem Aug</i>	COMPLETION DEPTH <i>65</i>	TOTAL NO. OF SAMPLES
SIZE AND TYPE OF BIT <i>6"</i>	HOLE DIAMETER <i>6"</i>	NO. OF SAMPLES	BULK SS DRIVE PITCHER
DRILLING FLUID <i>None</i>	DRILLING ANGLE <i>Vert.</i>	WATER LEVEL	FIRST AFTER _____ HOURS

SAMPLE HAMMER TYPE	DRIVING WT.	DROP	HYDROGEOLOGIST / DATE R. SINGER	CHECKED BY / DATE
--------------------	-------------	------	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
					<i>Hard Auger - Beckel 11/6</i>			<i>25</i>	<i>75</i>	<i>silt</i>
					<i>Approx 4" Alluvium and</i>					
					<i>4 Sand - silt - med Br</i>					
					<i>104R 4/4 moist</i>					
	<i>5</i>			<i>10/18</i>	<i>Alluvium - sandy silt</i>			<i>40</i>	<i>60</i>	<i>SMILT H Z T CON T I N E R T</i>
					<i>med Br 104R 6/4 moist</i>					
	<i>10</i>			<i>10/18</i>	<i>Alluvium Sandy Silt</i>			<i>40</i>	<i>60</i>	
					<i>med Br 104R 6/18 moist</i>					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2067B

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	55			50/6	weathered sandstone - V-F of sand matrix w/ Brn 2.5 y 6/8 matrix some cementation less than above highly weathered		80	20		
	60			100/4	weathered sandstone V-F sand w/ Brn 2.5 y 6/6 - matrix some cementation - highly weathered		80	20		
	65				no sample				end of boring	
					BENTONITE EMPLACED FROM 59'-65'					

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER P2068

SHEET 2 OF 4

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	15			100/4	Weathered Sandstone V-f-f Sand 4 Bar 2.5 Y 6/6 moist. Some cementation - highly weathered		70	30		↓ Soils @ 17
	20			100/4	Weathered Sandstone - v-f-f sand 4 Bar 2.5 Y 6/6 with red Bar mottling. moist - some cementation highly weathered		70	30		CONSISTENT ↓ Harder @ 22'
	25			100/4	Weathered Sandstone v-f-f sand 4 Bar 2.5 Y 6/6 moist. some cementation - very weathered		70	30		↓ Harder @ 27
	30			100/3	Weathered Sandstone V-f-f Sand 4 Bar 2.5 Y 6/6 moist some cementation highly weathered		75	25		↓ CONSISTENT ↓ Harder @ 33

FIELD LOG OF BORING

BORING NUMBER **P2069**

SHEET **1** OF **3**

PROJECT NAME SEELSMOK		PROJECT NUMBER 313150005	ELEVATION AND DATUM TBD	LOCATION PT 013
DRILLING COMPANY LAyne		DRILLER R. Singer	DATE AND TIME STARTED 1-18-01	DATE AND TIME COMPLETED 1-18-01
DRILLING EQUIPMENT CMZ-9.5		DRILLING METHOD Hollow stem	COMPLETION DEPTH 49.8	TOTAL NO. OF SAMPLES
SIZE AND TYPE OF BIT 6"		HOLE DIAMETER 6"	NO. OF SAMPLES	BULK SS DRIVE PITCHER
DRILLING FLUID None		DRILLING ANGLE Vert.	WATER LEVEL	FIRST AFTER _____ HOURS

SAMPLE HAMMER TYPE DRIVING WT. DROP			HYDROGEOLOGIST / DATE R. SINGER	CHECKED BY / DATE
--	--	--	---	-------------------

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
					Hand dug Backfill to 2.5' Alluvium sandy silt Lt Br 2.5 y 6/6 moist		30	76		Soft Backfill
					Alluvium / Beachrock 4-6'					Softer 3.5'
	5		100%		weathered Sandstone fV-f sand Lt Br 2.5 y 6/6 moist. Some cementation - highly weathered		75	28		consistency
	10		45%		weathered Sandstone V-f-f sand Lt Br 2.5 y 6/6 with red pm mottled some cementation highly weathered		75	25		consistency

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZ 069

SHEET 3 OF 3

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	F	
	35			50/6	weathered sandstone ft-f sand lt. Brn 2.5 Y 6/6 moist - some cementation - highly weathered		80	20		
									Harder @ 38	
	40			100/5	Weathered Sandstone ft-f sand lt. Brn 2.5 Y 6/6 moist - some cementation highly weathered		80	20		
									CONTINUED DOWN	
	45			100/6	weathered Sandstone ft-f sand. lt. Brn 2.5 Y 6/6 - moist - (more than above) some cementation - highly weathered (water at 45')		75	25		
									DOWN START	
	50			100/5 (100/5)	Weathered Sandstone ft-f sand 2.5 Y 6/6 - moist highly mottled - some cementation - Interbedded with highly weathered silt				End of boring 49.8' (TD)	

FIELD LOG OF BORING (CONTINUED)

BORING NUMBER PZ 070

SHEET 2 OF 2

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF			COMMENTS
							GR	SA	FI	
	15									
										Very hard 14-19'
					Cuttings wet @ 16-17' approx					
					greenish gray cuttings (matrix)					color change (approx)
					lighter yellowish/grayish brown matrix					
		X	100	50/2						
	20				vf-fine sandstone, yellowish brown, moist, slightly cemented in sample					Softer @ 21'-23'
					matrix is yellowish brown					
					" " light grayish brown					
					at 23' darker grayish brown					Color change; Harder Drilling
		X	80	50/5						
	25				Sandstone, vf-med. grained, moist, pale olive					
										Same Drill rate
		X	100	50/5						
	30				Poorly sorted sandstone, as above, moist, slight cementation in sample, yellowish brown (oxidized)					
										Same drill rate
		X	100	50/5						
	35				Interbeds of silt + sand, olive gray & olive yellow, respectively, 1-2" thick, mod. well cemented, moist					

