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LA-14437-PR
Progress Report
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Groundwater Level Status Report for 2010 Los Alamos National Laboratory

Richard J. Koch
Sarah Schmeer

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Groundwater Level Status Report for 2010 Los Alamos National Laboratory

by

Richard J. Koch and Sarah Schmeer

Abstract

The status of groundwater level monitoring at Los Alamos National Laboratory in 2010 is provided in this report. This report summarizes groundwater level data for 194 monitoring wells, including 63 regional aquifer wells (including 10 regional/intermediate wells), 34 intermediate wells, 97 alluvial wells, and 12 water supply wells. Pressure transducers were installed in 162 monitoring wells for continuous monitoring of groundwater levels. Time-series hydrographs of groundwater level data are presented along with pertinent construction and location information for each well. The report also summarizes the groundwater temperatures recorded in intermediate and regional aquifer monitoring wells and seasonal responses to snowmelt runoff observed in intermediate wells.

1.0 Introduction

This report presents and describes groundwater level data obtained by Los Alamos National Laboratory (LANL) during Fiscal Year (FY) 2010 to provide regulatory compliance and to provide other programs at LANL with groundwater level data as a resource for groundwater modeling and data assessment. The Groundwater Level Monitoring (GWLM) Project was instituted in 2005 to meet New Mexico Environment Department Compliance Order on Consent (Consent Order) requirements to collect groundwater level data.

During 2010, 63 regional aquifer monitoring wells containing 106 regional aquifer screens, 30 intermediate wells and 10 intermediate/regional monitoring wells comprising 57 intermediate screens, 97 alluvial wells, and 12 Los Alamos County (LAC) water supply wells were monitored for groundwater levels. Ten of the multiple completion regional aquifer wells monitored one or more intermediate zones; however, at least one intermediate zone was dry in seven of these wells. Six of the multiple completion regional aquifer wells also monitored intermediate groundwater levels.

Pressure transducers were installed in 61 regional aquifer wells and 30 intermediate wells; periodic manual measurements were obtained from four intermediate wells, which are typically dry and are monitored annually. Transducers were installed in 92 alluvial wells during 2010 and five alluvial wells were monitored with periodic manual measurements. Transducers have been installed in all 12 LAC water supply wells through the cooperation and efforts of the LAC Utilities Department personnel.

This report includes groundwater level data obtained during FY 2010 (October 1, 2009, through September 30, 2010) and, where available, historical data and data obtained after September 30, 2010. The groundwater level data are presented in time-series hydrographs to provide a comprehensive representation of the groundwater level characteristics, to the extent possible with available data. For the alluvial wells, the first hydrograph for each well represents the entire period of record, while the second hydrograph represents the most recent two or three years of data to provide better representation of recent and seasonal changes.

2.0 Description of Groundwater Level Data

The GWLM Project at LANL is conducted under the Quality Assurance Project Plan (QAPP) for Groundwater Level Monitoring (LANL 2006) to assure the quality of groundwater level data. The QAPP contains the work processes and the data quality objectives utilized in the GWLM Project.

Groundwater level data were collected during 2010 according to the criteria outlined in the 2010 Interim Facility-Wide Groundwater Monitoring Plan (LANL 2010). Two types of groundwater level data were collected:

- manual groundwater level measurements were obtained in monitoring wells, supply wells, and boreholes and
- pressure transducers were used to measure groundwater levels in monitoring wells and supply wells.

Manual groundwater level measurements were obtained according to Environmental Program Directorate (EPD) standard operating procedure (SOP) 5223 (formerly ENV-SOP-202), *Manual Groundwater Level Measurements*. Transducer measurements were obtained according to EPD SOP 5227 (formerly ENV-SOP-201), *Pressure Transducer Installation, Removal, and Maintenance*, and EPD SOP 5226 (formerly ENV-WQH-SOP-064), *Westbay® Pressure Transducer Installation, Removal, and Maintenance*. Groundwater level data obtained both manually and with pressure transducers were reviewed and validated according to EPD SOP 5230 (formerly ENV-WQH-SOP-062), *Groundwater Level Data Processing, Review, and Validation*.

Wells installed with pressure transducers had measurements collected at least hourly. Where possible, manual groundwater level measurements were obtained at least semi-annually to provide quality control for the transducer measurements. In the following sections, both manual measurements and transducer measurements are shown on the time-series hydrographs. Because hourly transducer measurements are too voluminous to reproduce for most hydrographs, mean daily groundwater levels are shown on most hydrographs in this report. Some monitoring wells have significant drawdown when pumped during sampling events. Because pumping of the monitoring wells for sampling usually occurs over several hours, the mean daily water level value will not usually portray the full amount of drawdown experienced during pumping of a well. For this reason, mean daily water level data are not usually appropriate for determining well characteristics such as specific capacity, etc.

Transducers that measure pressure head in wells typically have a measurement precision of ±0.1% of the full-scale measurement capability. Thus, typical measurement accuracy for a 100-psi transducer is 0.23 ft, and for a 500-psi transducer is 1.2 ft. The higher-pressure-rated transducers are required in the deeper Westbay® installations where higher water pressures are encountered. Most shallow wells and deep wells not installed with the Westbay® sampling system are equipped with 30-psi transducers, with a measurement accuracy of 0.07 ft. A few of the shallow alluvial wells are equipped with 15-psi transducers. Manual groundwater level measurements typically have an accuracy of approximately 0.1 ft per 100 ft of measurement (0.1%).

From 2000 through 2004, groundwater level data obtained during groundwater sampling of Westbay® wells was from a 1000-psi-rated transducer that had an accuracy of about ±2.3 ft. In 2005 new sampling transducers with a 500-psi rating were obtained, which have an accuracy of about 1.2 ft. The higher accuracy of the new Westbay® sampling transducers is the cause for the apparent water level shift for sampling water levels in mid 2005, as observed on many of the accompanying hydrographs for Westbay® wells. Similarly, the apparent scatter of sampling water levels on hydrographs from Westbay® wells is the result of the higher-pressure-rated and less accurate transducers that are used for sampling.

In the following sections, acronyms used to describe groundwater level data include

GW	data obtained from transducers during groundwater sampling events
Trans	measurements from transducers installed in a well
MP	Measurement Port identification in multiple completion Westbay® wells
RT	Regional aquifer top screen
RD	Regional aquifer deeper screen
I	Intermediate perched groundwater
A	Alluvial groundwater

Geologic unit codes used in the construction information tables are listed in Appendix A; Appendix B presents mean annual water level data; Appendix C summarizes transient responses to supply well pumping; Appendix D summarizes intermediate groundwater level responses to runoff; and groundwater temperature data are summarized for regional and intermediate wells in Appendix E.

Previous reports of groundwater level data at LANL were compiled for the regional aquifer test wells (TWs) by Koch et al. (2004) and for all wells in a submittal to the New Mexico Environment Department in January 2005 (LANL 2005). Groundwater levels in water supply wells at Los Alamos have been summarized in the series of water supply reports for Los Alamos, e.g., Koch and Rogers (2003). The previous reports in this series are as follows: *Groundwater Level Status Report for 2005,* issued in May 2006 (Allen and Koch 2006); *Groundwater Level Status Report for Fiscal Year 2006,* issued in March 2007 (Allen and Koch 2007); *Groundwater Level Status Report for Fiscal Year 2007,* issued in March 2008 (Allen and Koch 2008); *Groundwater Level Status Report for 2008,* issued in March 2009 (Koch and Schmeer 2009), and *Groundwater Level Status Report for 2009,* issued in March 2010 (Koch and Schmeer 2010).

3.0 Groundwater Level Data from Regional Aquifer Wells

Figure 3-1 shows the locations of the regional aquifer monitoring wells and water supply wells in the vicinity of LANL. Table 3-1 lists the regional aquifer monitoring wells that were monitored for groundwater levels in 2010. Screen intervals and port depths for each well are shown in subsequent sections.

The Appendix B table lists the mean annual water level for 2010 for each well screen located at the top of the regional aquifer. Figure 3-1 also shows the mean annual regional aquifer groundwater elevation for monitoring wells and the mean annual non-pumping water level for supply wells. Appendix C Table C-1 summarizes the transient responses observed in monitoring wells that result from supply well pumping at Los Alamos.

In the following sections reference is made to the barometric efficiency of some monitoring wells. Barometric efficiency is defined as the ratio of the water level change observed in a well divided by the concurrent atmospheric pressure change, expressed as a percentage. For a given change in atmospheric pressure, if the water in a well responds by an equal amount, the well is said to have 100% barometric efficiency; however, this type of response by the water in the well can occur only when the aquifer adjacent to the well does not experience the atmospheric pressure change. Thus, a well with a 100% barometric efficiency is installed into an aquifer that does not experience the atmospheric pressure fluctuations.

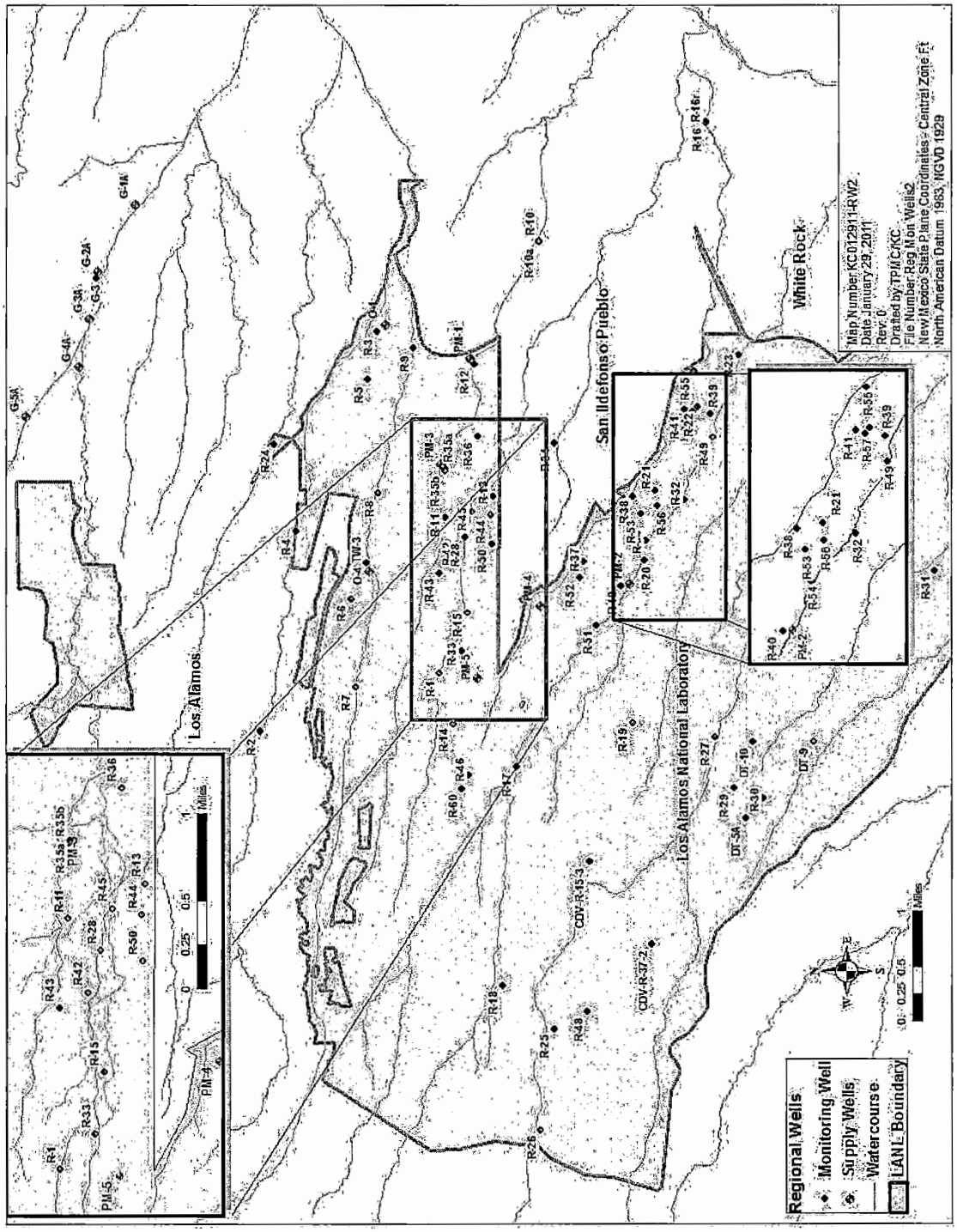


Figure 3-1. Regional aquifer monitoring wells and supply wells.

Table 3-1. Location Information for Regional Aquifer Monitoring Wells

Well Name	Date Completed	Completed Depth (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)
CdV-R-15-3	9/24/2000	1675.0	1623221.00	1762349.20	7258.90
CdV-R-37-2	8/1/2003	1587.3	1619218.96	1759327.28	7330.60
R-1	3/12/2004	1080.1	1632354.13	1769600.84	6881.21
R-2	10/28/2003	943.3	1629519.57	1778281.56	6770.38
R-3	6/21/2010	1006.8	1649037.61	1772598.75	6395.88
R-4	1/6/2004	840.0	1639287.98	1776530.28	6577.49
R-5	6/19/2001	884.0	1646707.00	1773063.00	6472.60
R-6	12/4/2004	1252.0	1636011.02	1773884.07	6995.80
R-7	2/26/2001	977.0	1631666.00	1773653.00	6779.20
R-8	4/22/2002	850.0	1641139.01	1772554.62	6544.74
R-9	10/18/1999	758.0	1648236.50	1770847.10	6382.80
R-10	10/5/2005	1079.0	1653465.92	1764766.46	6362.31
R-10a	8/18/2005	706.0	1653411.63	1764782.29	6363.74
R-11	10/8/2004	901.7	1639959.31	1769353.57	6673.72
R-13	10/6/2001	1029.4	1640991.66	1766994.17	6673.05
R-14	12/19/2002	1315.6	1629855.01	1768953.12	7062.08
R-15	9/21/1999	1030.6	1635308.60	1768272.50	6820.00
R-16	12/19/2002	1276.7	1659283.61	1756710.97	6256.87
R-16r	10/11/2005	631.4	1659289.39	1756730.68	6256.97
R-17	1/4/2006	1140.9	1627795.96	1765861.23	6921.51
R-18	12/14/2004	1405.0	1617254.37	1766545.47	7404.83
R-19	9/19/2000	1877.4	1629918.40	1760252.10	7066.30
R-20	12/19/2002	1353.3	1637835.40	1759694.51	6694.35
R-21	11/26/2002	941.4	1641284.17	1759143.06	6656.24
R-22	12/10/2000	1472.9	1645324.40	1757111.10	6650.50
R-23	10/2/2002	886.3	1647913.60	1755165.37	6527.75
R-24	9/12/2005	861.0	1643554.46	1777591.35	6547.38
R-25	9/28/2000	1934.7	1615178.42	1764060.50	7516.10
R-26	10/17/2003	1479.0	1610267.23	1764721.12	7641.69
R-27	11/7/2005	878.7	1629230.52	1756296.28	6713.72
R-28	12/17/2003	980.3	1638988.73	1768358.57	6728.61
R-29	3/12/2010	1191.8	1626779.91	1755383.32	7100.75
R-30	4/3/2010	1171.8	1626287.74	1753921.18	7073.84
R-31	12/1/2000	1077.7	1637353.80	1745648.40	6362.50
R-32	11/17/2002	1002.0	1640797.67	1757730.25	6637.63
R-33	10/13/2004	1126.0	1633401.71	1768532.65	6853.33
R-34	9/10/2004	920.7	1643595.82	1764028.77	6629.99
R-35a	6/21/2007	1086.2	1642326.53	1769310.85	6623.06
R-35b	7/11/2007	872.2	1642234.75	1769322.98	6625.21
R-36	2/12/2008	803.7	1643907.07	1767736.64	6591.37
R-37	6/6/2009	1068.8	1637828.13	1762616.71	6870.59
R-38	12/7/2008	853.4	1640998.66	1760235.07	6668.58
R-39	12/1/2008	875.6	1644995.98	1756488.99	6580.86
R-40	1/5/2009	895.0	1636628.23	1760801.14	6719.24
R-41	3/19/2009	997.1	1645217.12	1757745.55	6660.53
R-42	8/27/2008	973.5	1637709.96	1768775.73	6759.02
R-43	10/17/2008	990.4	1637236.21	1769614.70	6732.65
R-44	1/15/2009	1016.0	1640061.34	1767109.85	6714.91
R-45	1/24/2009	1016.0	1640249.62	1768017.72	6704.02
R-46	2/26/2009	1383.8	1627433.85	1768183.02	7213.33
R-48	9/26/2009	1540.0	1615977.33	1762436.24	7486.78
R-49	6/1/2009	949.3	1643900.90	1756401.85	6584.54
R-50	2/13/2010	1217.5	1638666.13	1767087.32	6904.11
R-51	2/8/2010	1046.1	1634685.79	1761983.36	6762.17
R-52	4/5/2010	1128.7	1636988.93	1762825.71	6883.04
R-53	3/29/2010	1001.9	1640109.61	1759860.57	6689.98
R-54	1/29/2010	936.0	1638803.48	1759602.87	6679.85
R-55	8/25/2010	1021.0	1647083.52	1757272.15	6533.86
R-56	7/19/2010	1078.8	1640507.31	1759044.73	6780.88
R-57	6/8/2010	1013.8	1645109.00	1757337.71	6648.04
R-60	10/18/2010	1360.9	1626734.38	1768514.75	7228.17
Test Well 3	11/20/1949	815.0	1637727.50	1773138.12	6626.90
Test Well DT-10	3/13/1960	1408.0	1628988.50	1754448.75	7019.90
Test Well DT-5A	1/25/1960	1819.5	1625310.00	1754789.37	7143.86
Test Well DT-9	2/19/1960	1501.0	1628993.62	1751492.62	6935.00

3.1 CdV-R-15-3

Location: CdV-R-15-3 is located on a mesa between upper Three-Mile Canyon and Cañon de Valle within the Cañon de Valle watershed.

Completion Type: Multiple completion, three screens in intermediate vadose zones, three screens in regional zones.

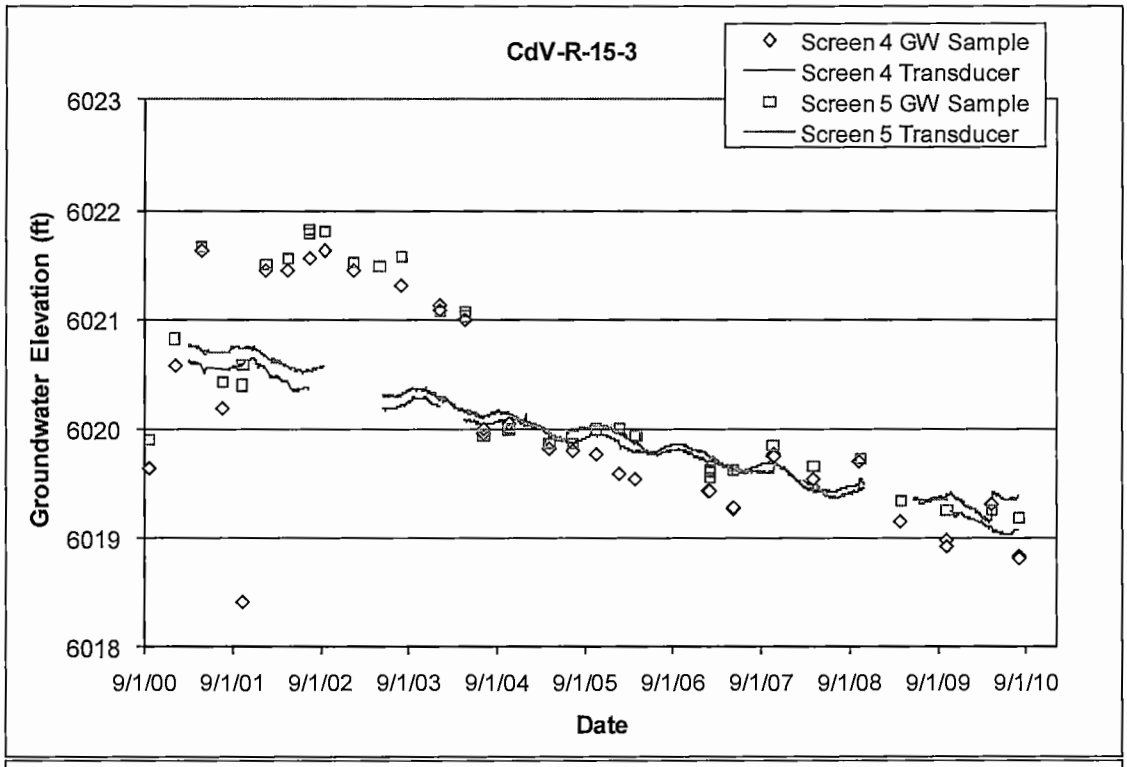
Period of Record: Westbay® installed September 17, 2000; transducers installed March 1, 2001; intermittent data to August 2, 2010, when the transducers were removed in preparation for Westbay® system removal and well testing. The transducers were removed for several months in 2009 to rebuild the cables.

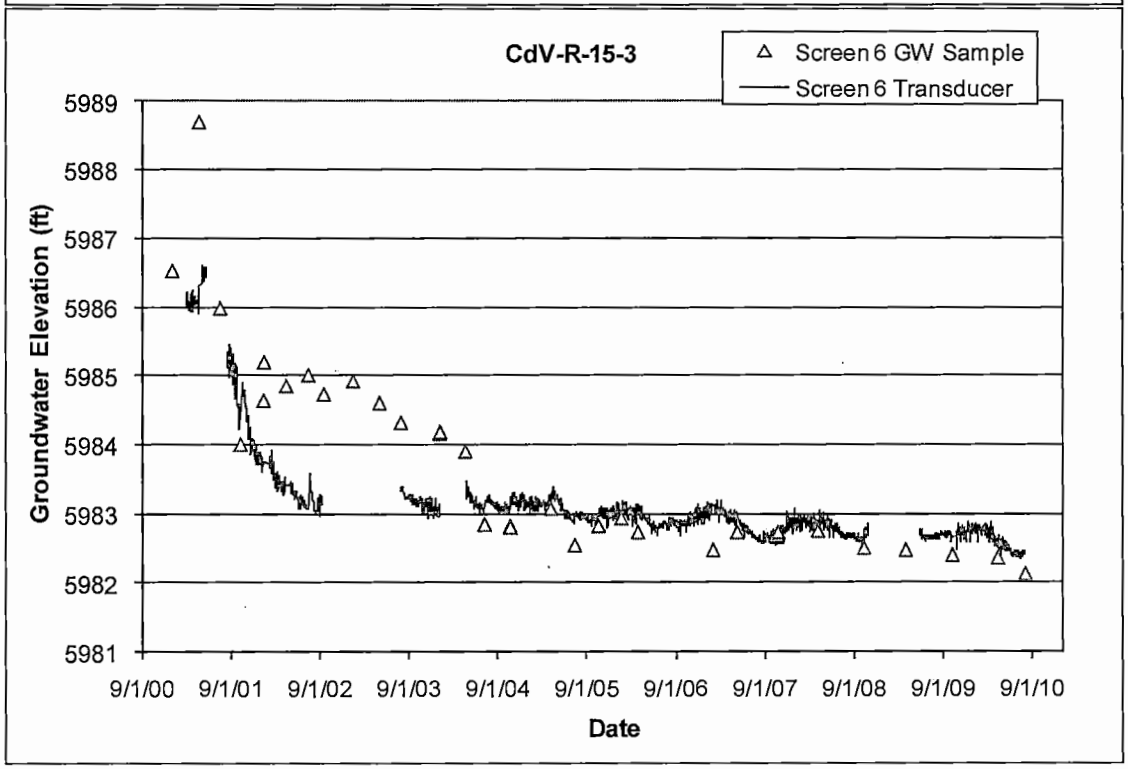
Remarks: The three intermediate screens have been dry since well installation. A transducer was never installed at screen 2. Transducers monitoring dry screens 1 and 3 were removed in January 2006. Regional screens 4 and 5 have similar heads; screen 6 head is 35 ft lower. Westbay® monitoring port MP6B has not been operational since the system was installed (Kopp et al. 2002, p. 38). Six ft of water appeared in the screen 3 sump at port MP3C October 2006; sump water still present in 2010. Screens 4 and 5 do not indicate a water level response to atmospheric pressure fluctuations; screen 6 indicates a 30% response to atmospheric pressure.

Measurement and Sampling Ports in CDV-R-15-3

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Hydro Zone Code	Geo Unit Code	Port	Port Depth (ft)	Port Elev (ft)	Port Distance from Bottom of Screen (ft)	Comment
1	617.7	624.5	6641.2	6634.4	6.8	I	Qbo	MP1A	624.3	6634.6	0.2	Within Screen, port dry
								PP1	629.7	6629.2	-5.2	Below Screen
								MP1B	635.3	6623.6	-10.8	Below Screen, port dry
2	800.8	807.8	6458.1	6451.1	7.0	I	Tpf	MP2A	807.3	6451.6	0.5	Within Screen, port dry
								PP2	812.6	6446.3	-4.8	Below Screen
								MP2B	818.3	6440.6	-10.5	Below Screen
3	964.8	980.9	6294.1	6278.0	16.1	I	Tb4	MP3A	969.0	6289.9	11.9	Within Screen, port dry
								MP3B	979.3	6279.6	1.6	Within Screen, port dry
								PP3	984.7	6274.2	-3.8	Below Screen
								MP3C	990.3	6268.6	-9.4	Below Screen, 6' water in sump
4	1235.1	1278.9	6023.8	5980.0	43.8	RT	Tpf	**MP4A**	1254.4	6004.5	24.5	Within Screen, Regional Aquifer
								PP4A	1259.6	5999.3	19.3	Within Screen
								MP4B	1275.1	5983.8	3.8	Within Screen
								PP4B	1280.5	5978.4	-1.6	Below Screen
								MP4C	1286.1	5972.8	-7.2	Below Screen
5	1348.4	1355.3	5910.5	5903.6	6.9	RD	Tpf	**MP5A**	1350.1	5908.8	5.2	Within Screen
								PP5	1355.4	5903.5	-0.1	Below Screen
								MP5B	1361.1	5897.8	-5.8	Below Screen
6	1637.9	1644.8	5621.0	5614.1	6.9	RD	Tpf	**MP6A**	1640.1	5618.8	4.7	Within Screen
								PP6	1645.5	5613.4	-0.7	Below Screen
								MP6B	1651.1	5607.8	-6.3	Below Screen, Port inoperational

Note: CDV-R-15-3 Brass Cap Ground Elevation: 7258.9 ft; all measurements are from this elevation;
MP = Monitor Port; PP = Pump Port; Monitor Ports shown in bold are instrumented ports


CdV-R-15-3
Screen 4 GW Sample
Screen 4 Transducer
Screen 5 GW Sample
Screen 5 Transducer
Groundwater Elevation (ft)
6023
6022
6021
6020
6019
6018
9/1/00
9/1/01
9/1/02
9/1/03
9/1/04
9/1/05
9/1/06
9/1/07
9/1/08
9/1/09
9/1/10
Date


CdV-R-15-3
Screen 6 GW Sample
Screen 6 Transducer
Groundwater Elevation (ft)
5989
5988
5987
5986
5985
5984
5983
5982
5981
9/1/00
9/1/01
9/1/02
9/1/03
9/1/04
9/1/05
9/1/06
9/1/07
9/1/08
9/1/09
9/1/10
Date

3.2 CdV-R-37-2

Location: CdV-R-37-2 is located on a mesa between Cañon de Valle and Water Canyon at Technical Area (TA) 37 in the Water Canyon watershed.

Completion Type: Multiple completion, one screen in an intermediate vadose zone, three screens in regional zones.

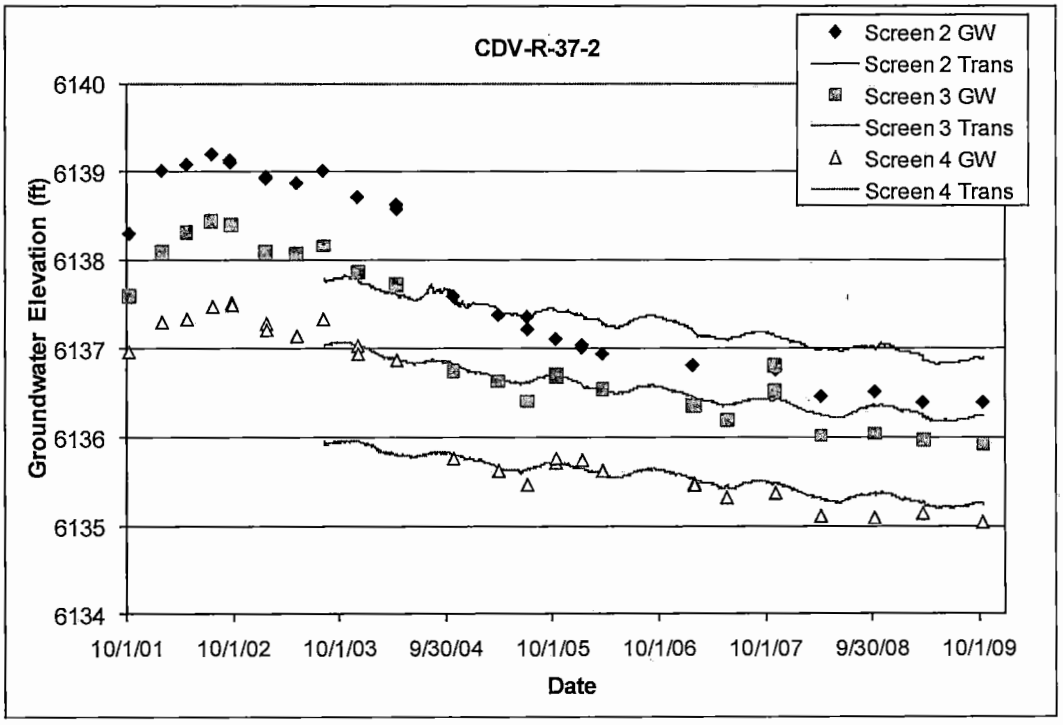
Period of Record: Westbay® installed October 8, 2001; transducers installed August 8, 2003; data to August 09, 2010, when the transducers were removed in preparation for Westbay® system removal and well testing.

Remarks: The intermediate screen has been dry since well installation; the transducer at this screen was removed in January 2006. The three regional screens have similar heads that show downward gradient of about 1 ft between each screen. The screens do not indicate a water level response to atmospheric pressure fluctuations.

Measurement and Sampling Ports in CDV-R-37-2

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Hydro Zone Code	Geo Unit Code	Port	Port Depth (ft)	Port Elevation (ft)	Distance from Bottom of Screen (ft)	Comment
1	914.4	939.5	6416.2	6391.1	25.1	I	Tp	MP1A	934.9	6395.7	4.6	Within Screen (Dry)
								PP1	940.2	6390.4	-0.7	Below Screen
								MP1B	945.9	6384.7	-6.4	Below Screen
2	1188.7	1213.8	6141.9	6116.8	25.1	RT	Tt	**MP2A**	1200.3	6130.3	13.5	Within Screen
								PP2	1205.7	6124.9	8.1	Within Screen
								MP2B	1216.2	6114.4	-2.4	Below Screen
3	1353.7	1377.1	5976.9	5953.5	23.4	RD	Tt	**MP3A**	1359.3	5971.3	17.8	Within Screen
								PP3	1365.0	5965.6	12.1	Within Screen
								MP3B	1375.2	5955.4	1.9	Within Screen
4	1549.3	1556.0	5781.3	5774.6	6.7	RD	Tt	**MP4A**	1550.6	5780.0	5.4	Within Screen
								PP4	1556.0	5774.6	0	Base of Screen
								MP4B	1561.6	5769.0	-5.6	Below Screen

Note: CDV-R-37-2 Brass Cap Ground Elevation: 7330.6 ft; all measurements are from this elevation;
MP = Monitor Port; PP = Pump Port; Monitor Ports shown in bold are instrumented ports



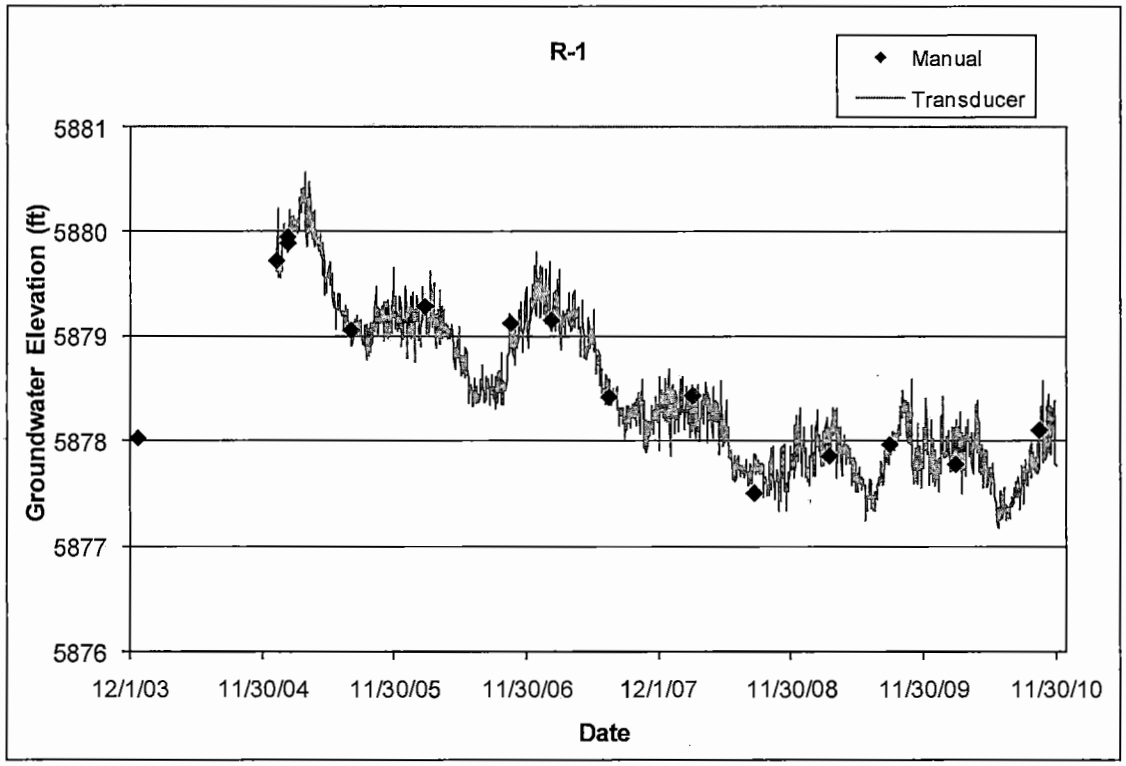
3.3 R-1

Location: R-1 is located in Mortandad Canyon about 220 ft west of former monitoring well TW-8.
Completion Type: Single completion at the top of the regional aquifer. The top of the screen is about 28 ft below the water table.
Period of Record: Well completed November 2003, transducer installed January 2005, transducer data through 2010.
Remarks: R-1 was completed to a depth of 1080.1 ft, about 80 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer has no immediate response to atmospheric pressure fluctuations. The aquifer indicates a seasonal response to supply well pumping and primarily responds to pumping at PM-5 and possibly to PM-4.

R-1 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1031.1	1057.4	5850.1	5823.8	26.3	1027.7	5853.5	1057.4	5823.8	1080.1	22.7	69.7	RT	Tp

Note: R-1 Brass Cap Ground Elevation: 6881.21 ft; all measurements are from this elevation

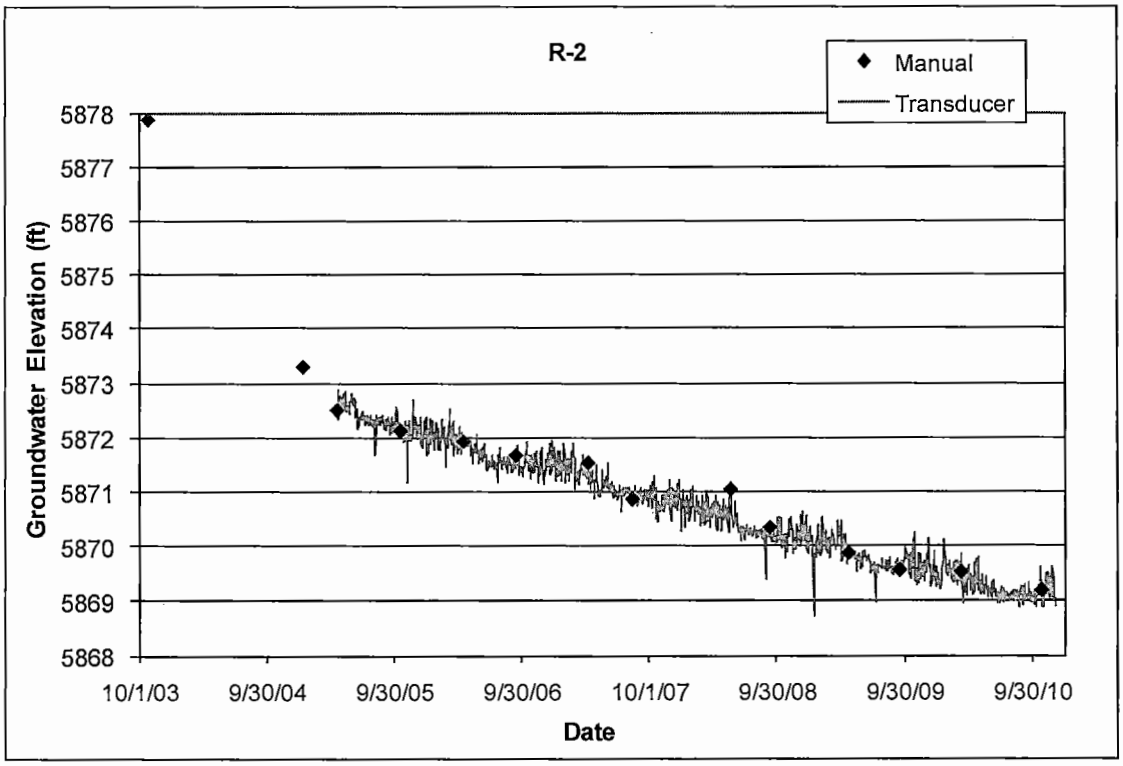


3.4 R-2

Location: R-2 is located in middle Pueblo Canyon between former monitoring wells TW-4 and TW-2.
Completion Type: Single completion at the top of the regional aquifer. The top of the screen is about 5 ft below the water table.
Period of Record: Well completed October 2003, transducer installed January 2005, transducer data through 2010.
Remarks: R-2 was completed to a depth of 943.3 ft, about 50 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer has no immediate response to atmospheric pressure fluctuations. The well shows a continuous water level decline but does not indicate a seasonal response to supply well pumping or an apparent response to pumping of any specific supply well.

R-2 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	906.4	929.6	5864.0	5840.8	23.2	917.0	5853.4	929.6	5840.8	943.3	13.7	42.1	RT	Tp
Note: R-2 Brass Cap Ground Elevation: 6770.38 ft; all measurements are from this elevation														



3.5 R-3

Location: R-3 is located in lower Pueblo Canyon about 0.5 mi east of monitor well R-5 and about 500 ft northwest of supply well O-1.

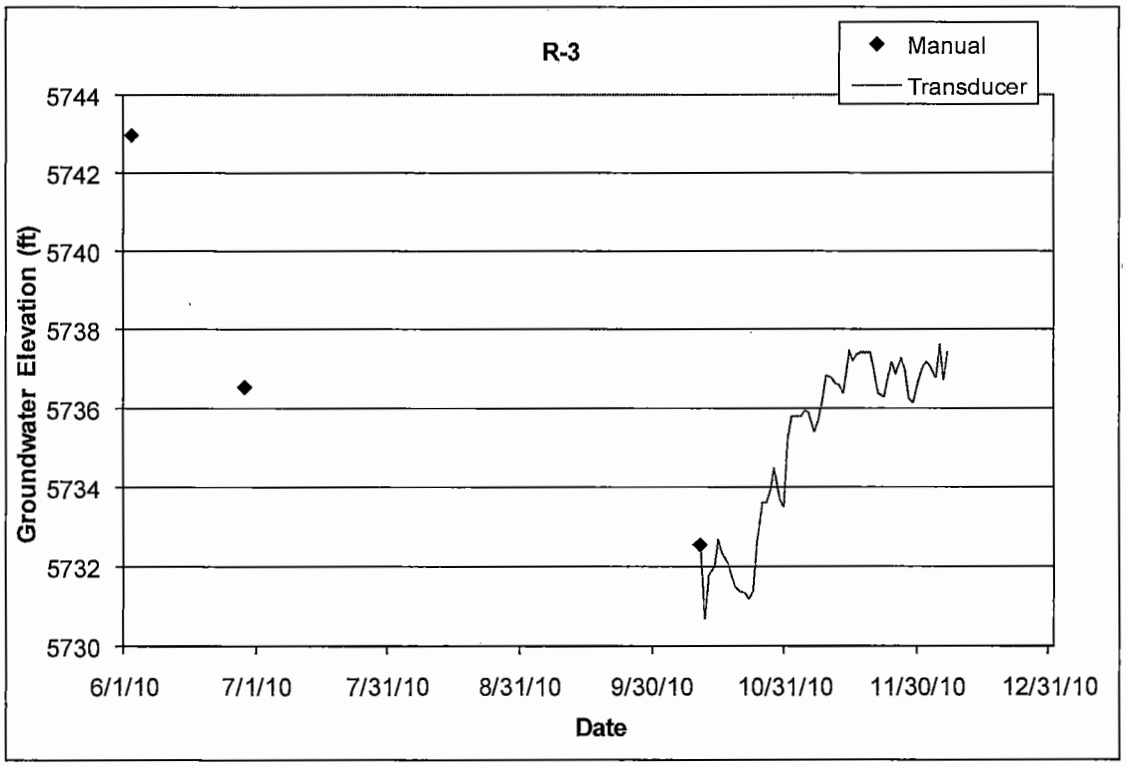
Completion Type: Single completion in the regional aquifer. The top of the screen is about 315 ft below the water table.

Period of Record: Well completed May 2010, transducer installed October 12, transducer data through 2010.

Remarks: R-3 was completed to a depth of 1077.7 ft, about 415 ft into the regional aquifer. The well responds to pumping at PM-1.

R-3 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Bottom Well Depth (ft)	Sump Length (ft)	Hydro Zone Code	Geo Unit Code
1	974.5	995.0	5421.4	5400.9	20.5	965.8	5430.1	995.0	5400.9	1006.8	11.8	RT	Tsf
Note: Brass Cap Ground Elevation: 6395.88 ft; all measurements are from this elevation													



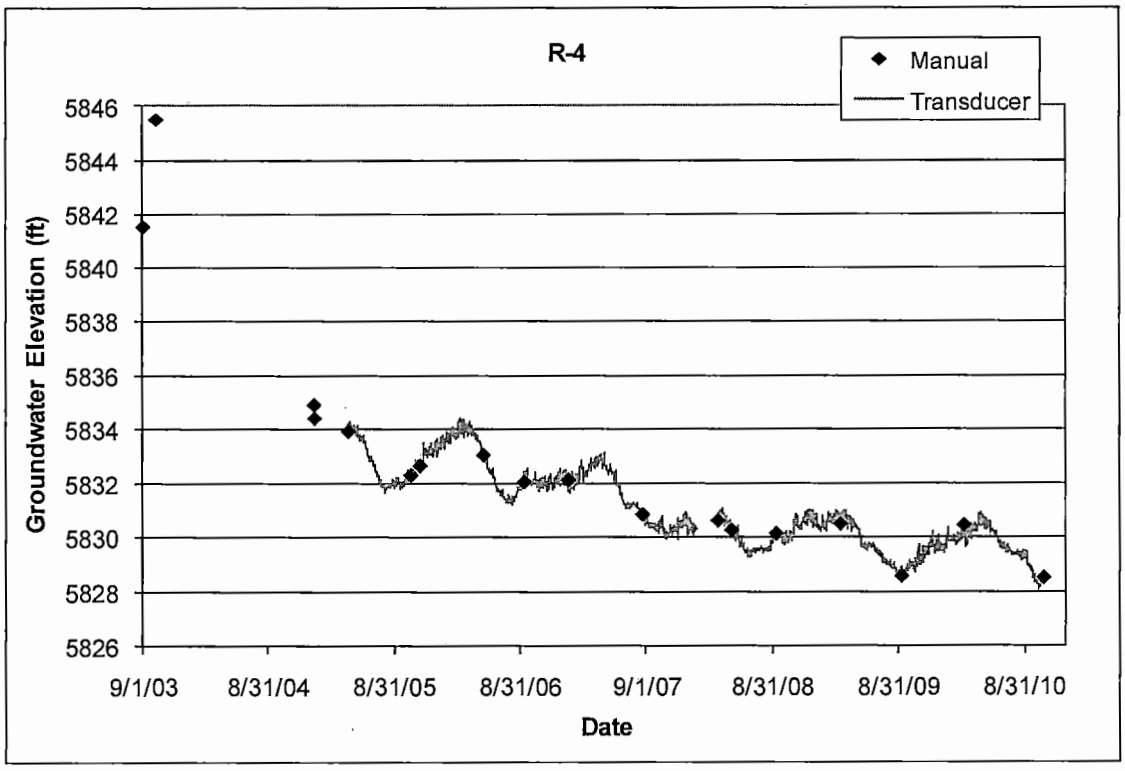
3.6 R-4

Location: R-4 is located in Pueblo Canyon near the new LAC Sewage Treatment Plant.
Completion Type: Single completion at the top of the regional aquifer. The top of the screen is about 49 ft below the piezometric water table in a confined zone.
Period of Record: Well completed September 2003, transducer installed January 2005, data through 2010. The transducer failed in January 2008 and was replaced in March 2008.
Remarks: R-4 was completed to a depth of 840 ft, about 90 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer has no immediate response to atmospheric pressure fluctuations. The aquifer indicates a seasonal response to supply well pumping and appears to respond primarily to pumping PM-3, and possibly to pumping at O-4 and the Guaje well field.

R-4 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	792.9	816	5784.6	5761.5	23.1	787.5	5790.0	816.0	5761.5	840.0	24.0	73.7	RT	Tp

Note: R-4 Brass Cap Ground Elevation: 6577.49 ft; all measurements are from this elevation



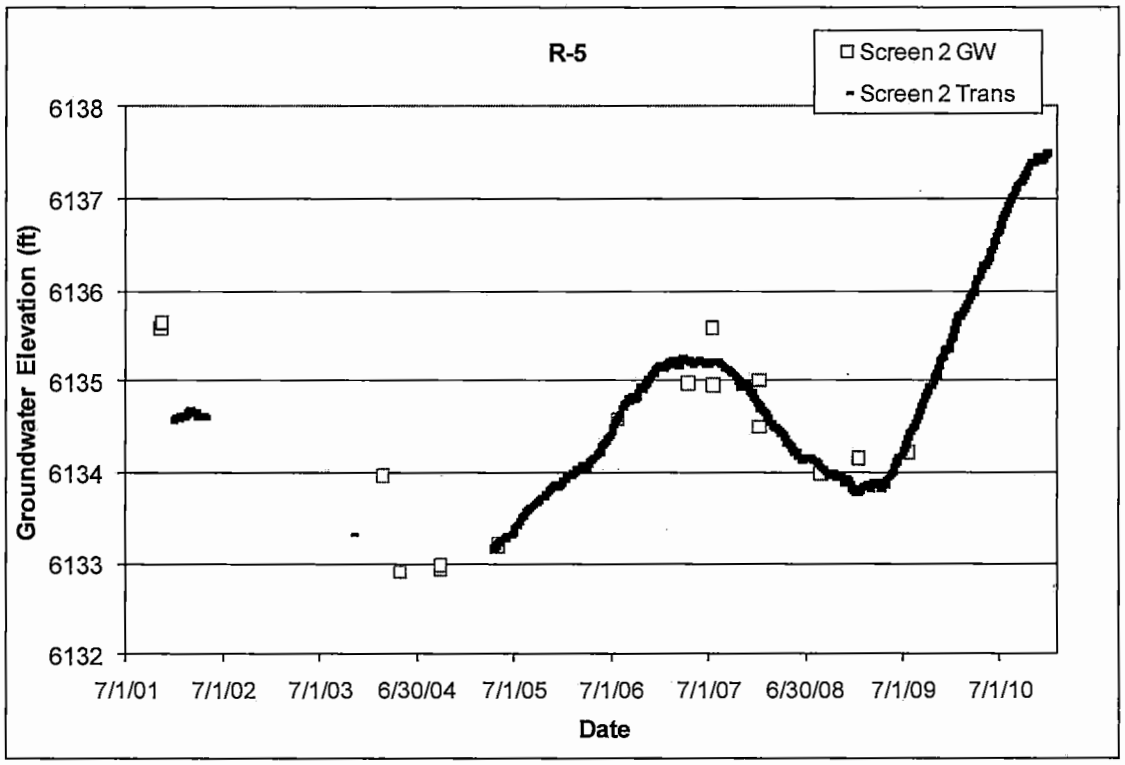
3.7 R-5

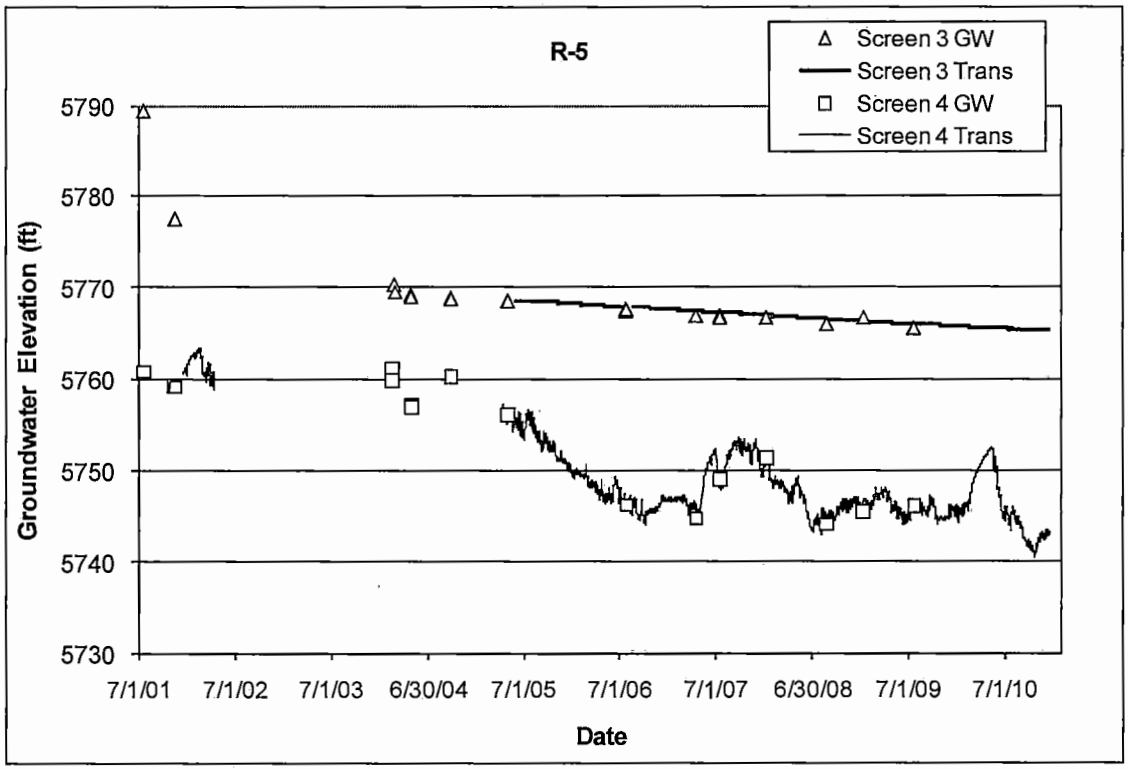
Location: R-5 is located in lower Pueblo Canyon about 0.5 mi upstream of supply well O-1.
Completion Type: Multiple completion, two screens in intermediate zones, two screens in regional zones.
Period of Record: Westbay® installed July 17, 2001, transducers installed December 17, 2001, and April 4, 2005, intermittent data through 2010.
Remarks: Screen 1 has been dry since well installation, although there is about 3 ft of water above port MP1B in the sump below screen 1. The screen 2 intermediate groundwater level is about 5 ft below the bottom of screen 1. The two regional screens have heads about 10 to 15 ft apart. The water level at the top of the regional aquifer at screen 3 declined below port MP3A in 2001; samples are collected and groundwater levels are monitored from port MP3B. The aquifer at screen 4 responds primarily to supply well pumping at PM-1, but screen 3 apparently shows little or no response. The R-5 regional aquifer screens do not indicate a response to atmospheric pressure fluctuations.

R-5 Construction and Port Data

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Hydro Zone Code	Geo Unit Code	Port	Port Depth (ft)	Port Elevation (ft)	Distance from Bottom of Screen (ft)	Sump Volume (L)	Comment
1	326.4	331.5	6146.2	6141.1	5.1	I	Tp	**MP1A**	329.5	6143.1	2.0		Within Screen, Screen Dry
								PP1	334.9	6137.7	-3.4	9.8	Below Screen
								MP1B	350.4	6122.2	-18.9	54.7	Below Screen, 3 ft of water
2	372.8	388.8	6099.8	6083.8	16.0	I	Tp	**MP2A**	383.9	6088.7	4.9		Within Screen
								PP2	388.8	6083.8	0.0	0.0	At Bottom of Screen
								MP2B	394.4	6078.2	-5.6	16.2	Below Screen
3	676.9	720.3	5795.7	5752.3	43.4	RT	Tsf	MP3A	695.1	5777.5	25.2		Within Screen, Port Dry
								MP3B	718.6	5754.0	1.7		Within Screen, Port sampled
								PP3	724.0	5748.6	-3.7	10.7	Below Screen
4	858.7	863.7	5613.9	5608.9	5.0	RD	Tsfb	**MP4A**	860.9	5611.7	2.8		Within Screen
								PP4	866.3	5606.3	-2.6	7.5	Below Screen
								MP4B	871.9	5600.7	-8.2	23.7	Below Screen

Note: R-5 Brass Cap Ground Elevation: 6472.6 ft; all measurements are from this elevation;
MP = Monitor Port; PP = Pump Port; Monitor Ports shown in bold are instrumented ports


R-5
Screen 2 GW
Screen 2 Trans
Groundwater Elevation (ft)
6138
6137
6136
6135
6134
6133
6132
7/1/01
7/1/02
7/1/03
6/30/04
7/1/05
7/1/06
7/1/07
6/30/08
7/1/09
7/1/10
Date


R-5
Screen 3 GW
Screen 3 Trans
Screen 4 GW
Screen 4 Trans
Groundwater Elevation (ft)
5790
5780
5770
5760
5750
5740
5730
7/1/01
7/1/02
7/1/03
6/30/04
7/1/05
7/1/06
7/1/07
6/30/08
7/1/09
7/1/10
Date

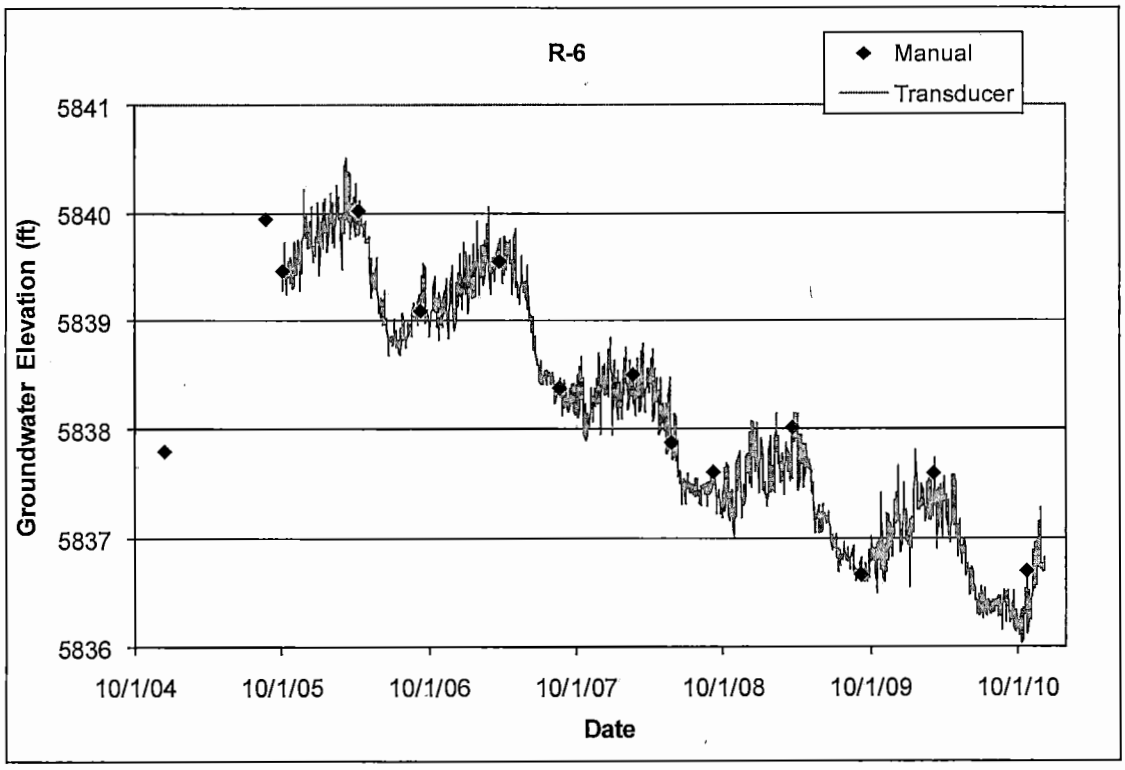
3.8 R-6

Location: R-6 is located at the east end of DP Mesa between DP Canyon and Los Alamos Canyon.
Completion Type: Single completion at the top of the regional aquifer. The top of the screen is about 44 ft below the water table.
Period of Record: Well completed November 2004, transducer installed December 2004, data through 2010.
Remarks: R-6 was completed to a depth of 1252 ft, about 100 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer has no immediate response to atmospheric pressure fluctuations.

R-6 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1205.0	1228.0	5790.8	5767.8	23.0	1197.66	5798.1	1228.0	5767.8	1252.0	24.0	73.7	RT	Tf

Note: Brass Cap Ground Elevation: 6995.80 ft; all measurements are from this elevation



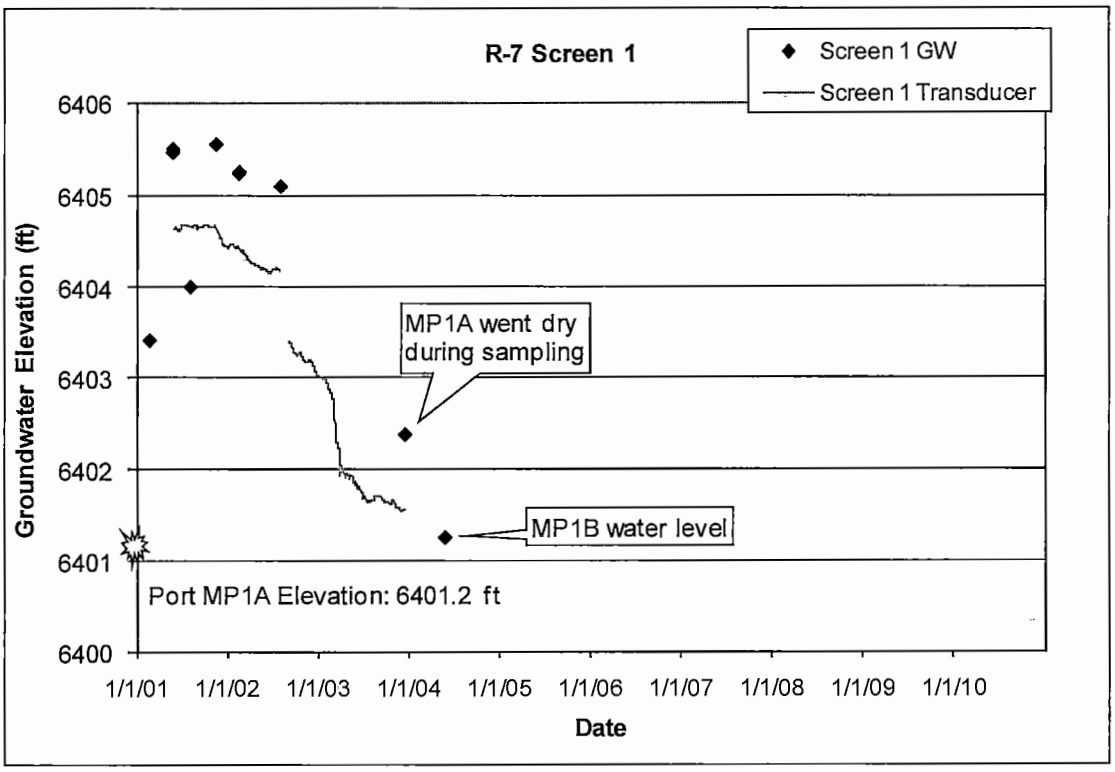
3.9 R-7

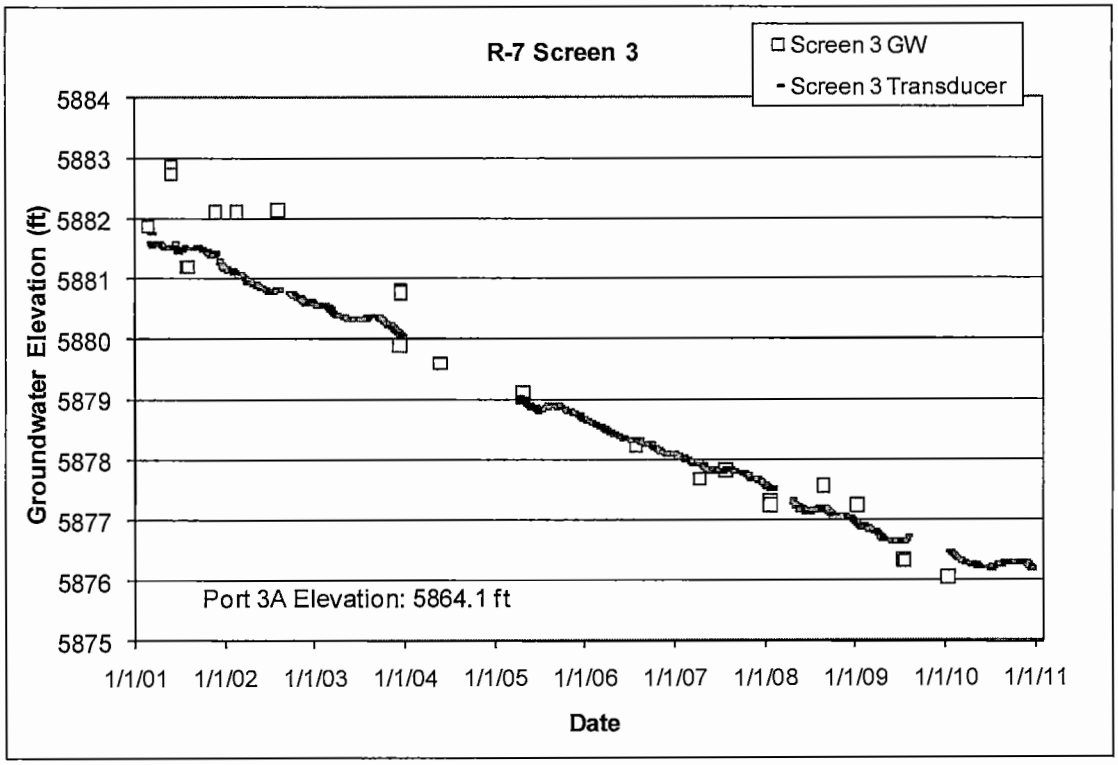
Location: R-7 is located in middle Los Alamos Canyon about 1 mi upstream of supply well O-4.
Completion Type: Multiple completion, two screens in intermediate zones, one screen at the top of the regional aquifer.
Period of Record: Westbay® installed February 25, 2001, transducers installed February 28, 2001, intermittent data to July 20, 2009. Equipment problems caused data loss from July 2009 to January 2010. Transducer data through 2010.
Remarks: Initial transducer data from MP1A are not valid because transducer apparently did not connect properly to port. Port MP1A at intermediate screen 1 went dry during sampling on December 18, 2003. Pressure data from port MP1B located in the sump have indicated 3 to 4 ft of water present above the port but about 7 ft below screen 1 since 2005. The screen 2 intermediate screen has been dry since well installation but port MP2B indicates about 1 ft of water in the sump above the port since mid 2008. The regional aquifer at R-7 screen 3 does not indicate a response to atmospheric pressure fluctuations and does not show a seasonal water level response to supply well pumping or a response to pumping any of the water supply wells, but shows a relatively constant water level decline of about 0.6 ft/yr.

R-7 Construction and Port Data

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Hydro Zone Code	Geo Unit Code	Port	Port Depth (ft)	Port Elevation (ft)	Distance from Bottom of Screen (ft)	Comment
1	363.2	379.2	6416.0	6400.0	16.0	I	Tp	**MP1A**	378.0	6401.2	1.2	Within screen - Screen dry
								PP1	383.3	6395.9	-4.1	Below screen
								MP1B	389.0	6390.2	-9.8	Below screen
2	730.4	746.4	6048.8	6032.8	16.0	I	Tp	**MP2A**	744.8	6034.4	1.6	Within screen - Screen dry
								PP2	750.1	6029.1	-3.7	Below screen
								MP2B	755.8	6023.4	-9.4	Below screen
3	895.5	937.4	5883.7	5841.8	41.9	RT	Tp	**MP3A**	915.1	5864.1	22.3	Within screen
								MP3B	935.3	5843.9	2.1	Within screen
								PP3	940.6	5838.6	-3.2	Below screen
								MP3C	946.3	5832.9	-8.9	Below screen

Note: R-7 Brass Cap Ground Elevation: 6779.2 ft; all measurements are from this elevation;
MP = Monitor Port; PP = Pump Port; Monitor Ports shown in bold are instrumented ports


R-7 Screen 1
Screen 1 GW
Screen 1 Transducer
Groundwater Elevation (ft)
6406
6405
6404
6403
6402
6401
6400
MP1A went dry during sampling
MP1B water level
Port MP1A Elevation: 6401.2 ft
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
1/1/07
1/1/08
1/1/09
1/1/10
Date


R-7 Screen 3
Screen 3 GW
Screen 3 Transducer
Groundwater Elevation (ft)
5884
5883
5882
5881
5880
5879
5878
5877
5876
5875
Port 3A Elevation: 5864.1 ft
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
1/1/07
1/1/08
1/1/09
1/1/10
1/1/11
Date

3.10 R-8

Location: R-8 is located in middle Los Alamos Canyon about 0.75 mi downstream of the confluence with DP Canyon and supply well O-4.

Completion Type: Multiple completion, two screens in the regional aquifer. The top of screen 1 is about 13 ft below the water table.

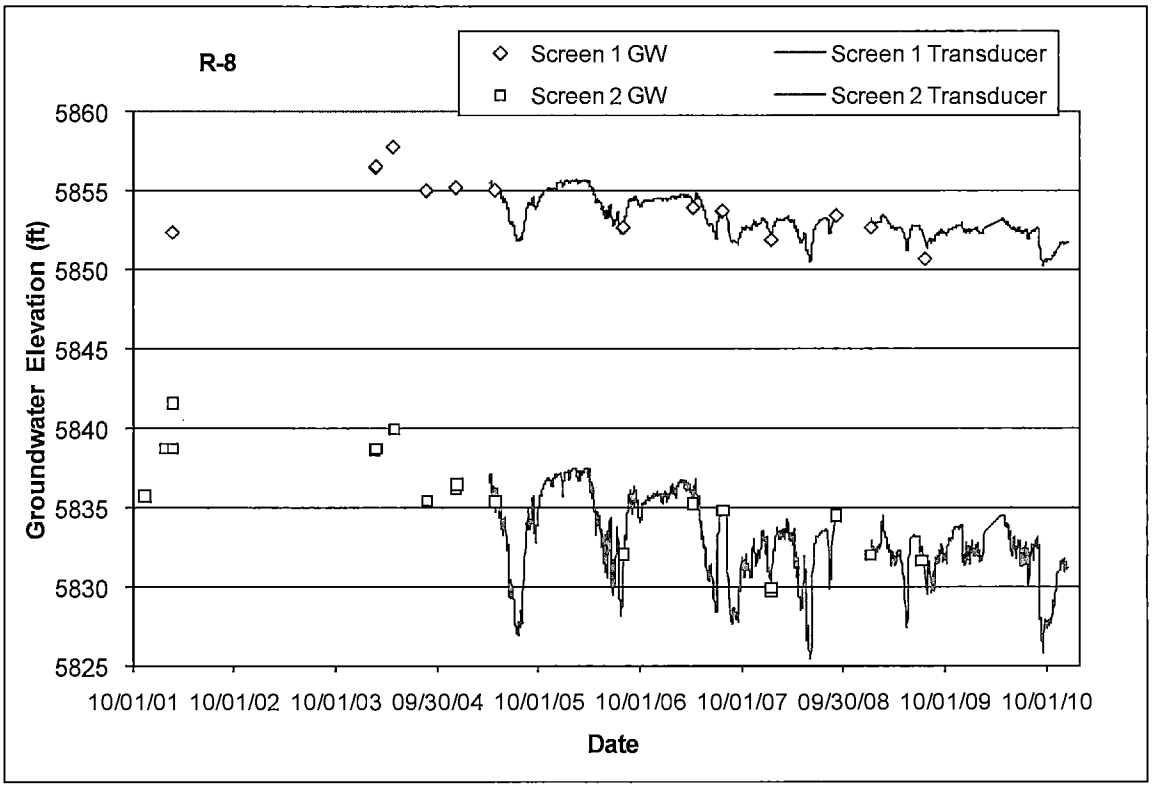
Period of Record: Westbay® installed February 23, 2002, transducers installed April 7, 2005, data through 2010.

Remarks: Screens are 66 ft apart, head in screen 2 about 20 ft lower than screen 1. The groundwater does not indicate a response to atmospheric pressure fluctuations, but the groundwater at both screens responds to pumping supply well PM-3.

R-8 Construction and Port Data

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Hydro Zone Code	Geo Unit Code	Port	Port Depth (ft)	Port Elevation (ft)	Distance from Bottom of Screen (ft)	Comment
1	705.3	755.7	5839.4	5789.04	50.4	RT	Tp	MP1A	711.1	5833.64	44.6	Within Screen
								MP1B	721.4	5823.34	34.3	Within Screen
								MP1C	751.3	5793.44	4.4	Within Screen
								PP1	756.7	5788.04	-1.0	Below Screen
								MP1D	762.3	5782.44	-6.6	Below Screen
2	821.3	828.0	5723.4	5716.74	6.7	RD	Tp	MP2A	825.0	5719.74	3.0	Within Screen
								PP2	830.4	5714.34	-2.4	Below Screen
								MP2B	836.0	5708.7	-8.0	Below Screen

Note: R-8 Brass Cap Ground Elevation: 6544.74 ft; all measurements are from this elevation;
MP = Monitor Port; PP = Pump Port; Monitor Ports shown in bold are instrumented ports



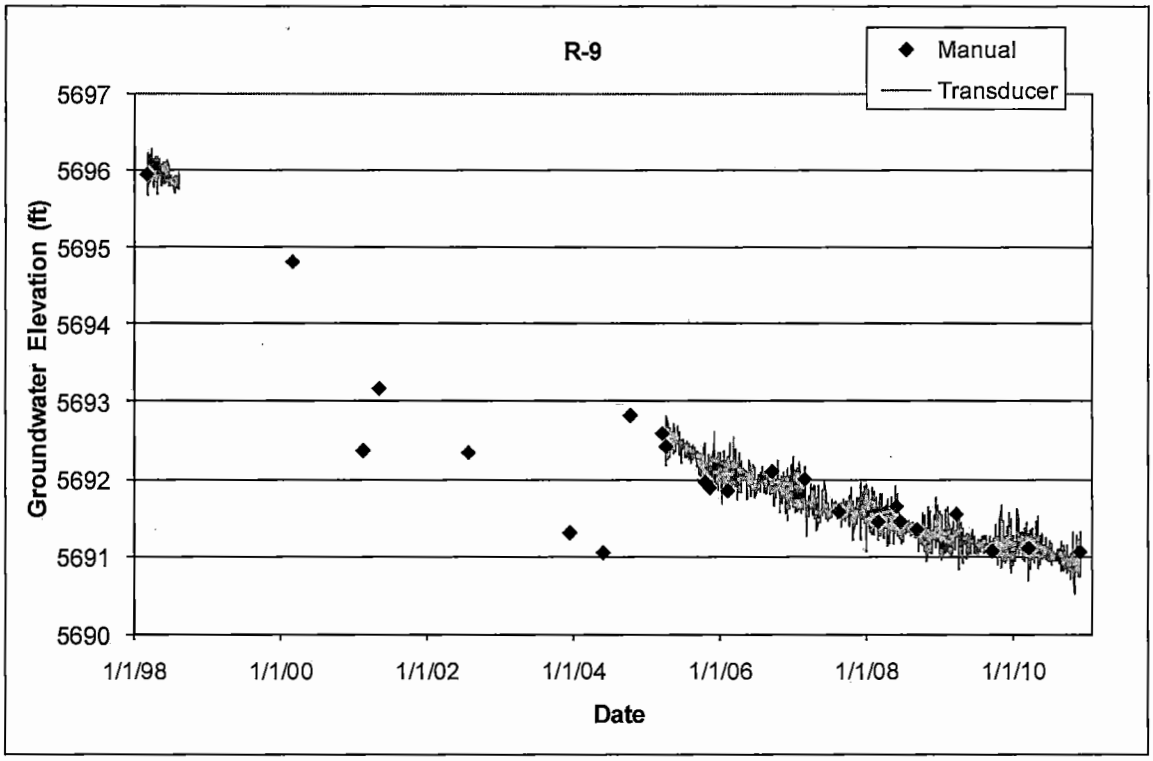
3.11 R-9

Location: R-9 is located in Los Alamos Canyon near the eastern LANL boundary.
Completion Type: Single completion at the top of the regional aquifer. The screen straddles the water table.
Period of Record: March 2, 1998, to August 12, 1998, in temporary well. Final well completed October 1999. Transducer installed April 5, 2005, data through 2010.
Remarks: R-9 was completed to a depth of 758 ft, about 70 ft into the regional aquifer. The well is 100% barometrically efficient; the groundwater has no immediate response to atmospheric pressure fluctuations. However, the aquifer indicates a delayed 65% response to atmospheric pressure.

R-9 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	683.0	748.5	5699.8	5634.3	65.5	741.4	5641.4	748.5	5634.3	758	9.5	29.7	RT	Tsfb

Note: R-9 Brass Cap Ground Elevation: 6382.8; all depths are from this elevation



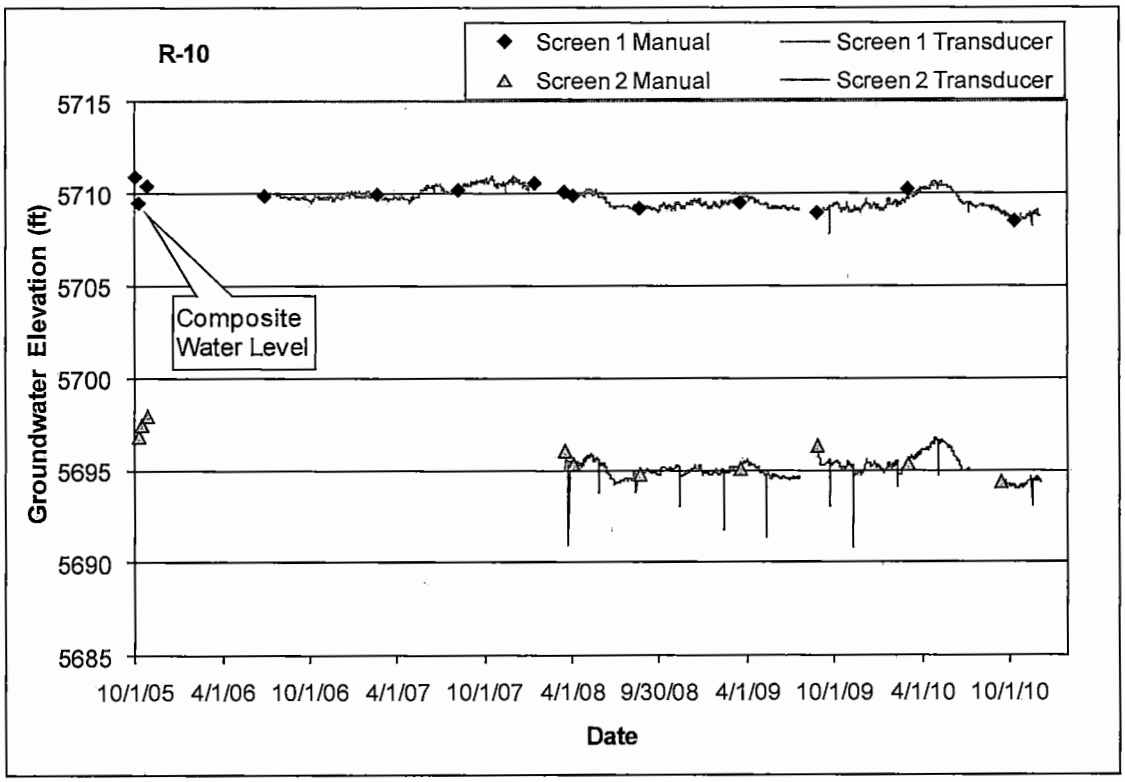
3.12 R-10

Location: R-10 is located in lower Sandia Canyon on San Ildefonso land east of the LANL boundary.
Completion Type: Dual completion in two deeper zones within the regional aquifer. Baski packer and dual valve sampling system with single submersible pump installed in May 2006.
Period of Record: Well completed October 2005, transducers installed July 26, 2006, data through 2010. The transducers were removed during repair of the Baski system in 2008 and 2009.
Remarks: R-10 screen 1 is 174 ft deeper than the screen at R-10a; due to relatively low hydraulic conductivity of the formation between these screens, the head at R-10 screen 1 is 30 ft lower than at R-10a. The screen 2 water level gage tube was inoperable until repaired in February 2008; water level data for R-10 screen 2 in 2006 and 2007 are not available. The groundwater at R-10 screens exhibit a barometric efficiency of about 45%. The regional aquifer at both screens responds to pumping at supply well PM-1.

R-10 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Packer/ Sump (ft)	Top of Packer/ Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	874.0	897.0	5488.3	5465.3	23.0	884.3	5478.0	905.2	5457.2	905.2	8.2	25.5	RD	Tsf
2	1042.0	1065.0	5320.3	5297.3	23.0	1053.1	5309.2	1065.0	5297.3	1081.6	16.6	5.8	RD	Tsf

Note: R-10 Brass Cap Ground Elevation: 6362.31 ft; all measurements are from this elevation



3.13 R-10a

Location: R-10a is located in lower Sandia Canyon on San Ildefonso land east of the LANL boundary about 55 ft west of R-10.

Completion Type: Single completion at the top of the regional aquifer. The top of the screen is about 66 ft below the water table.

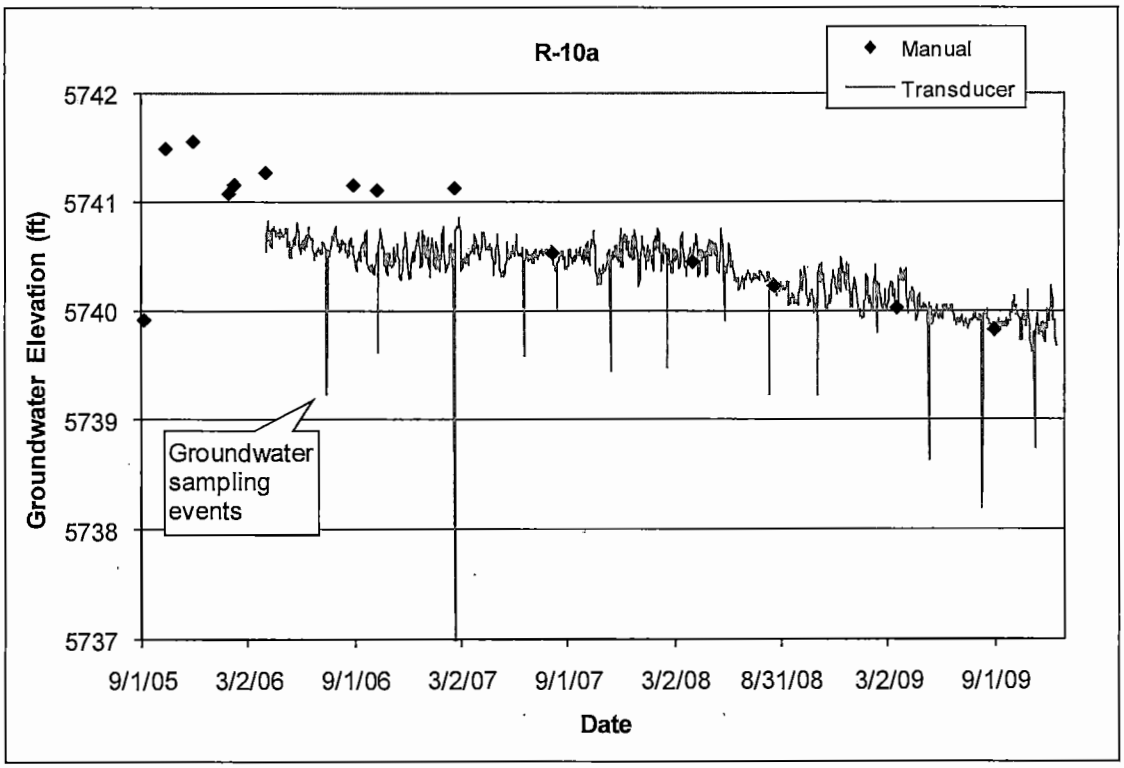
Period of Record: Well completed August 2005, transducer installed April 3, 2006, data through 2010.

Remarks: The R-10a water level is about 30 ft higher than at R-10 screen 1. The groundwater at R-10a shows an immediate 58% response to atmospheric pressure fluctuations for a well barometric efficiency of 42%. There is no apparent response to supply well pumping at R-10a.

R-10a Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	690.0	700.0	5673.7	5663.7	10.0	685.6	5678.1	700.0	5663.7	709.1	9.1	27.9	RT	Tsf

Note: Brass Cap Ground Elevation: 6363.74 ft; all measurements are from this elevation

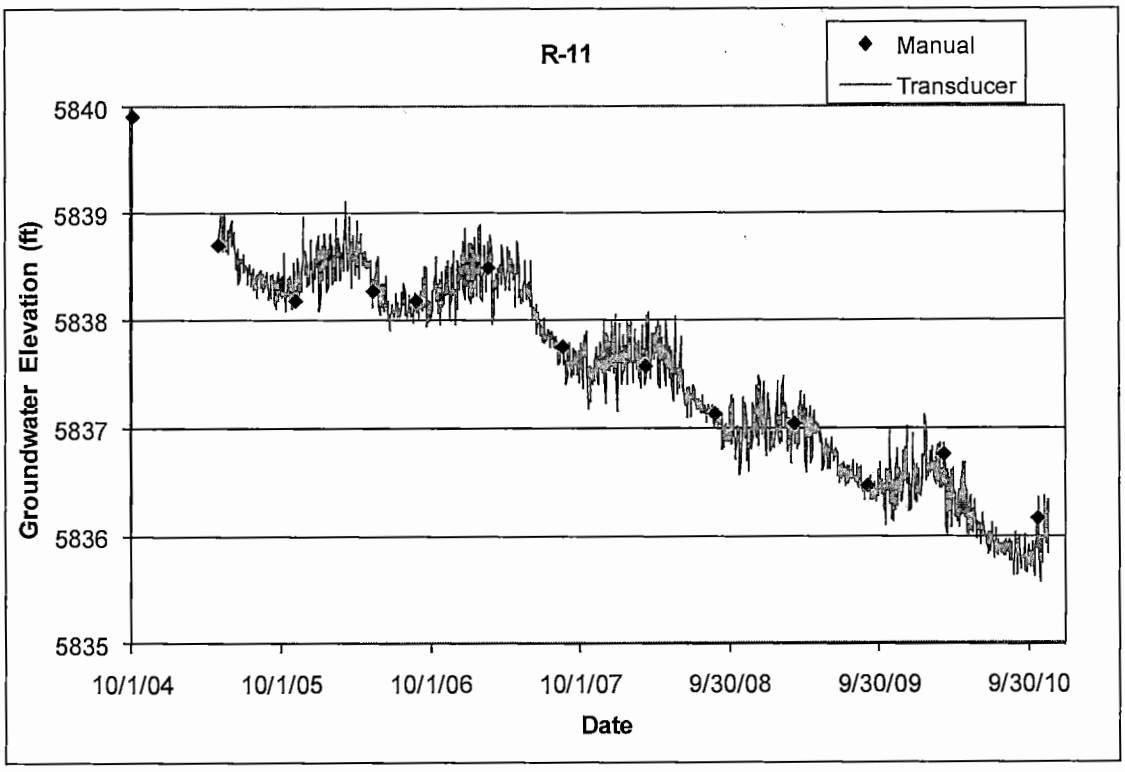


3.14 R-11

Location: R-11 is located in middle Sandia Canyon about 0.5 mi upstream of supply well PM-3.
Completion Type: Single completion at the top of the regional aquifer. The top of the screen is about 17 ft below the water table.
Period of Record: Transducer installed May 4, 2005; data through 2010.
Remarks: R-11 was completed in 2004 to a depth of 901.7 ft, about 66 ft into the regional aquifer. The well is 100% barometrically efficient; the groundwater has no immediate response to atmospheric pressure fluctuations. The aquifer at R-11 exhibits a seasonal response to supply well pumping but does not indicate a direct response to any specific supply well.

R-11 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	855.0	877.9	5818.7	5795.8	22.9	850.0	5823.7	877.9	5795.8	901.7	23.8	73.1	RT	Tp
Note: R-11 Brass Cap Ground Elevation: 6673.72 ft; all measurements are from this elevation														



3.15 R-12 (Regional)

Monitoring well R-12 was recompleted as a dual screen intermediate monitoring well in December 2007. Refer to Section 4 for recent R-12 intermediate groundwater level status.

Location: R-12 is located in lower Sandia Canyon near State Route (SR) 4 and supply well PM-1.

Completion Type: Multiple completion, two screens in intermediate zones, one screen at the top of the regional aquifer until September 2006. Well recompleted as two intermediate screens on December 13, 2007, when regional screen 3 was plugged and abandoned.

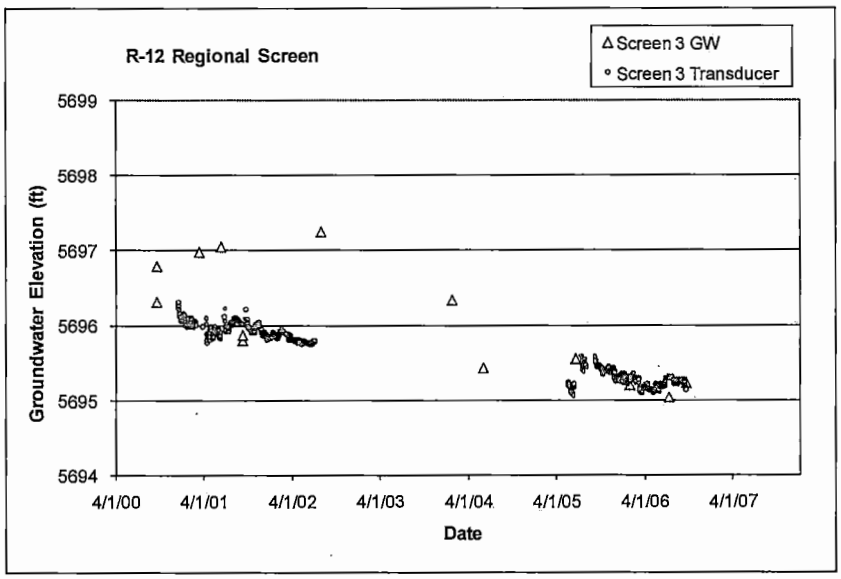
Period of Record: Westbay® installed March 21, 2000, transducers installed December 14, 2000, intermittent data to September 21, 2006, when transducers were removed for removal of the Westbay® system for well rehabilitation. No regional aquifer water level data after 2006. Transducers were reinstalled at intermediate screens 1 and 2 on December 13, 2007; data through 2010.

Remarks: In December 2007, screen 3 was abandoned and a Baski packer with dual pump sampling system was installed at the two intermediate screens. The regional aquifer at screen 3 did not exhibit a seasonal response to supply well pumping, or a response to pumping of any specific supply well, including nearby supply well PM-1. There is no immediate response to atmospheric pressure fluctuations at any screen.

R-12 Former Westbay Port Data

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Hydro Zone Code	Geo Unit Code	Port	Port Depth (ft)	Port Elev (ft)	Distance from Bottom of Screen (ft)	Sump Volume (L)	Comment
1	459.0	467.5	6040.6	6032.1	8.5	I	Tb4	MP1A	468.1	6031.5	-0.6	1.1	Below screen
								PP1	473.5	6026.1	-6.0	11.3	Below screen
								MP1B	479.1	6020.5	-11.6	21.9	Below screen
2	504.5	508.0	5995.1	5991.6	3.5	I	Tb4	MP2A	507.0	5992.6	1.0		Within screen
								PP2	512.4	5987.2	-4.4	8.3	Below screen
								MP2B	518.0	5981.6	-10.0	18.9	Below screen
3	801.0	839.0	5698.6	5660.6	38	RT	Tsfb	MP3A	810.8	5688.8	28.2		Within screen
								PP3A	816.2	5683.4	22.8		Within screen
								MP3B	821.8	5677.8	17.2		Within screen
								PP3B	827.2	5672.4	11.8		Within screen
								MP3C	832.9	5666.7	6.1		Within screen

Brass Cap Elevation: 6499.6 ft; all measurements are from this elevation;
MP = measurement port; PP = pumping port

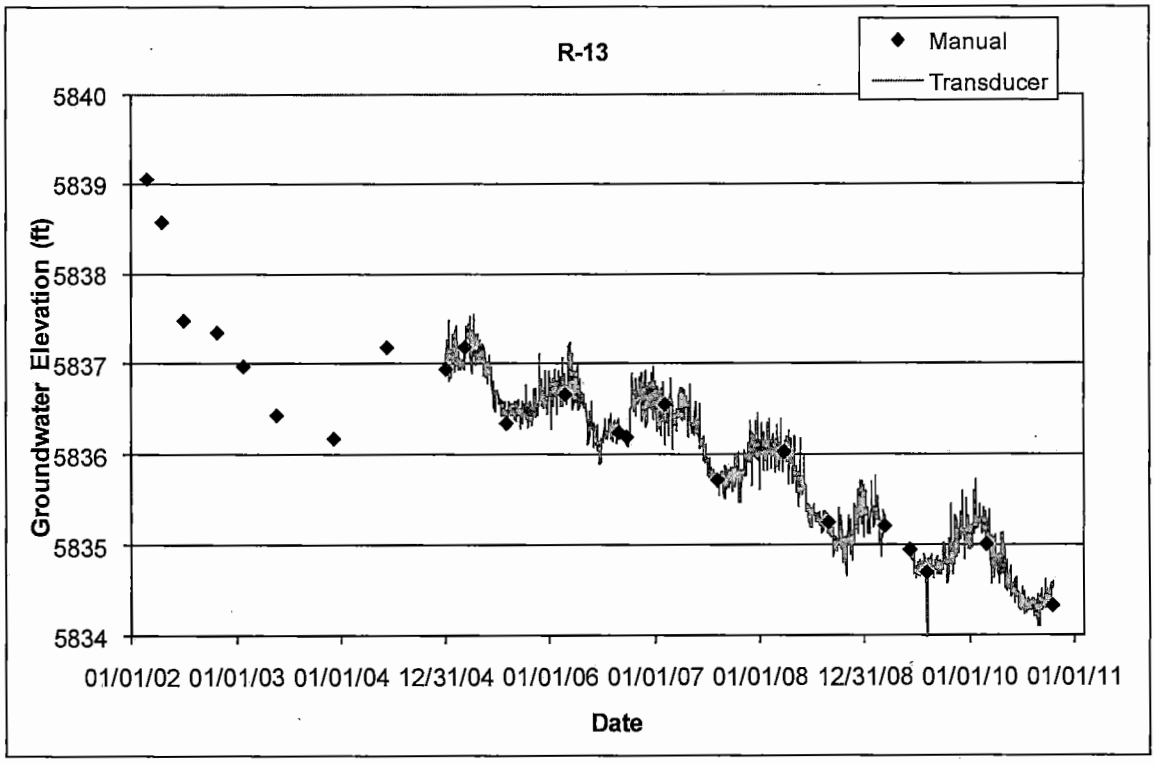


3.16 R-13

Location: R-13 is located in lower Mortandad Canyon near the LANL boundary.
Completion Type: Single completion at the top of the regional aquifer. The top of the screen is about 120 ft below the water table.
Period of Record: Well completed October 2001, transducer installed January 3, 2005, data through 2010. The transducer failed and was replaced in June 2009.
Remarks: R-13 was completed to a depth of 1029.4 ft, about 200 ft into the regional aquifer. The well is 100% barometrically efficient; the groundwater has no immediate response to atmospheric pressure fluctuations. However, the aquifer indicates a delayed 30% response to atmospheric pressure. R-13 exhibits a seasonal response to supply well pumping and responds primarily to pumping at PM-4 (McLin 2006) and possibly to PM-2 and PM-5, but apparently does not respond significantly to pumping at nearby supply well PM-3.

R-13 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Hydro Zone Code	Geo Unit Code
1	958.3	1018.7	5714.8	5654.4	60.4	933.0	5740.1	1018.7	5654.4	1029.4	10.7	RT	Tp
Note: R-13 Brass Cap Ground Elevation: 6673.05 ft; all measurements are from this elevation													



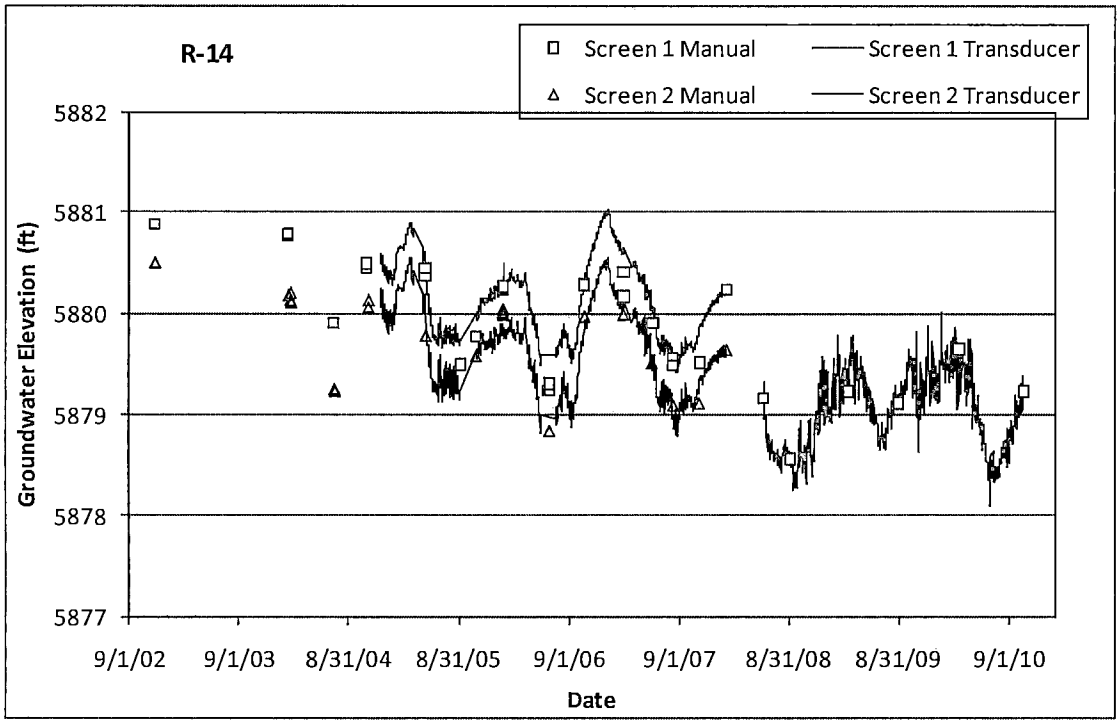
3.17 R-14

Location: R-14 is located in upper Ten Site Canyon about 0.5 mi upgradient of supply well PM-5.
Completion Type: Formerly multiple completion, two screens in the regional aquifer; recompleted in February 2008 to single screen at the top of the regional aquifer when screen 2 was plugged and abandoned. The top of screen 1 is about 20 ft below the water table.
Period of Record: Westbay® system installed November 23, 2002, transducers installed December 14, 2004, water level data from Westbay® system to February 25, 2008. Single transducer installed in recompleted single screen well June 10, 2008; data through 2010.
Remarks: Screens were formerly 53 ft apart; heads between screens were within 0.5 ft of each other. The aquifer shows no response to atmospheric pressure fluctuations. The aquifer at R-14 responds primarily to pumping supply well PM-5. After removal of the Westbay® system, an error in the Westbay® pipe tally resulted in correction of all Westbay® derived water level data downward by 3.3 ft.

R-14 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Depth (ft)	Pump Elev (ft)	Top of Packer/ Plug (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1200.6	1233.2	5861.48	5828.88	32.6	1198.0	5864.1	1244.7	11.5	36.0	RT	Tp
2	1286.5	1293.1	5775.58	5768.98	6.6	Screen 2 Plugged and Abandoned 2/08					RD	Tp

Note: R-14 brass cap elevation 7062.08 ft; all measurements from this elevation.



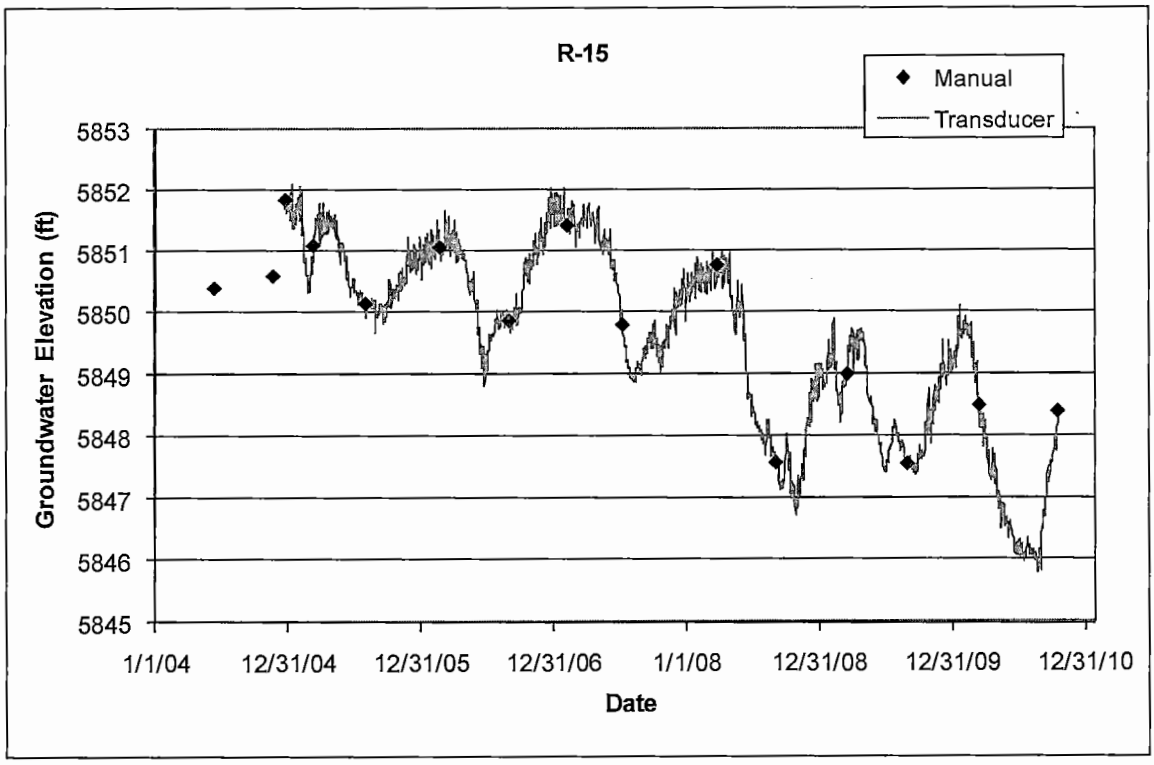
3.18 R-15

Location: R-15 is located in lower Mortandad Canyon downstream of the sediment traps.
Completion Type: Single completion at the top of the regional aquifer. The screen straddles the water table.
Period of Record: Well completed September 1999, transducer installed December 23, 2004, transducer data through 2010.
Remarks: R-15 was completed in 1999 to a depth of 1030.6 ft, about 140 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. The aquifer at R-15 responds to pumping supply wells PM-4 and PM-5.

R-15 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Casing Vol (Gal.)	Hydro Zone Code	Geo Unit Code
1	958.6	1020.3	5861.4	5799.7	61.7	1015.6	5804.4	1020.3	5799.7	1030.6	10.3	60.8	RT	Tp

Note: R-15 Brass Cap Ground Elevation: 6820.0 ft; all measurements are from this elevation



3.19 R-16

Location: R-16 is located northeast of White Rock in lower Cañada del Buey near the confluence with lower Mortandad Canyon.

Completion Type: Multiple completion, four screens in the regional aquifer, screen 1 is blocked by casing and is not useable.

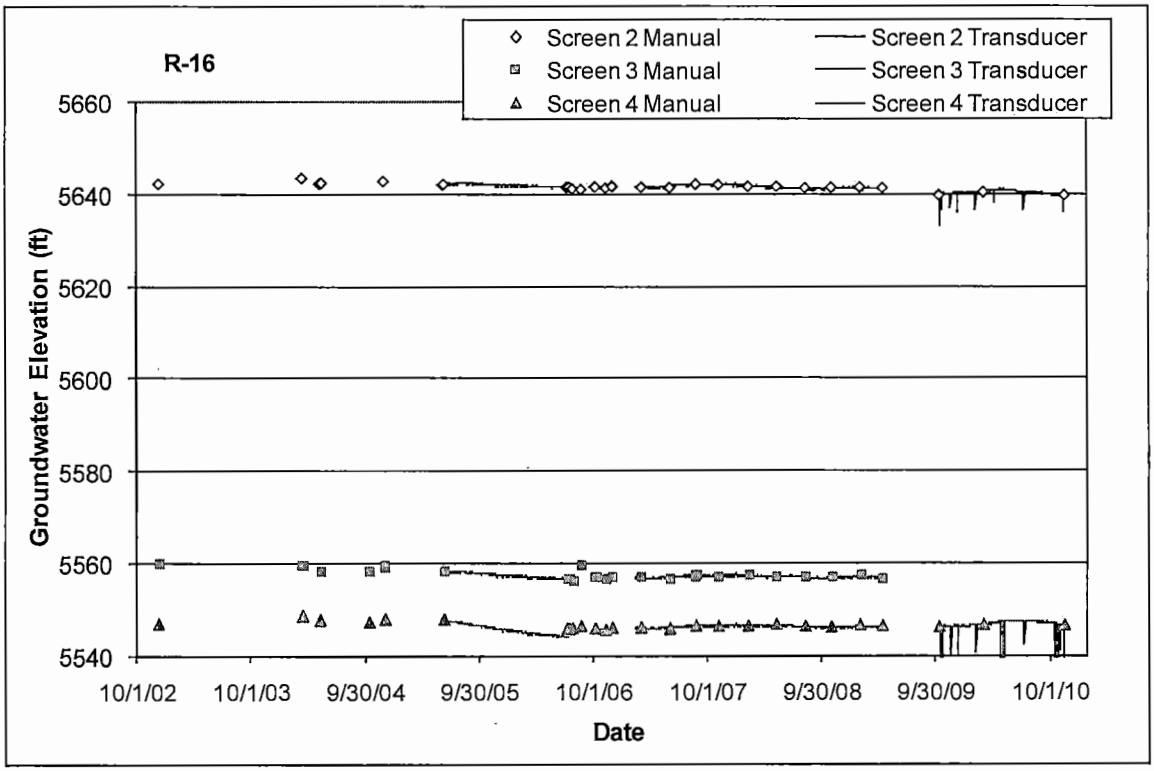
Period of Record: Westbay® installed December 14, 2002, transducers installed June 16, 2005, transducer data to July 12, 2006, when the Westbay® system was removed for additional screen development. The Westbay® system was reinstalled and transducers were reinstalled October 18, 2006. Westbay® transducer data extend to April 15, 2009, when the Westbay® system was removed for well rehabilitation and conversion. A single submersible pump with dual valve Baski sampling system was installed on October 14, 2009, to monitor screens 2 and 4; screen 3 not monitored after April 15, 2009 (LANL 2009). Groundwater level data from the dual screen sampling system are available from October 14, 2009, through 2010.

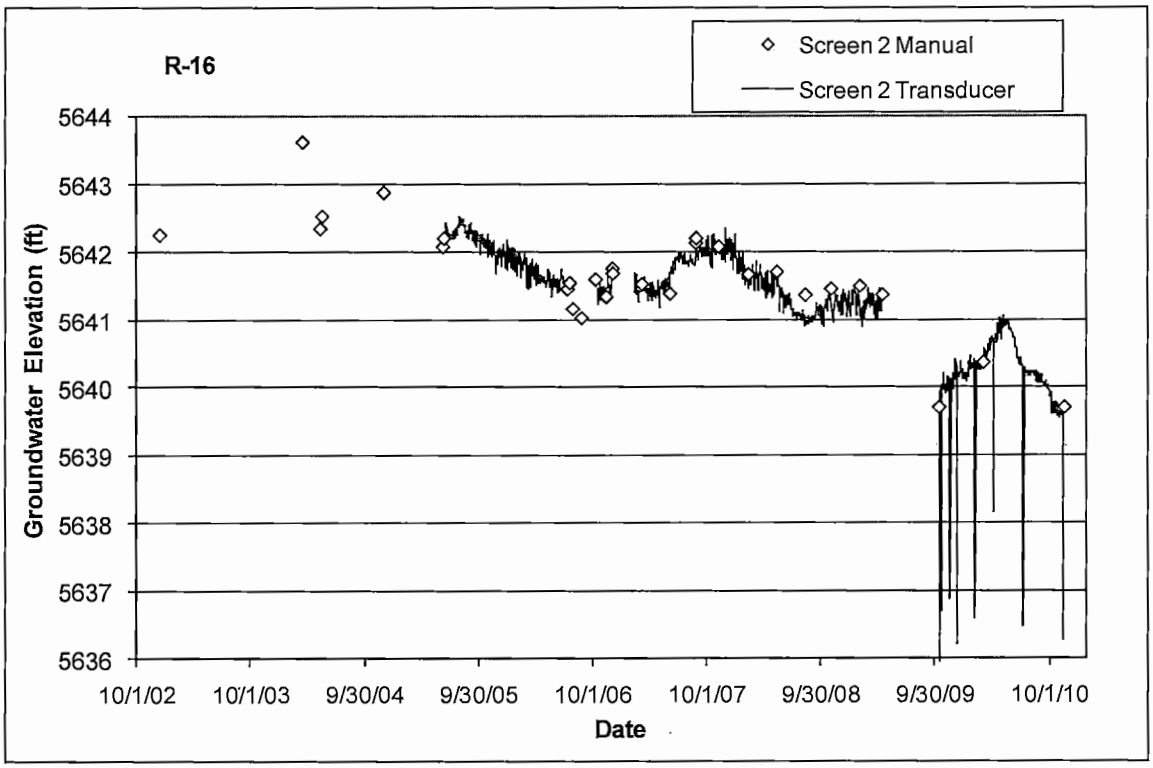
Remarks: Screens 2 and 3 are about 144 ft apart with a head difference of over 80 ft. Screens 3 and 4 are 215 ft apart and have a head difference of about 11 ft. The aquifer response to atmospheric pressure declines downward from screen 2 to screen 4, from 68% at screen 2 to 57% at screen 4.

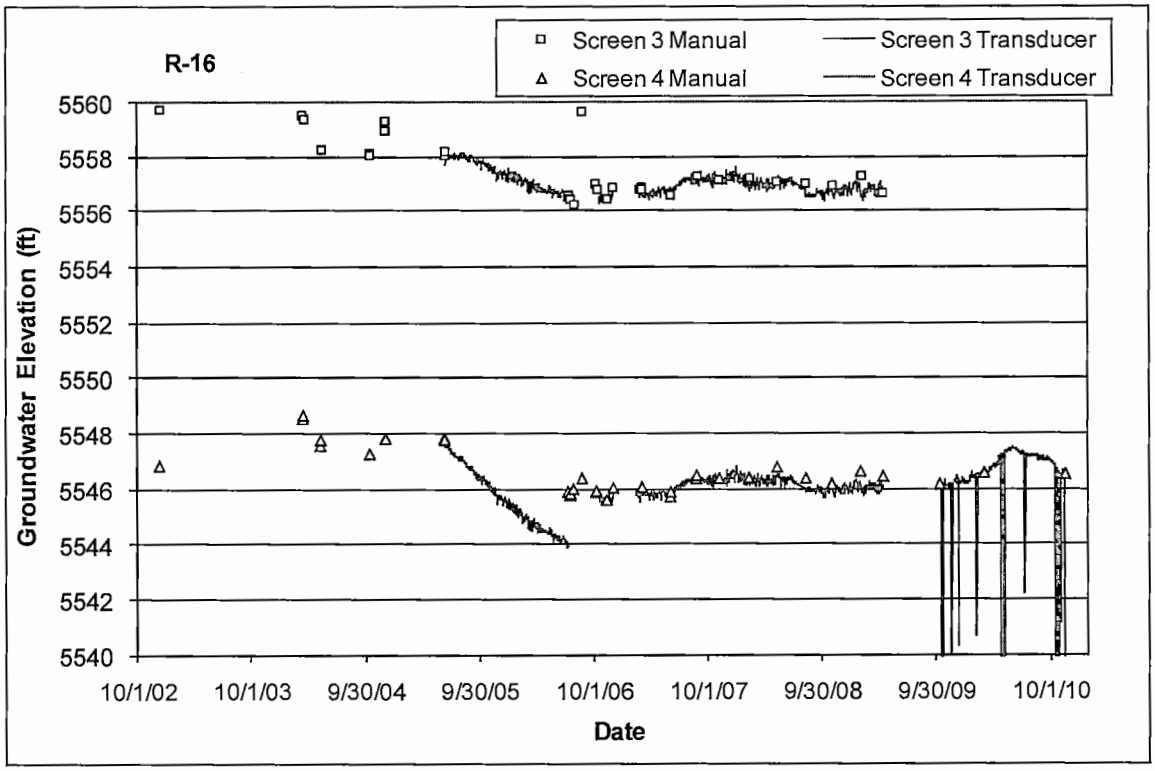
R-16 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Packer/ Sump Bottom (ft)	Packer Bottom Depth (ft)	Bottom of Sump Elev (ft)	Sump Length (ft)	Hydro Zone Code	Geo Unit Code	Comment
1	641.0	648.6	5615.9	5608.3	7.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RT	Tp	Screen unusable
2	863.4	870.9	5393.5	5386.0	7.5	872.8	5384.1	870.9	5386.0	881.2	885.6	5375.6	10.3	RD	Tsf	Upper zone
3	1014.8	1022.4	5242.1	5234.5	7.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RD	Tsf	Screen sealed off
4	1237.0	1244.6	5019.9	5012.3	7.6	1234.6	5022.3	1244.6	5012.3	1276.7	1223.0	4980.2	32.1	RD	Tsf	Lower zone

Brass Cap Elevation: 6256.87 ft; all measurements are from this elevation




R-16
Screen 2 Manual
Screen 2 Transducer
Groundwater Elevation (ft)
5644
5643
5642
5641
5640
5639
5638
5637
5636
10/1/02
10/1/03
9/30/04
9/30/05
10/1/06
10/1/07
9/30/08
9/30/09
10/1/10
Date


R-16
Screen 3 Manual
Screen 3 Transducer
Screen 4 Manual
Screen 4 Transducer
Groundwater Elevation (ft)
5560
5558
5556
5554
5552
5550
5548
5546
5544
5542
5540
10/1/02
10/1/03
9/30/04
9/30/05
10/1/06
10/1/07
9/30/08
9/30/09
10/1/10
Date

3.20 R-16r

Location: R-16r is located northeast of White Rock adjacent to R-16 in lower Cañada del Buey near the confluence with lower Mortandad Canyon.

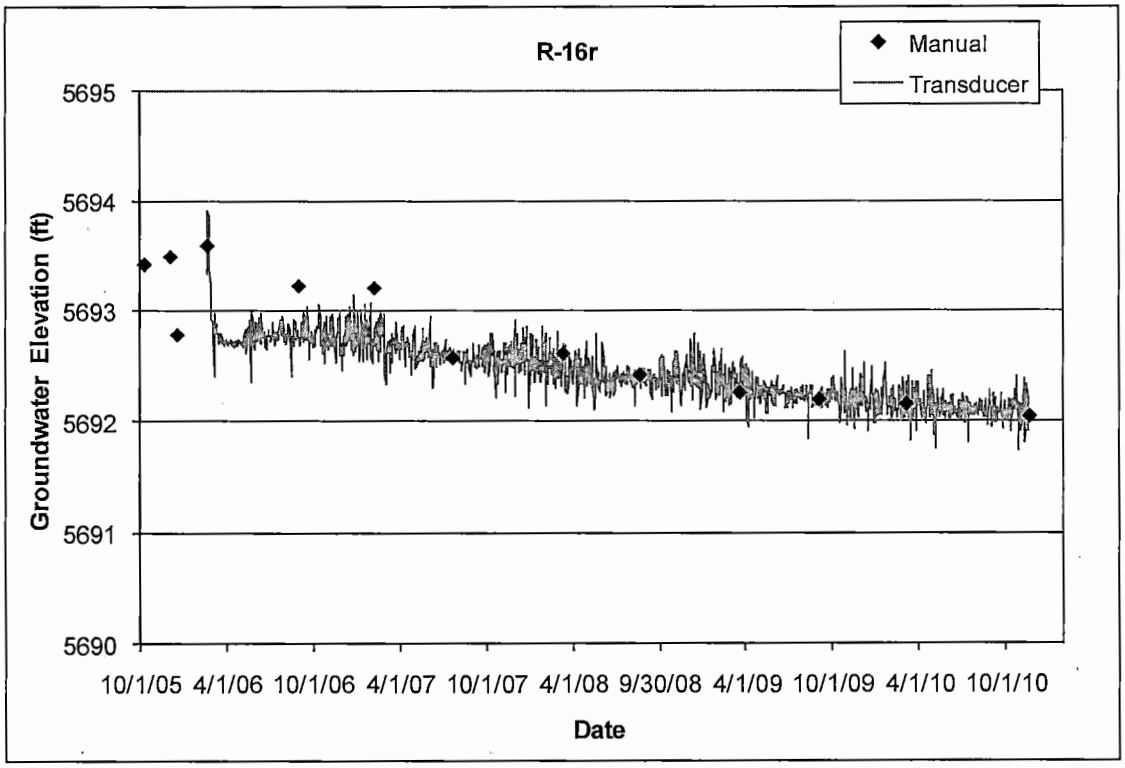
Completion Type: Single completion at the top of the regional aquifer. R-16r provides data for the top of the regional aquifer in place of R-16 screen 1, which is blocked by casing and not useable. The top of the screen is about 35 ft below the water table.

Period of Record: Well completed October 11, 2005, transducers installed February 21, 2006, data through 2010.

Remarks: R-16r water level at the top of the regional aquifer about 50 ft higher than the water level at R-16 screen 2, which is 250 ft lower than the R-16r screen. The well is 90% barometrically efficient; the aquifer indicates a 10% delayed response to atmospheric pressure.

R-16r Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (Gal.)	Hydro Zone Code	Geo Unit Code
1	600.0	617.6	5657.0	5639.4	17.6	596.6	5660.4	617.6	5639.4	631.4	13.8	11.2	RT	Tpt
Note: Brass Cap Ground Elevation: 6256.97 ft; all measurements are from this elevation														



3.21 R-17

Location: R-17 is located in middle Pajarito Canyon below the confluence with Two-Mile Canyon and about 1 mi southwest of supply well PM-5.

Completion Type: Dual completion within the regional aquifer with a Baski dual valve system and single submersible pump. The top of screen 1 is located about 20 ft below the water table. The screens are 44 ft apart.

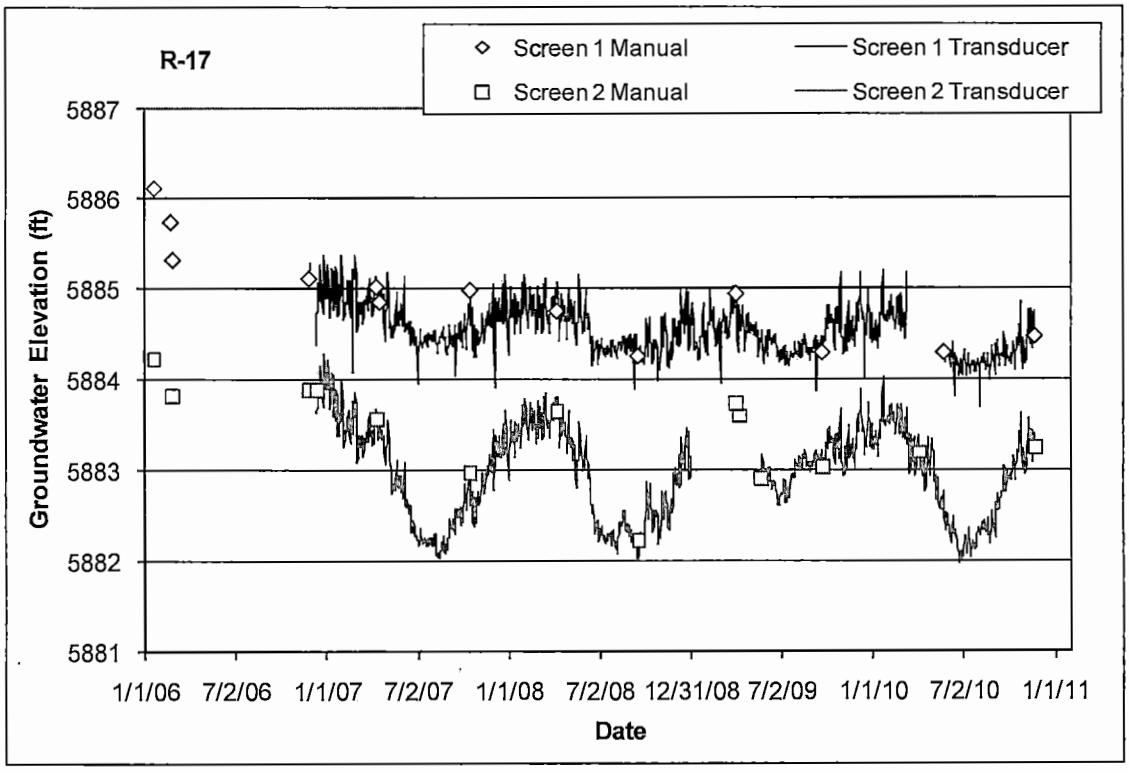
Period of Record: Completed January 4, 2006, transducers installed December 12, 2006, transducer data through 2010.

Remarks: R-17 was completed to a depth of 1140.9 ft, about 100 ft into the regional aquifer. Screen 1 is 100% barometrically efficient; the aquifer does not show a response to atmospheric pressure fluctuations. Screen 2 is 90% barometrically efficient. Both screens show a seasonal response to supply well pumping; screen 2 shows a response to pumping supply wells PM-2, PM-4, and PM-5.

R-17 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Packer/ Sump (ft)	Top of Packer/ Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1057.0	1080.0	5864.5	5841.5	23.0	1089.6	5831.9	1101.2	5820.4	1101.2	21.1	66.1	RT	Tpf
2	1124.0	1134.0	5797.5	5787.5	10.0	1128.6	5792.9	1134.0	5787.5	1140.9	6.9	21.6	RD	Tpf

Note: Brass Cap Ground Elevation: 6921.51 ft; all measurements are from this elevation



3.22 R-18

Location: R-18 is located on a mesa at TA-14 between Pajarito Canyon and Cañon de Valle, about 3000 ft northeast of R-25.

Completion Type: Single completion at the top of the regional aquifer. The top of the screen is about 70 ft bellow the water table.

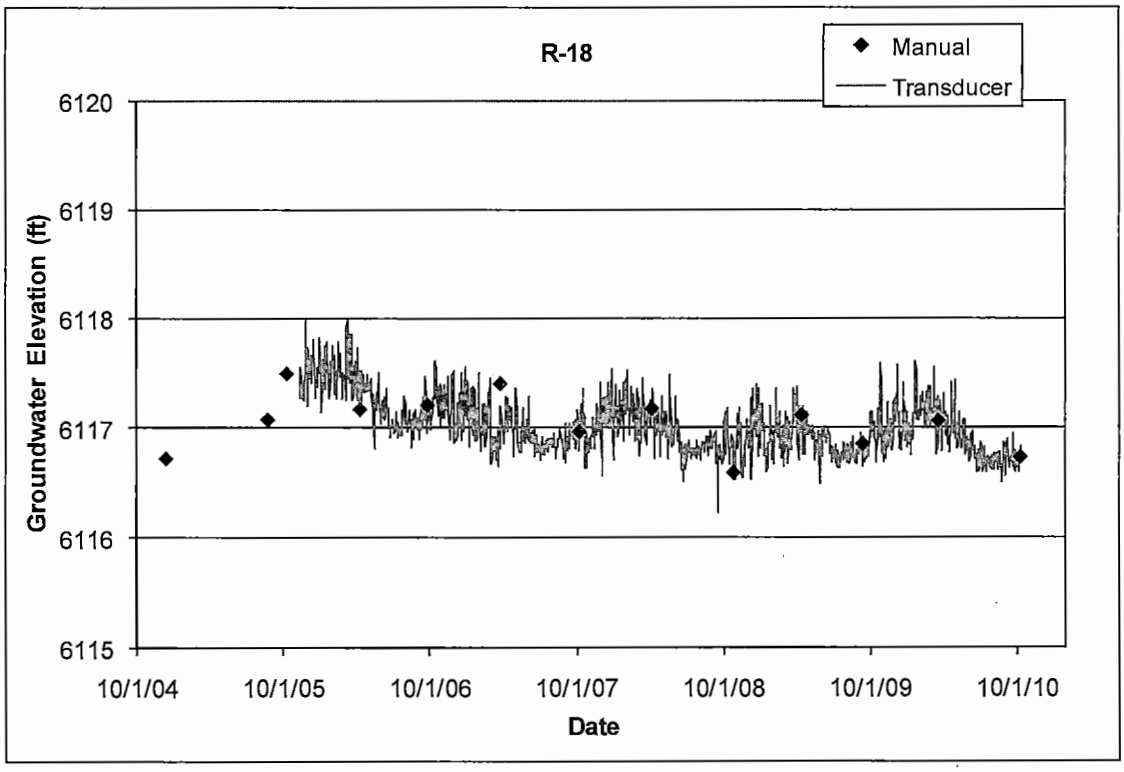
Period of Record: Completed December 12, 2004, transducer installed October 11, 2005, transducer data through 2010.

Remarks: R-18 was completed to a depth of 1405 ft, about 118 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer does not indicate a response to atmospheric pressure fluctuations. There is no apparent response to supply well pumping.

R-18 Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1358.0	1381	6046.8	6023.8	23.0	1353	6051.8	1381.0	6023.8	1405	24.0	75.1	RT	Tpf

Note: Brass Cap Ground Elevation: 7404.83 ft; all measurements are from this elevation



3.23 R-19

Location: R-19 is located on a mesa south of Three-Mile Canyon about 1.2 mi west of supply well PM-2.

Completion Type: Multiple completion, two screens in intermediate zones, and five screens in the regional aquifer. Screen 3 straddles the regional water table.

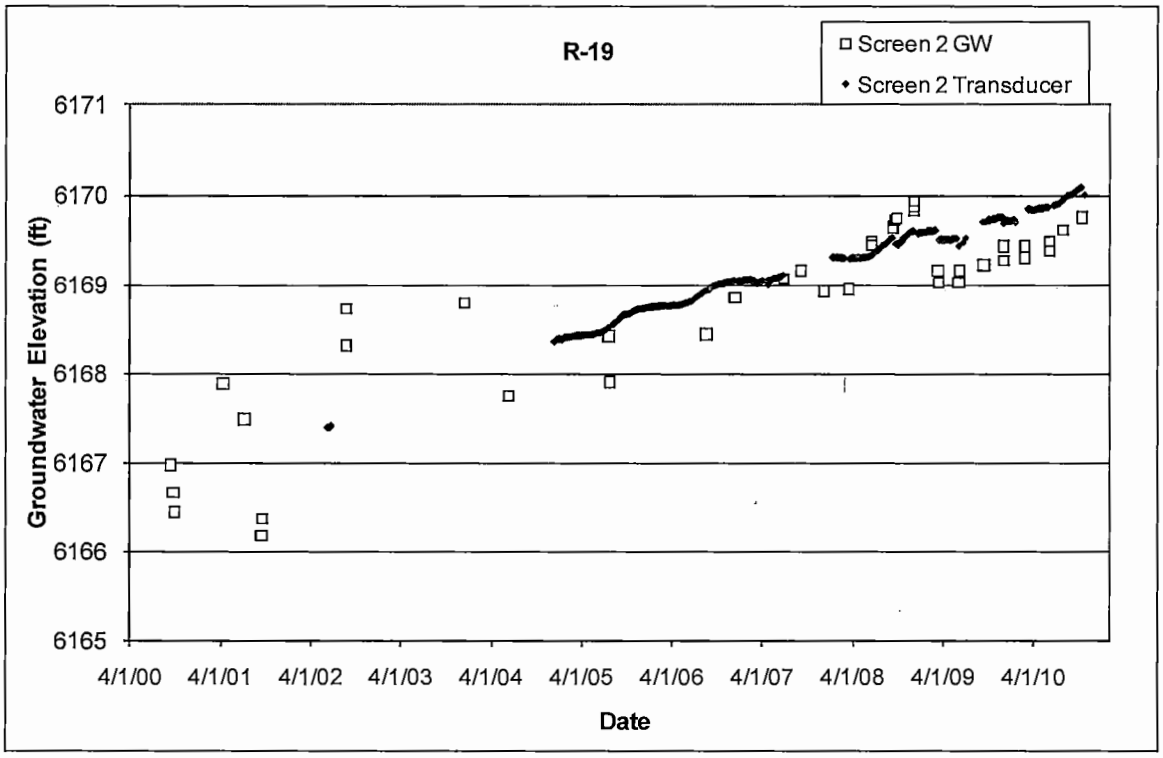
Period of Record: Westbay® installed September 11, 2000, transducers installed June 04, 2002, equipment problems occurred within two weeks. Transducers reinstalled December 10, 2004; transducer data to June 25, 2007, when the transducer string cable failed. Cable rebuilt and transducers reinstalled January 10, 2008; data are available intermittently through 2010.

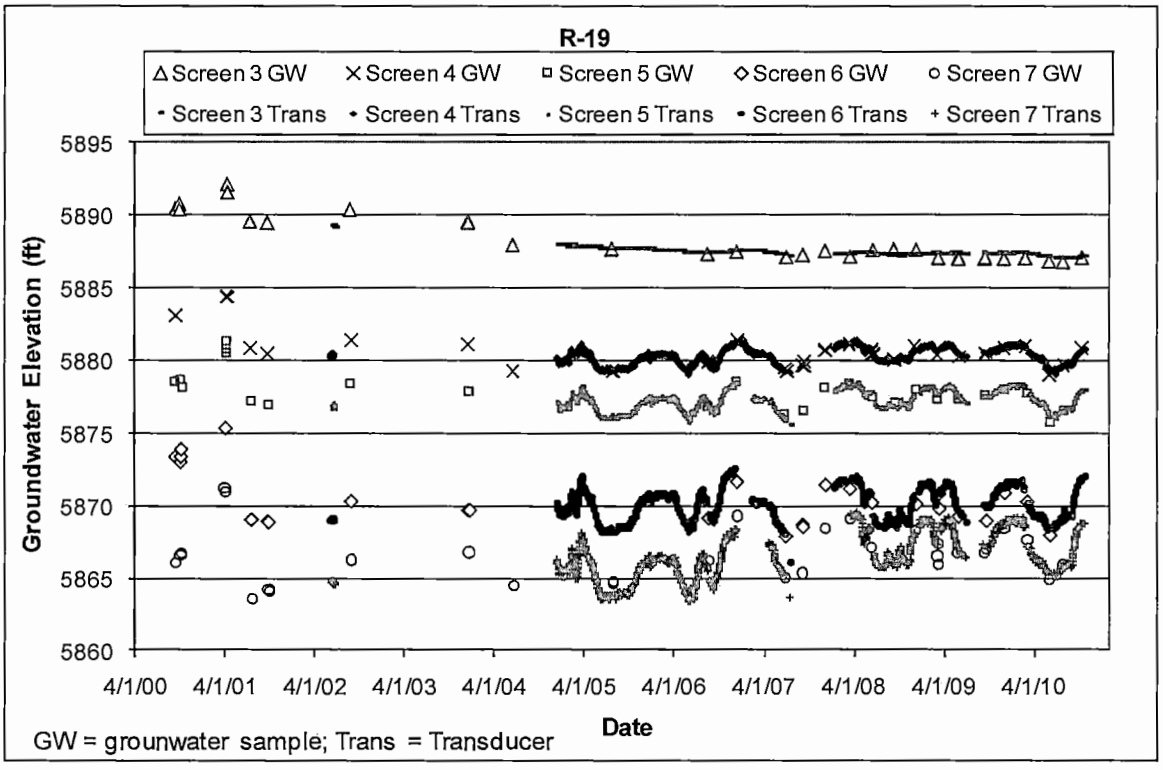
Remarks: Screen 1 has been dry since Westbay® installation. Screen 3 at the top of the regional aquifer does not show a response to atmospheric pressure fluctuations, but the deeper screens 4 through 7 indicate 40% to 50% response. The deeper screens (4 through 7) in the regional aquifer respond to supply well pumping at PM-2 and PM-4, and possibly to PM-5.

R-19 Construction Information and Port Data

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Hydro Zone Code	Geo Unit Code	Port	Port Depth (ft)	Port Elevation (ft)	Distance from Bottom of Screen (ft)	Sump Volume (L)	Comment
1	827.2	843.6	6239.1	6222.7	16.4	I	Qbog	MP1A	844.2	6222.1	-0.6	1.3	Below Screen
								PP1	849.6	6216.7	-6	13.0	Below Screen
								MP1B	855.2	6211.1	-11.6	25.1	Below Screen
2	893.3	909.6	6173.0	6156.7	16.3	I	Tp	**MP2A**	909.3	6157.0	0.3		Within Screen
								PP2	914.7	6151.6	-5.1	11.0	Below Screen
								MP2B	920.3	6146.0	-10.7	23.1	Below Screen
3	1171.4	1215.4	5894.9	5850.9	44.0	RT	Tpf	MP3A	1190.7	5875.6	24.7		Within Screen
								PP3	1196.1	5870.2	19.3		Within Screen
								MP3B	1201.7	5864.6	13.7		Within Screen
								MP3C	1212.8	5853.5	2.6		Within Screen
4	1410.2	1417.4	5656.1	5648.9	7.2	RD	Tpf	**MP4A**	1412.9	5653.4	4.5		Within Screen
								PP4	1418.3	5648.0	-0.9	1.9	Below Screen
								MP4B	1423.9	5642.4	-6.5	14.1	Below Screen
5	1582.6	1589.8	5483.7	5476.5	7.2	RD	Tpf	**MP5A**	1586.1	5480.2	3.7		Within Screen
								PP5	1591.5	5474.8	-1.7	3.7	Below Screen
								MP5B	1597.1	5469.2	-7.3	15.8	Below Screen
6	1726.8	1733.9	5339.5	5332.4	7.1	RD	Tpf	**MP6A**	1730.1	5336.2	3.8		Within Screen
								PP6	1735.4	5330.9	-1.5	3.2	Below Screen
								MP6B	1741.1	5325.2	-7.2	15.6	Below Screen
7	1832.4	1839.5	5233.9	5226.8	7.1	RD	Tpf	**MP7A**	1834.7	5231.6	4.8		Within Screen
								PP7	1840.0	5226.3	-0.5	1.1	Below Screen
								MP7B	1845.7	5220.6	-6.2	13.4	Below Screen

Note: R-19 Brass Cap Ground Elevation: 7066.3 ft; all measurements are from this elevation;
MP = Monitor Port; PP = Pump Port; Monitor Ports shown in bold are instrumented ports


R-19
Screen 2 GW
Screen 2 Transducer
Groundwater Elevation (ft)
6171
6170
6169
6168
6167
6166
6165
4/1/00
4/1/01
4/1/02
4/1/03
4/1/04
4/1/05
4/1/06
4/1/07
4/1/08
4/1/09
4/1/10
Date

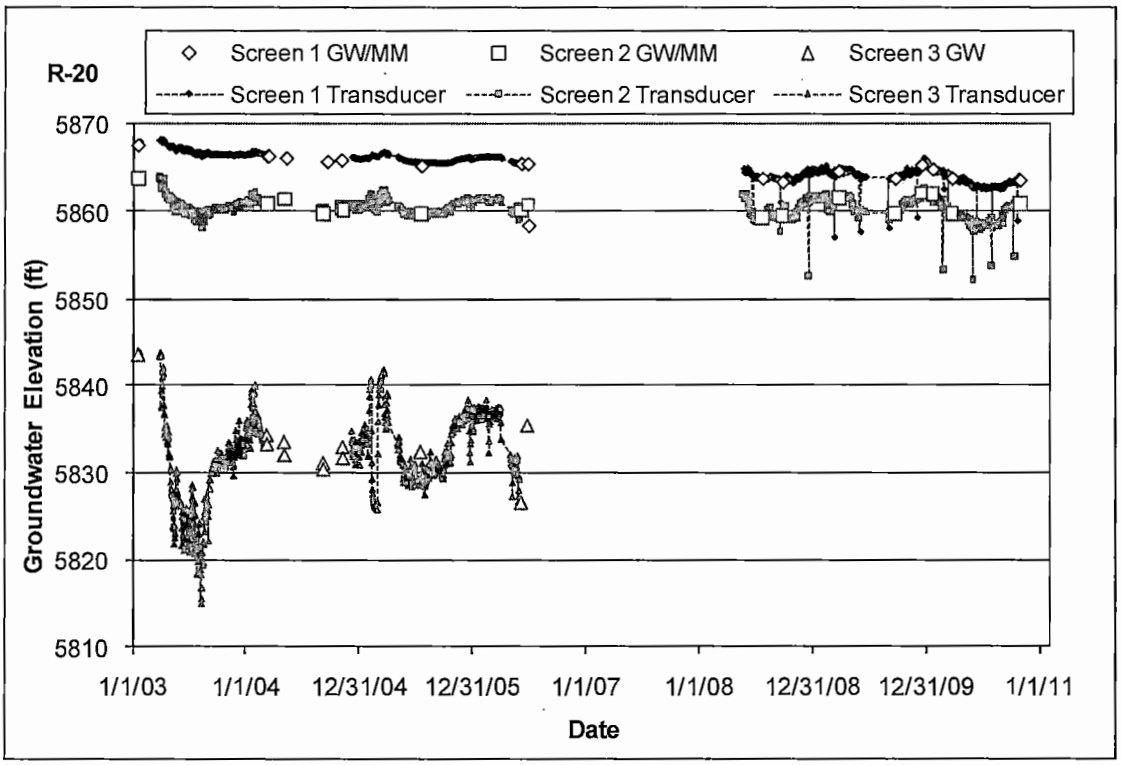

R-19
Screen 3 GW
Screen 4 GW
Screen 5 GW
Screen 6 GW
Screen 7 GW
Screen 3 Trans
Screen 4 Trans
Screen 5 Trans
Screen 6 Trans
Screen 7 Trans
Groundwater Elevation (ft)
5895
5890
5885
5880
5875
5870
5865
5860
4/1/00
4/1/01
4/1/02
4/1/03
4/1/04
4/1/05
4/1/06
4/1/07
4/1/08
4/1/09
4/1/10
Date
GW = grounwater sample; Trans = Transducer

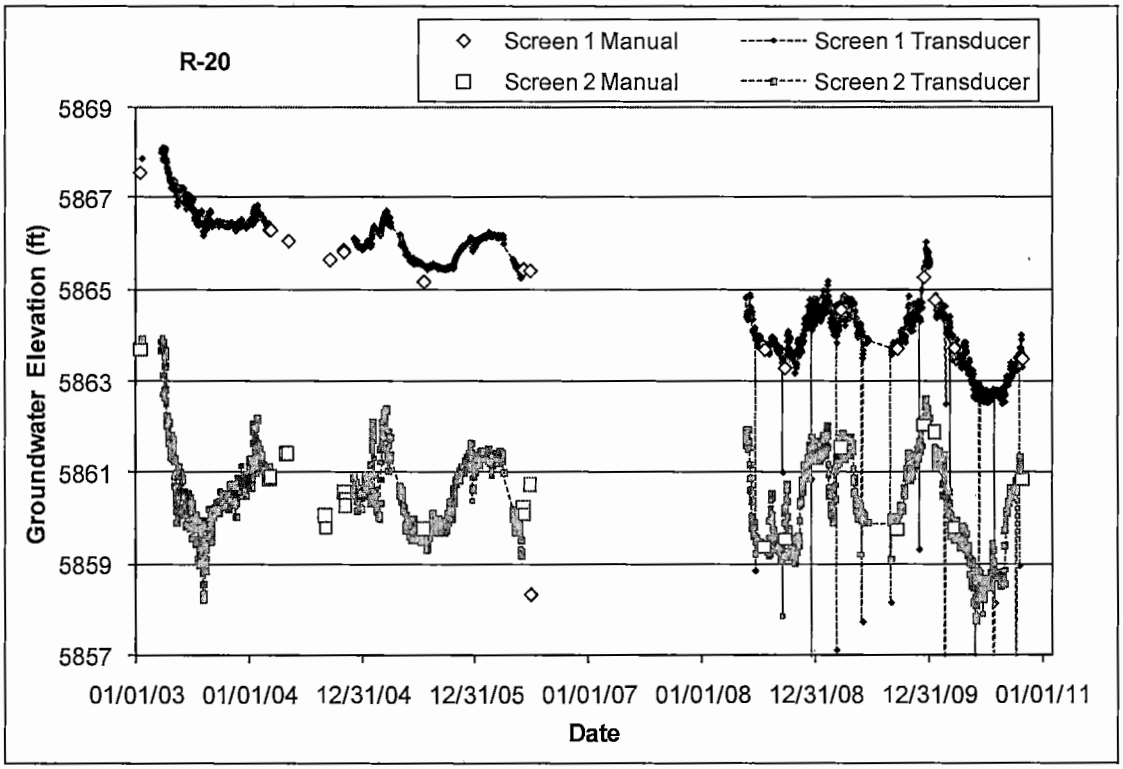
3.24 R-20

Location: R-20 is located in lower Pajarito Canyon about 1300 ft east of supply well PM-2.
Completion Type: Multiple completion, originally three screens in the regional aquifer. Screen 3 was plugged and abandoned November 2007, leaving two screens in the regional aquifer. The top of screen 1 is about 76 ft below the regional water table. The recompleted well incorporates two packers, one below screen 1 and one above screen 2 to minimize purge volumes.
Period of Record: Westbay® installed January 18, 2003, transducers installed March 26, 2003, intermittent transducer data to June 1, 2006, when the Westbay® system was removed. No water level data in the last half of 2006 and in 2007 during well rehabilitation. Transducers installed at screens 1 and 2 in May 2008; data through 2010.
Remarks: A dual pump Baski sampling system with two packers between screens 1 and 2 installed May 2008 (LANL January 2008). Screen 1 shows no response to atmospheric pressure fluctuations. Screen 3 responded to supply well pumping at PM-2 and PM-4. The shallower screens 1 and 2 show a muted response to supply well pumping.

R-20 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top/ Bottom Packer Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (gal)	Hydro Zone Code	Geo Unit Code
1	904.6	912.2	5789.8	5782.2	7.6	908.43	5785.9	918.7	5782.2	918.7	6.5	5.3	RT	Tb4
2	1147.1	1154.7	5547.3	5539.7	7.6	1141.7	5552.6	1133.8	5539.7	1183.5	28.8	23.8	RD	Tpp
3	1328.8	1336.5	5365.6	5357.9	7.7	**Screen 3 plugged and abandoned November 2007**							RD	Tsf
Note: R-20 Brass Cap Ground Elevation: 6694.35 ft; all measurements are from this elevation														


R-20
Screen 1 GW/MM
Screen 2 GW/MM
Screen 3 GW
Screen 1 Transducer
Screen 2 Transducer
Screen 3 Transducer
Groundwater Elevation (ft)
5870
5860
5850
5840
5830
5820
5810
1/1/03
1/1/04
12/31/04
12/31/05
1/1/07
1/1/08
12/31/08
12/31/09
1/1/11
Date


R-20
Screen 1 Manual
Screen 2 Manual
Screen 1 Transducer
Screen 2 Transducer
Groundwater Elevation (ft)
5869
5867
5865
5863
5861
5859
5857
01/01/03
01/01/04
12/31/04
12/31/05
01/01/07
01/01/08
12/31/08
12/31/09
01/01/11
Date

3.25 R-21

Location: R-21 is located in Cañada del Buey north of TA-54 and between Material Disposal Area (MDA) L and MDA G. R-21 is 780 ft east of R-56, 1130 ft south of R-38, and 1500 ft north of R-32.

Completion Type: Single completion at the top of the regional aquifer. The top of the screen is about 87 ft below the water table.

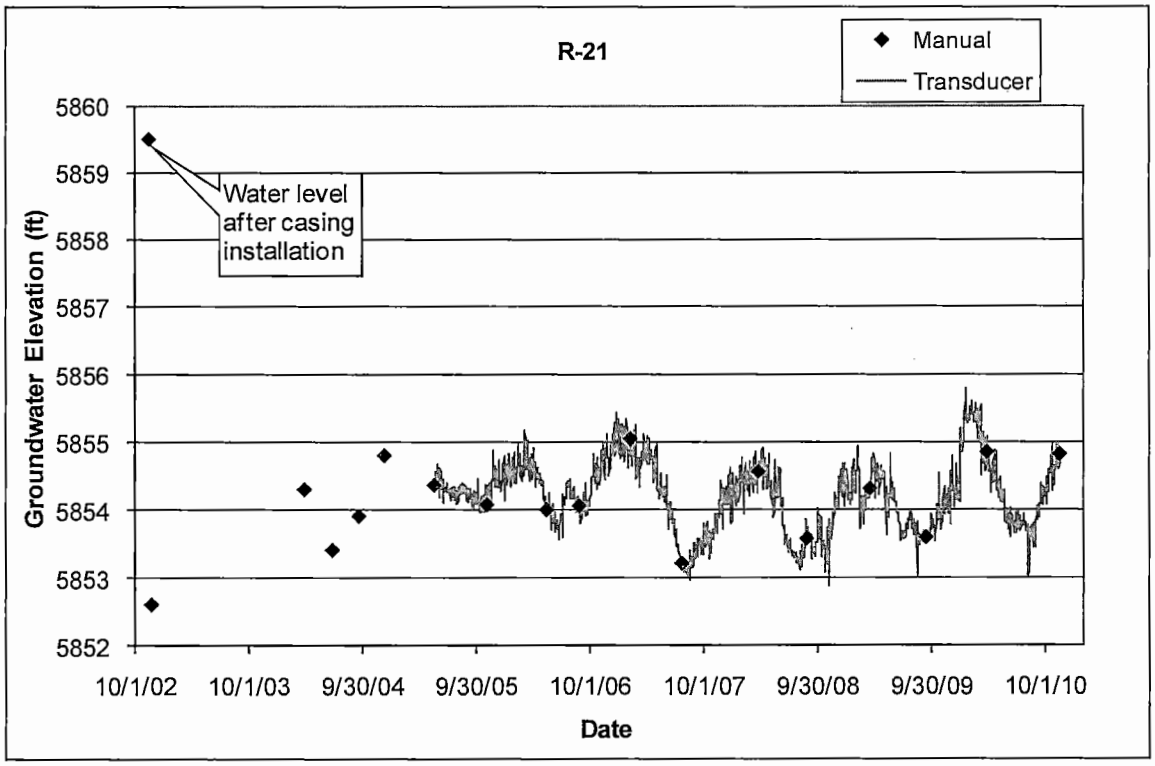
Period of Record: Well completed November 2002, transducer installed May 23, 2005, transducer data through 2010.

Remarks: R-21 installed to a depth of 941.4 ft, about 140 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. The well responds to pumping of PM-2, PM-4, and possibly another well or combination of wells.

R-21 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	888.8	906.8	5767.4	5749.4	18.0	861.0	5795.2	906.8	5749.4	941.4	34.6	192.4	RT	Tpf

Note: R-21 Brass Cap Ground Elevation: 6656.24 ft; all measurements are from this elevation



3.26 R-22

Location: R-22 is located at the east end of Mesita del Buey, east of TA-54. R-22 is about 310 ft southeast of R-57, 640 ft south of R-41, and 700 ft northeast of R-39.

Completion Type: Multiple completion, five screens in the regional aquifer. Screen 1 straddles the regional water table.

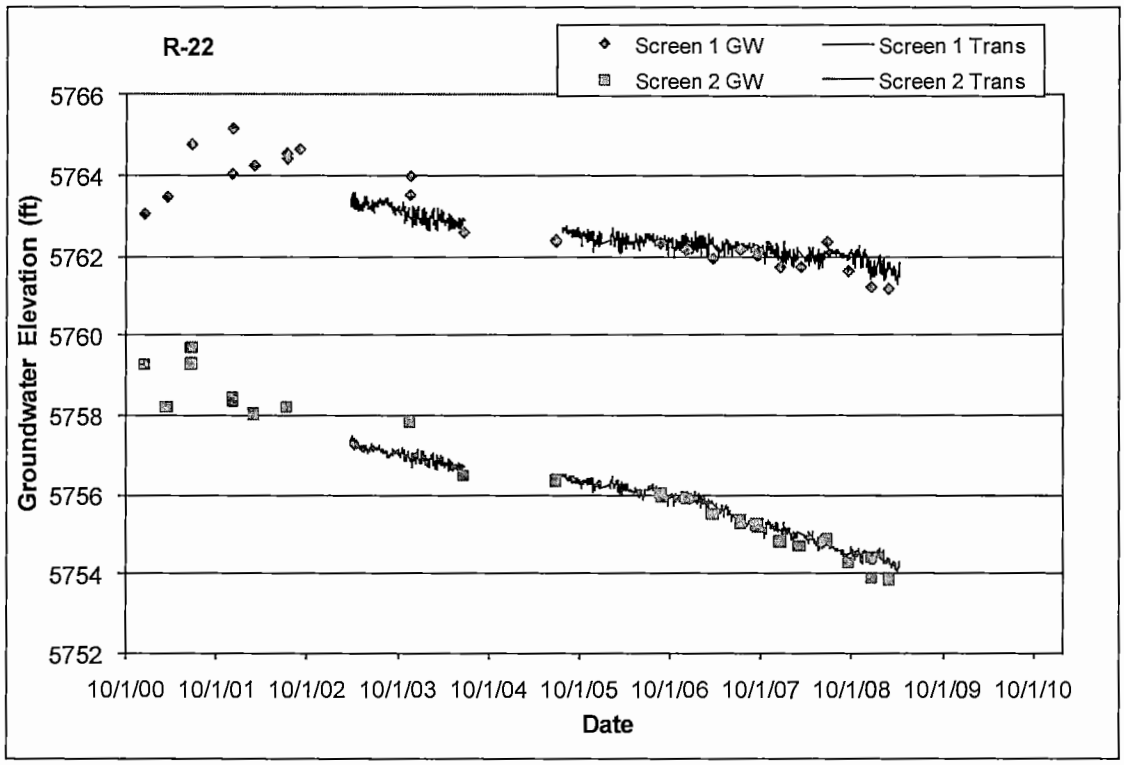
Period of Record: Westbay® installed December 11, 2000, transducers installed March 26, 2003, intermittent transducer data to April 13, 2009, when the transducers were removed in preparation for removing the Westbay® system.

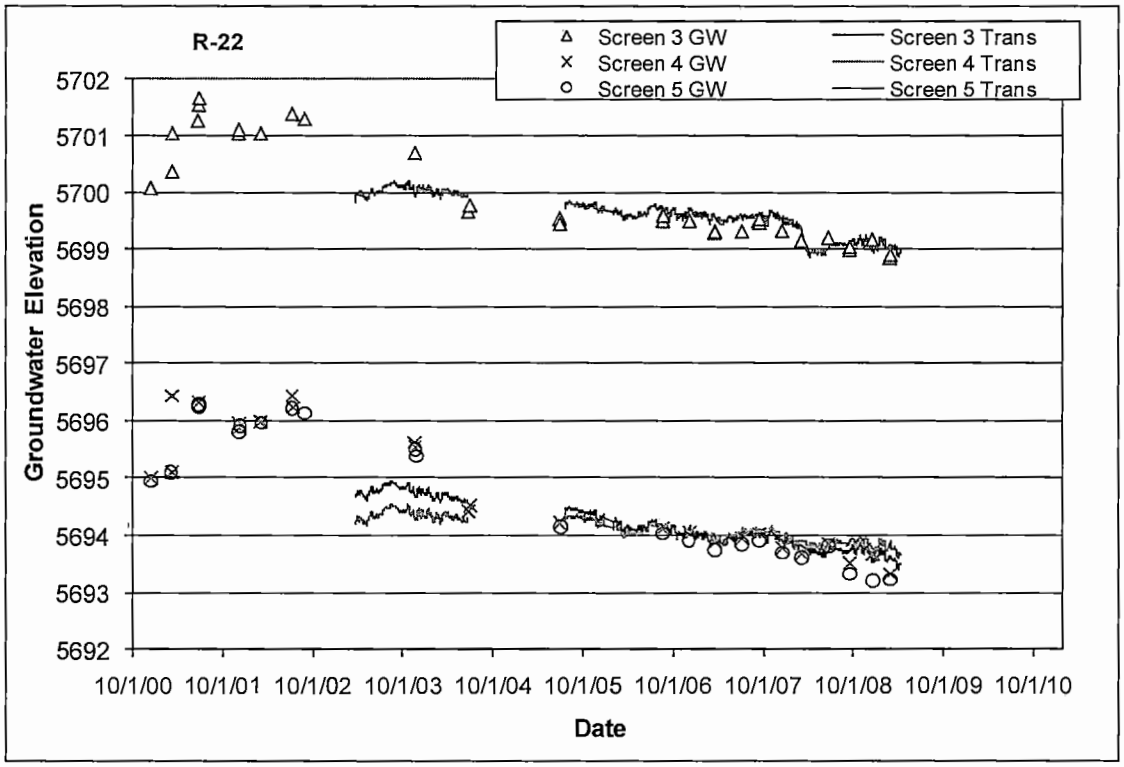
Remarks: Screens 1 and 2 have similar head values about 6 ft apart. Screens 3, 4, and 5 have similar heads within 6 ft of each other, but about 60 ft lower than screens 1 and 2. Screens 4 and 5 have nearly identical head values. The R-22 screens do not show an immediate response to atmospheric pressure fluctuations, but show a delayed response ranging from 20% to 95%. The deeper aquifer at R-22 screens 3, 4, and 5 shows an apparent small seasonal response to supply well pumping. The Westbay® system was removed on May 3, 2009, for well rehabilitation (LANL 2009).

R-22 Construction and Port Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Hydro Zone Code	Geo Unit Code	Port	Port Depth (ft)	Port Elevation (ft)	Distance from Bottom of Screen (ft)	Sump Volume (L)	Comment
1	872.3	914.2	5778.2	5736.3	41.9	RT	Tb4	**MP1A**	907.1	5743.4	7.1		Within Screen
								PP1	912.4	5738.1	1.8		Within Screen
								MP1B	918.1	5732.4	-3.9	9.1	Below Screen
2	947.0	988.9	5703.5	5661.6	41.9	RD	Tb4	**MP2A**	962.8	5687.7	26.1		Within Screen
								PP2	967.7	5682.8	21.2		Within Screen
								MP2B	973.4	5677.1	15.5		Within Screen
3	1272.2	1278.9	5378.3	5371.6	6.7	RD	Tpf	**MP3A**	1273.5	5377.0	5.4		Within Screen
								PP3	1278.9	5371.6	0		Within Screen
								MP3B	1284.5	5366.0	-5.6	13.1	Below Screen
4	1378.2	1384.9	5272.3	5265.6	6.7	RD	Tb	**MP4A**	1378.0	5272.5	6.9		Above Screen
								PP4	1383.4	5267.1	1.5		Within Screen
								MP4B	1389.1	5261.4	-4.2	9.9	Below Screen
5	1447.3	1452.3	5203.2	5198.2	5.0	RD	Tpf	**MP5A**	1448.2	5202.3	4.1		Within Screen
								PP5	1453.6	5196.9	-1.3	3.0	Below Screen
								MP5B	1459.2	5191.3	-6.9	16.2	Below Screen

Note: R-22 Brass Cap Ground Elevation: 6650.5 ft; all measurements are from this elevation;
MP = Monitor Port; PP = Pump Port; Monitor Ports shown in bold are instrumented ports


R-22
Screen 1 GW
Screen 2 GW
Screen 1 Trans
Screen 2 Trans
Groundwater Elevation (ft)
5766
5764
5762
5760
5758
5756
5754
5752
10/1/00 10/1/01 10/1/02 10/1/03 10/1/04 10/1/05 10/1/06 10/1/07 10/1/08 10/1/09 10/1/10
Date


R-22
Screen 3 GW
Screen 4 GW
Screen 5 GW
Screen 3 Trans
Screen 4 Trans
Screen 5 Trans
Groundwater Elevation
5702
5701
5700
5699
5698
5697
5696
5695
5694
5693
5692
10/1/00 10/1/01 10/1/02 10/1/03 10/1/04 10/1/05 10/1/06 10/1/07 10/1/08 10/1/09 10/1/10
Date

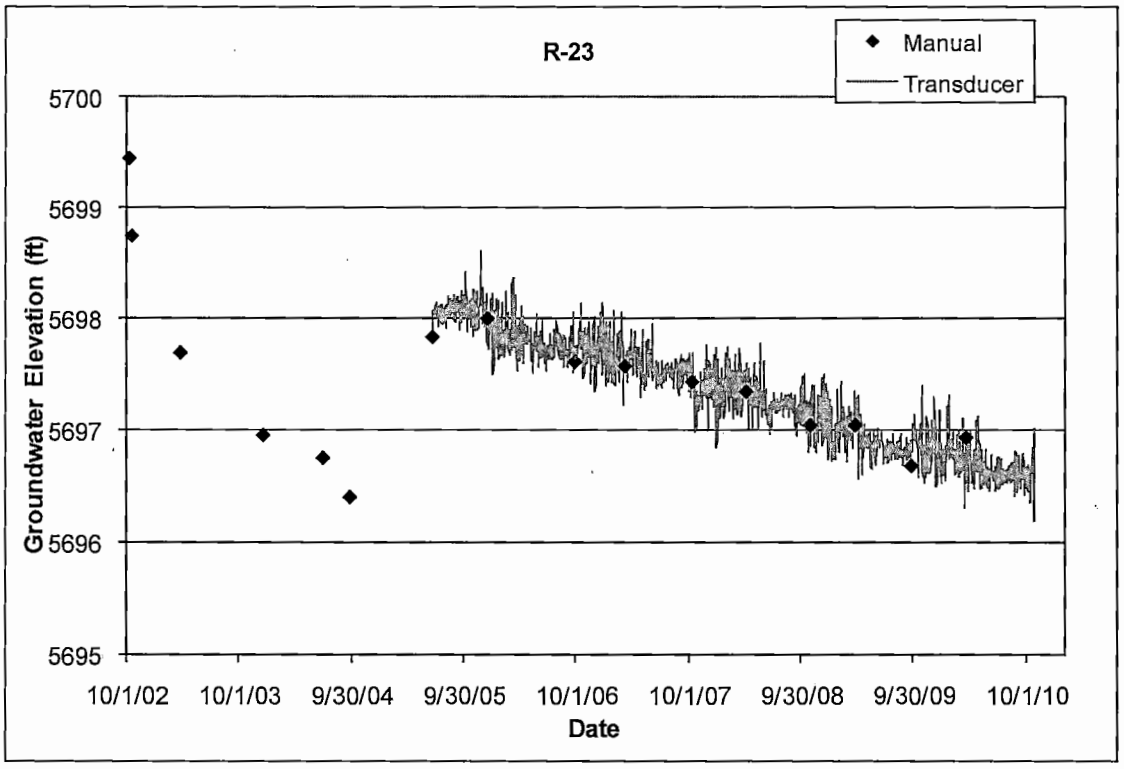
3.27 R-23

Location: R-23 is located in lower Pajarito Canyon near SR-4 and the eastern LANL boundary.
Completion Type: Single completion at the top of the regional aquifer. The screen straddles the water table.
Period of Record: Well completed October 2002, transducer installed June 20, 2005, transducer data through 2010.
Remarks: R-23 was installed to a depth of 886.3 ft, about 60 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer has no immediate response to atmospheric pressure fluctuations, however, the aquifer has a delayed response to atmospheric pressure. The aquifer at R-23 shows no apparent response to pumping the PM well field or the Buckman well field, but exhibits a steady water level decline of about 0.3 ft/yr.

R-23 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	816.0	873.2	5711.8	5654.6	57.2	870.7	5657.1	873.2	5654.6	886.3	13.1	41.0	RT	Tsf

Note: R-23 Brass Cap Ground Elevation: 6527.75 ft; all measurements are from this elevation

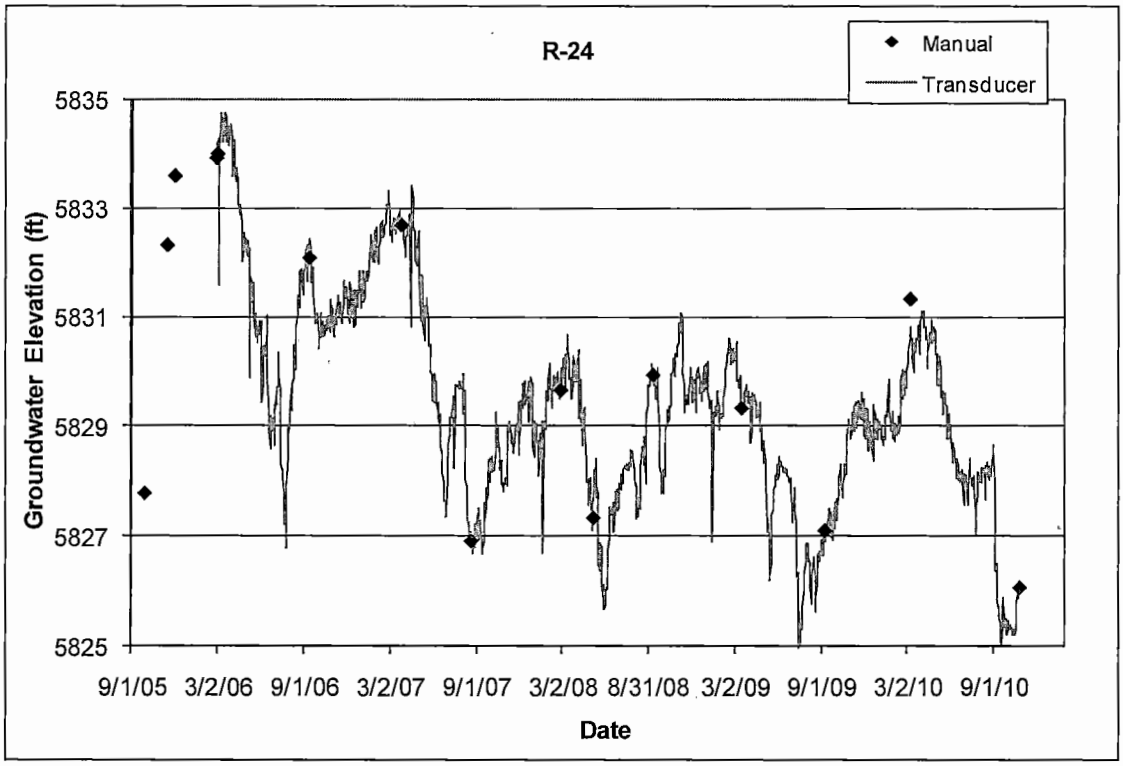


3.28 R-24

Location: R-24 is located in Bayo Canyon north of the former Bayo Sewage Treatment Plant.
Completion Type: Single completion at the top of the regional aquifer. The top of the screen is in a confined zone about 110 ft below the water table.
Period of Record: Well completed September 2005, transducer installed March 1, 2006, data through 2010.
Remarks: R-24 installed to a depth of 861 ft, about 150 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. The aquifer at R-24 responds primarily to pumping at supply well PM-3 located 1.5 mi south in Sandia Canyon, but may also respond to pumping the Guaje well field and supply well O-4.

R-24 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	825.0	848.0	5722.4	5699.4	23.0	818.7	5728.7	848.0	5699.4	861	13.0	40.7	RT	Tsf
Note: R-24 Brass Cap Ground Elevation: 6547.38 ft; all measurements are from this elevation														



3.29 R-25

Location: R-25 is located at TA-16 within the Cañon de Valle watershed. R-25 is about 50 ft east of R-25b, 100 ft east of R-25c, 370 ft south of CdV-16-1(i), and 425 ft southwest of CdV-16-4ip.

Completion Type: Multiple completion, four screens in intermediate zones, and five screens in the regional aquifer. Screens 3 and 9 were damaged during installation and are not reliable for water level monitoring. Screen 5 straddles the regional water table.

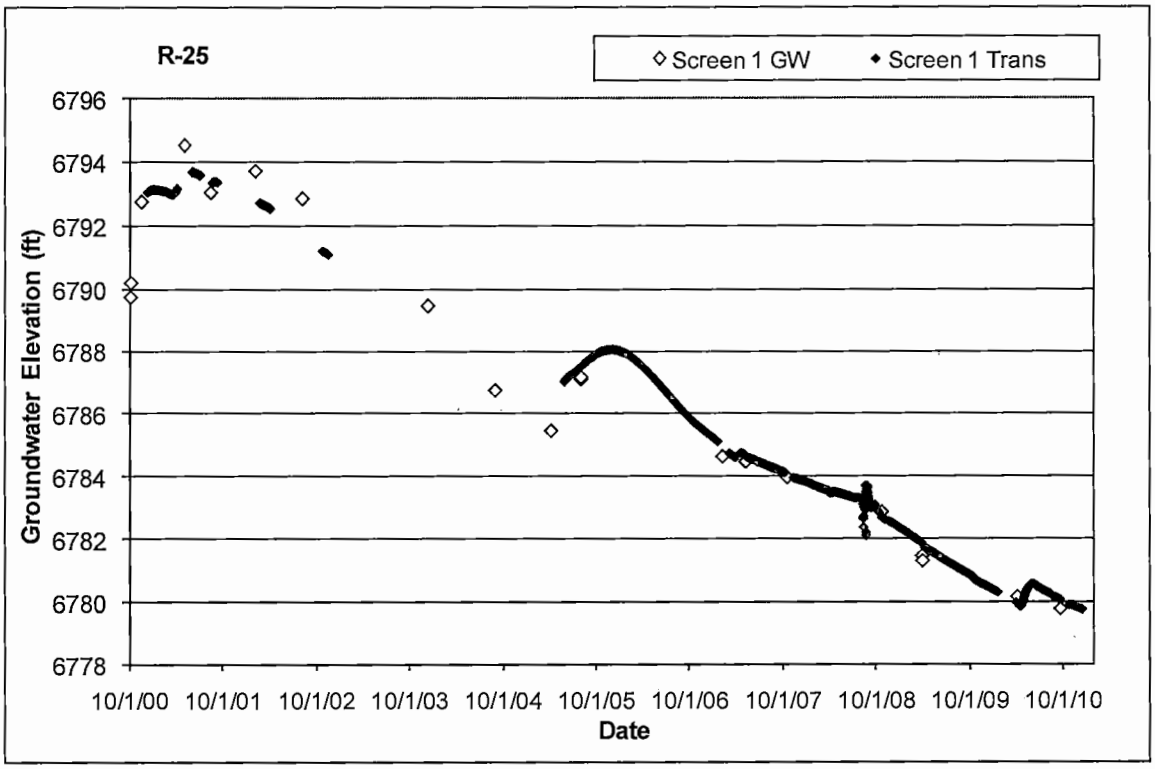
Period of Record: Westbay® installed October 3, 2000, transducers installed February 26, 2001, and between sampling events through 2002. Transducers installed again June 2, 2005; data through 2010.

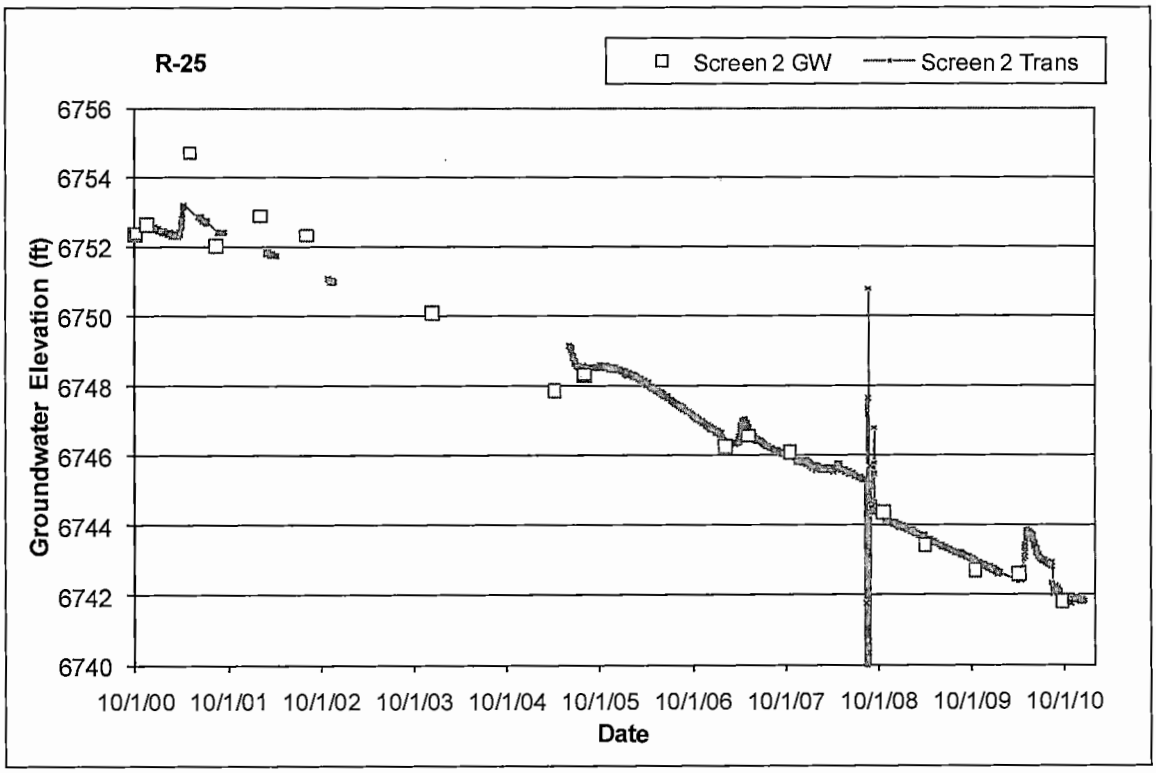
Remarks: Recurring problems with the transducer cables from 2001 to 2005 caused loss of data. The transducer cables were rebuilt in 2005. Screens 1 and 2 are in upper intermediate zones. Screen 3 has always been dry; screen 4 appears to be in a separate intermediate zone. The water level at screen 5, the top of the regional aquifer, declines significantly during low flow sampling and recovers slowly. There is no significant response to atmospheric pressure at any of the screens. Intermediate screens 1, 2, and perhaps 4 responded to snowmelt runoff in 2005, 2007, 2008, and 2010; see Appendix D for more information. The regional aquifer screens do not indicate an apparent response to supply well pumping. The intermediate groundwater at screens 1, 2, and 4 and the sump water at screen 3 responded to drilling and installation of adjacent well R-25c (replacement for R-25 screen 3) in August 2008 (LANL September 2008). Screen 2 responded during drilling of nearby well CDV-16-4ip.

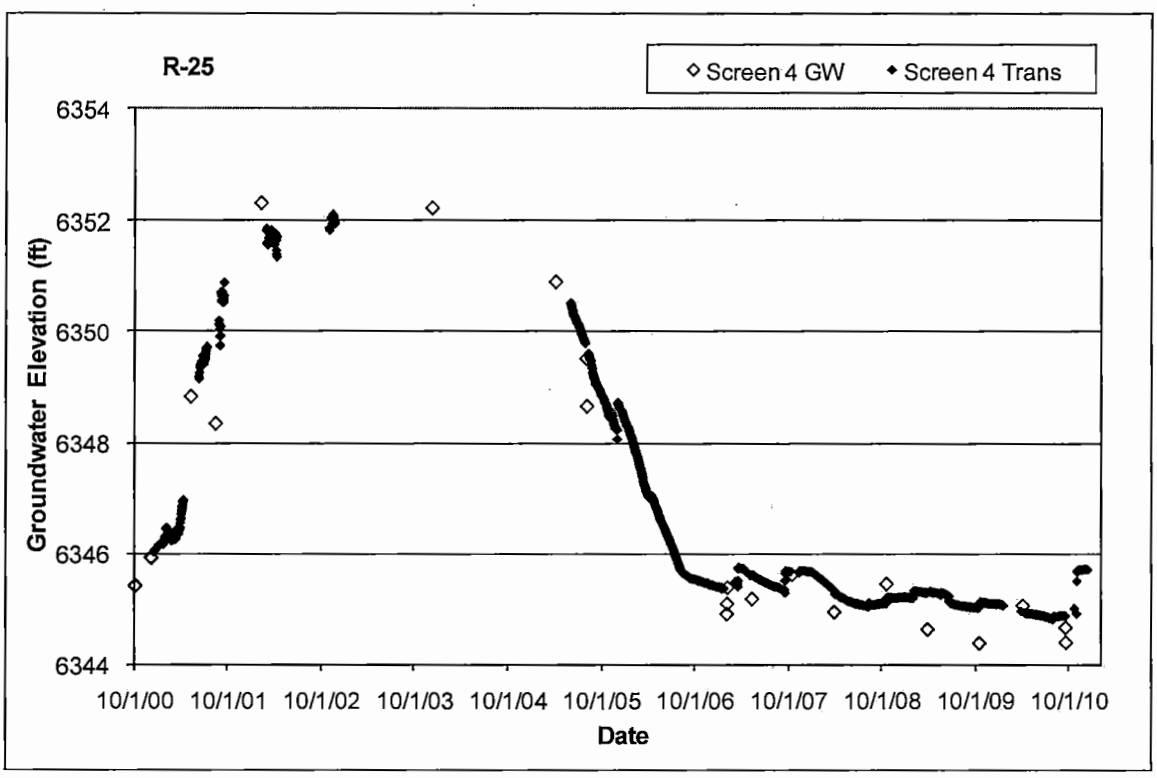
R-25 Construction and Port Information

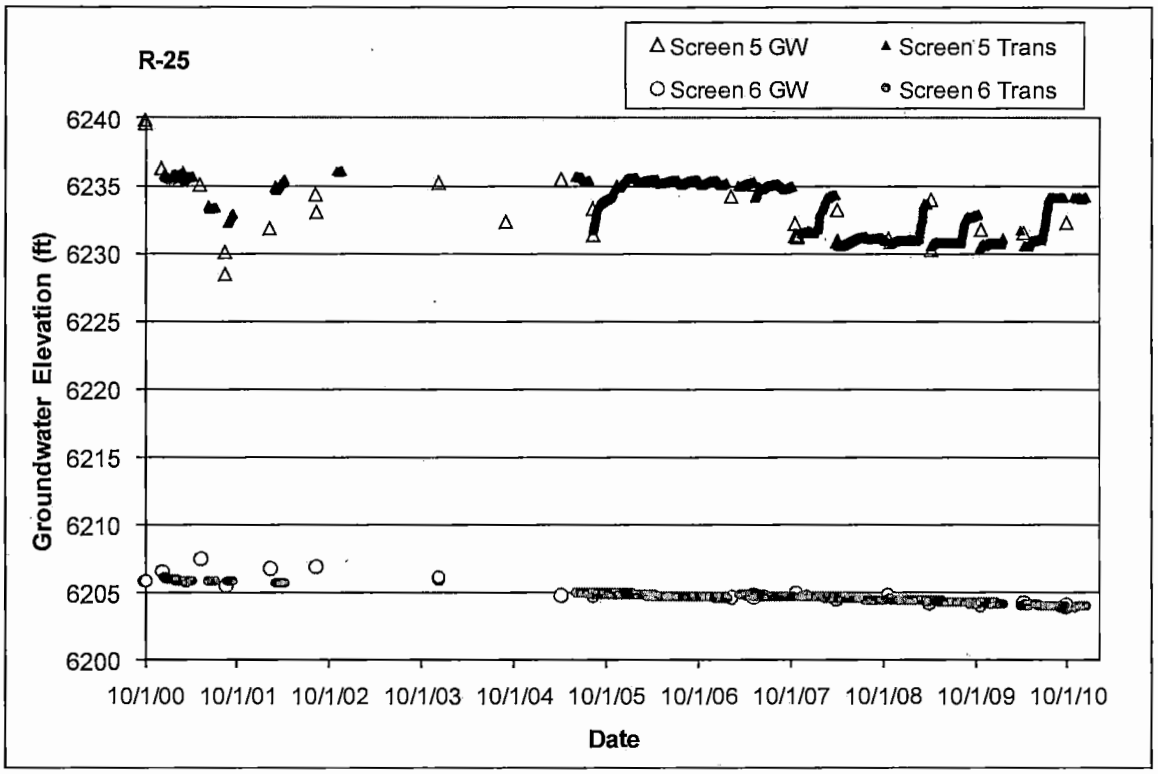
Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Hydro Zone Code	Geo Unit Code	Port	Port Depth (ft)	Port Elev (ft)	Distance from Bottom of Screen (ft)	Sump Vol above Port (L)	Sump Vol Total (L)	Comment
1	737.6	758.4	6778.5	6757.7	20.8	I	Qbo	**MP1A**	754.8	6761.3	3.6			Within Screen
								PP1	760.1	6756.0	-1.7	4.9		Below Screen
								MP1B	765.8	6750.3	-7.4	21.4	31.9	Below Screen
2	882.6	893.4	6633.5	6622.7	10.8	I	Tpf	**MP2A**	891.8	6624.3	1.6			Within Screen
								PP2	897.2	6618.9	-3.8	11.0		Below Screen
								MP2B	902.8	6613.3	-9.4	27.2	37.9	Below Screen
3	1054.6	1064.6	6461.5	6451.5	10.0	I	Tpf	**MP3A**	1063.4	6452.7	1.2			Within Screen, screen damaged
								PP3	1068.8	6447.3	-4.2	12.2		Below Screen
								MP3B	1084.2	6431.9	-19.6	56.8	72.4	Below Screen, sump water
4	1184.6	1194.6	6331.5	6321.5	10.0	I	Tpf	**MP4A**	1192.4	6323.7	2.2			Within Screen
								PP4	1197.8	6318.3	-3.2	9.3		Below Screen
								MP4B	1203.4	6312.7	-8.8	25.5	36.5	Below Screen
5	1294.7	1304.7	6221.4	6211.4	10.0	RT	Tpf	**MP5A**	1303.4	6212.7	1.3			Within Screen
								PP5	1308.8	6207.3	-4.1	11.9		Below Screen
								MP5B	1314.4	6201.7	-9.7	28.1	39.1	Below Screen
6	1404.7	1414.7	6111.4	6101.4	10.0	RD	Tpf	**MP6A**	1406.3	6109.8	8.4			Within Screen
								PP6	1411.7	6104.4	3			Within Screen
								MP6B	1417.3	6098.8	-2.6	7.5	18.5	Below Screen
7	1604.7	1614.7	5911.4	5901.4	10.0	RD	Tpf	**MP7A**	1606.0	5910.1	8.7			Within Screen
								PP7	1611.4	5904.7	3.3			Within Screen
								MP7B	1617.1	5899.0	-2.4	7.0	17.7	Below Screen
8	1794.7	1804.7	5721.4	5711.4	10.0	RD	Tpf	**MP8A**	1796.0	5720.1	8.7			Within Screen
								PP8	1801.4	5714.7	3.3			Within Screen
								MP8B	1807.0	5709.1	-2.3	6.7	17.4	Below Screen
9	1894.7	1904.7	5621.4	5611.4	10.0	RD	Tpf	**MP9**	1825.1	5691.0	79.6			Screen 9 blocked by sediment

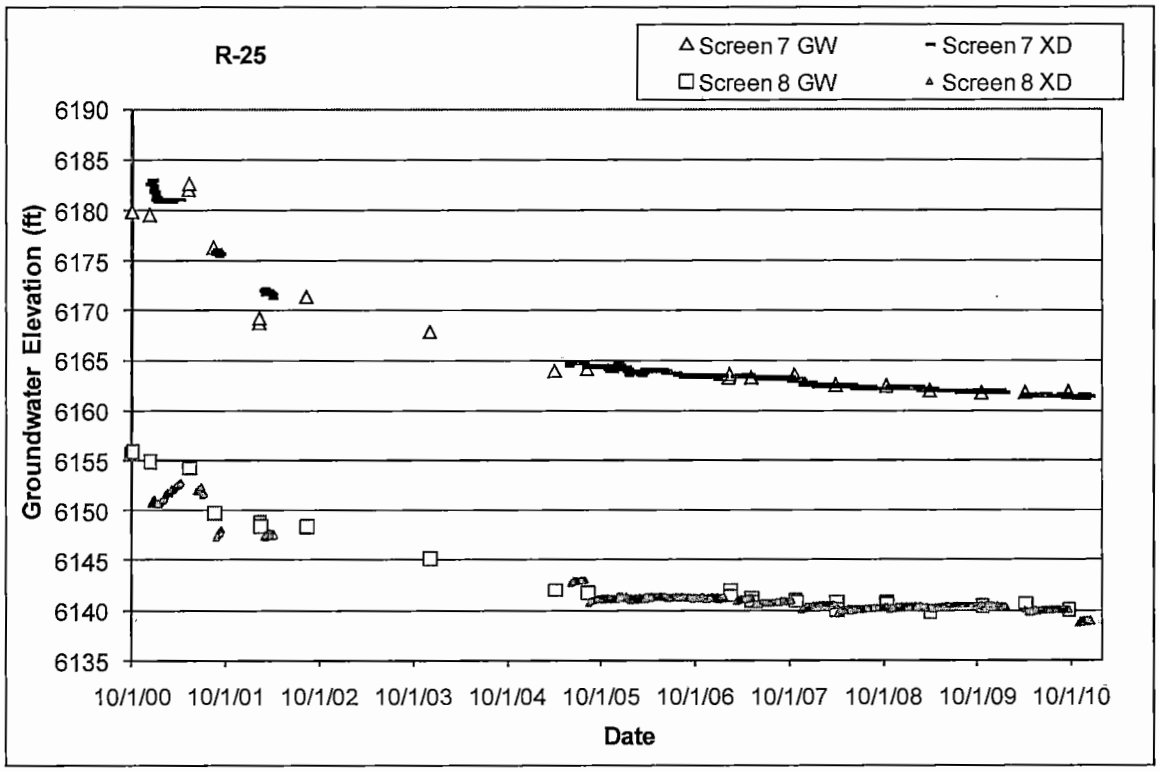
Note: R-25 Brass Cap Ground Elevation: 7516.1 ft; all measurements are from this elevation;
MP = Monitor Port; PP = Pump Port; Monitor Ports shown in bold are instrumented ports


R-25
◇ Screen 1 GW
◆ Screen 1 Trans
Groundwater Elevation (ft)
6796
6794
6792
6790
6788
6786
6784
6782
6780
6778
10/1/00 10/1/01 10/1/02 10/1/03 10/1/04 10/1/05 10/1/06 10/1/07 10/1/08 10/1/09 10/1/10
Date


R-25
□ Screen 2 GW
Screen 2 Trans
Groundwater Elevation (ft)
6756
6754
6752
6750
6748
6746
6744
6742
6740
10/1/00 10/1/01 10/1/02 10/1/03 10/1/04 10/1/05 10/1/06 10/1/07 10/1/08 10/1/09 10/1/10
Date


R-25
Screen 4 GW
Screen 4 Trans
6354
6352
6350
6348
6346
6344
Groundwater Elevation (ft)
10/1/00 10/1/01 10/1/02 10/1/03 10/1/04 10/1/05 10/1/06 10/1/07 10/1/08 10/1/09 10/1/10
Date


R-25
Screen 5 GW
Screen 5 Trans
Screen 6 GW
Screen 6 Trans
6240
6235
6230
6225
6220
6215
6210
6205
6200
Groundwater Elevation (ft)
10/1/00 10/1/01 10/1/02 10/1/03 10/1/04 10/1/05 10/1/06 10/1/07 10/1/08 10/1/09 10/1/10
Date


R-25
Screen 7 GW
Screen 7 XD
Screen 8 GW
Screen 8 XD
Groundwater Elevation (ft)
6190
6185
6180
6175
6170
6165
6160
6155
6150
6145
6140
6135
10/1/00
10/1/01
10/1/02
10/1/03
10/1/04
10/1/05
10/1/06
10/1/07
10/1/08
10/1/09
10/1/10
Date

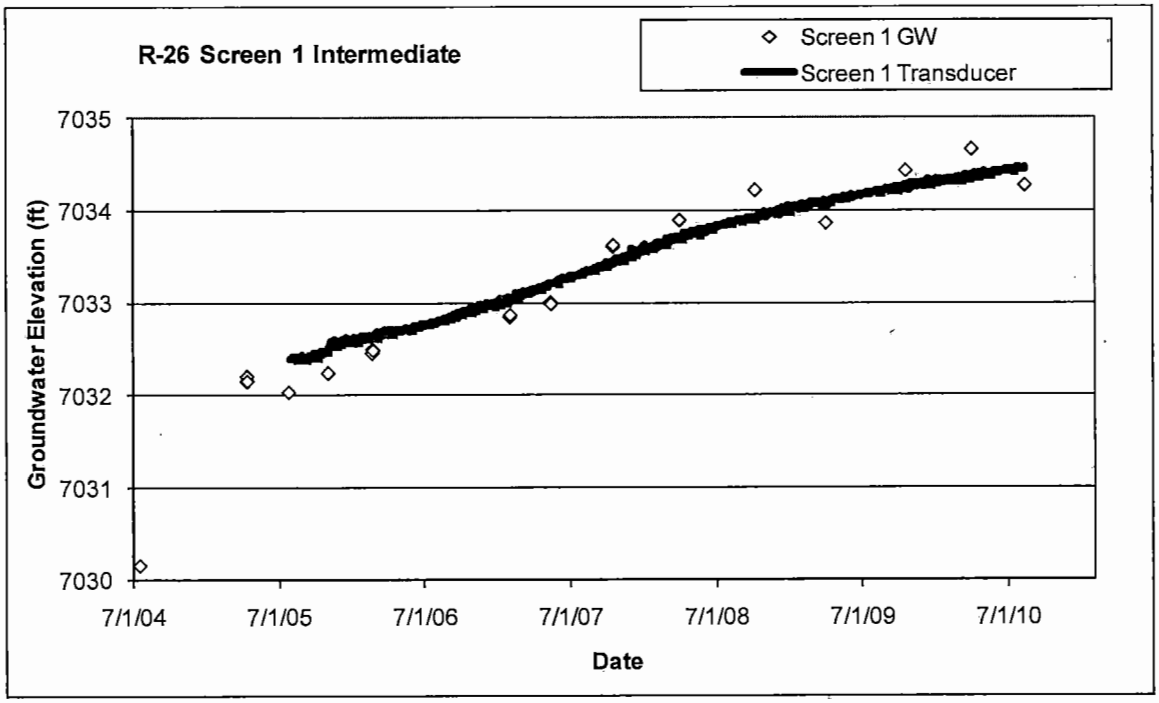
3.30 R-26

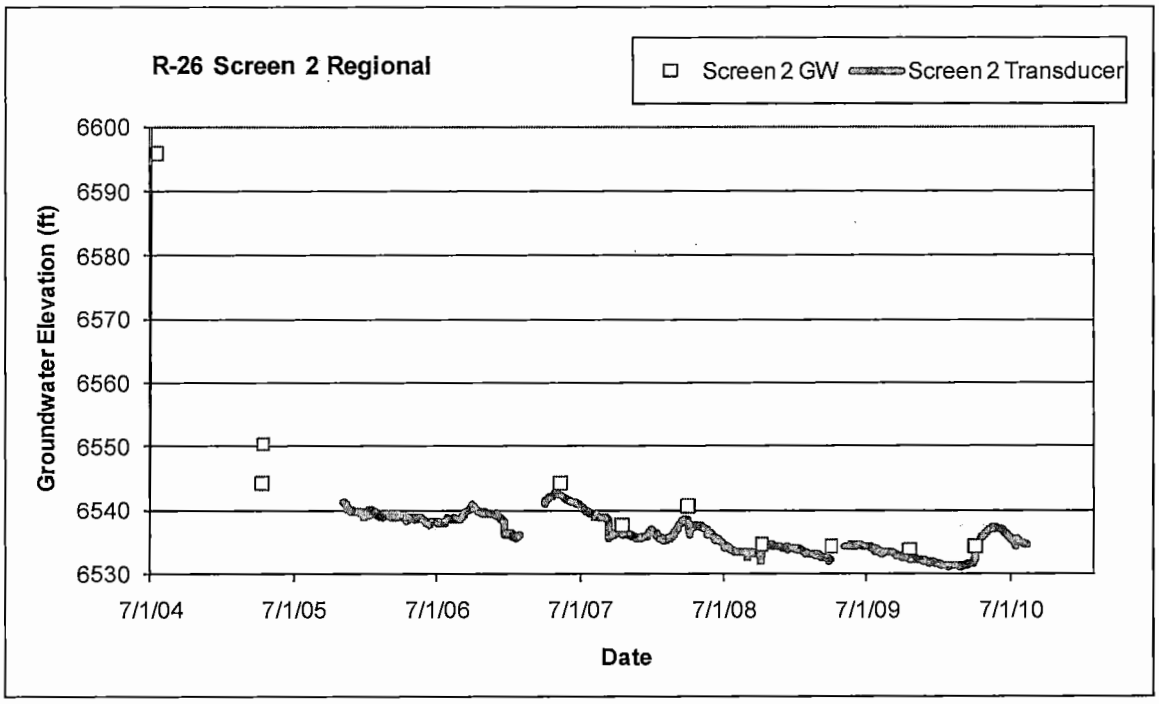
Location: R-26 is located at the western LANL boundary near Cañon de Valle.
Completion Type: Multiple completion, screen 1 is in an intermediate zone, and screen 2 is within the regional aquifer. The top of screen 2 is about 319 ft below the regional water table.
Period of Record: Westbay® installed July 18, 2004, transducers installed July 29, 2005, transducer data to August 13, 2010, when the transducers were removed in preparation for removal of the Westbay® system. When the Westbay® removal was delayed, the transducers were reinstalled December 16, 2010.
Remarks: Screen 2 is in a tight zone and/or improperly completed zone. Sampling attempts at MP2A caused plugging of the port and sampler with bentonite; the transducers were installed in the B ports on November 3, 2005; water level data from screen 2 at port MP2B appear valid with some questions as to validity pending additional data and review. There is no apparent response to supply well pumping at R-26.

R-26 Construction and Port Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Hydro Zone Code	Geo Unit Code	Port	Port Depth (ft)	Port Elevation (ft)	Distance from Bottom of Screen (ft)	Sump Volume (L)	Comment
1	651.8	669.9	6989.9	6971.8	18.1	I	Qct	**MP1A**	659.3	6982.4	10.6		Within Screen
								PP1	664.7	6977.0	5.2		Within Screen
								MP1B	670.3	6971.4	-0.4	0.8	Below Screen
2	1421.8	1445.0	6219.9	6196.7	23.2	RT	Tp	**MP2A**	1427.0	6214.7	18.0		Within Screen
								PP2	1432.4	6209.3	12.6		Within Screen
								MP2B	1438	6203.7	7.0		Within Screen

Note: R-26 Brass Cap Ground Elevation: 7641.69 ft; all measurements are from this elevation;
MP = Monitor Port; PP = Pump Port; Monitor Ports shown in bold are instrumented ports




R-26 Screen 2 Regional
Screen 2 GW
Screen 2 Transducer
Groundwater Elevation (ft)
6600
6590
6580
6570
6560
6550
6540
6530
7/1/04
7/1/05
7/1/06
7/1/07
7/1/08
7/1/09
7/1/10
Date

3.31 R-27

Location: R-27 is located in middle Water Canyon about 0.35 mi north of DT-10 and about 0.75 mi south of R-19.

Completion Type: Single completion at the top of the regional aquifer in Puye fanglomerates. The top of the screen is about 36 ft below the water table.

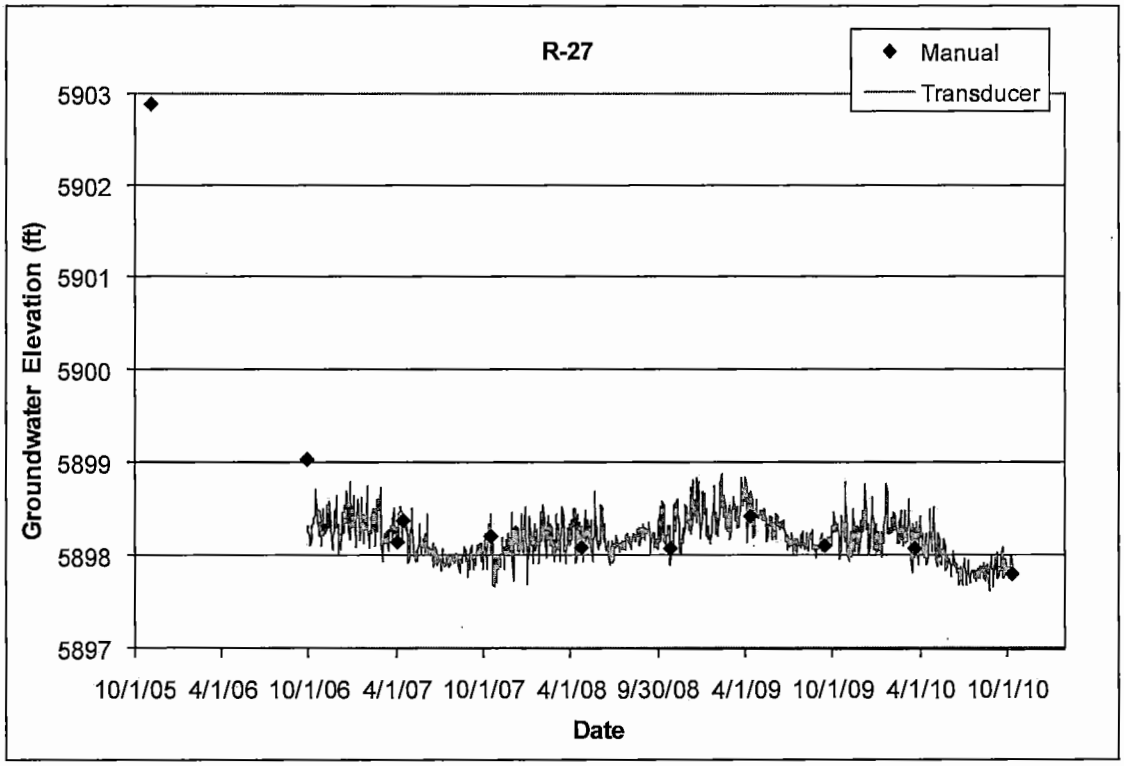
Period of Record: Well completed November 2005, transducer installed September 29, 2006, transducer data through 2010.

Remarks: R-27 is installed to a depth of 878.7 ft, about 60 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer does not show a response to atmospheric pressure fluctuations. The aquifer at R-27 may show a small seasonal response to supply well pumping at PM-2, but the general water level trend does not correlate with supply well pumping.

R-27 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	852.0	875.0	5861.7	5838.7	23.0	847	5866.7	875.0	5838.7	878.7	3.7	11.6	RT	Tpf

Note: Brass Cap Ground Elevation: 6713.72 ft; all measurements are from this elevation



3.32 R-28

Location: R-28 is located in middle/lower Mortandad Canyon between and about 1300 ft from both R-42 and R-45 and about 1300 ft north of R-50.

Completion Type: Single completion at the top of the regional aquifer. The top of the screen is about 43 ft below the water table.

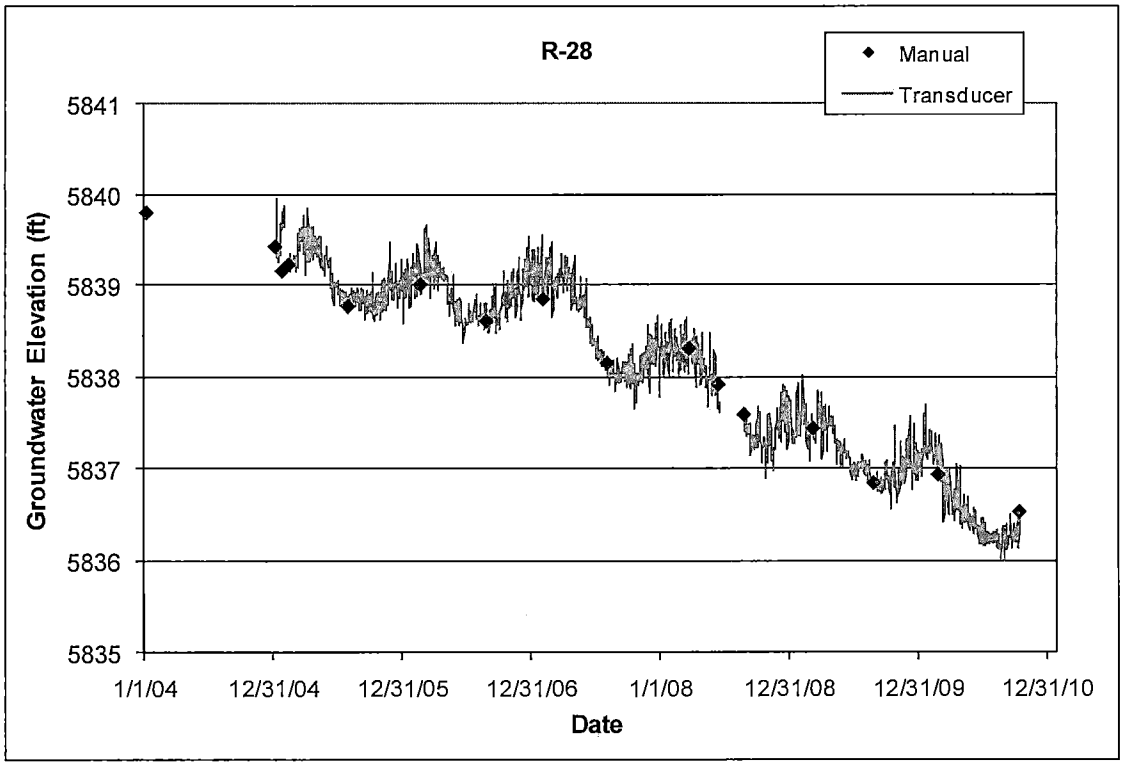
Period of Record: Well completed December 2003, transducer installed January 7, 2005, data through 2010.

Remarks: R-28 installed to a depth of 980.3 ft, about 100 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. R-28 exhibits a seasonal response to supply well pumping and responds primarily to pumping at PM-4 and PM-2 and possibly to PM-5, but apparently does not respond significantly to pumping at nearby supply well PM-3.

R-28 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	934.3	958.1	5794.3	5770.5	23.8	929.6	5799.0	958.1	5770.5	980.3	22.2	68.2	RT	Tpf

Note: R-28 Brass Cap Ground Elevation: 6728.61 ft; all measurements are from this elevation



3.33 R-29

Location: R-29 is located at TA-49 east of MDA AB and about 0.3 mi northeast of Test Well DT-5A and 0.3 mi north of R-30.

Completion Type: Single completion at the top of the regional aquifer. The top of the screen is about 17 ft below the water table.

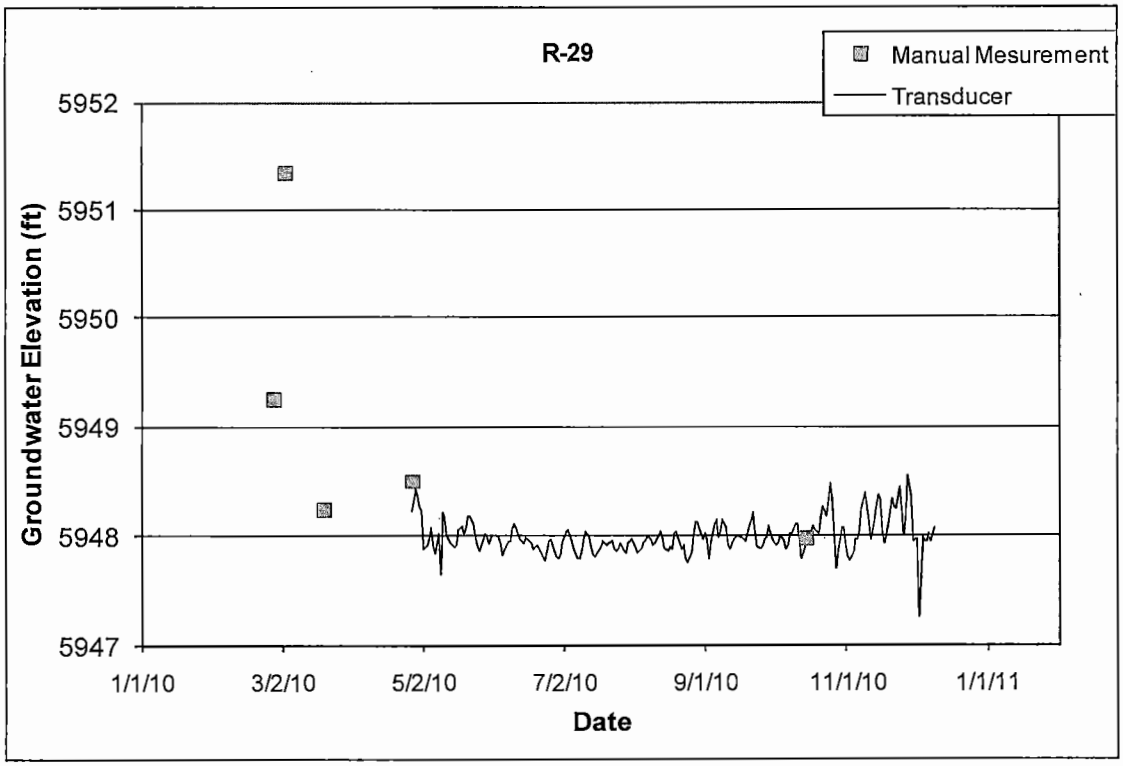
Period of Record: Well completed March 12, 2010, transducer installed April 28, 2010, data through 2010.

Remarks: R-29 installed to a depth of 1191.8 ft, about 39 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. The tested specific capacity of R-29 was 0.62 gpm/ft.

R-29 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Sump Bottom (ft)	Bottom of Well Elev (ft)	Sump Length (ft)	Sump Vol (gal)	Hydro Zone Code	Geo Unit Code
1	1170.0	1180.0	5930.8	5920.8	10.0	1187.4	5913.4	1191.8	5909.0	11.8	12.0	RT	Tpf

Note: Brass Cap Ground Elevation: 7100.75 ft; all measurements are from this elevation



3.34 R-30

Location: R-30 is located at TA-49 east of MDA AB and about 0.25 mi southeast of Test Well DT-5A and 0.3 mi south of R-29.

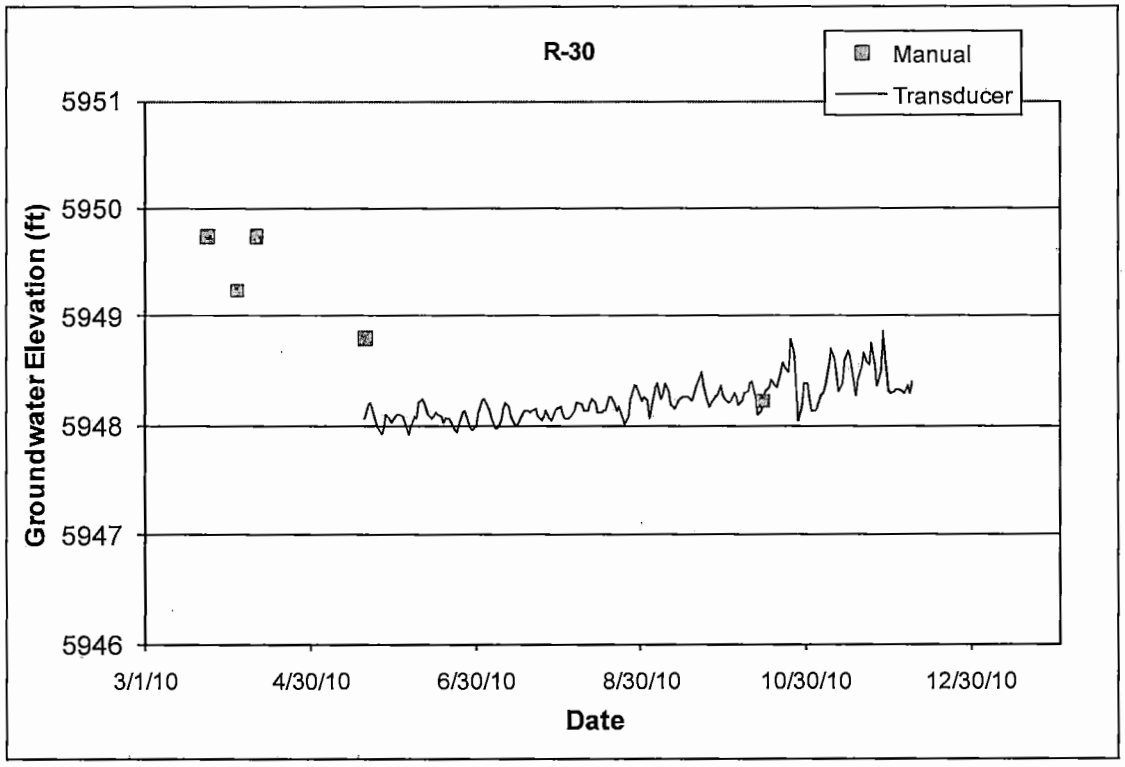
Completion Type: Single completion at the top of the regional aquifer. The top of the screen is about 14 ft below the water table.

Period of Record: Well completed April 03, 2010, transducer installed May 21, 2010, data through 2010.

Remarks: R-30 installed to a depth of 1171.8 ft, about 46 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. The tested specific capacity of R-30 was 2.04 gpm/ft.

R-30 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Sump Bottom Depth (ft)	Bottom of Well Elev (ft)	Sump Length (ft)	Sump Vol (gal)	Hydro Zone Code	Geo Unit Code
1	1140.0	1160.9	5933.8	5912.9	20.9	1168.0	5905.8	1171.8	5902.0	10.9	11.1	RT	Tpf
Note: Brass Cap Ground Elevation: 7073.84 ft; all measurements are from this elevation													



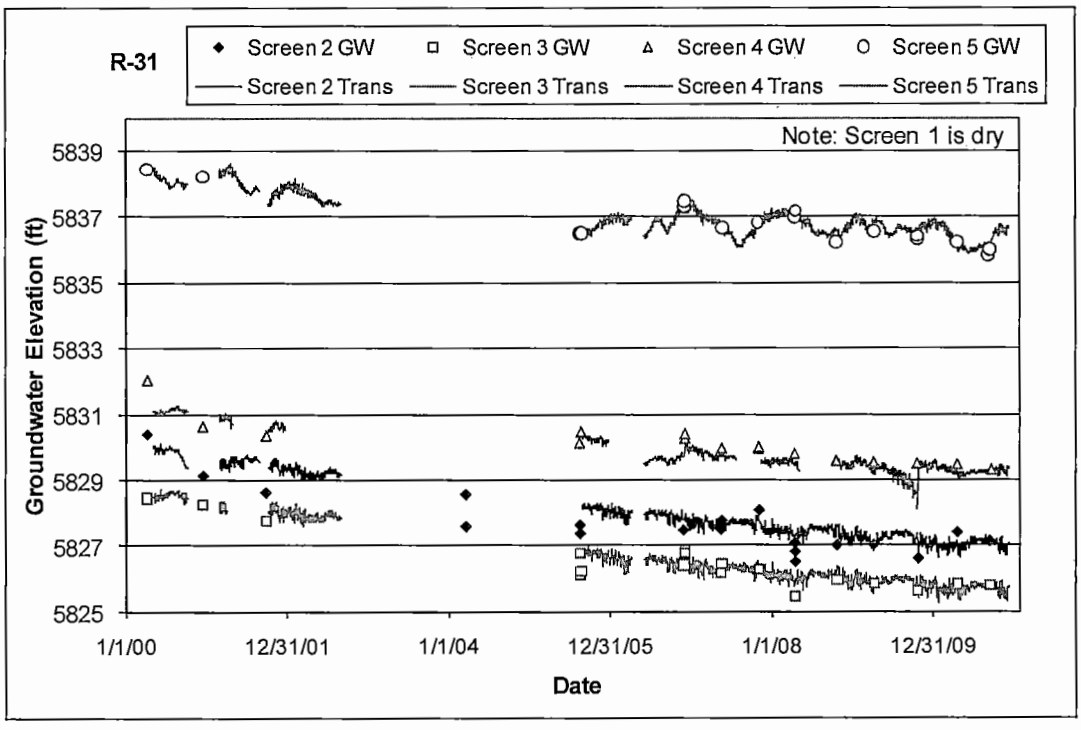
3.35 R-31

Location: R-31 is located in the southern part of LANL in the north Ancho Canyon tributary.
Completion Type: Multiple completion, one screen in an intermediate zone, and four screens in the regional aquifer. The intermediate screen 1 has been dry since Westbay® installation.
Period of Record: Westbay® installed April 7, 2000, transducers installed May 4, 2000, transducer data through 2010.
Remarks: Screen 5 has the highest head values, followed by screen 4 and screen 2; screen 3 has the lowest head values. Port MP2A was dry after Westbay® installation; port MP2B is used to collect samples and groundwater level data. Screens 2 and 3 have 80% and 100% response to atmospheric pressure fluctuations, respectively, while screens 3 and 4 have about 45% response. Screens 4 and 5 show seasonal responses to supply well pumping that coincide with the non-pumping water levels at PM-2.

R-31 Construction and Port Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Hydro Zone Code	Geo Unit Code	Port	Port Depth (ft)	Port Elev (ft)	Distance from Bottom of Screen (ft)	Sump Volume (L)	Comment
1	439.1	454.4	5923.4	5908.1	15.3	I	Tb4	MP1A	453.8	5908.7	0.6		Screen dry
								PP1	459.2	5903.3	-4.8	13.9	Below screen
								MP1B	464.8	5897.7	-10.4	30.1	Below screen
2	515.0	545.7	5847.5	5816.8	30.7	RT	Tb4	MP2A	532.2	5830.3	13.5		Within screen, port dry
								MP2B	542.5	5820.0	3.2		Within screen
								PP2	547.9	5814.6	-2.2	6.4	Below screen
								MP2C	553.5	5809.0	-7.8	22.6	Below screen
3	666.3	676.3	5696.2	5686.2	10.0	RD	Tb4	MP3A	670.3	5692.2	6.0		Within screen
								PP3	675.6	5686.9	0.7		Within screen
								MP3B	681.3	5681.2	-5.0	14.5	Below screen
4	826.6	836.6	5535.9	5525.9	10.0	RD	Tpt	MP4A	830.9	5531.6	5.7		Within screen
								PP4	836.3	5526.2	0.3		Within screen
								MP4B	841.9	5520.6	-5.3	15.3	Below screen
5	1007.1	1017.1	5355.4	5345.4	10.0	RD	Tpt	MP5A	1011.3	5351.2	5.8		Within screen
								PP5	1016.7	5345.8	0.4		Within screen
								MP5B	1022.3	5340.2	-5.2	15.1	Below screen

Brass Cap Elevation: 6362.5 ft; all measurements are from this elevation;
MP = measurement port; PP = pumping port



3.36 R-32

Location: R-32 is located in lower Pajarito Canyon about 1 mi east of supply well PM-2 and south of TA-54 between MDA L and MDA G. R-32 is about 0.25 mi south of R-56.

Completion Type: Multiple completion, three screens in the regional aquifer until September 2007 when screens 2 and 3 were plugged and abandoned. Screen 1 is about 90 ft below the water table.

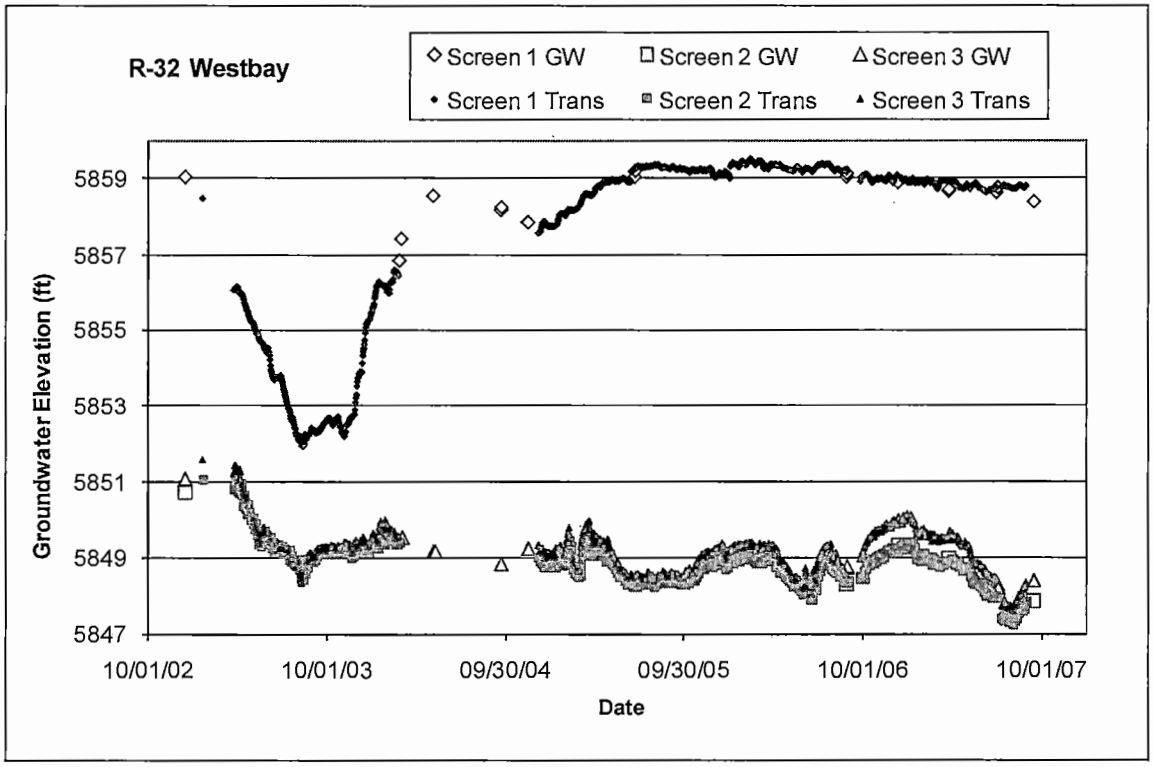
Period of Record: Westbay® installed December 14, 2002, transducers installed January 21, 2003, transducer data through August 2007. The Westbay® system was removed on September 18, 2007, and the well was rehabilitated to a single completion well at screen 1 in September 2007. A submersible pump was installed in November 2007 and a transducer was installed at screen 1 in February 2008; transducer data through 2010.

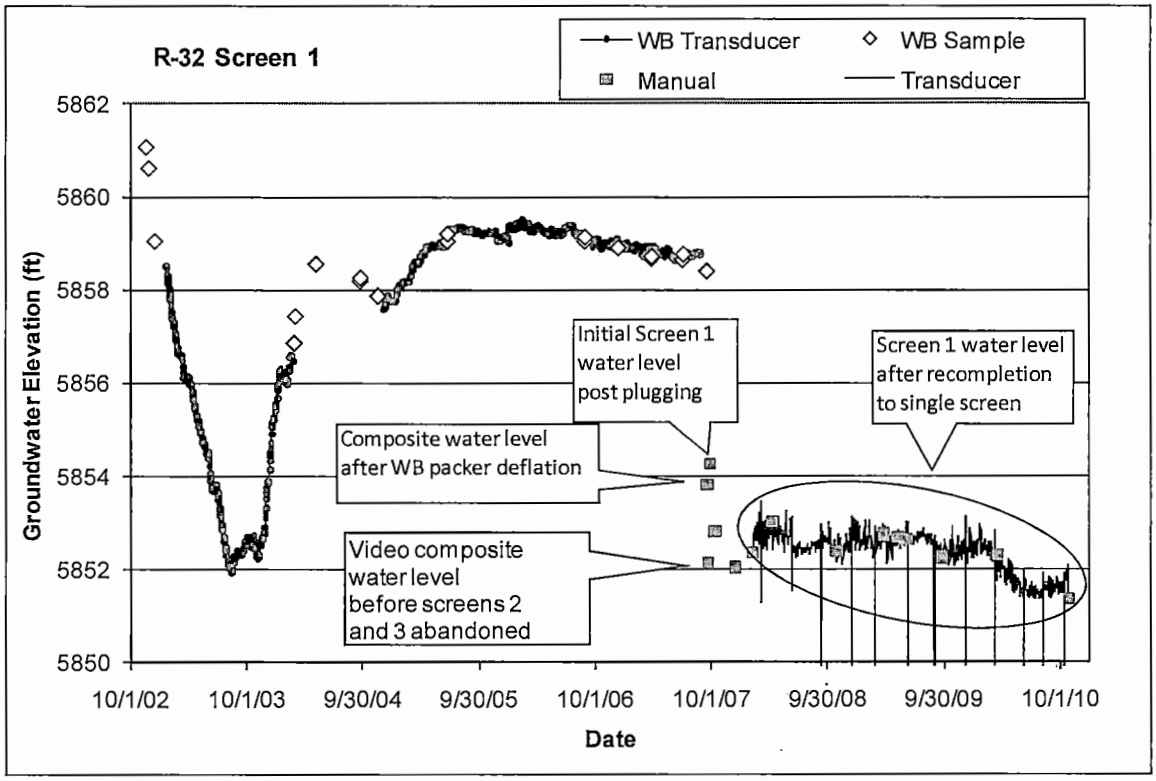
Remarks: Screens 2 and 3 had nearly identical head values and responded to pumping supply wells PM-2 and PM-4. Screen 1 apparently responded to long-term pumping of PM-4 in 2003, but vaguely to test pumping PM-2 in 2004 and PM-4 in 2005. Screens 2 and 3 responded to the PM-2 aquifer test in January 2003 (McLin 2005), to the PM-4 aquifer test in January 2005 (McLin 2006), and to PM-4 pumping in June 2006 and July 2007.

R-32 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	867.5	875.2	5770.1	5762.4	7.7	858.6	5779.0	875.2	5762.4	893.6	18.4	57.5	RT	Tb4
2	931.8	934.9	5705.8	5702.7	3.1	Sceen plugged and abandoned Sept 2007							RD	Tpf
3	972.9	980.6	5657.0	5657.0	7.7	Sceen plugged and abandoned Sept 2007							RD	Tpf

Note: R-32 Brass Cap Ground Elevation: 6637.63 ft; all measurements are from this elevation


R-32 Westbay
Screen 1 GW
Screen 2 GW
Screen 3 GW
Screen 1 Trans
Screen 2 Trans
Screen 3 Trans
Groundwater Elevation (ft)
5859
5857
5855
5853
5851
5849
5847
10/01/02
10/01/03
09/30/04
09/30/05
10/01/06
10/01/07
Date


R-32 Screen 1
WB Transducer
WB Sample
Manual
Transducer
Groundwater Elevation (ft)
5862
5860
5858
5856
5854
5852
5850
Initial Screen 1 water level post plugging
Screen 1 water level after recompletion to single screen
Composite water level after WB packer deflation
Video composite water level before screens 2 and 3 abandoned
10/1/02
10/1/03
9/30/04
9/30/05
10/1/06
10/1/07
9/30/08
9/30/09
10/1/10
Date

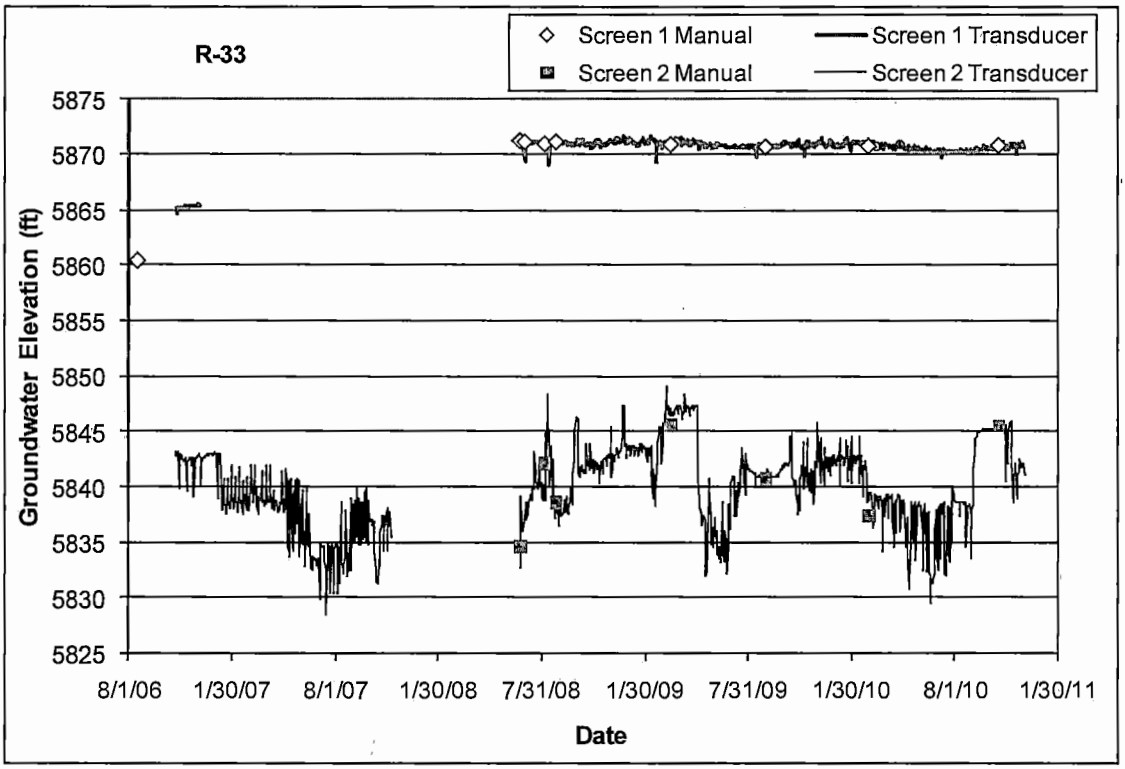
3.37 R-33

Location: R-33 is located in lower Ten Site Canyon about 1500 ft northeast of supply well PM-5.
Completion Type: Dual screen completion in the regional aquifer.
Period of Record: Well completed October 2004, transducers installed February 2005 but equipment problems hindered data collection. Transducers calibrated and the packer inflated in August 2006 and again in October 2006 with nitrogen bottle to maintain packer pressure. Water level data for screen 2 from October 24, 2006, to November 8, 2007; data for screen 1 ended December 5, 2006. New sampling system and transducers installed July 2008; water level data through 2010.
Remarks: R-33 screen 1 installed about 12 ft below the regional water table at a depth of 1018.5 ft, and screen 2 within the regional aquifer to a depth of 1126 ft, about 140 ft into the regional aquifer. Transducer equipment problems occurred from February 2005 until October 2006 when transducers and packer equipment became operational. The original transducer equipment was removed from the well on November 8, 2007, in preparation for removing the Barcad sampling system from the well. A dual valve Baski sampling system was installed July 2008 (LANL August 2008). The water level at screen 2 responds primarily to pumping of supply well PM-5 but also to pumping at PM-4.

R-33 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Top/ Bottom Packer Depth (ft)	Top/ Bottom Packer Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (Gal.)	Hydro Zone Code	Geo Unit Code
1	995.5	1018.5	5857.8	5834.8	23.0	1067.0	5786.3	1074.6	5778.8	1074.6	56.1	46.3	RT	Tpp
2	1112.4	1122.3	5740.9	5731.0	9.9	1110.8	5742.6	1078.9	5774.5	1126.0	3.7	3.1	RD	Tpp

Note: R-33 Brass Cap Ground Elevation: 6853.33 ft; all measurements are from this elevation; APV = access port valve



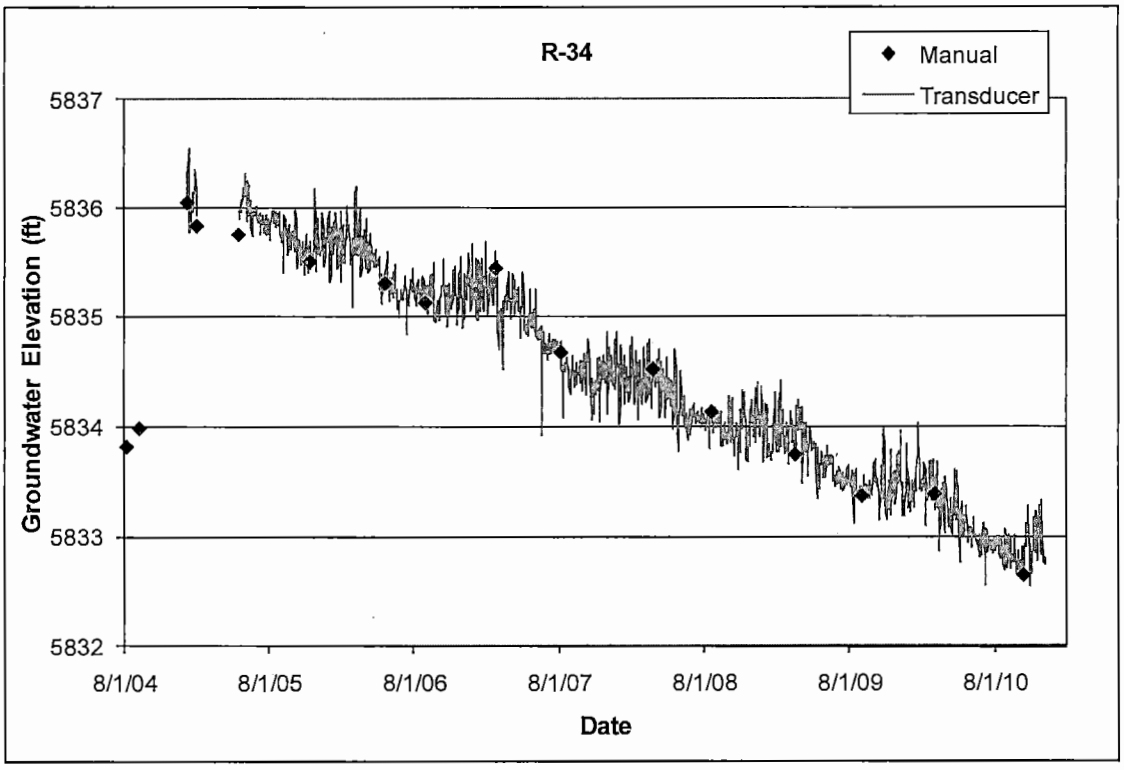
3.38 R-34

Location: R-34 is located in Cedro Canyon on San Ildefonso land east of LANL.
Completion Type: Single completion in the regional aquifer. The top of the screen is about 90 ft below the water table.
Period of Record: Well completed August 2004, transducer installed January 2005, water level data through 2010.
Remarks: R-34 installed at the top of the regional aquifer at a depth of 920.7 ft, about 110 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. R-34 exhibits a seasonal response to supply well pumping but does not indicate a response to any specific supply well. The average annual water decline has been about 0.55 ft/yr.

R-34 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	883.7	906.6	5746.3	5723.4	22.9	881.6	5748.4	906.6	5723.4	920.7	14.1	44.1	RT	Tpp

Note: R-34 Brass Cap Ground Elevation: 6629.99 ft; all measurements are from this elevation



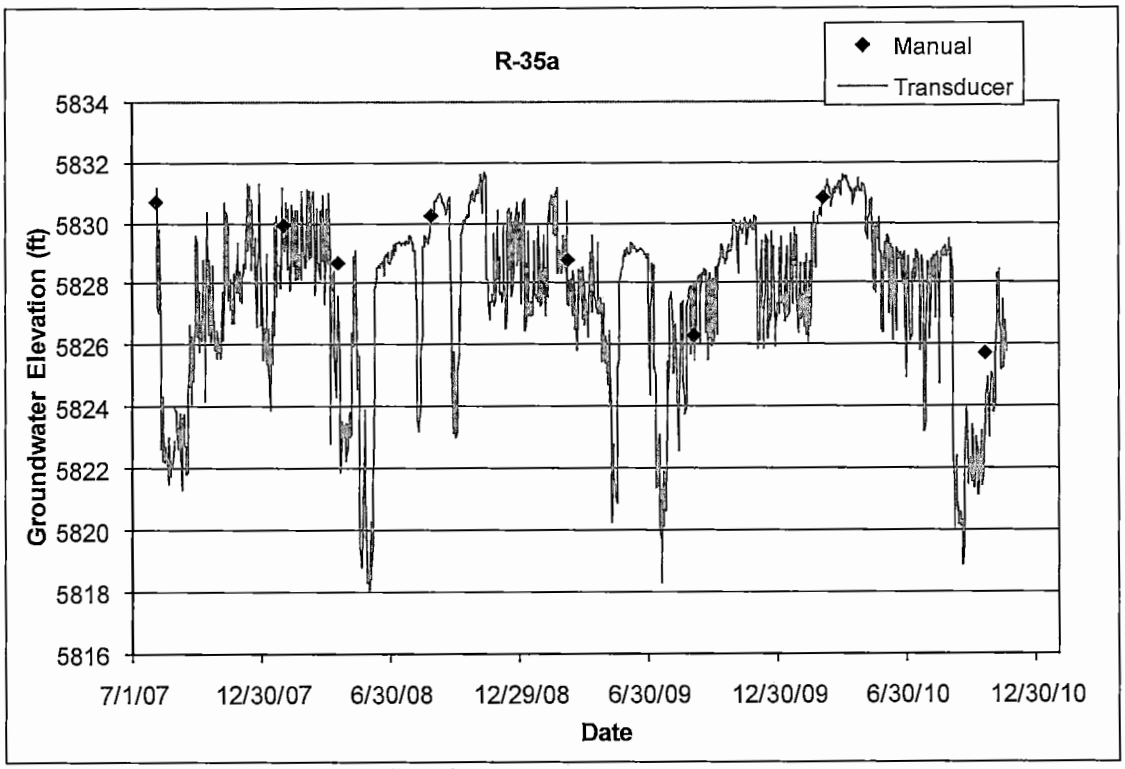
3.39 R-35a

Location: R-35a is located in Sandia Canyon about 340 ft southwest of supply well PM-3.
Completion Type: Single completion in the regional aquifer. The top of the screen is about 220 ft below the water table at the same elevation as the top of the PM-3 screen.
Period of Record: Well completed June 2007, transducer installed August 3, 2007; water level data through 2010.
Remarks: R-35a installed at a depth of 1082.2 ft, about 290 ft into the regional aquifer. R-35a responds primarily to pumping supply well PM-3, about 3 to 4 ft daily, but also shows a response to pumping supply well O-4. When the well was completed, the static water level at R-35a was about 7 ft lower than nearby monitoring well R-35b, which is screened at the top of the aquifer.

R-35a Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1013.1	1062.2	5610.0	5560.9	49.1	998.3	5624.8	1062.2	5560.9	1086.2	24.0	75.1	RD	Tsfu

Note: Brass Cap Ground Elevation: 6623.06 ft; all measurements are from this elevation



Note: Hydrograph shows mean daily values

3.40 R-35b

Location: R-35b is located in Sandia Canyon about 90 ft west of R-35a and about 400 ft southwest of supply well PM-3.

Completion Type: Single completion at the top of the regional aquifer. The top of the screen was about 37 ft below the water table when the well was installed.

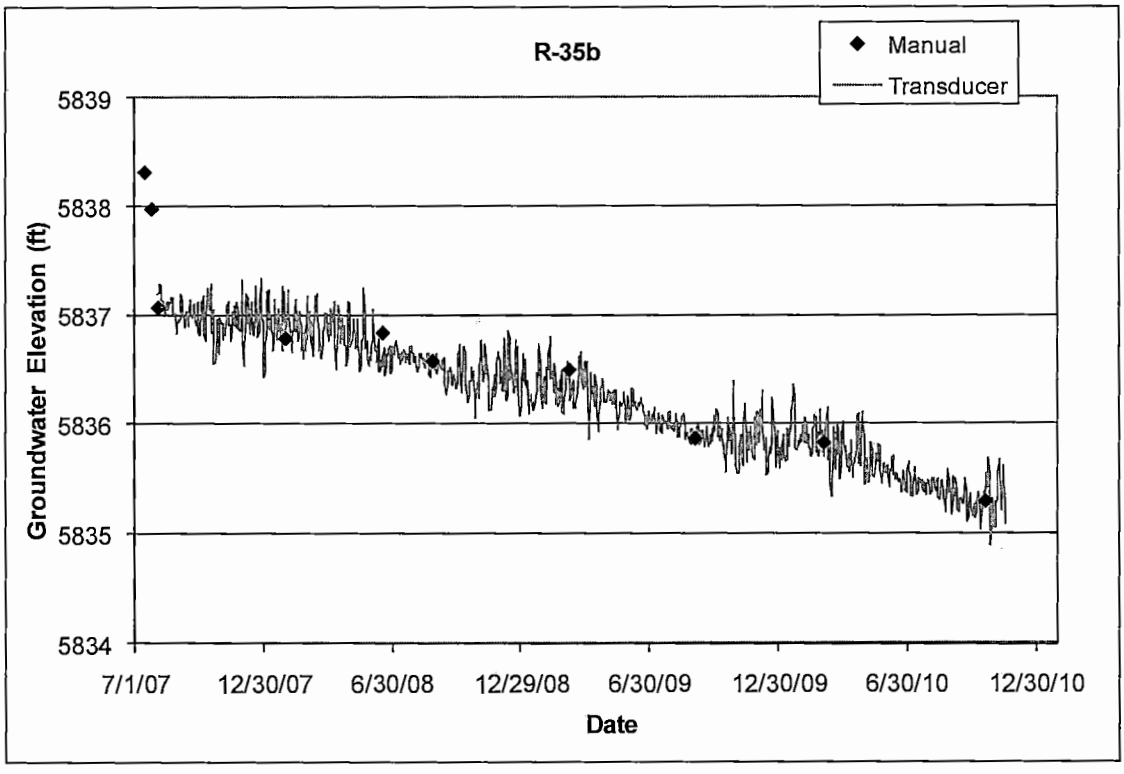
Period of Record: Well completed July 2007, transducer installed August 3, 2007; water level data through 2010.

Remarks: R-35b installed near the top of the regional aquifer at a depth of 872.2 ft, about 80 ft into the regional aquifer. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. R-35b does not indicate a response to pumping of nearby well PM-3 or to any specific supply well, but indicates a relatively continual decline of about 0.5 ft/yr in response to supply well pumping.

R-35b Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	825.4	848.5	5799.8	5776.7	23.1	832.7	5792.5	848.5	5776.7	872.2	23.7	74.1	RT	Tpf

Note: Brass Cap Ground Elevation: 6625.21 ft; all measurements are from this elevation



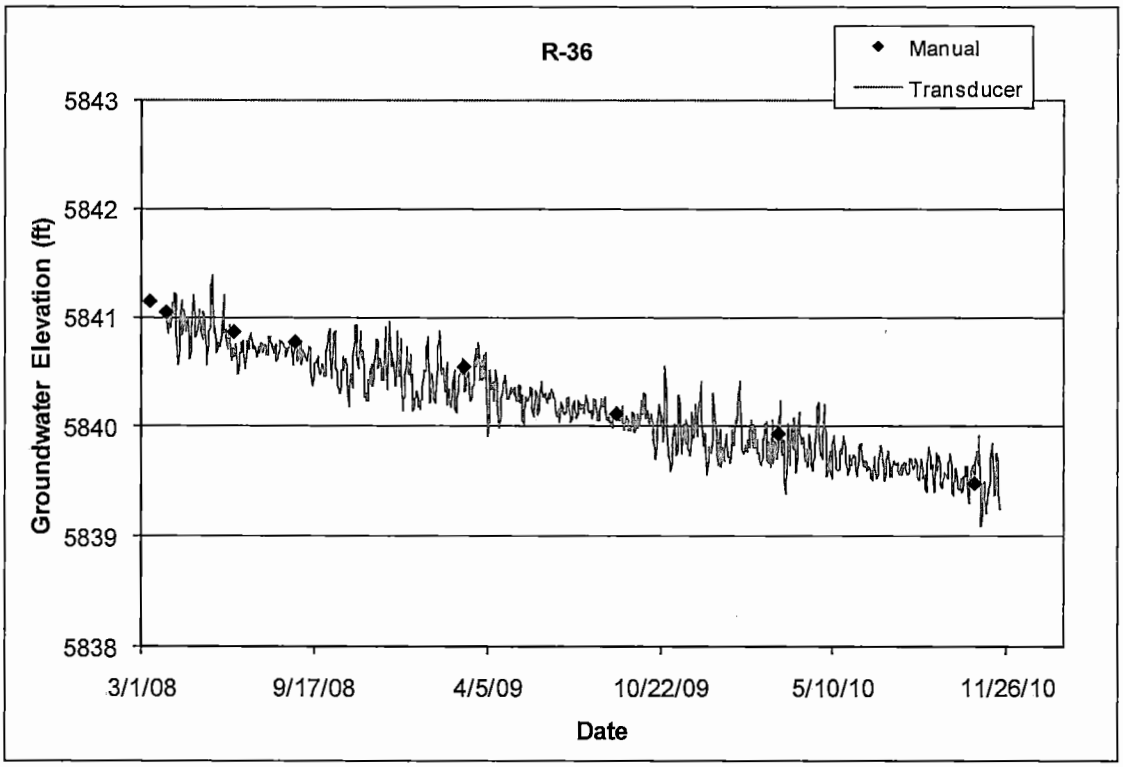
3.41 R-36

Location: R-36 is located in lower Sandia Canyon about 2200 ft southeast of supply well PM-3.
Completion Type: Single completion at the top of the regional aquifer.
Period of Record: Well completed February 2008, transducer installed March 31, 2008; water level data through 2010.
Remarks: R-36 installed near the top of the regional aquifer to a depth of 803.7 ft; top of screen is about 17 ft below the regional water table. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. Available water level data indicate that R-36 does not appear to respond to supply well pumping at nearby wells PM-1 and PM-3, but indicate a relatively continual decline of about 0.5 ft/yr in response to supply well pumping.

R-36 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	766.9	789.9	5824.5	5801.5	23.0	764.5	5826.9	789.9	5801.5	803.7	13.8	43.2	RT	Tsfu

Note: Brass Cap Ground Elevation: 6591.37 ft; all measurements are from this elevation



3.42 R-37

Location: R-37 is located at TA-54 on an unnamed mesa between Cañada del Buey and the south fork of Cañada del Buey. R-37 is about 3000 ft southeast of supply well PM-4, 2500 ft northeast of supply well PM-2, and about 1100 ft east of MDA J.

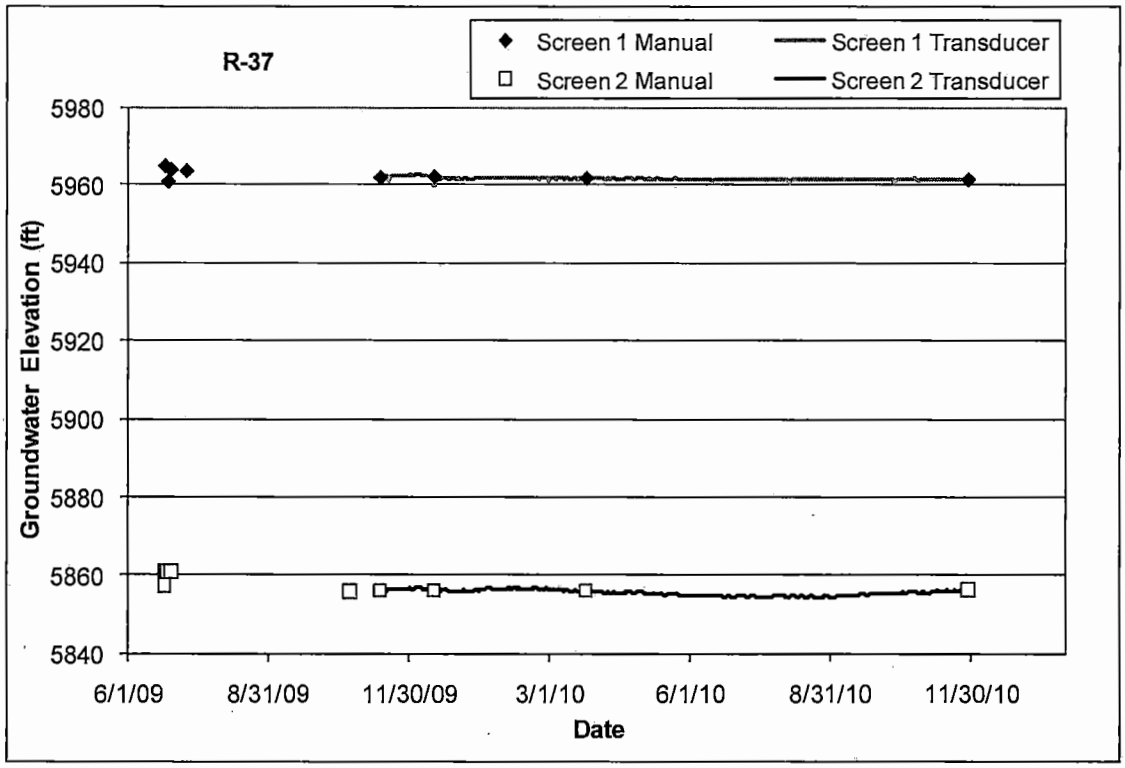
Completion Type: Dual completion in a perched intermediate zone and in the top of the regional aquifer. A Baski dual pump sampling system was installed on November 11, 2009, but due to a problem with the Bennett pump, the system was removed on December 14, 2009, and reinstalled on December 16, 2009.

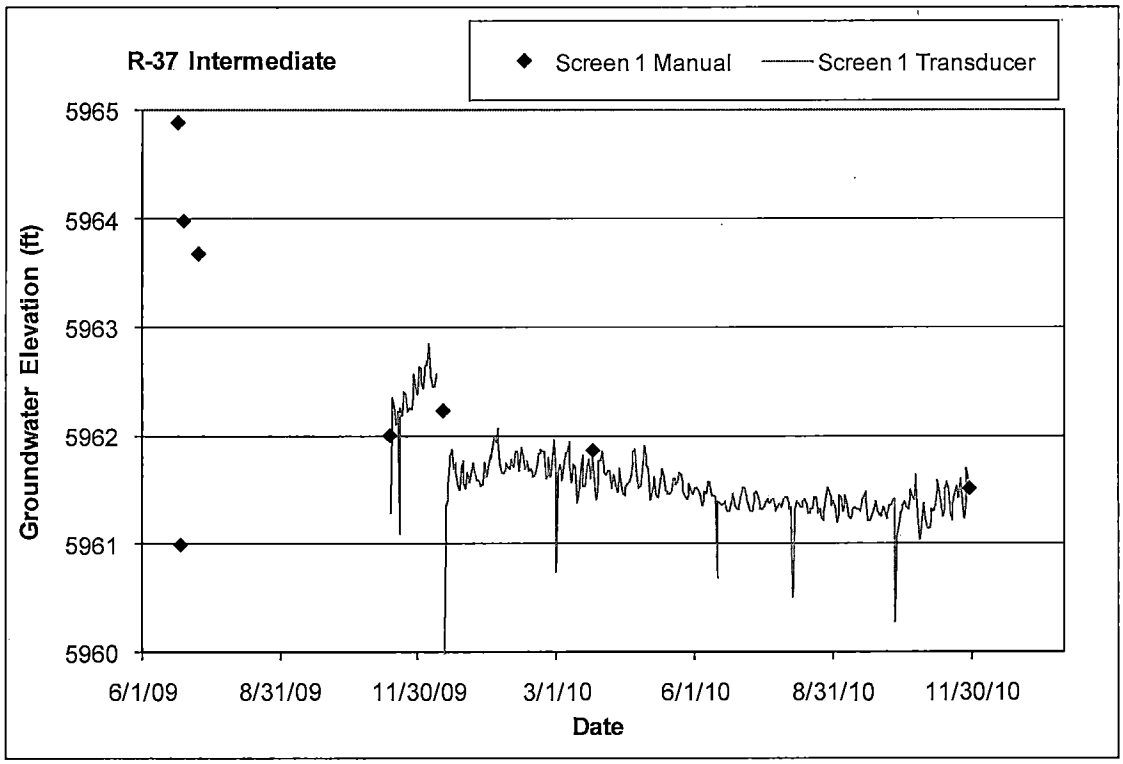
Period of Record: Well completed June 2009, transducers installed November 12, 2009, and again on December 17, 2009; water level data through 2010.

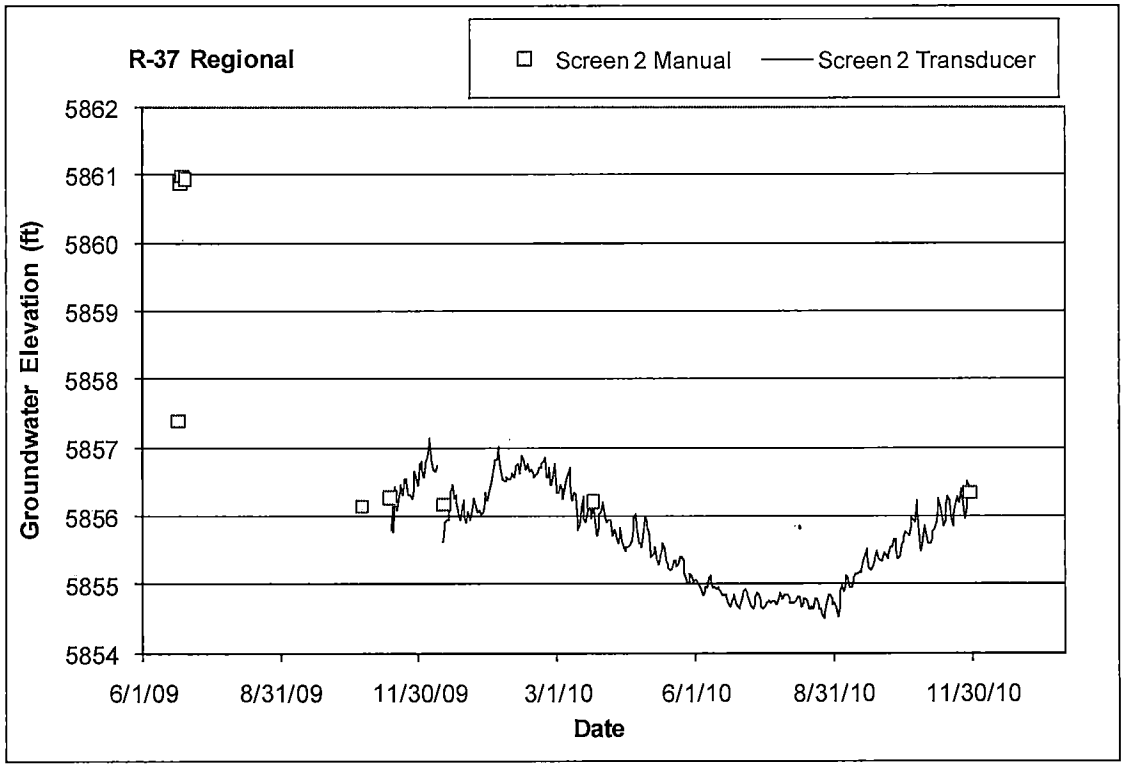
Remarks: The top of screen 2 is about 12 ft below the regional water table. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. The regional aquifer at R-37 screen 2 responds to supply well pumping at nearby well PM-4.

R-37 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Packer/ Sump Bottom (ft)	Depth to bottom of Packer	Sump Length (ft)	Bottom Well Elev (ft)	Hydro Zone Code	Geo Unit Code
1	929.3	950.0	5941.3	5920.6	20.7	948.9	5921.7	959.3	NA	9.3	5911.3	I	Tpf
2	1026.0	1046.6	5844.6	5824.0	20.6	1055.9	5814.7	1068.8	964.1	22.2	5801.8	RT	Tpf
Note: Brass Cap Elevation: 6870.59 ft; all measurements are from this elevation													




R-37 Intermediate
Screen 1 Manual
Screen 1 Transducer
Groundwater Elevation (ft)
5965
5964
5963
5962
5961
5960
6/1/09
8/31/09
11/30/09
3/1/10
6/1/10
8/31/10
11/30/10
Date


R-37 Regional
Screen 2 Manual
Screen 2 Transducer
Groundwater Elevation (ft)
5862
5861
5860
5859
5858
5857
5856
5855
5854
6/1/09
8/31/09
11/30/09
3/1/10
6/1/10
8/31/10
11/30/10
Date

3.43 R-38

Location: R-38 is located in middle Cañada del Buey northeast of MDA L and about 960 ft northeast of R-53.

Completion Type: Single completion at the top of the regional aquifer in Cerros del Rio basalt.

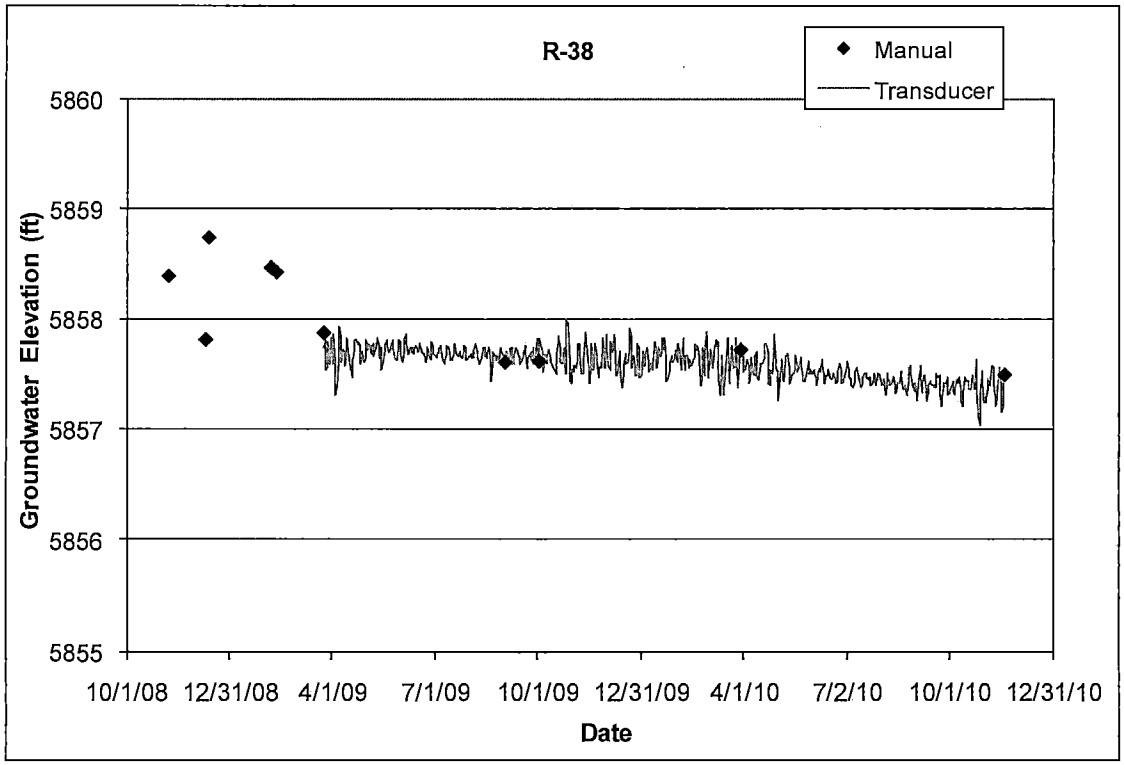
Period of Record: Well completed December 2008, transducer installed March 25, 2009; data through 2010.

Remarks: R-38 installed near the top of the regional aquifer to a depth of 853 ft; top of screen is about 10 ft below the regional water table. The well is 100% barometrically efficient; however, the aquifer has a delayed response to atmospheric pressure fluctuations. Available data indicate that R-38 shows a small response to pumping at supply well PM-4.

R-38 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Bottom Well Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	821.2	831.2	5847.4	5837.4	10.0	818.5	5850.1	831.2	5837.4	853.0	21.8	84.2	RT	Tb4

Note: Brass Cap Ground Elevation: 6668.58 ft; all measurements are from this elevation



3.44 R-39

Location: R-39 is located in lower Pajarito Canyon southeast and downgradient of TA-54 MDA G. R-38 is about 700 ft southwest of monitoring well R-22, 850 ft south of R-57, and 1100 ft east of R-49.

Completion Type: Single completion at the top of the regional aquifer in Cerros del Rio basalt.

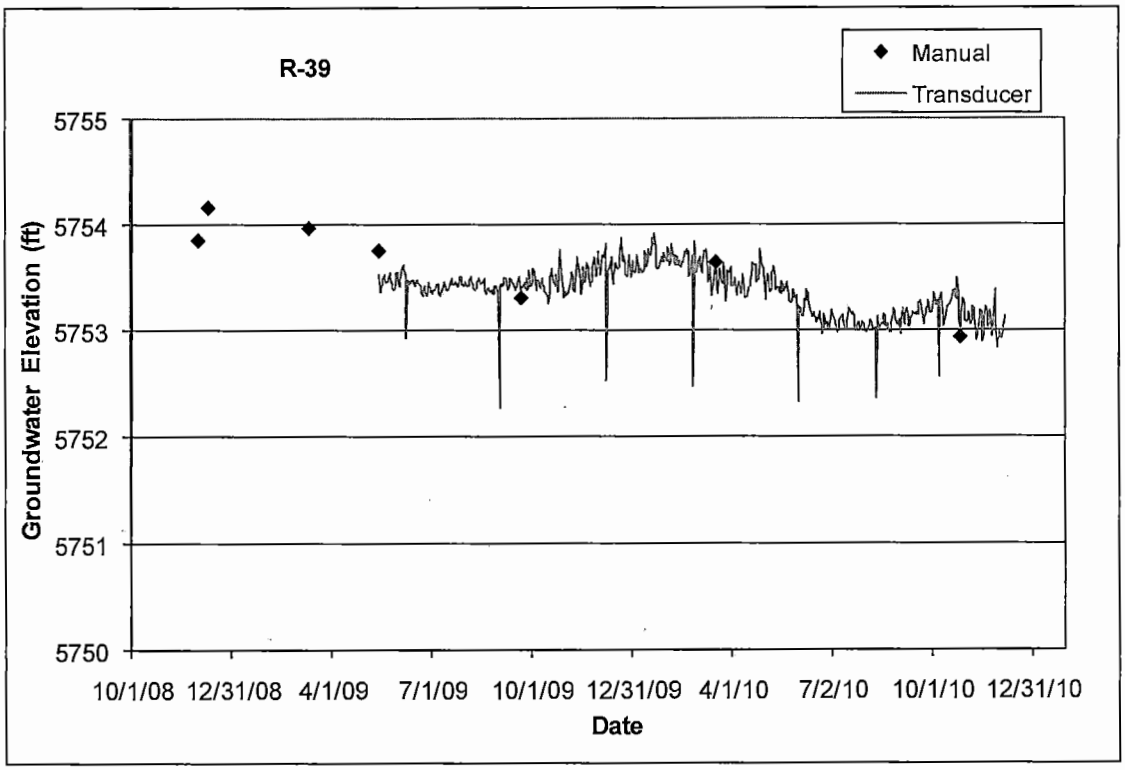
Period of Record: Well completed December 2008. Transducer installed May 15, 2009; data through 2010.

Remarks: R-39 installed near the top of the regional aquifer to a depth of 875.6 ft; top of the screen is about 30 ft below the regional water table. The well is 80% barometrically efficient; the aquifer indicates a partial response to atmospheric pressure fluctuations. The R-39 screen overlaps the lower 4 ft of R-57 screen 1 and is 36 ft above R-57 screen 2; R-39 water level is 5 ft lower than R-57 screen 1 and 3 ft higher than R-57 screen 2. The groundwater at R-39 responded during drilling R-57 and responds to pumping R-57 screen 2. The water level at R-39 is about 2 ft higher than at R-49 screen 2, which shows similar responses to R-57 screen 2 pumping.

R-39 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	859.0	869.0	5721.8	5711.8	10.0	858.8	5722.1	869.0	5711.8	875.6	6.5	25.3	RT	Tb4

Note: Brass Cap Ground Elevation: 6580.86 ft; all measurements are from this elevation



3.45 R-40

Location: R-40 is located in lower Pajarito Canyon east of TA-18, 400 ft north of supply well PM-2 and about 0.25 mi south of MDA J.

Completion Type: Three screens in two piezometers; one intermediate 3-in.-ID PVC piezometer screen (R-40i) and two 5-in.-ID stainless steel screens (R-40) with the upper screen in an intermediate zone and the lower screen at the top of the regional aquifer.

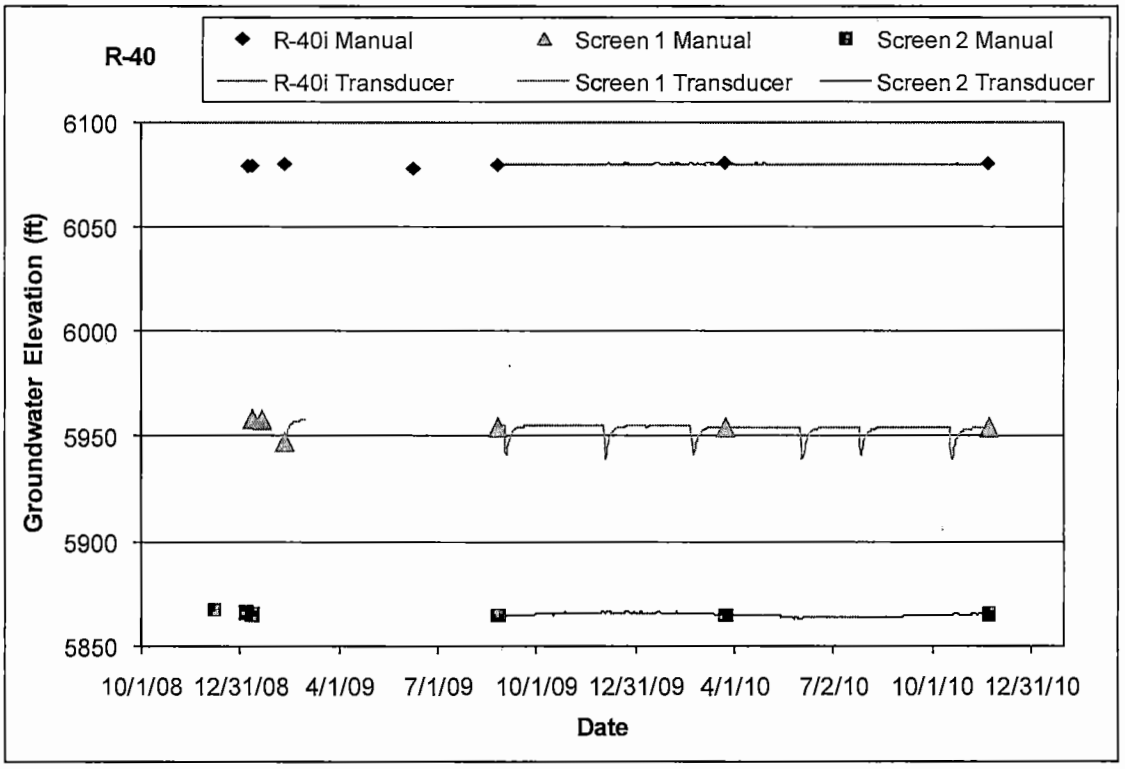
Period of Record: Well completed January 2009. Transducers installed at all three screens August 27, 2009; data through 2010. A temporary transducer was installed at the R-40 upper screen from February 11 to March 3, 2009, to monitor the slow recovery of the lower intermediate zone after attempting an aquifer test.

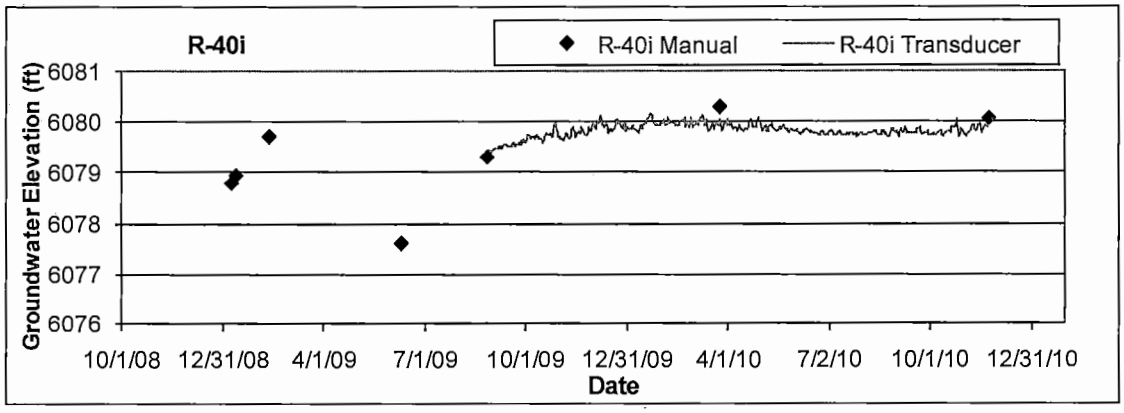
Remarks: Screen R-40i and the upper R-40 screen are completed in intermediate perched zones within the Cerros del Rio basalt. The lower R-40 screen is installed in Puye fanglomerates near the top of the regional aquifer to a depth of 895 ft; the lower R-40 screen straddles the regional water table. The regional aquifer indicates a response to pumping supply wells PM-2 and PM-4.

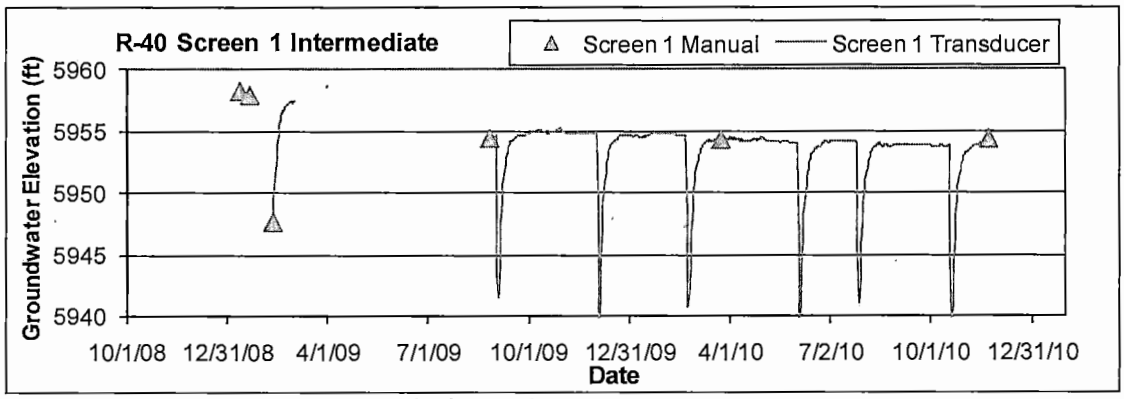
R-40 and R-40i Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Packer / Sump Bottom (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code	Comment
R-40i	649.7	669.0	6069.5	6050.2	19.3	669.0	6050.2	669.0	6050.2	674.6	5.6	7.8	I	Tb4	3" ID PVC Casing
1	751.6	785.1	5967.6	5934.1	33.5	778.0	5941.2	785.1	5934.1	794.1	9.0	34.8	I	Tb4	5" ID SS Casing
2	849.3	870.0	5869.9	5849.2	20.7	871.0	5848.2	870.0	5849.2	895.0	25.0	96.5	RT	Tpf	5" ID SS Casing

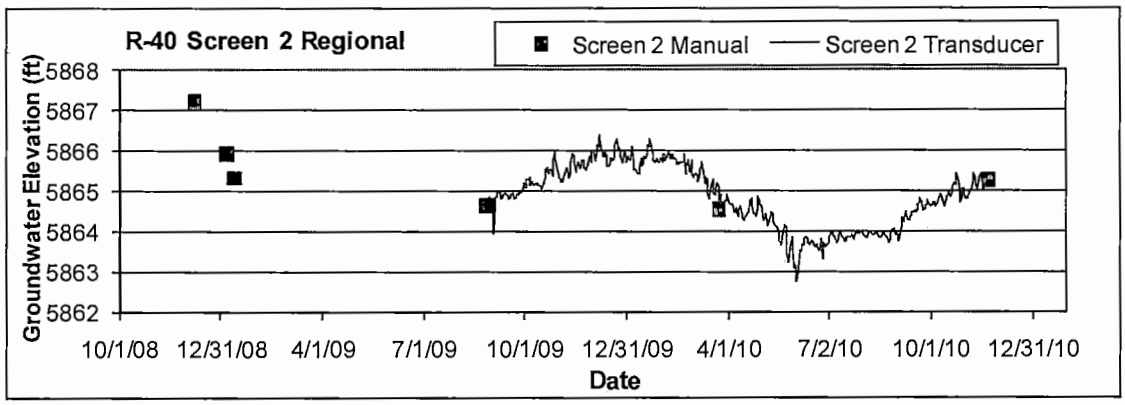
Note: Brass Cap Ground Elevation: 6719.24 ft; all measurements are from this elevation







Note scale change for R-40 Screen 1 hydrograph



3.46 R-41

Location: R-41 is located about 100 ft east of MDA G at TA-54 and about 420 ft northeast of R-57 and 650 ft north of monitoring well R-22.

Completion Type: Dual completion in a dry zone and at the top of the regional aquifer in Santa Fe Group sediments.

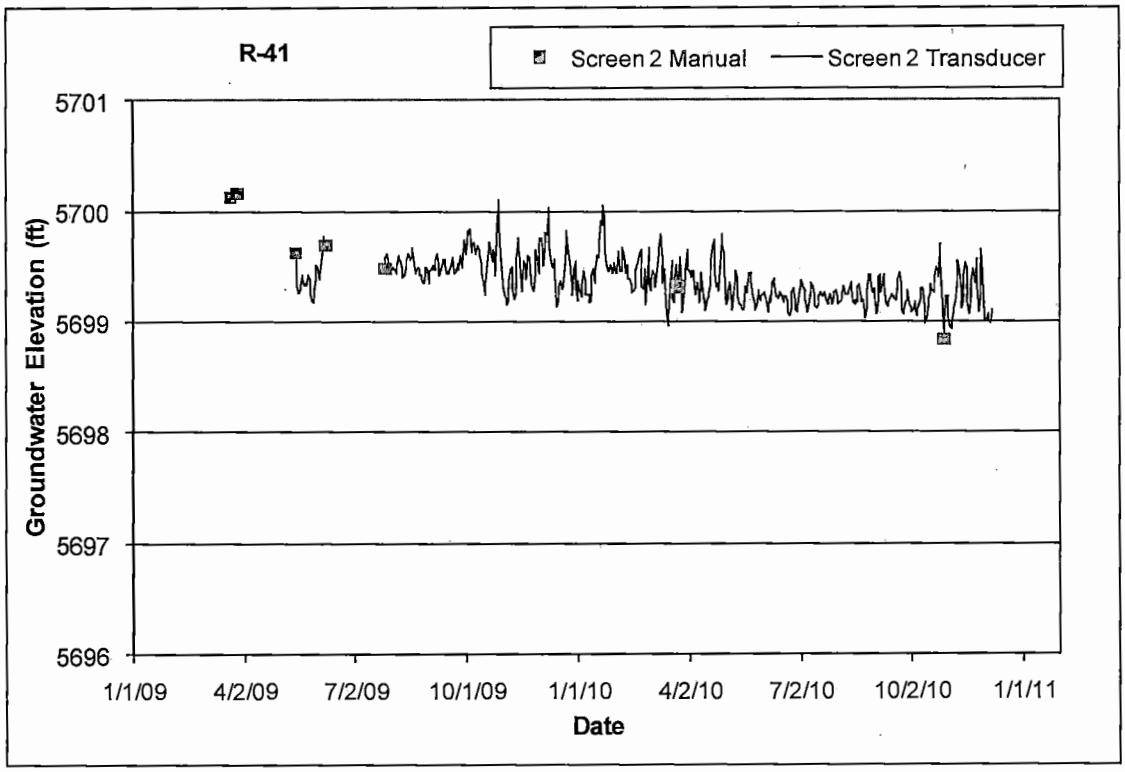
Period of Record: Well completed March 2009. Temporary transducer installed from May 15 to June 8, 2009. Dedicated transducer installed July 27, 2009; data through 2010.

Remarks: Screen 1 has been dry since installation. Screen 2 is installed near the top of the regional aquifer to a depth of 997.1 ft; the top of the screen is about 4 ft below the regional water table. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuation. The water level at R-41 is about 60 ft lower than at R-22 screen 1 and R-57 screen 1 and about 50 ft lower than at R-57 screen 2. The R-41 water level is similar to the water level at R-22 screen 3. The aquifer at R-41 showed no apparent response to pumping at nearby well R-57. Available data do not indicate a response at R-41 to supply well pumping.

R-41 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Packer/ Sump (ft)	Top of Packer/ Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Vol (gal.)	Hydro Zone Code	Geo Unit Code
1	928.0	937.7	5732.5	5722.8	9.7	NA	NA	944.8	5715.7	944.8	7.1	7.2	I	Tsf
2	965.3	975.0	5695.2	5685.5	9.7	978.5	5682.0	975.0	5685.5	997.1	22.1	22.5	RT	Tsf

Note: Brass Cap Ground Elevation: 6660.53 ft; all measurements are from this elevation



3.47 R-42

Location: R-42 is located in lower Mortandad Canyon between R-15 and R-28. R-42 is about 970 ft southeast of R-43 (located in Sandia Canyon) and 0.25 mi west of R-28.

Completion Type: Single completion within the regional aquifer in Santa Fe Group sediments.

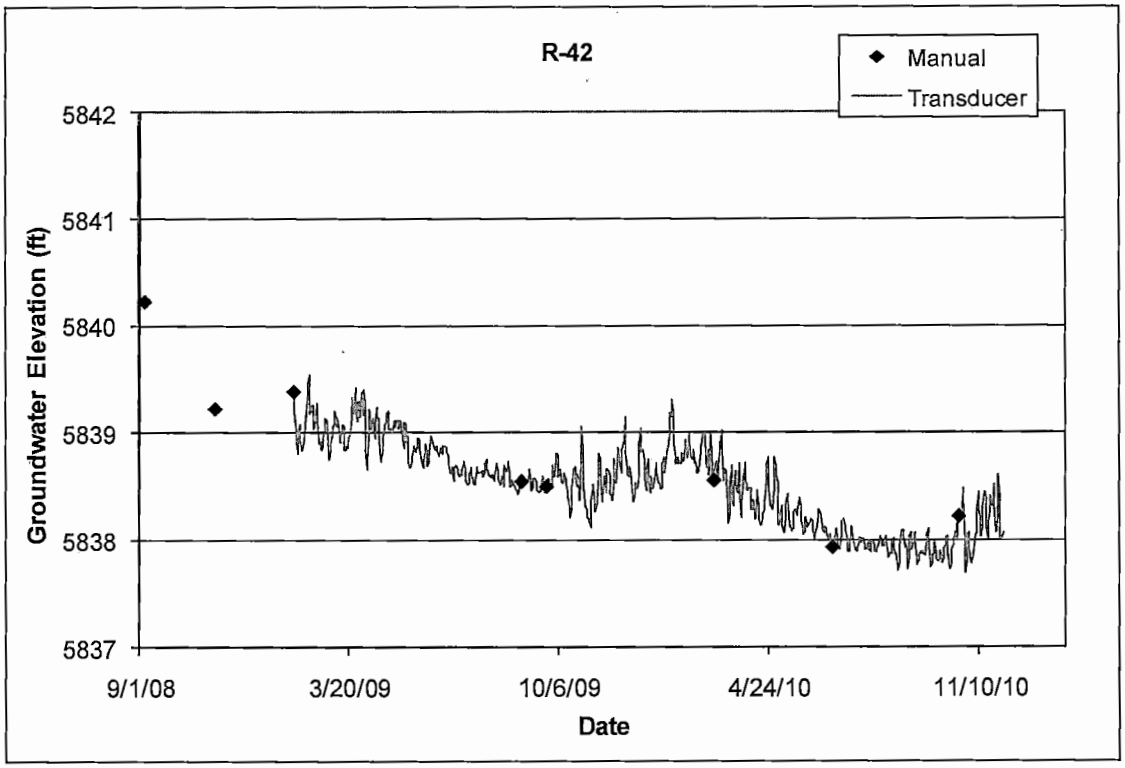
Period of Record: Well completed August 2008. Transducer installed January 26, 2009; data through 2010.

Remarks: R-42 installed in the regional aquifer to a depth of 973.5 ft. The top of the screen is about 12 ft below the water table. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. The aquifer indicates a response to pumping supply well PM-4.

R-42 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	931.8	952.9	5827.2	5806.1	21.1	930.9	5828.2	952.9	5806.1	973.5	20.6	79.5	RT	Tsfu

Note: Brass Cap Ground Elevation: 6759.02 ft; all measurements are from this elevation

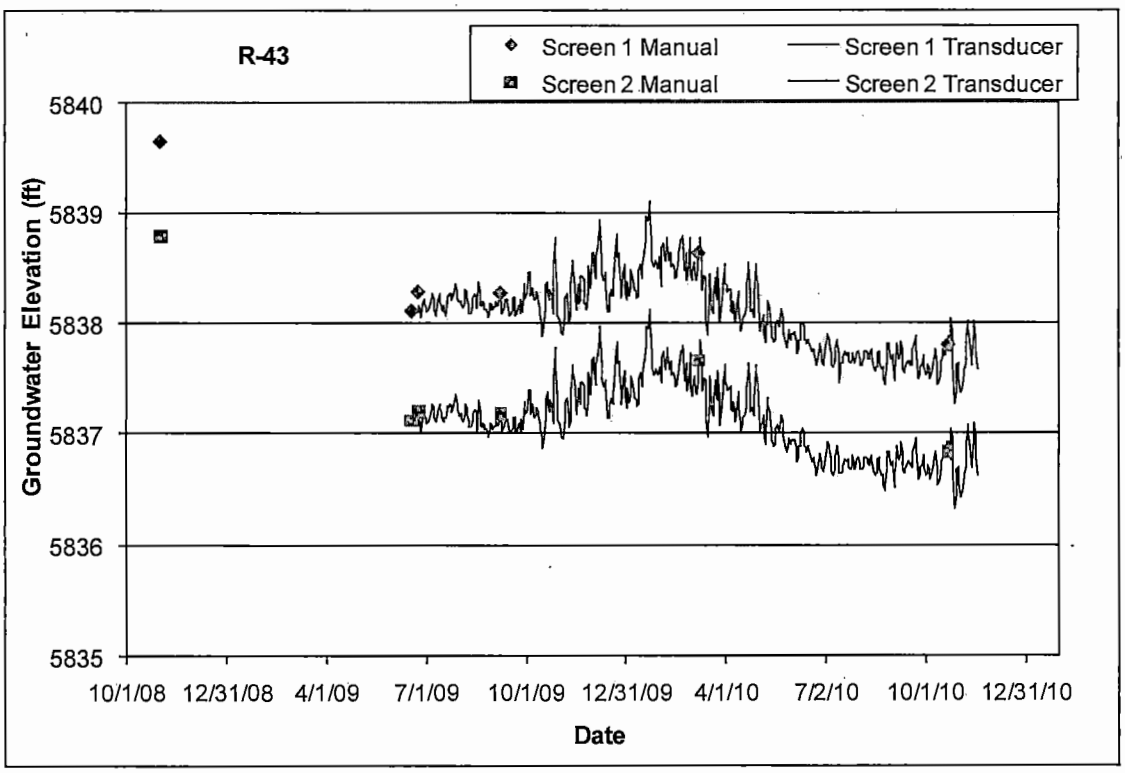


3.48 R-43

Location: R-43 is located in middle Sandia Canyon about 970 ft northwest of R-42.
Completion Type: Dual completion within the regional aquifer. The top of screen 1 is about 10 ft below the water table.
Period of Record: Well completed October 2008. Transducers installed June 25, 2009; data through 2010.
Remarks: R-43 installed in the regional aquifer to a depth of 990 ft, about 95 ft into the aquifer. A Baski packer with dual valve, single submersible pump sampling system was installed June 8, 2009. The screens are 44.5 ft apart with a head difference of about 1 ft. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. The aquifer indicates a response to pumping supply well PM-4.

R-43 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Top of Packer/ Sump Depth (ft)	Top of Packer/ Sump Elev (ft)	Bottom of Packer (ft)	Sump Length (ft)	Sump/ Well Bottom Elev (ft)	Hydro Zone Code	Geo Unit Code
1	903.9	924.6	5828.8	5808.1	20.7	948.4	5784.3	960.7	5772.0	NA	36.1	5772.0	RT	Tsfu
2	969.1	979.1	5763.6	5753.6	10.0	967.5	5765.2	990.4	5742.3	965.4	11.3	5742.3	RD	Tsfu
Note: Brass Cap Ground Elevation: 6732.65 ft; all measurements are from this elevation														



3.49 R-44

Location: R-44 is located in lower Mortandad Canyon about 925 ft west of R-13, 940 ft south of R-45, and 0.25 mi east of R-50.

Completion Type: Dual screen completion within the regional aquifer.

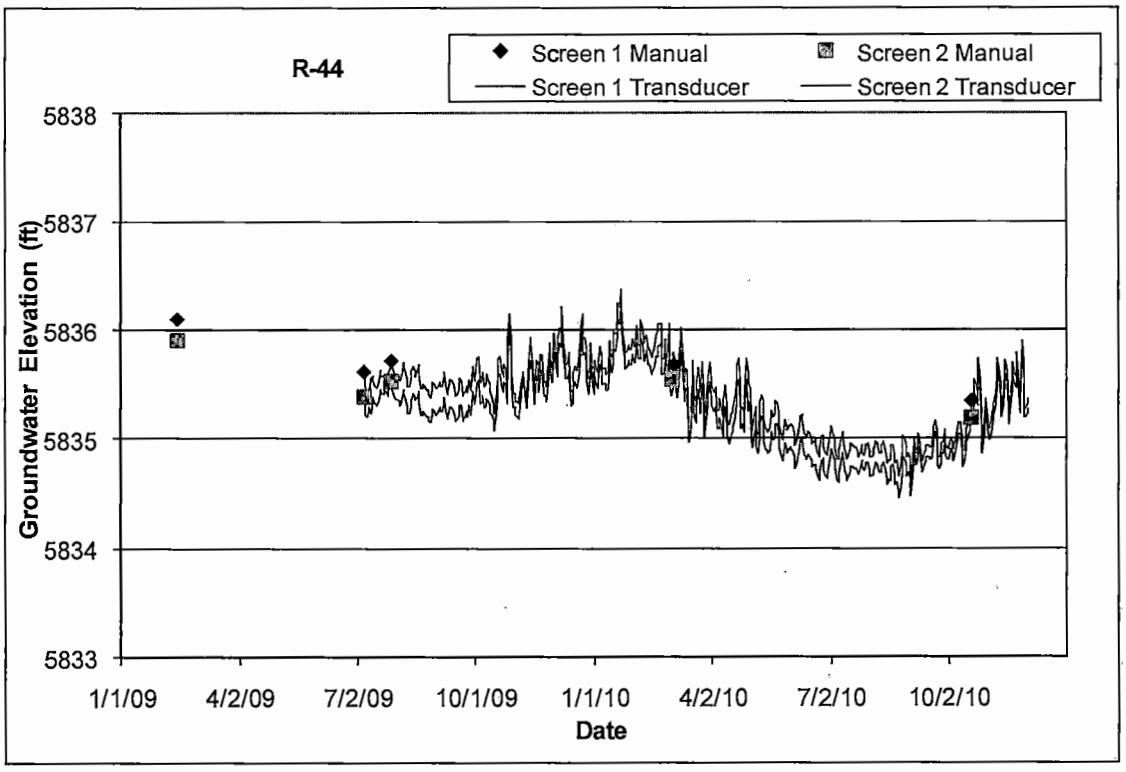
Period of Record: Well completed January 2009; transducers installed July 8, 2009; data through 2010.

Remarks: R-44 installed in the regional aquifer to a depth of 1016 ft, about 110 ft into the aquifer. The screens are 80 ft apart. Both screens exhibit a response to pumping supply well PM-4; however, screen 2 shows more response than screen 1. During pumping PM-4, the head difference between screens was about 0.25 ft; however, with PM-4 shut down, the head difference declines. The well is 100% barometrically efficient; however, the aquifer shows a delayed response to atmospheric pressure fluctuations.

R-44 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Top/Bottom of Packer (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	895.0	905.0	5819.9	5809.9	10.0	921.9	5793.0	905.0	5809.9	936.3	936.3	31.3	120.9	RT	Tpf
2	985.3	995.2	5729.6	5719.7	9.9	983.2	5731.7	995.2	5719.7	941.1	1016.0	20.8	80.3	RD	Tpf

Note: Brass Cap Ground Elevation: 6714.91 ft; all measurements are from this elevation



3.50 R-45

Location: R-45 is located in lower Mortandad Canyon about 925 ft north of R-44 and 1285 ft east of R-28.

Completion Type: Dual screen completion within the regional aquifer.

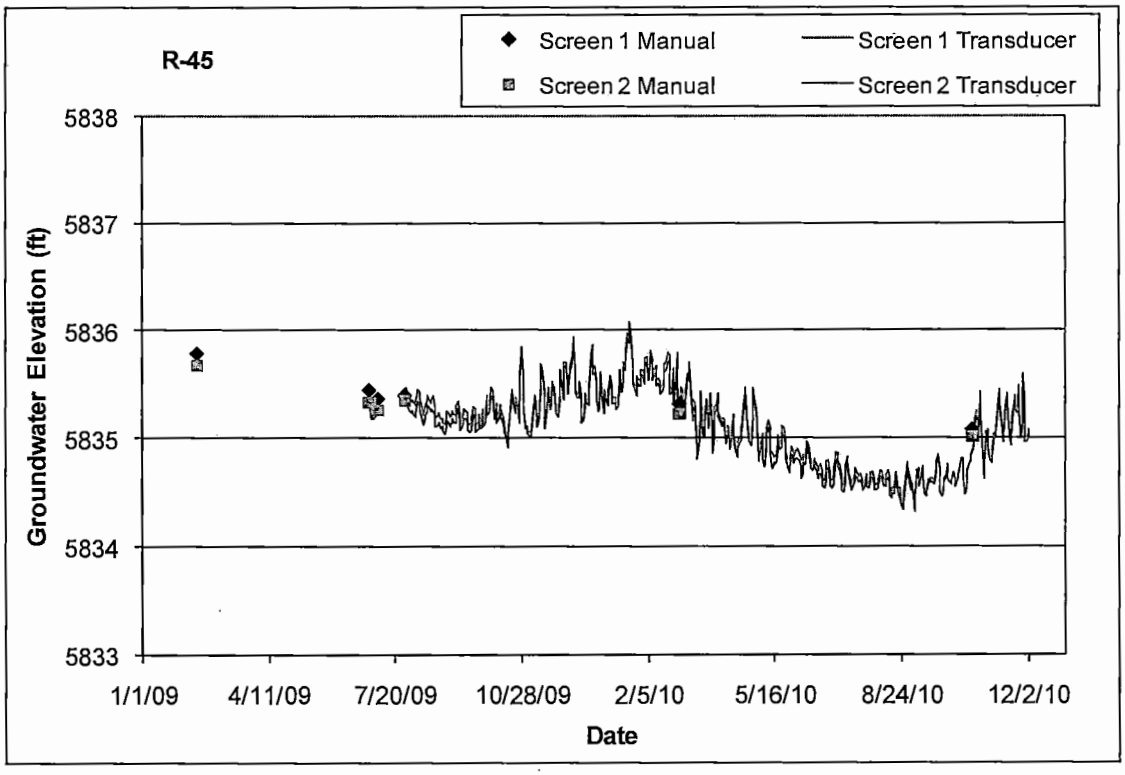
Period of Record: Well completed January 2009. Temporary transducers installed from June 30 to July 7, 2009. Dedicated transducers installed July 28, 2009; data through 2010.

Remarks: R-45 installed in the regional aquifer to a depth of 1016 ft, about 147 ft into the aquifer. The screens are 85 ft apart. Both screens exhibit a response to pumping supply well PM-4; however, screen 2 shows more response than screen 1. During pumping PM-4 in 2009, the head difference between screens was about 0.10 ft; however with PM-4 shut down, the head difference declines to 0.05 ft or less. The well is 100% barometrically efficient; however, the aquifer shows a delayed response to atmospheric pressure fluctuations.

R-45 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Top/ Bottom of Packer (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	880.0	890.0	5824.0	5814.0	10.0	905.5	5798.5	890.0	5814.0	921.3	921.26	31.26	120.7	RT	Tpf
2	974.9	994.9	5729.1	5709.1	20.0	973.2	5730.8	994.9	5709.1	926.0	1016.0	21.1	81.5	RD	Tsfu

Note: Brass Cap Ground Elevation: 6704.02 ft; all measurements are from this elevation



3.51 R-46

Location: R-46 is located on a mesa between Mortandad Canyon and Pajarito Canyon about 800 ft east (downgradient) of MDA C and R-60, and 4700 ft west (upgradient) of supply well PM-5.

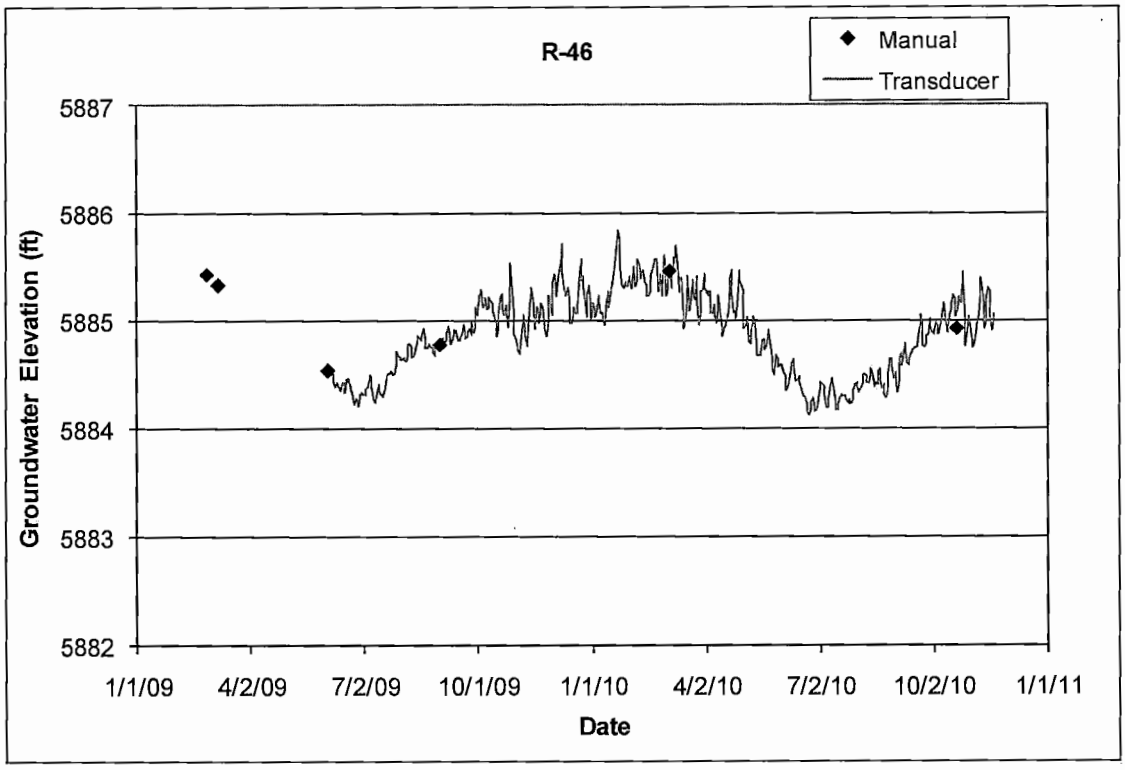
Completion Type: Single completion at the top of the regional aquifer. The screen is located about 12 ft below the water table.

Period of Record: Well completed February 2009, transducer installed June 6, 2009, groundwater level data through 2010.

Remarks: R-46 installed in the regional aquifer to a depth of 1382.2 ft. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. The groundwater responds to pumping supply wells PM-4 and PM-5.

R-46 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1340.0	1360.7	5873.3	5852.6	20.7			1360.7	5852.6	1382.2	21.5	83.0	RT	Tpf
Note: Brass Cap Ground Elevation: 7213.33 ft; all measurements are from this elevation														



3.52 R-48

Location: R-48 is located at the east side of TA-16 about 1800 ft south of R-25. R-48 was formerly borehole CdV-16-3i, which was deepened and completed in the regional aquifer.

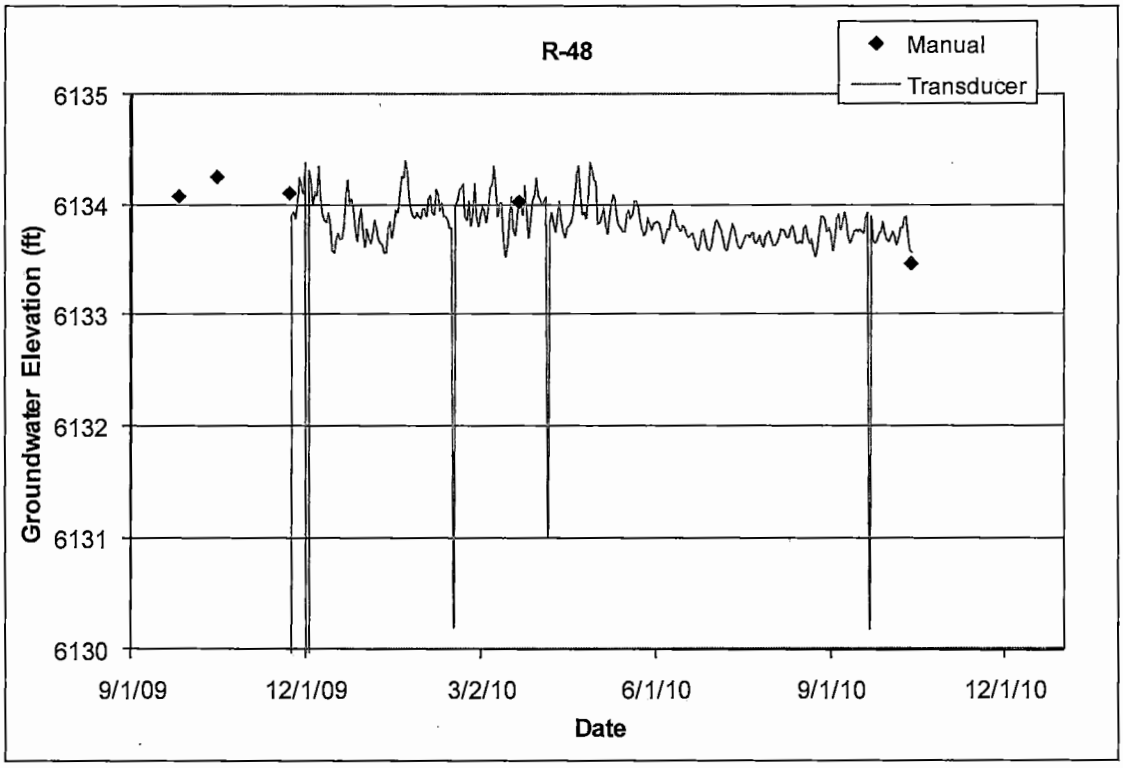
Completion Type: Single completion at the top of the regional aquifer. The screen is located about 147 ft below the water table in Tschicoma dacite.

Period of Record: Well completed September 2009, aquifer test conducted October 2009, transducer installed November 23, 2009, groundwater level data through 2010.

Remarks: R-48 installed in the regional aquifer to a depth of 1540 ft. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations.

R-48 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Hydro Zone Code	Geo Unit Code
1	1500.0	1520.6	5986.8	5966.2	20.6			1520.6	5966.2	1540	19.4	RT	Tt
Note: Brass Cap Ground Elevation: 7486.78 ft; all measurements are from this elevation													



3.53 R-49

Location: R-49 is located in lower Pajarito Canyon south of TA-54 and MDA G and about 1100 ft west of R-39. R-49 is 1550 ft southwest of R-57.

Completion Type: Dual completion, two screens in the regional aquifer. The screens are 50 ft apart. The upper screen is located in basalt about 35 ft below the water table and the lower screen is in Puye Totavi lentil sediments.

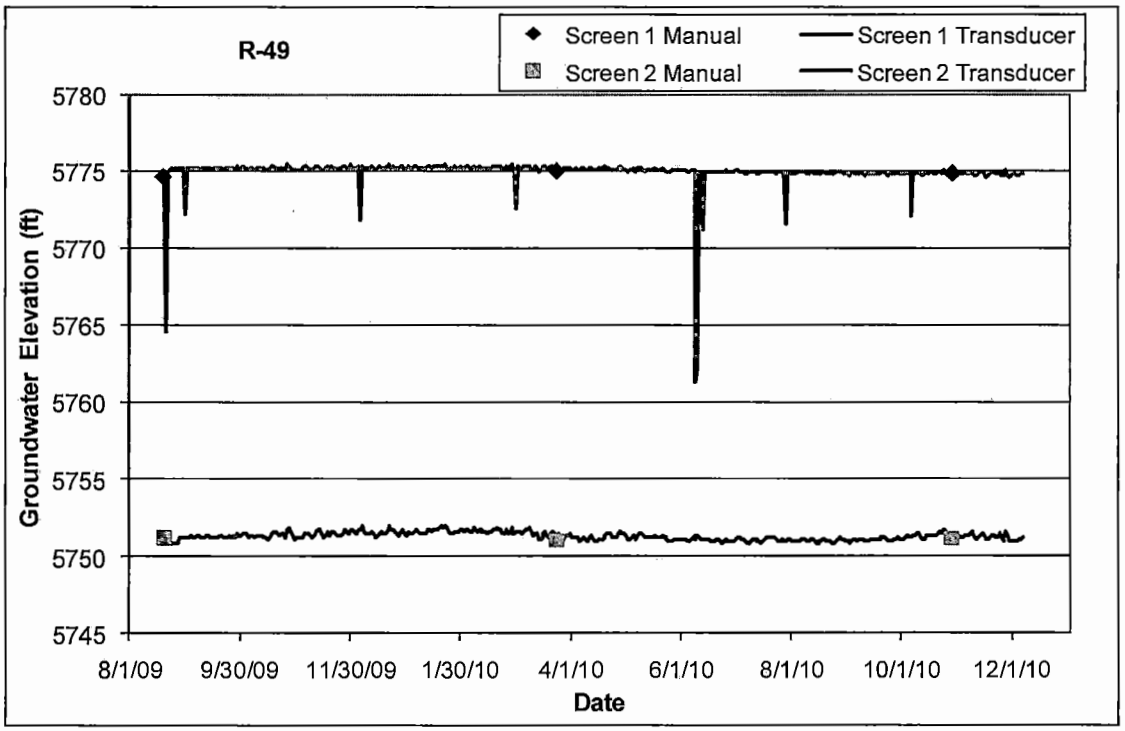
Period of Record: Well completed June 2009, transducers installed August 20, 2009, groundwater level data through 2010.

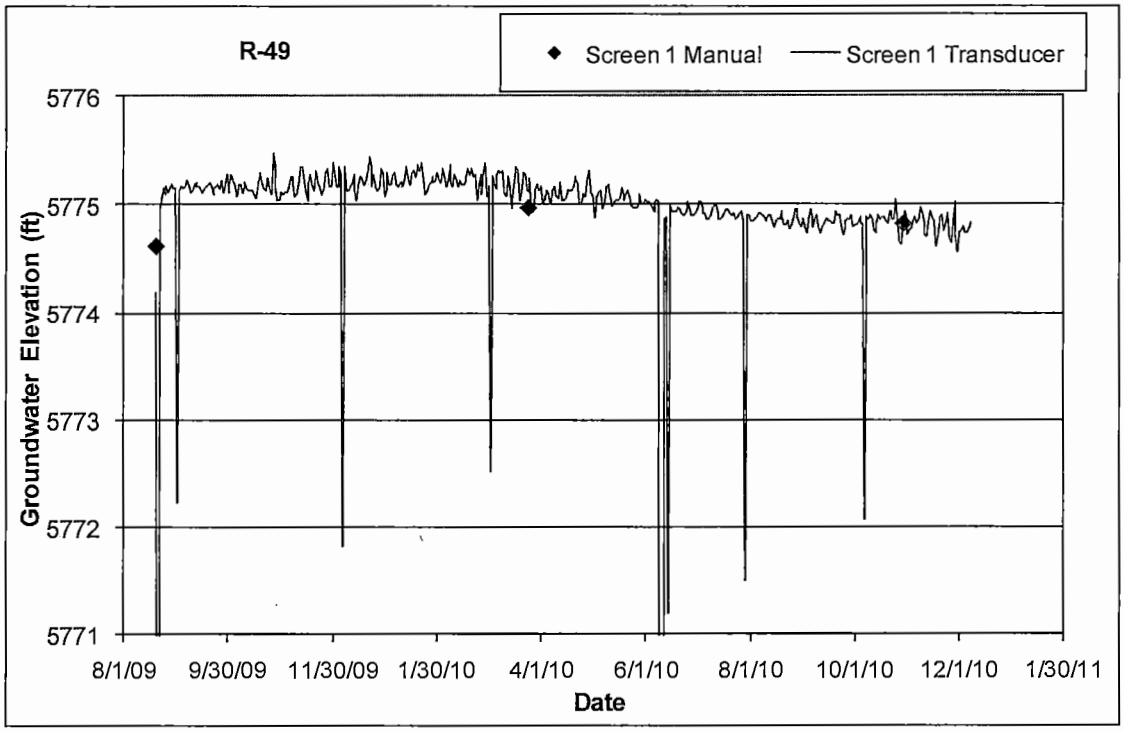
Remarks: R-49 installed in the regional aquifer to a depth of 949.3 ft. A Baski dual valve sampling system was installed in August 2009. The well is 100% barometrically efficient; the aquifer does not immediately respond to atmospheric pressure fluctuations; however, the groundwater shows a delayed response to atmospheric pressure fluctuations. The groundwater at R-49 screen 2 responds to pumping supply wells PM-4 and PM-5 and responded to drilling activities at R-57 and pumping at R-57 screen 2.

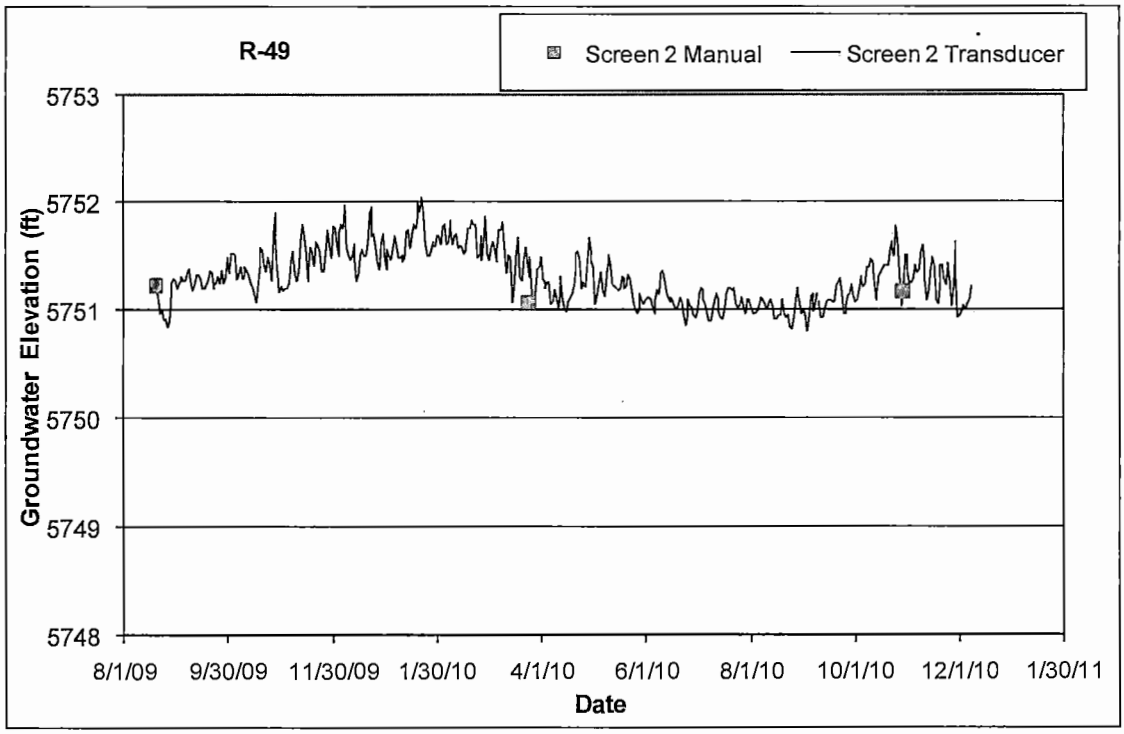
R-49 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	Pump Intake Elev (ft)	Top of Packer/ Sump Depth (ft)	Top of Packer/ Sump Elev (ft)	Bottom of Packer Depth (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	845.0	855.0	5739.5	5729.5	10.0	874.3	5710.3	887.6	5697.0	N/A	887.6	32.6	125.8	RT	Tb4
2	905.6	926.4	5678.9	5658.1	20.8	904.4	5680.1	926.4	5658.1	892.3	949.3	22.9	88.4	RD	Tpt

Note: Brass Cap Ground Elevation: 6584.54 ft; all measurements are from this elevation




R-49
Screen 1 Manual
Screen 1 Transducer
Groundwater Elevation (ft)
5776
5775
5774
5773
5772
5771
8/1/09
9/30/09
11/30/09
1/30/10
4/1/10
6/1/10
8/1/10
10/1/10
12/1/10
1/30/11
Date


R-49
Screen 2 Manual
Screen 2 Transducer
Groundwater Elevation (ft)
5753
5752
5751
5750
5749
5748
8/1/09
9/30/09
11/30/09
1/30/10
4/1/10
6/1/10
8/1/10
10/1/10
12/1/10
1/30/11
Date

3.54 R-50

Location: R-50 is located on a mesa south of Mortandad Canyon near the boundary with San Ildefonso Pueblo. R-50 is about 0.25 mi west of R-44 and 0.25 mi south of R-28.

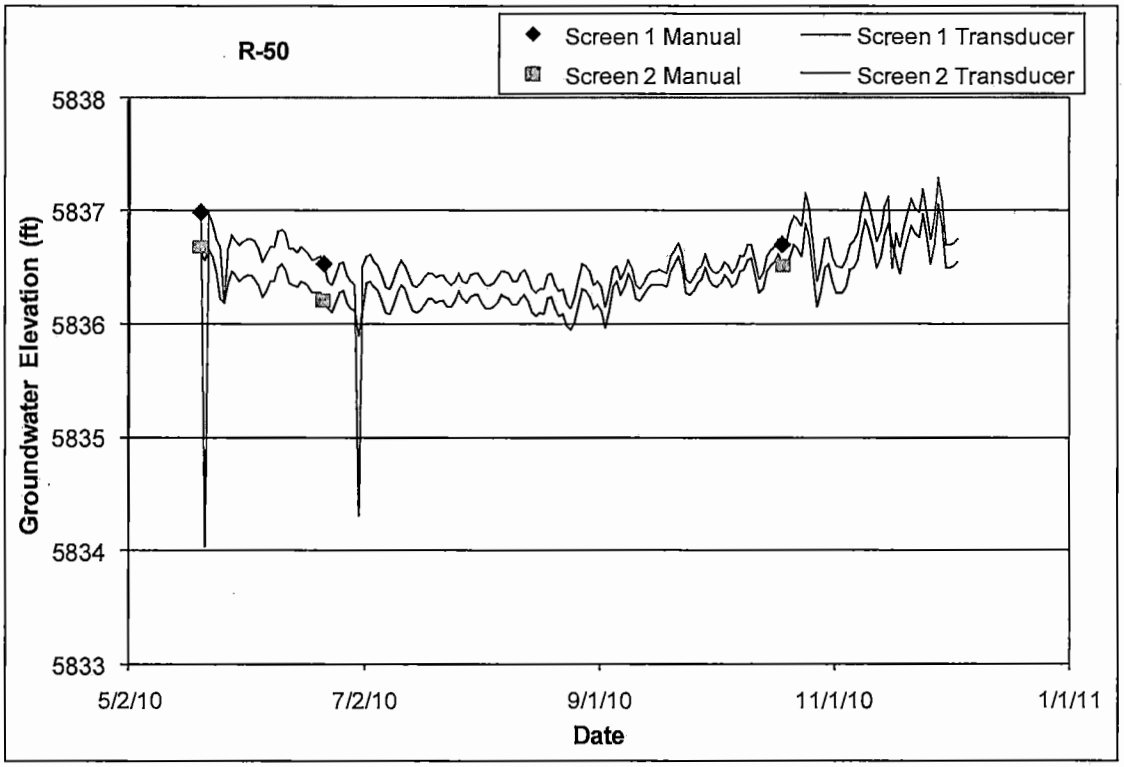
Completion Type: Dual completion, two screens in the regional aquifer. The screens are 98 ft apart. The upper screen is located in Puye fanglomerates about 10 ft below the water table.

Period of Record: Well completed February 2010, transducers installed May 21, 2010, groundwater level data through 2010.

Remarks: R-50 installed in the regional aquifer to a depth of 1217.5 ft. A dual valve Baski sampling system was installed in May 2010. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. The groundwater at R-50 responds to pumping supply well PM-4. The groundwater at the lower screen contains significant volumes of gas, which requires pumping screen 2 at a reduced rate during purging and sampling.

R-50 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Top/ Bottom Packer Depth (ft)	Top/ Bottom of Packer Elev (ft)	LIC Top/ Bottom Depth (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (gal.)	Hydro Zone Code	Geo Unit Code
1	1077.0	1087.0	5827.1	5817.1	10.0	1104.8	5799.3	1118.1	5786.0	1106.5	1118.1	31.1	31.8	RT	Tpf
2	1185.0	1205.6	5719.1	5698.5	20.6	1183.6	5720.5	1122.9	5781.2	1111.1	1217.5	11.9	12.1	RD	Tsfu
Note: Brass Cap Ground Elevation: 6904.11 ft; all measurements are from this elevation															



3.55 R-51

Location: R-51 is located in middle Pajarito Canyon west of TA-18. R-51 is about 0.55 mi south of supply well PM-4, 0.48 mi northwest of supply well PM-02, and 0.43 mi northwest and upstream of R-40.

Completion Type: Dual completion, two screens in the regional aquifer. The screens are 105.7 ft apart. Both screens are located in Puye fanglomerates; the upper screen is about 25 ft below the water table.

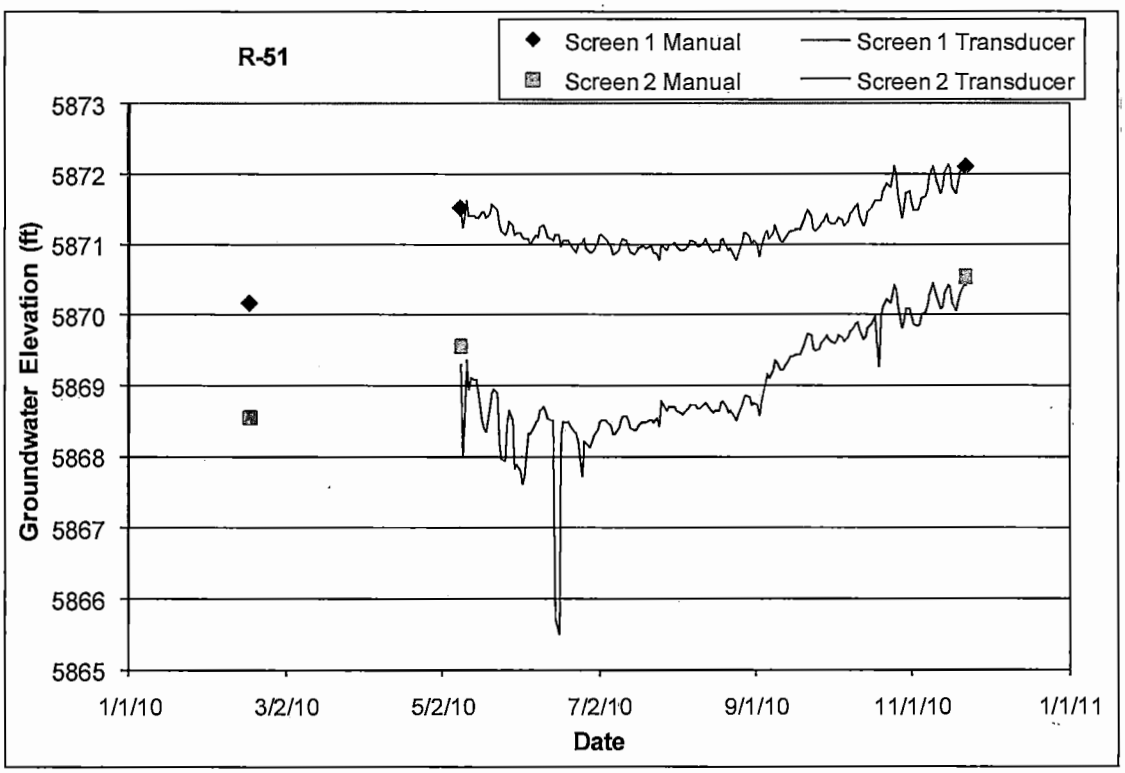
Period of Record: Well completed February 2010, transducers installed May 10, 2010, groundwater level data through 2010.

Remarks: R-51 installed in the regional aquifer to a depth of 1046.1 ft. A dual valve Baski sampling system was installed in May 2010. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. The groundwater responds to pumping supply wells PM-2 and PM-4.

R-51 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Top/ Bottom Packer Depth (ft)	Top/ Bottom of Packer Elev (ft)	Depth to LIC Top/ Bottom (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Vol (gal.)	Hydro Zone Code	Geo Unit Code
1	915.0	925.2	5847.2	5836.9	10.3	940.2	5822.0	952.1	5810.1	940.9	952.1	26.8	27.3	RT	Tpf
2	1031.0	1041.0	5731.2	5721.2	10.0	1030.0	5732.2	956.8	5805.4	945.5	1046.1	5.0	5.2	RD	Tpf

Note: Brass Cap Ground Elevation: 6762.17 ft; all measurements are from this elevation



3.56 R-52

Location: R-52 is located at TA-54 on an unnamed mesa between Cañada del Buey and the south fork of Cañada del Buey. The well is about 500 ft northeast of MDA J, 850 ft northwest of R-37 and 0.45 mi southeast of supply well PM-4.

Completion Type: Dual completion, two screens in the regional aquifer. The screens are 51.3 ft apart. A dual valve Baski system was installed July 17, 2010.

Period of Record: Well completed April 2010, transducers installed July 19, 2010, groundwater level data through 2010.

Remarks: R-51 installed in the regional aquifer to a depth of 1128.7 ft. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. The groundwater responds to pumping nearby supply well PM-4.

R-52 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Top / Bottom of Packer Depth (ft)	Top / Bottom of Packer Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Vol (gal.)	Hydro Zone Code	Geo Unit Code
1	1035.2	1055.7	5847.8	5827.3	20.5	1071.4	5811.7	1081.7	5801.3	1081.7	26.0	26.5	RT	Tpf
2	1107.0	1117.0	5776.0	5766.0	10.0	1105.6	5777.4	1086.5	5796.6	1128.7	11.7	11.9	RD	Tpf

Note: Brass Cap Ground Elevation: 6883.04 ft; all measurements are from this elevation

3.57 R-53

Location: R-53 is located in the south fork of Cañada del Buey about 400 ft northeast of MDA L at TA-54. R-53 is about 950 ft west of R-38, 1370 ft northwest of R-21, and 1330 ft east of R-54.

Completion Type: Dual completion, two screens in the regional aquifer. The screens are 100.5 ft apart. A dual valve Baski system was installed July 07, 2010.

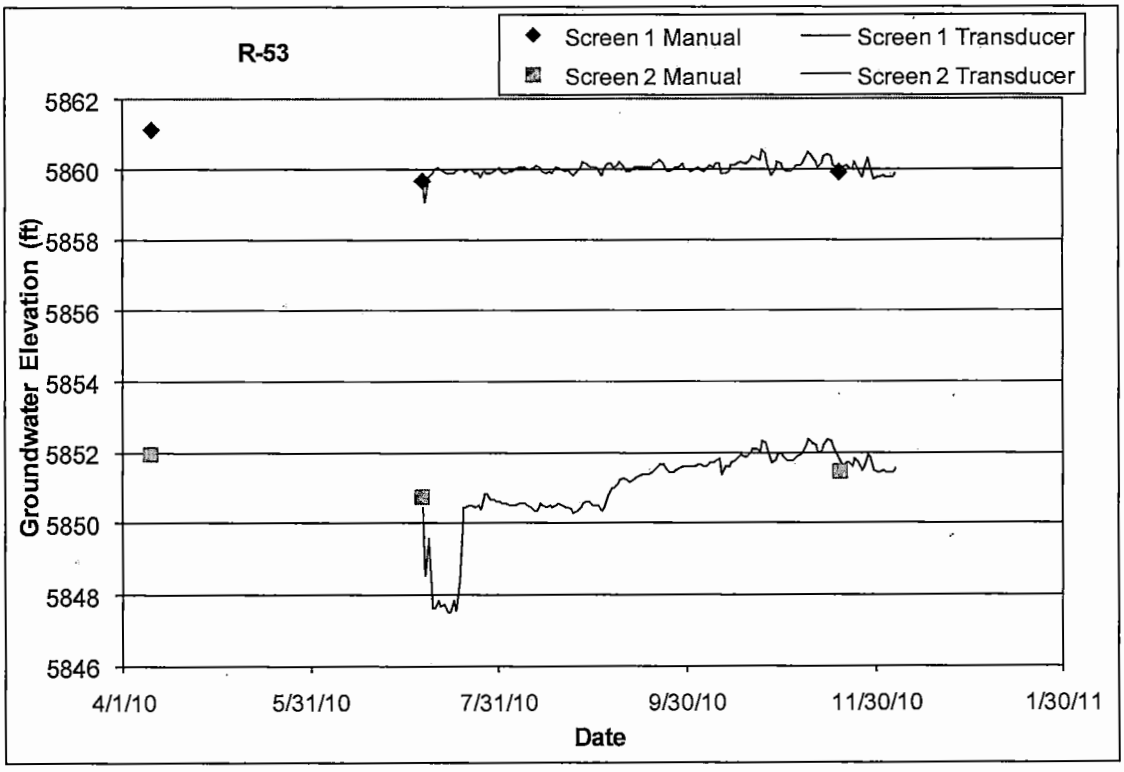
Period of Record: Well completed March 2010, transducers installed July 07, 2010, groundwater level data through 2010.

Remarks: R-53 installed in the regional aquifer to a depth of 1001.9 ft. The upper screen is located in Puye fanglomerates about 20 ft below the Cerros del Rio basalt and 19 ft below the water table; the lower screen is also in Puye fanglomerates but there does not appear to be hydraulic communication between screens. Preliminary data indicate that screen 1 is about 80% barometrically efficient and screen 2 is about 50% barometrically efficient. The groundwater at screen 2 responds to supply pumping at PM-4.

R-53 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Top/ Bottom of Packer Depth (ft)	Top of Packer/ Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Vol (gal.)	Hydro Zone Code	Geo Unit Code
1	849.2	859.2	5840.8	5830.8	10.0	892.6	5797.4	905.5	5784.5	905.5	46.3	47.2	RT	Tpf
2	959.7	980.2	5730.3	5709.8	20.5	958.4	5731.6	910.2	5779.8	1001.9	21.7	22.1	RD	Tpf

Note: Brass Cap Ground Elevation: 6689.98 ft; all measurements are from this elevation



3.58 R-54

Location: R-54 is located in lower Pajarito Canyon about 985 ft east of R-20 and 2250 east of PM-2. R-54 is about 0.5 mi northwest of R-32 and 0.25 mi west of R-53.

Completion Type: Dual completion, two screens in the regional aquifer. The screens are 75 ft apart. Screen 1 is located in the Cerros del Rio basalt and screen 2 is located in Puye fanglomerates; the upper screen is about 13 ft below the water table.

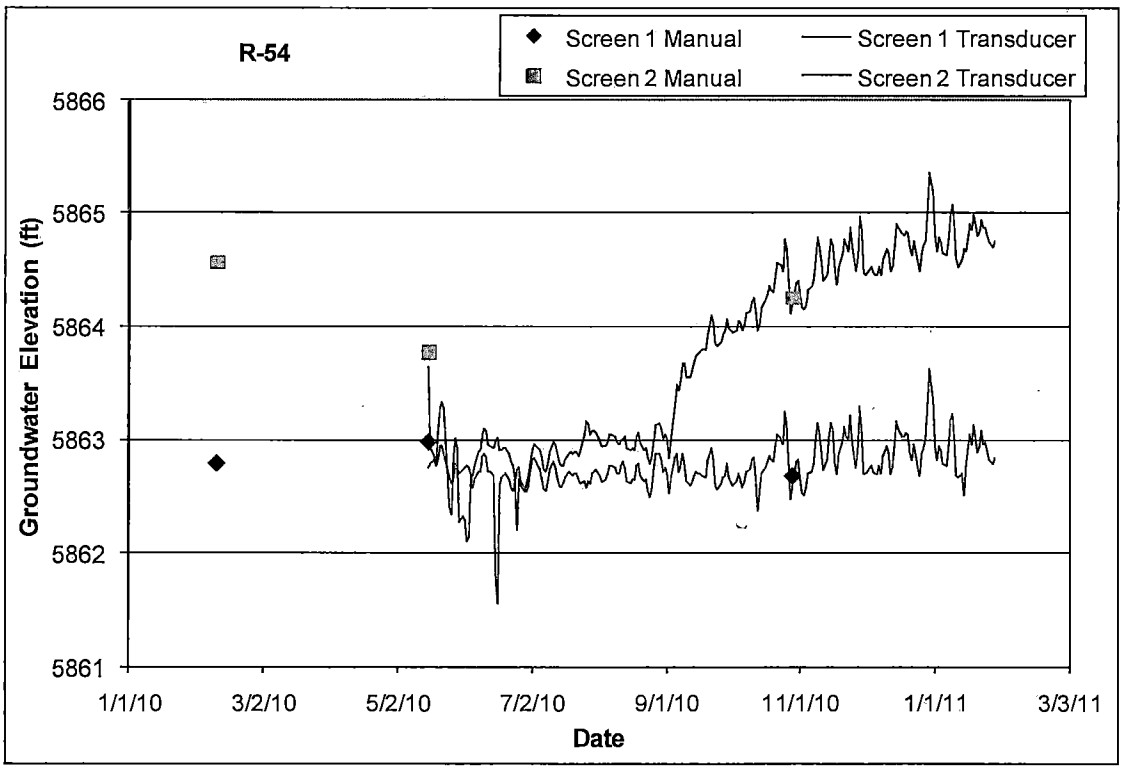
Period of Record: Well completed January 2010, transducers installed May 2010, groundwater level data through 2010.

Remarks: R-54 installed in the regional aquifer to a depth of 936 ft. A dual valve Baski sampling system was installed in May 2010. The well is 100% barometrically efficient; the aquifer does not respond to atmospheric pressure fluctuations. Note that screen 2 has a higher head than screen 1 except when supply well PM-2 is pumping. Screen 2 responds to pumping at PM-2 and PM-4.

R-54 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Top/ Bottom of Packer Depth (ft)	Top of Packer/ Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (gal.)	Hydro Zone Code	Geo Unit Code
1	830.0	840.0	5849.9	5839.9	10.0	857.9	5822.0	871.3	5808.6	871.3	31.3	31.9	RT	Tb4
2	915.0	925.0	5764.9	5754.9	10.0	913.2	5766.7	876.0	5803.9	936.0	11.0	11.2	RD	Tpf

Note: Brass Cap Ground Elevation: 6679.85 ft; all measurements are from this elevation



3.59 R-55

Location: R-55 is located in lower Cañada del Buey about 0.4 mi east of MDA G at TA-54. R-55 is about 1975 ft east of R-47 and 1760 ft east-northeast of R-22.

Completion Type: Dual completion, two screens in the regional aquifer. The screens are 114 ft apart. Screen 1 is located in Puye fanglomerates and screen 2 is located in the Chamita Formation; the upper screen is about 25 ft below the water table.

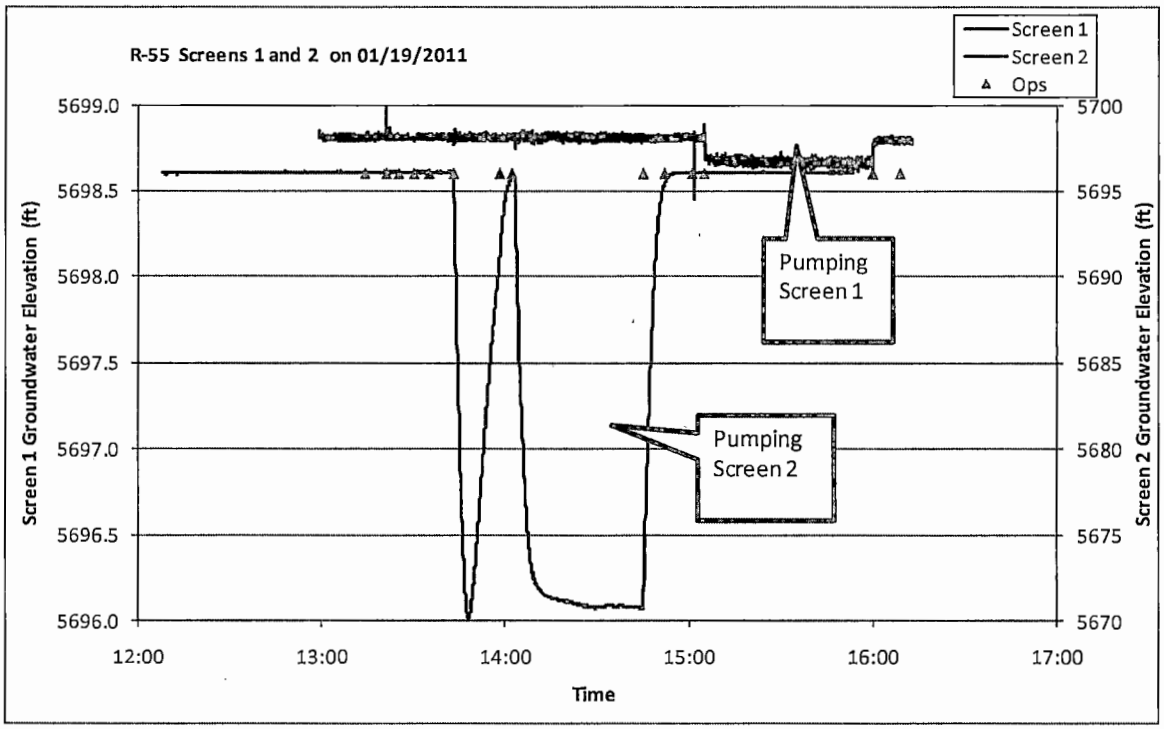
Period of Record: Well completed August 25, 2010, transducers installed January 19, 2011; groundwater level data through January 2011.

Remarks: R-55 installed in the regional aquifer to a depth of 1021 ft. A dual valve Baski sampling system was installed January 18, 2011. The head difference between screens is about 2.8 ft.

R-55 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Top / Bottom of Packer Depth (ft)	Top / Bottom of Packer Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (gal.)	Hydro Zone Code	Geo Unit Code
1	860.0	880.6	5673.9	5653.3	20.6	934.9	5599.0	945.3	5588.6	945.3	64.7	66.0	RT	Tpf
2	994.4	1015.4	5539.5	5518.5	21.0	992.2	5541.7	950.0	5583.8	1021.0	5.6	5.7	RD	Tch

Note: Brass Cap Ground Elevation: 6533.86 ft; all measurements are from this elevation



Note very short time scale.

3.60 R-56

Location: R-56 is located on Mesita del Buey at TA-54 between MDA L and MDA G. R-56 is about 550 ft southeast of MDA L and about 0.25 mi northwest of MDA G. R-56 is about 780 ft west of R-21 and 900 ft southeast of R-53.

Completion Type: Dual completion, two screens in the regional aquifer. The screens are 81 ft apart. Both screens are located in dacitic gravels within the Puye fanglomerates; the upper screen is about 25 ft below the water table.

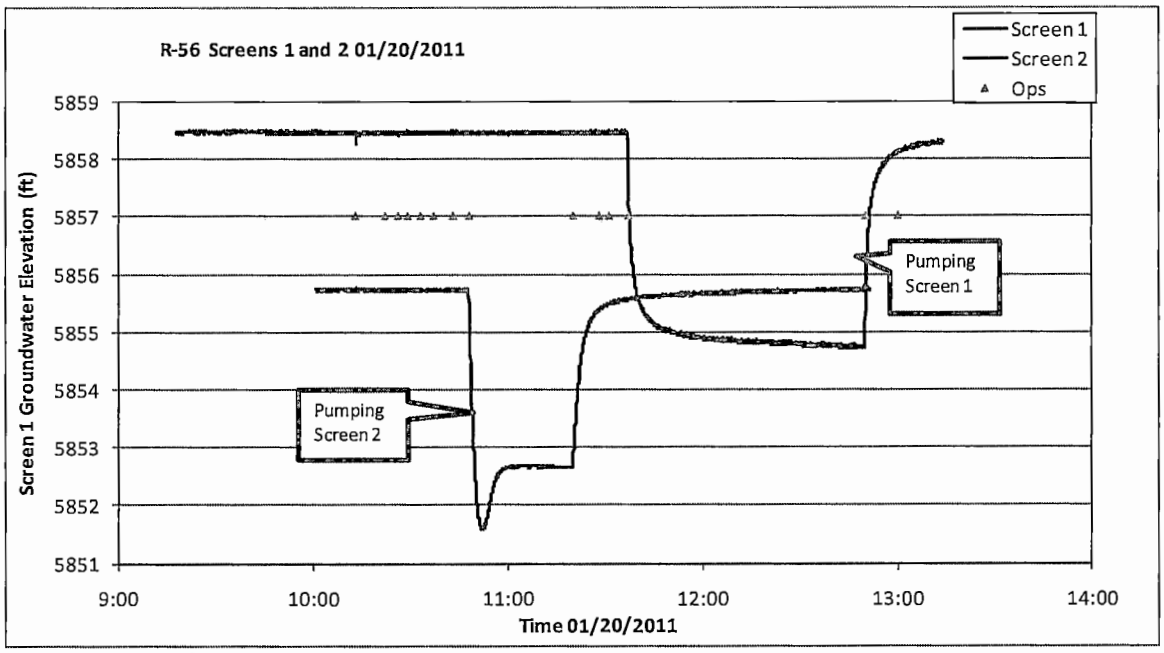
Period of Record: Well completed July 19, 2010, transducers installed January 20, 2011; groundwater level data through January 2011.

Remarks: R-56 installed in the regional aquifer to a depth of 1078 ft. A dual valve Baski sampling system was installed January 15, 2011. The head difference between screens in August 2010 was about 4 ft and, in January 2011, was about 2.7 ft.

R-56 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Top / Bottom of Packer Depth (ft)	Top / Bottom of Packer Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (gal.)	Hydro Zone Code	Geo Unit Code
1	945.0	965.6	5835.9	5815.3	20.6	988.3	5792.6	1006.7	5774.2	1006.7	41.1	41.9	RT	Tpf
2	1046.6	1067.1	5734.3	5713.8	20.5	1045.6	5735.3	1011.4	5769.5	1078.8	11.7	11.9	RD	Tpf

Note: Brass Cap Ground Elevation: 6780.88 ft; all measurements are from this elevation



Note very short time scale.

3.61 R-57

Location: R-57 is located east of TA-54 MDA G about 420 ft south of R-41 and 300 ft northwest of R-22. R-57 is about 850 ft north of R-39 and 1550 ft northeast of R-49.

Completion Type: Dual completion, two screens in the regional aquifer. The screens are 41 ft apart. Screen 1 is located in the Cerros del Rio basalt and screen 2 is located in Puye Totavi lentil sediments; the upper screen is about 20 ft below the water table.

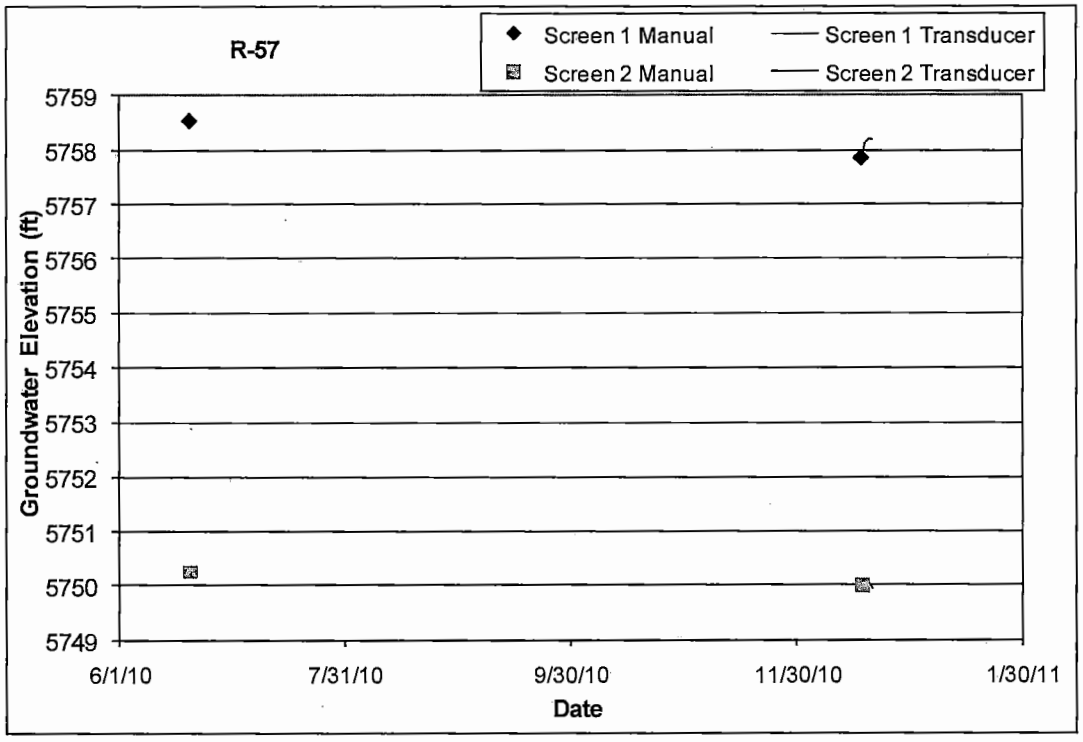
Period of Record: Well completed June 2010, transducers installed December 18, 2010, groundwater level data through 2010.

Remarks: R-57 installed in the regional aquifer to a depth of 1013.8 ft; the head separation between screens is about 8 ft. A dual valve Baski sampling system was installed December 16, 2010. R-57 screen 1 is at the approximate same elevation as nearby well R-41 screen 1, which is dry. The top of R-57 screen 2 is about 10 ft below the bottom of R-41 screen 2; however, the water level at R-41 screen 2 is about 50 ft lower than the R-57 screen 2 water level. The R-57 screen 1 water level is similar to that at R-22 screen 1; R-57 screen 2 water level is similar to that at R-22 screen 2 and about 50 ft higher than the groundwater at R-22 screen 3. R-49 screen 1 and R-57 screen 1 are at similar elevations but the water level at R-49 screen 1 is about 12 ft higher than R-57 screen 1. The lower screens at R-57 and R-49 are at equivalent elevations, and the groundwater levels are similar.

R-57 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Top/ Bottom of Packer Depth (ft)	Top of Packer/ Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (gal.)	Hydro Zone Code	Geo Unit Code
1	910.0	930.5	5738.0	5717.5	20.5	947.7	5700.4	959.0	5689.0	959.0	28.5	29.1	RT	Tb4
2	971.5	992.1	5676.5	5655.9	20.6	969.9	5678.2	963.8	5684.3	1013.8	21.7	22.1	RD	Tpt

Note: Brass Cap Ground Elevation: 6648.04 ft; all measurements are from this elevation



3.62 R-60

Location: R-60 is located on a mesa between Mortandad Canyon and Pajarito Canyon about 100 ft east of MDA C and about 770 ft northwest of R-46.

Completion Type: Single completion at the top of the regional aquifer. The screen is located in the Puye fanglomerates about 10 ft below the water table.

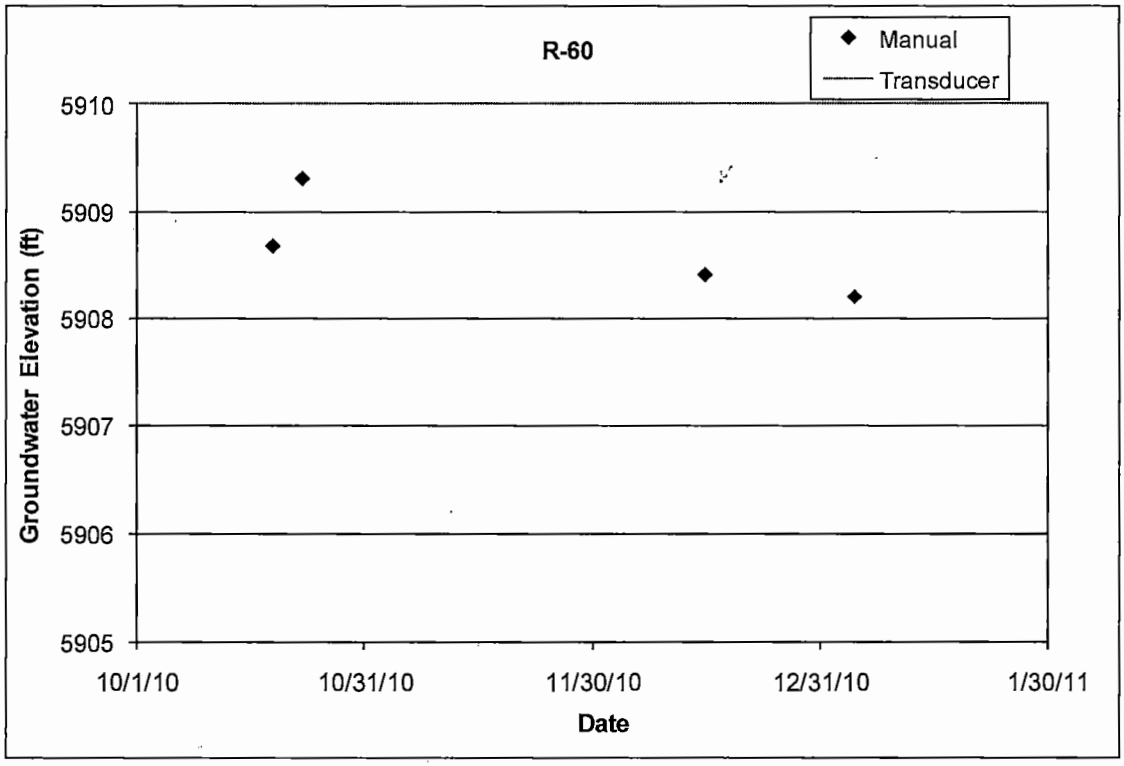
Period of Record: Well completed October 18, 2010, transducer installed January 5, 2011, groundwater level data through January 2011.

Remarks: R-60 installed in the regional aquifer to a depth of 1360.9 ft.

R-60 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	1330.0	1350.9	5898.2	5877.3	20.9	1345.8	5882.4	1350.9	5877.3	1360.9	10.0	38.6	RT	Tpf

Note: Brass Cap Ground Elevation: 7228.17 ft; all measurements are from this elevation



3.63 R-63

Location: R-63 is located at TA-16 near the Burning Grounds. R-63 is located adjacent to and on the same pad as CDV-16-2(i)r; R-63 is about 1000 ft east of intermediate well CDV-16-4ip and about 1500 ft east of R-25.

Completion Type: Single completion at the top of the regional aquifer. The screen is located in Puye fanglomerates.

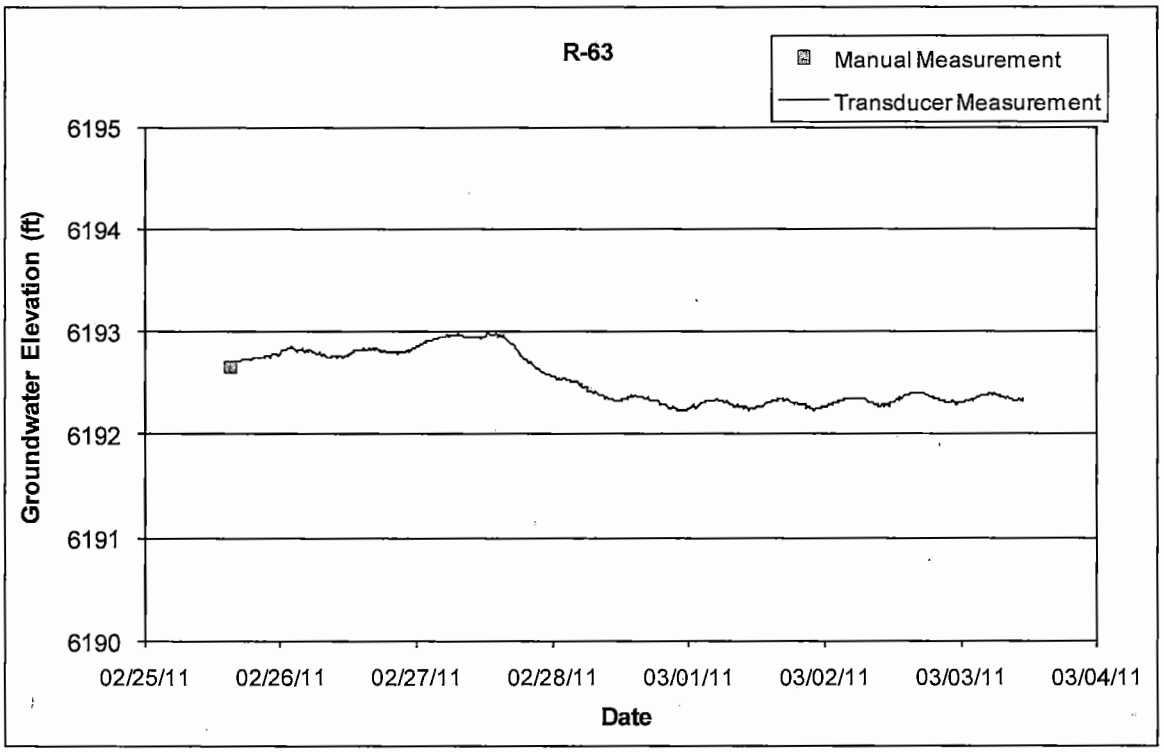
Period of Record: Well completed January 2011, pending transducer installation.

Remarks: R-63 installed in the regional aquifer to a depth of 1367 ft. Construction data pending.

R-63 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	1325.0	1345.3			20.3			1345.3		1367.0	21.7	21.7	RT	Tpf

Note: Brass Cap Ground Elevation: not yet surveyed; all measurements are from ground surface



3.64 Test Well 1

Location: TW-1 was located in lower Pueblo Canyon downstream of supply well O-1. TW-1 was plugged and abandoned in March 2010.

Completion Type: Single completion within the regional aquifer. The top of the screen was about 120 ft below the water table in 2006.

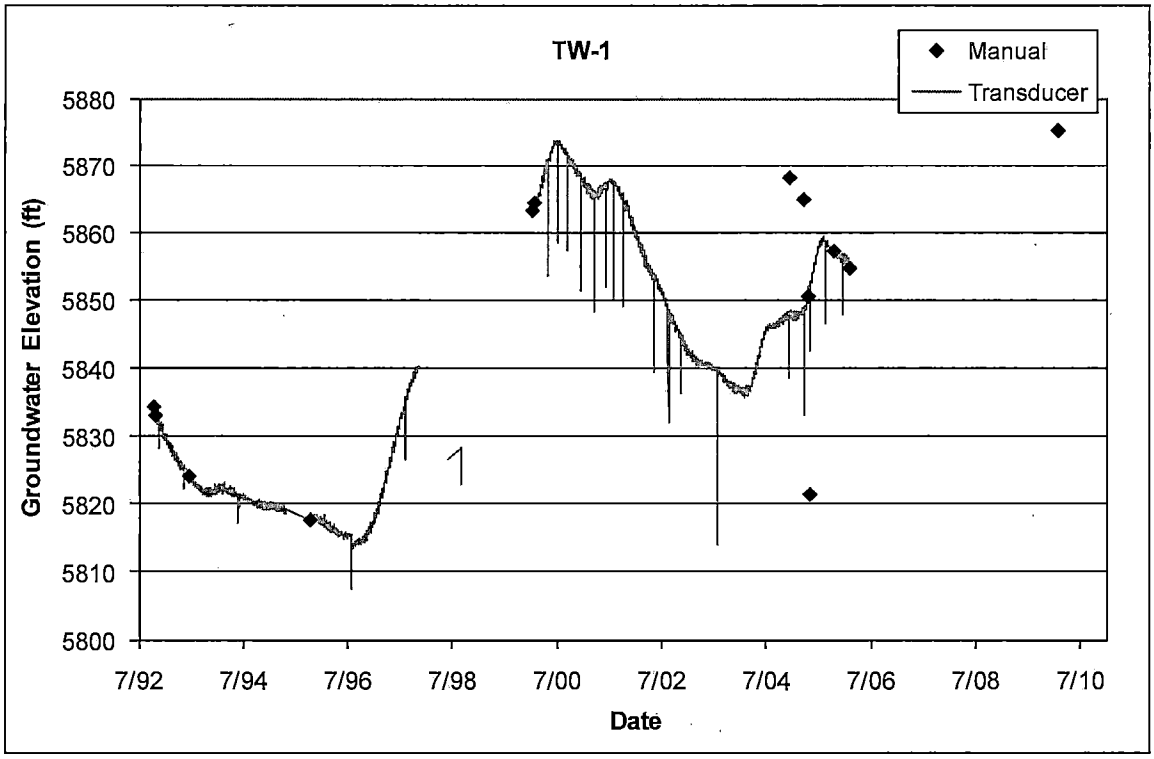
Period of Record: Well completed January 1950, transducer installed January 23, 1992, intermittent water level data to February 6, 2006, when the transducer was removed in preparation for well plugging and abandonment.

Remarks: TW-1 installed in the regional aquifer at a depth of 642 ft, about 100 ft into the regional aquifer. Water level in TW-1 was recharged locally by surface water from Pueblo Canyon (Koch and Rogers 2003) and did not correlate with the water level of surrounding regional aquifer wells. Test Well 1 was plugged and abandoned March 23, 2010 (LANL April 2010).

TW-1 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	632.0	642	5737.2	5727.2	10.0			642.0	5727.2	642	0.0	0.0	RT	Tpt

Note: TW-1 Ground Elevation: 6369.19 ft; all measurements are from this elevation



3.65 Test Well 2

Location: TW-2 was located in middle Pueblo Canyon. TW-2 was plugged and abandoned in February 2010.

Completion Type: Single completion at the top of the regional aquifer.

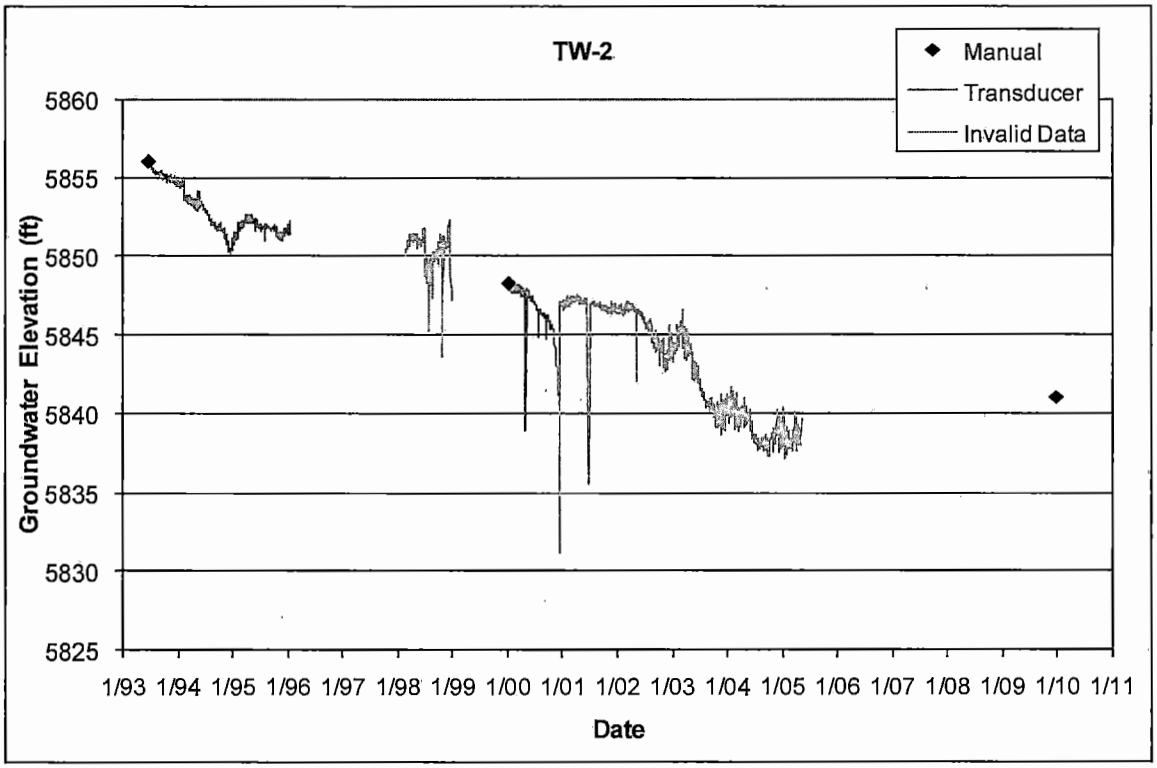
Period of Record: Well originally drilled in 1949, recompleted in 1990. Transducer installed June 1993; data to January 1996. Transducer reinstalled January 2000; transducer data to March 2005.

Remarks: TW-2 was completed at the top of the regional aquifer at a depth of 834 ft, about 35 ft into the regional aquifer. The transducer failed in November 2000, transducer data since then are questionable. A manual measurement attempt in March 2005 resulted in the measurement tape stuck in the well. Thus, transducer water level data since November 2000 are not valid with respect to elevation, but are shown for reference and character information only. TW-2 was plugged and abandoned February 8, 2010 (LANL March 2010).

TW-2 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	768.0	824	5880.1	5824.1	56.0			824.0	5824.1	834	10.0	55.6	RT	Tpt

Note: Test Well 2 Ground Elevation: 6648.06 ft; all measurements are from this elevation



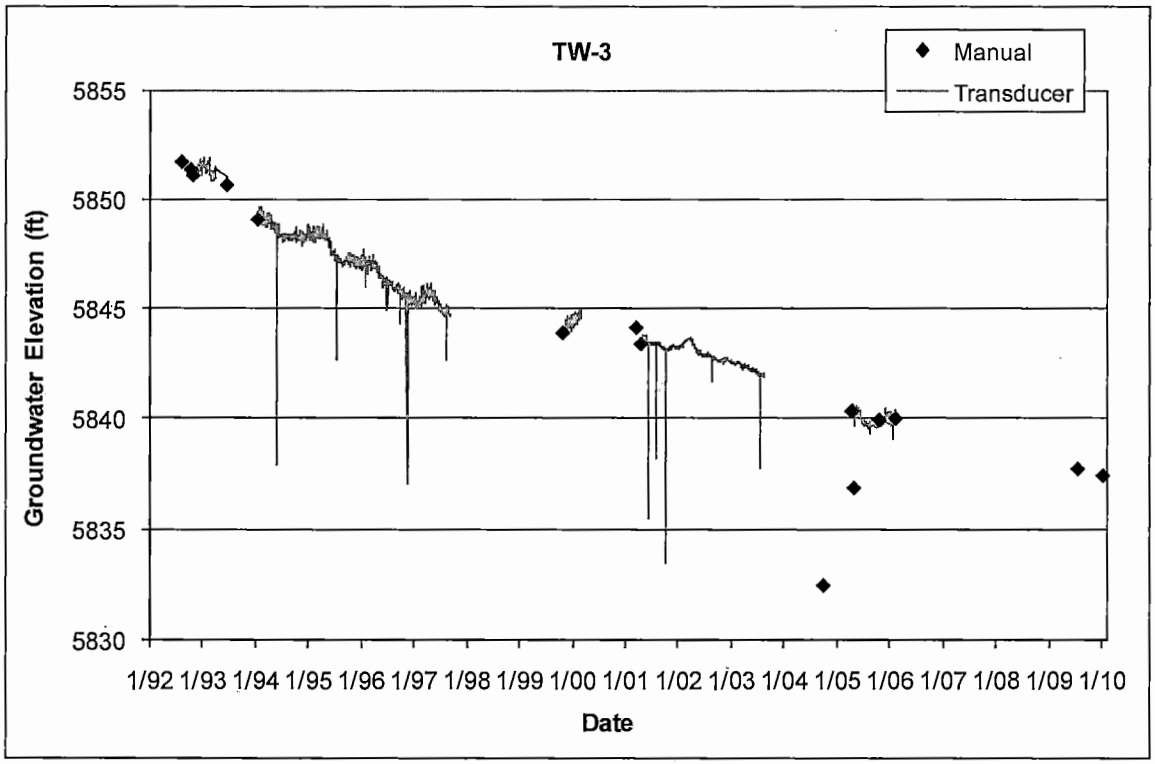
3.66 Test Well 3

Location: TW-3 is located in middle Los Alamos Canyon at the confluence with DP Canyon.
Completion Type: Single completion at the top of the regional aquifer.
Period of Record: Well drilled in 1949, transducer installed November 1992, intermittent data to February 2006. Periodic manual measurements 2009 and 2010.
Remarks: TW-3 completed at the top of the regional aquifer at a depth of 815 ft, about 30 ft into the regional aquifer. Transducer removed February 9, 2006, in preparation for well plugging and abandonment. The well was re-opened and sampled in July 2009 and January 2010.

TW-3 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	805.0	815.0	5821.9	5811.9	10.0			815.0	5811.9	815.0	0.0	0.0	RT	Tpt

Note: Ground Elevation: 6626.9 ft; all measurements are from this elevation



3.67 Test Well 4

Location: TW-4 was located in upper Pueblo Canyon east of Acid Canyon and about 1 mi west of R-2.

Completion Type: Single completion at the top of the regional aquifer.

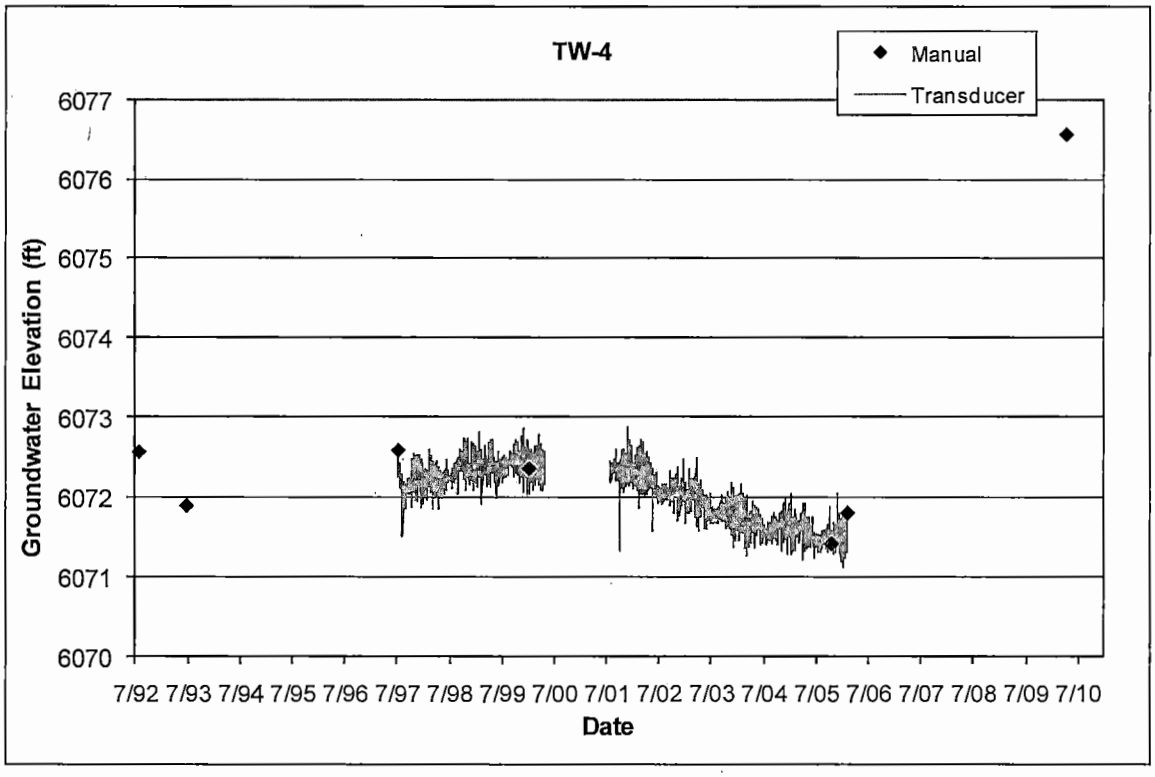
Period of Record: Well drilled in 1950, transducer installed June 1993 but problems occurred with the transducer equipment. Transducer reinstalled July 1997, intermittent data to February 8, 2006.

Remarks: Completed at the top of the regional aquifer to a depth of 1205 ft, about 30 ft into the regional aquifer. Transducer removed February 8, 2006, in preparation for well plugging and abandonment. TW-4 was plugged and abandoned May 3, 2010 (LANL July 2010). The groundwater level measurement before plugging was reported to be 6076.56 ft, but the accuracy of the measurement is questionable.

TW-4 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1195.0	1205	6049.6	6039.6	10.0			1205.0	6039.6	1205.0	0.0	0.0	RT	Tt

Note: TW-4 Ground Elevation: 7244.56 ft; all measurements are from this elevation



3.68 Test Well 8

Location: TW-8 was located in middle Mortandad Canyon about 220 ft east of R-1, which was drilled to replace TW-8.

Completion Type: Single completion at the top of the regional aquifer. The screen straddled the water table.

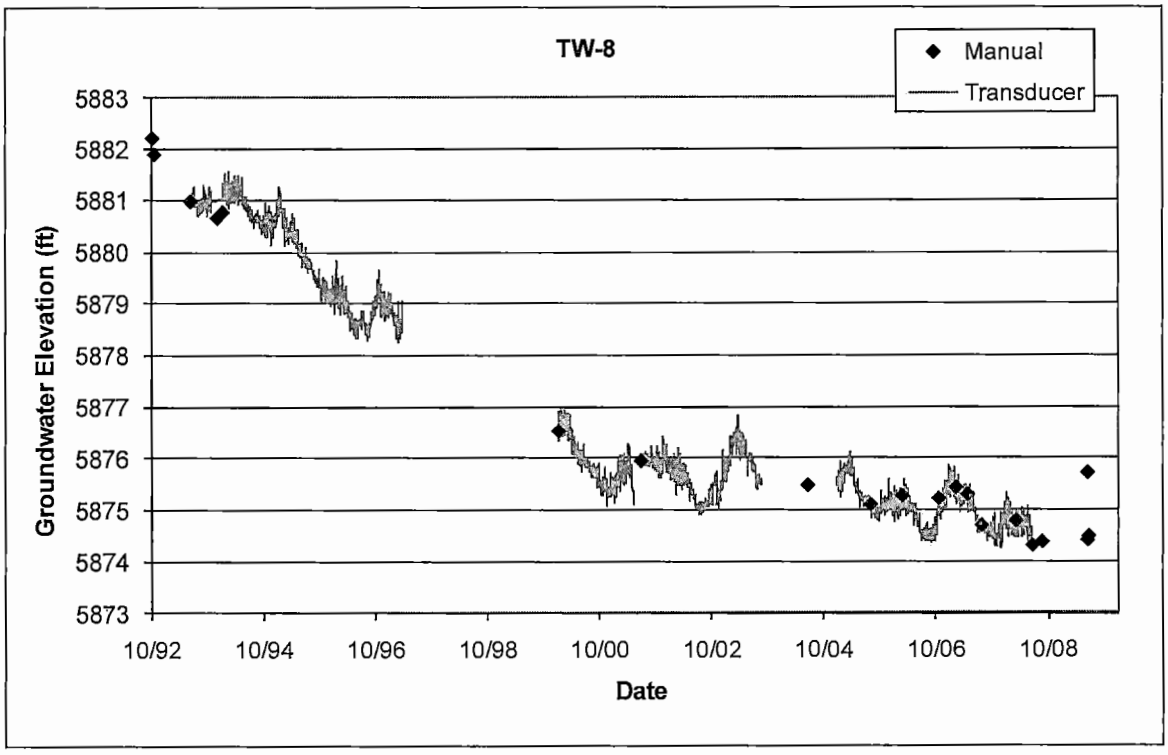
Period of Record: Well drilled in 1960, transducer installed June 1993, transducer data to March 1997. Transducer reinstalled January 2000; intermittent data to June 19, 2008, when the transducer was removed. Several manual measurements were obtained in June and July 2009 during preparations for plugging and abandonment.

Remarks: TW-8 was completed at the top of the regional aquifer at a depth of 1065 ft, about 70 ft into the regional aquifer. The well was nearly 100% barometrically efficient; the aquifer had no response to atmospheric pressure fluctuations. The aquifer indicated a seasonal response to supply well pumping and primarily responded to pumping PM-5 and possibly to pumping PM-4. The well was plugged and abandoned on August 13, 2009.

TW-8 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	953.0	1065	5920.5	5808.5	112.0			1065.0	5808.5	1065.0	0.0	0.0	RT	Tpf

Note: Ground Elevation 6873.5 ft; all measurements are from this elevation



3.69 Test Well DT-5A

Location: DT-5A is located at TA-49 near the southern boundary of LANL. DT-5A is about 1300 ft northwest of R-30 and 1600 ft west-southwest of R-29.

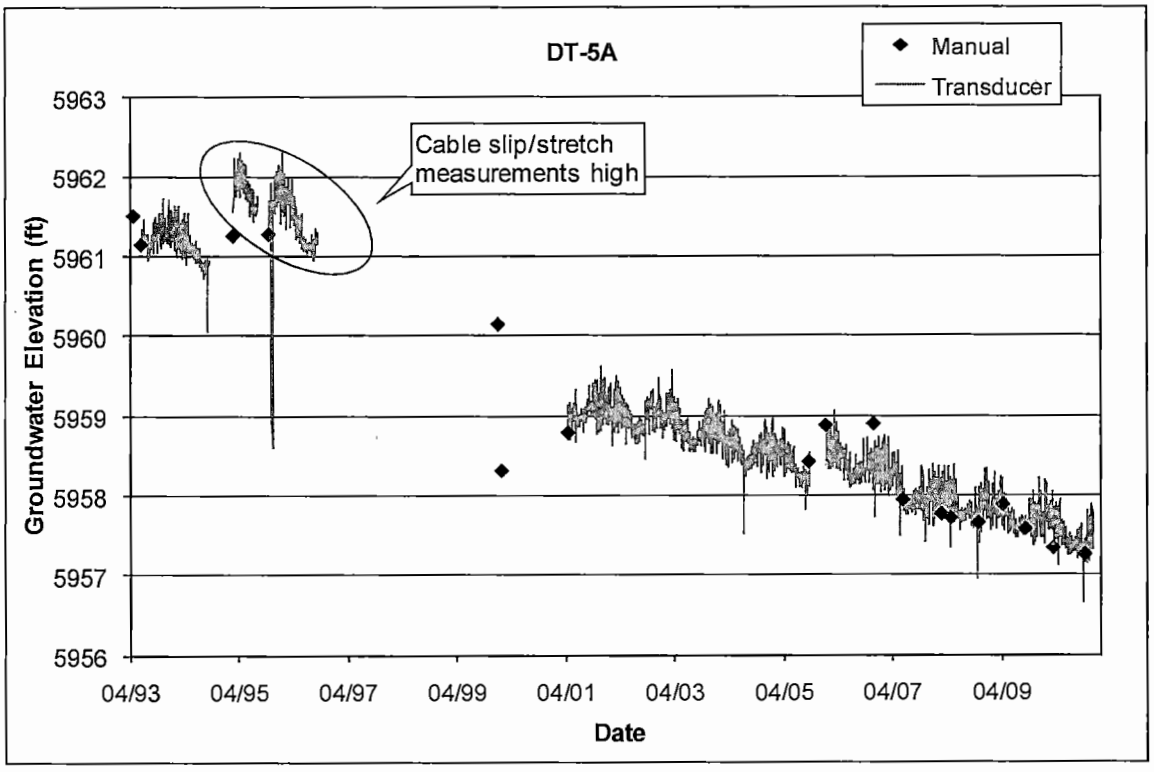
Completion Type: Single completion at the top of the regional aquifer. The screen straddles the water table.

Period of Record: Well drilled in 1960, transducer installed June 1993, data to September 1996. Transducer reinstalled January 2000 but equipment problems occurred. Transducer reinstalled April 2001; data through 2010.

Remarks: DT-5A completed at the top of the regional aquifer at a depth of 1819.5 ft, about 650 ft into the regional aquifer. The long screen encompasses Tb4 basalt and Tp fanglomerates. The well is 100% barometrically efficient; the aquifer does not respond immediately to atmospheric pressure fluctuations but shows a delayed response. The long-term water level shows a decline of about 0.2 ft/yr, likely in response to supply well pumping.

Test Well DT-5A Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1171.5	1788.5	5972.4	5355.4	617.0			1788.5	5355.4	1819.5	31.0	306.4	RT	Tb4
Note: Brass Cap Elevation 7143.86 ft; all measurements are from this elevation														

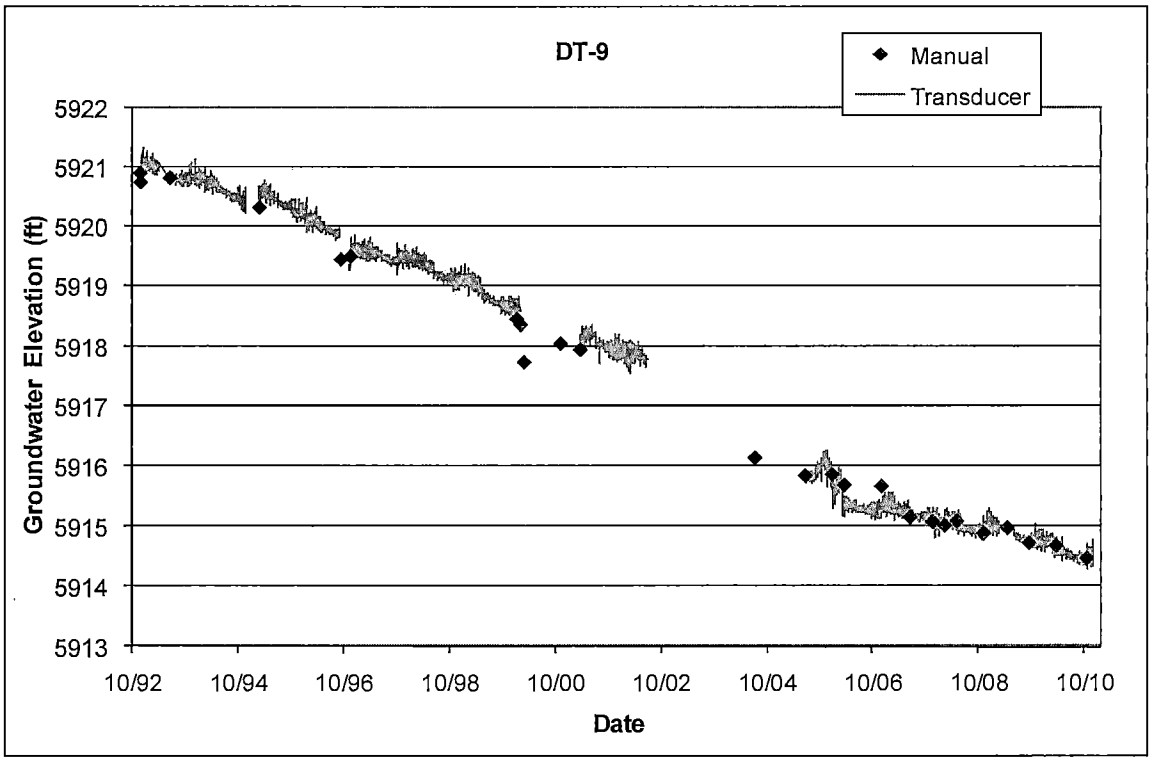


3.70 Test Well DT-9

Location: DT-9 is located at TA-49 near the southern LANL boundary.
Completion Type: Single completion at the top of the regional aquifer. The screen straddles the water table.
Period of Record: Well drilled in 1960, transducer installed November 1992, intermittent data to July 2002. Transducer reinstalled June 2005, data through 2010.
Remarks: DT-9 completed at the top of the regional aquifer at a depth of 1501 ft, about 500 ft into the regional aquifer. The long screen encompasses Tb4 basalt and Tp fanglomerates. The well is 100% barometrically efficient; the aquifer does not respond immediately to atmospheric pressure fluctuations but shows a delayed response. The aquifer shows a long-term decline of about 0.32 ft/yr, likely associated with supply well pumping.

Test Well DT-9 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	819.0	1500.0	6116.0	5435.0	681.0			1500.0	5435.0	1500.0	0.0	0.0	RT	Tb4
Note: Brass Cap Elevation 6935.0 ft; all measurements are from this elevation														



3.71 Test Well DT-10

Location: DT-10 is located at TA-49 near the southern LANL boundary. DT-10 is about 1850 ft south of R-27, 2400 ft southeast of R-29, and 2900 ft north of DT-9.

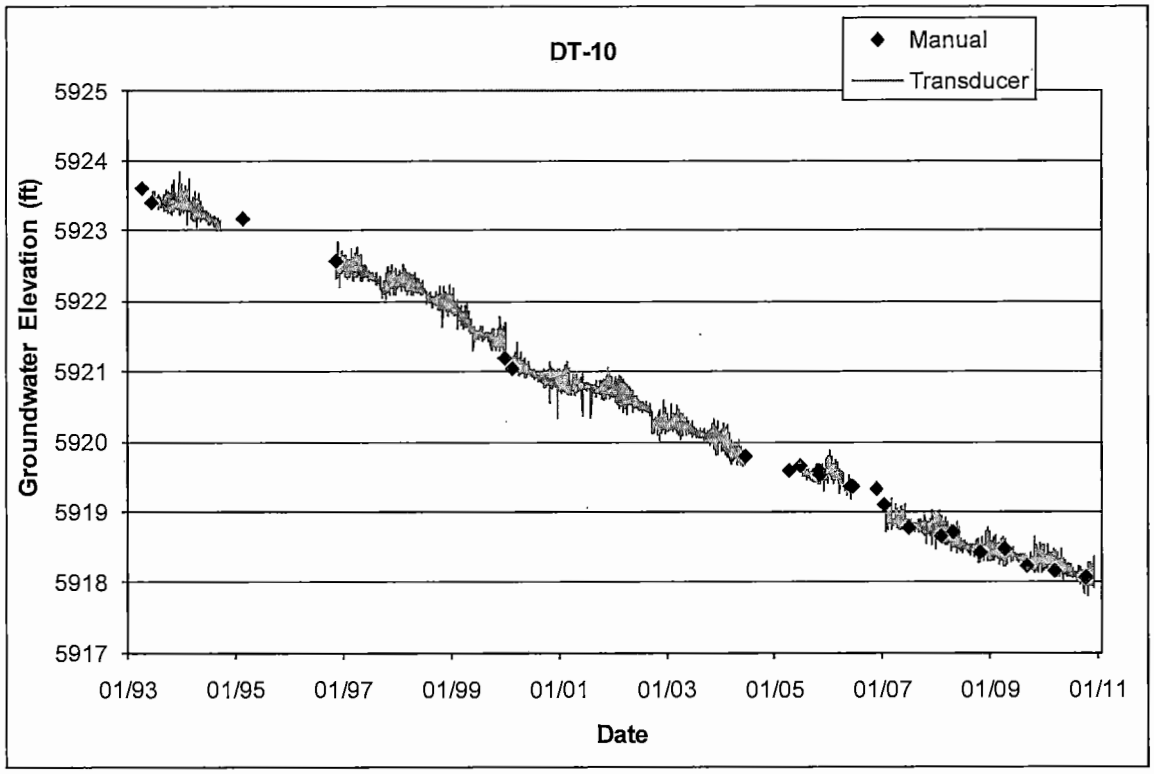
Completion Type: Single completion at the top of the regional aquifer. The screen straddles the water table.

Period of Record: Well drilled in 1960, transducer installed June 1993 and again in November 1996 and June 2005. Transducer equipment failed June 2006, new transducer installed January 2007; data through 2010.

Remarks: DT-10 completed at the top of the regional aquifer at a depth of 1408 ft, about 300 ft into the regional aquifer. The long screen encompasses Tb4 basalt and Tp fanglomerates. The well is about 70% barometrically efficient; the aquifer shows a 30% response to atmospheric pressure fluctuations. The aquifer exhibits a long-term water level decline of about 0.30 ft/yr, likely associated with supply well pumping.

Test Well DT-10 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1078.4	1408.0	5941.5	5611.9	329.6			1408.0	5611.9	1408.0	0.0	0.0	RT	Tb4
Note: Ground Elevation: 7019.90 ft; all depths are from this elevation														



4.0 Groundwater Level Data from Intermediate Wells

Table 4-1 lists the monitoring wells that specifically monitor intermediate groundwater at LANL; the table includes the well name, completed depth, surveyed location coordinates, and the date of completion. Note that R-12 was converted from a three-screen regional/intermediate to a two-screen intermediate monitoring well in December 2007. Table 4-2 lists the well construction information for the intermediate wells and for regional aquifer wells that have intermediate screens. The table includes information for the depth to the top and bottom of screens, screen casing size, geologic formation where the screen is completed, and whether the well/screen contains intermediate groundwater. The hydrographs for intermediate zones in the multiple completion regional aquifer wells are shown in the previous section.

Figure 4-1 shows the locations of the intermediate wells and regional wells that monitor intermediate groundwater. (Note that multiple completion regional wells that do not contain intermediate groundwater, such as CdV-R-15-3, CdV-R-37-2, and R-31, are not shown in Figure 4-1 because the intermediate screens in these wells are dry.) Appendix Table B-2 lists the average annual water levels for each intermediate screen.

Table 4-1. General Information for Intermediate Wells at LANL

Well Name	Date Completed	Completed Depth (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)
03-B-13	6/10/2005	32.0	1616691.69	1773317.07	7458.26
16-26644	8/17/2007	150.0	1612087.16	1763729.94	7591.43
90LP-SE-16-02669	6/10/2005	163.4	1612152.57	1763749.00	7583.26
BCO-1	11/23/1994	68.0	1640648.74	1778914.70	6641.97
CdV-16-1(i)	11/9/2003	657.8	1615078.20	1764415.20	7382.17
CdV-16-2(i)r	7/30/2005	863.2	1616673.24	1764219.40	7456.67
CDV-16-4ip	8/23/2010	1146.0	1615587.07	1764195.74	7463.91
CDV-37-1(i)	12/2/2009	657.8	1624592.30	1757798.61	6826.49
LADP-3	12/17/1993	326.0	1632989.00	1773469.10	6756.70
LAOI(a)-1.1	10/28/1994	309.8	1629427.38	1773924.51	6835.20
LAOI-3.2	5/1/2005	165.0	1637642.10	1773066.93	6622.60
LAOI-3.2a	1/20/2006	194.1	1637619.97	1773100.91	6624.43
LAOI-7	9/21/2005	264.9	1644788.53	1771584.11	6458.35
MCOI-1	1/9/2005	825.6	1628044.51	1769957.39	7106.20
MCOI-4	11/6/2004	525.7	1634128.53	1768542.01	6837.20
MCOI-5	10/25/2004	699.0	1635247.94	1768300.46	6819.70
MCOI-6	1/13/2005	713.2	1635345.65	1768428.06	6811.10
MCOI-8	1/7/2005	675.0	1633329.74	1769214.40	6859.20
MSC-16-02665	10/23/1997	124.0	1614427.59	1762530.55	7516.92
PCI-2	4/10/2009	533.3	1627648.27	1765872.63	6920.95
POI-4	5/1/1996	176.5	1649432.46	1772587.08	6372.29
R-3i	8/16/2005	220.3	1649196.5	1772599.2	6390.15
R-6i	12/20/2004	615.0	1635992.34	1773889.89	6996.90
R-9i	3/10/2000	309.9	1648202.70	1770837.80	6383.20
R-12	01/11/00	886.0	1647424.20	1767913.40	6499.60
R-23i	11/10/2005	550.7	1647898.02	1755148.04	6527.88
R-25b	10/13/2008	782.3	1615125.60	1764074.70	7517.00
R-25c	9/17/2008	1080.6	1615073.72	1764083.07	7517.59
R-26 PZ-1	10/1/2003	250.0	1610201.92	1764660.49	7639.56
R-26 PZ-2	10/1/2003	185.0	1610201.96	1764660.61	7639.56
R-27i	10/17/2009	630.2	1629129.03	1756302.42	6717.97
R-47i	11/15/2009	865.5	1619250.01	1763907.91	7358.41
R-55i			1647014.67	1757360.90	6534.91
R-6i	12/20/2004	615	1635992.3	1773889.9	6996.90
R-9i	3/10/2000	309.9	1648208.8	1770834.7	6383.20
SCI-1	10/7/2006	377.9	1636822.9	1770298.2	6738.27
SCI-2	8/31/2008	570.0	1637155.34	1769651.16	6735.70
TA-53i	3/10/2009	620.8	1635850.97	1771320.08	6987.17
TW-2Ar	3/4/2010	113.9	1634129.90	1777349.11	6651.67

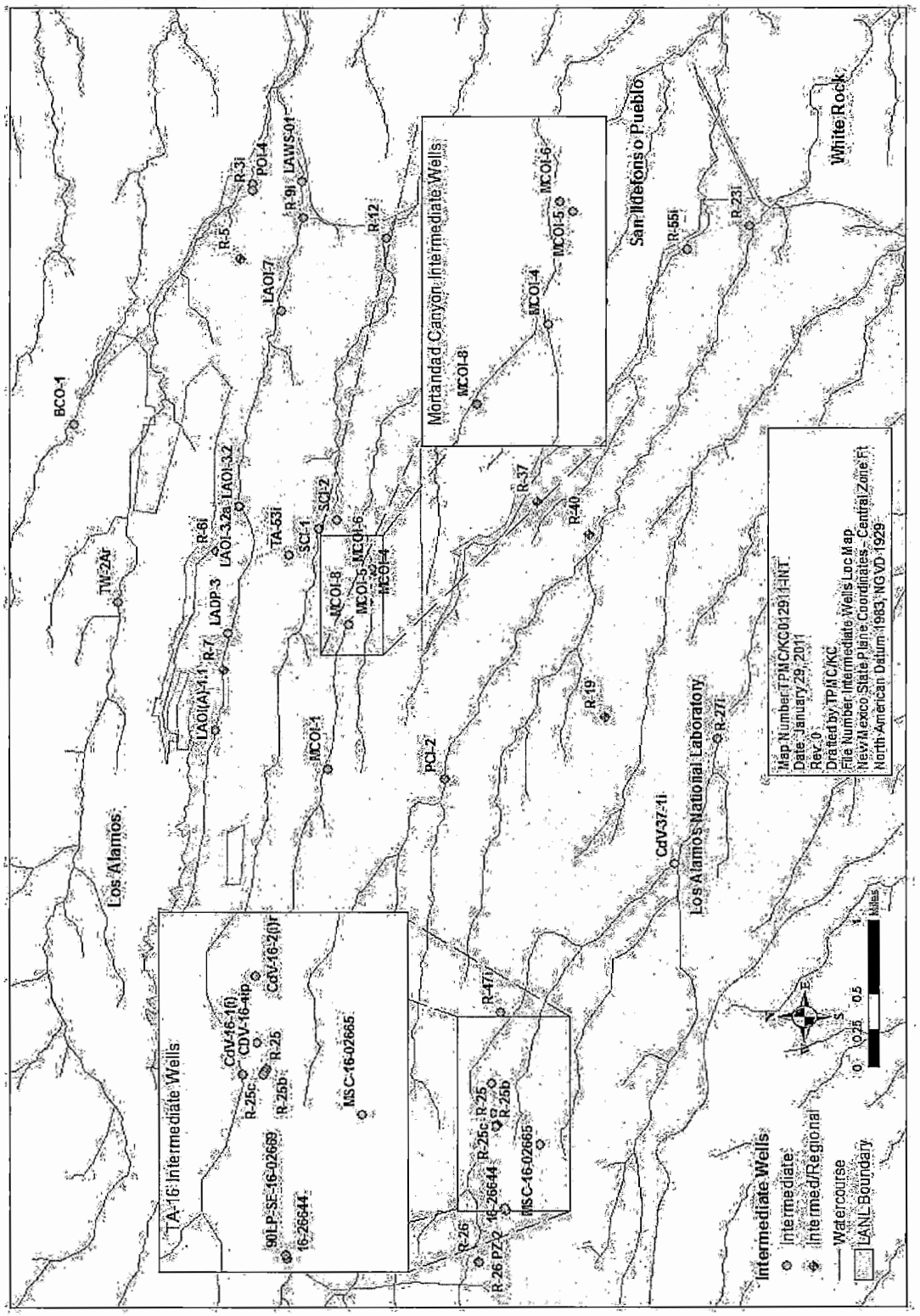


Figure 4-1. Intermediate monitoring wells.

Table 4-2. Well Completion Information for Intermediate Wells and Screens

Well Name	Screen Common Name	Screen Material	Top of Screen (ft)	Bottom of Screen (ft)	Screen Inside Diameter (in.)	Geologic Unit	Comment
03-B-13	03-B-13 Screen #1	PVC	21.5	31.5	2.00	Qbt3	
16-26644	16-26644 Screen #1	PVC	130.0	145.0	2.00	Qbt3	
90LP-SE-16-02669	16-02669 Screen #1	PVC	131.5	162.5	2.00	Qbt3	Dry
BCO-1	BCO-1 Screen #1	PVC	57.0	67.0	4.00	Tpf	Dry
CdV-16-1(i)	CdV-16-1(i) Screen #1	SS304	624.0	634.0	4.50	Qbo	
CdV-16-1(i) CH	CdV-16-1(i) PZ #1	PVC	50.0	80.0	1.50	Qbt3	Dry
CdV-16-2(i)r	CdV-16-2(i)r Screen #1	SS304	850.0	859.7	4.46	Tpf	
CDV-16-4ip	CDV-16-4ip Screen #1	SS304	815.6	879.2	5.00	Tpf	
CDV-16-4ip	CDV-16-4ip Screen #2	SS304	1110	1141.1	5.00	Tpf	
CDV-37-1(i)	CDV-37-1(i) Screen #1	SS304	632.0	652.5	5.00	Tpf	
CdV-R-15-3	CdV-R-15-3 Screen 1	SS312	617.7	624.5	4.50	Qbo	Dry
CdV-R-15-3	CdV-R-15-3 Screen 2	SS312	800.8	807.8	4.50	Tp	Dry
CdV-R-15-3	CdV-R-15-3 Screen 3	SS312	964.8	980.9	4.50	Tb	Dry
CdV-R-37-2	CdV-R37-2 Screen #1	SS304	914.4	939.5	4.50	Tp	Dry
LADP-3	LADP-3 Screen #1	PVC	316.0	325.0	3.00	Qbog	
LAOI(A)-1.1	LAOI(A)-1.1 Screen #1	PVC	295.2	305.0	3.00	Qbog	
LAOI-3.2	LAOI-3 Screen #1	PVC	153.3	162.8	4.46	Tb	
LAOI-3.2a	LAOI-3a Screen #1	SS304	181.4	191.0	3.10	Tpf	
LAOI-7	LAOI-7 Screen #1	SS304	240.0	259.6	3.00	Tb4	
MCOBT-4.4	MCOBT4.4 Screen #1	SS304	485.4	524.0	4.50	Tpf	P&A 2009
MCOI-1	MCOI-1 Screen #1	SS	815.0	825.5	1.10	Tpf	
MCOI-4	MCOI-4 Screen #1	PVC	498.9	522.0	4.50	Tpf	
MCOI-5	MCOI-5 Screen #1	PVC	689.0	699.0	4.50	Tb	
MCOI-6	MCOI-6 Screen #1	PVC	686.0	708.3	4.50	Tb	
MCOI-8	MCOI-6 Screen #1	PVC	665.0	675.0	4.46	Tb	
MSC-16-02665	16-02665 Screen #1	PVC	93.5	123.5	2.00	Qbt3	Usually dry
PCI-2	PCI-2 Screen #1	SS304	512.0	522.0	5.00	Tpf	near R-17
POI-4	POI-4 Screen #1	PVC	159.0	174.0	4.00	Tb4	
R-3i	R-3i Screen #1	PVC	215.2	220.0	2.00	Tb4	
R-12	R-12 Screen #1	SS304	459.0	467.5	4.50	Tb	
R-12	R-12 Screen #2	SS304	504.5	508.0	4.50	Tp	
R-19	R-19 Screen #1	SS304	827.2	843.6	4.50	Qbog	Dry
R-19	R-19 Screen #2	SS304	893.3	909.6	4.50	Tp	
R-23i	R-23i Screen #1	SS304	400.3	420.0	2.10	Tb4	
R-23i	R-23i Screen #2	SS304	470.2	480.1	4.50	Tb4	
R-23i	R-23i Screen #3	SS304	524.0	547.0	4.50	Tb4	
R-25	R-25 Screen #1	SS304	737.6	758.4	5.17	Qbo	
R-25	R-25 Screen #2	SS304	882.6	893.4	5.17	Tp	
R-25	R-25 Screen #3 damaged	SS304	1054.6	1064.6	5.17	Tp	Dry, sump water
R-25	R-25 Screen #4	SS304	1184.6	1194.6	5.17	Tp	
R-25b	R-25b Screen #1	SS304	750.0	770.8	5.00	Qbo	
R-25c	R-25c Screen #1	SS304	1039.6	1060.0	5.00	Tpf	Dry, sump water
R-26	R-26 Screen #1 (Upper)	SS304	643.0	662.0	4.50	Qct	
R-26 PZ-1	R-26 Piezometer Screen #1	PVC	230.0	250.0	1.00	Qbt3	Dry
R-26 PZ-2	R-26 Piezometer Screen #2	PVC	150.0	180.0	1.00	Qbt3	

Note: SS = stainless steel, PVC = polyvinyl chloride, Qbo = Otowi Member of the Bandelier Tuff, Tp = Puye Formation, Qbog = Guaje Pumice member of the Bandelier Tuff, Tpf = fluvial facies of the Puye Formation, Tb = undifferentiated basalt, Tb4 = Cerros del Rio Basaltic Rocks; Qbt3 = Unit 3 of the Tshirege Member of the Bandelier Tuff, Tt = Tschicoma Formation (dacite).

Table 4-2. Well Completion Information for Intermediate Wells and Screens (Continued)

Well Name	Screen Common Name	Screen Material	Top of Screen (ft)	Bottom of Screen (ft)	Screen Inside Diameter (in.)	Geologic Unit	Comment
R-27i	R-27i Screen #1	SS304	619.0	629.0	5.00	Qbt3	
R-31	R-31 Screen #1	SS304	439.1	454.4	4.50	Tb	Dry
R-37	R-37 Screen #1	SS304	929.3	950.0	5.00	Tb4	
R-40	R-40i	PVC	649.7	669.0	3.00	Tb4	
R-40	R-40 Screen #1	SS304	751.6	785.1	5.00	Tb4	
R-41	R-41 Screen #1	SS304	928.0	937.7	5.00	Tsf	Dry
R-47i	R-47i Screen #1	SS304	840.0	860.6	5.00	Tpf	
R-5	R-5 Screen #1	SS304	326.4	331.5	4.50	Tp	Dry
R-5	R-5 Screen #2	SS304	372.8	388.8	4.50	Tp	
R-55i	R-55i Screen #1	SS304	510.0	530.0	5.00	Tb4	Prelim information
R-6i	R-6i Screen #1	SS304	602.0	612.0	4.46	Tpf	
R-7	R-7 Screen #1	SS304	363.2	379.2	4.50	Tp	Dry since 2005
R-7	R-7 Screen #2	SS304	730.4	746.4	4.50	Tp	Dry
R-9i	R-9i Screen #1	SS304	189.1	199.5	5.00	Tb	
R-9i	R-9i Screen #2	SS304	269.6	280.3	5.00	Tb	
SCI-1	SCI-1 Screen #1	PVC	358.4	377.9	3.80	Tpf	
SCI-2	SCI-2 Screen #1	PVC	548.0	568.0	2.00	Tb4	near R-43
TA-53i	TA-53i Screen #1	SS304	600.0	610.0	5.00	Tpf	
Test Well 1A	TW-1A Screen #1	CS	215.0	225.0	6.00	Tb	P&A 2010
Test Well 2A	TW-2A Screen #1a	CS	123.0	133.0	6.00	Tp	P&A 2010
TW-2Ar	TW-2Ar Screen #1	SS304	102.0	112.0	4.88	Tpf	

Note: SS = stainless steel, PVC = polyvinyl chloride, Qbo = Otowi Member of the Bandelier Tuff, Tp = Puye Formation, Qbog = Guaje Pumice member of the Bandelier Tuff, Tpf = fluvial facies of the Puye Formation, Tb = undifferentiated basalt, Tb4 = Cerros del Rio Basaltic Rocks; Qbt3 = Unit 3 of the Tshirege Member of the Bandelier Tuff, Tt = Tschicoma Formation (dacite); P&A = plugged and abandoned.

The following sections include additional port and construction information for single and multiple completion intermediate wells at LANL. Time-series groundwater level data are shown for each well.

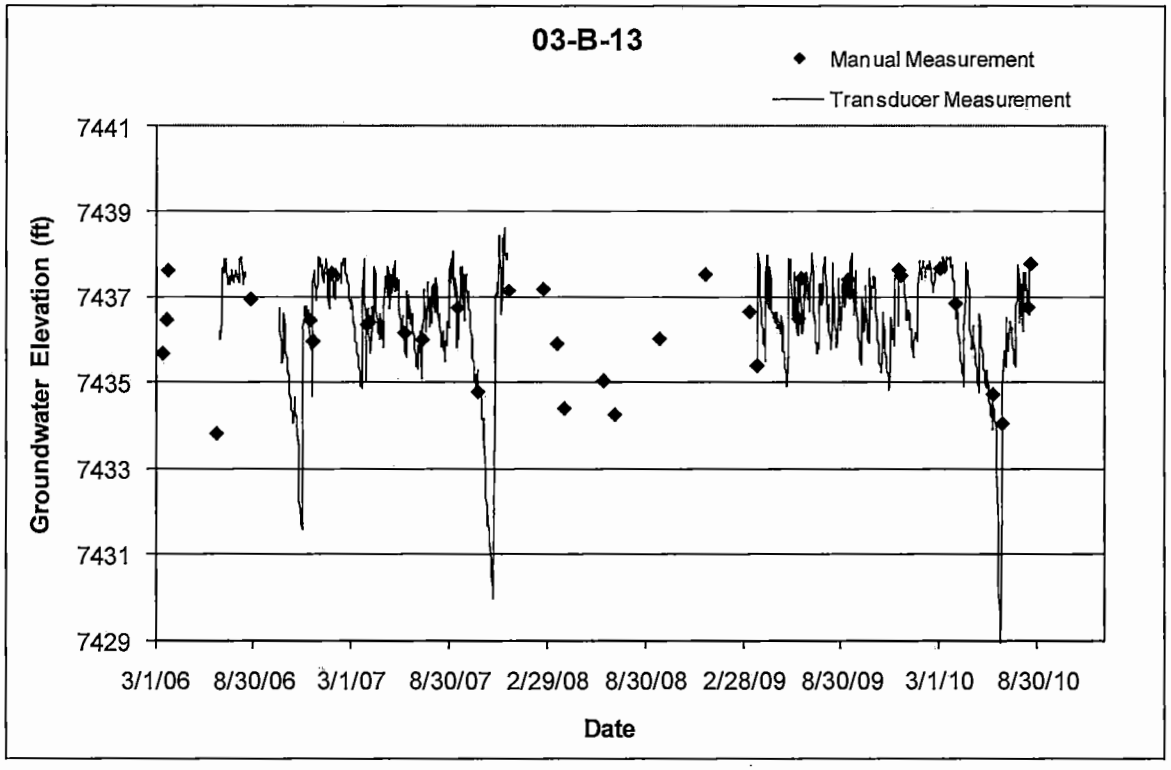
4.1 03-B-13

Location: 03-B-13 is located at TA-3 behind building SM-30.
Completion Type: Single completion in an intermediate perched zone in Unit 3 of the Bandelier Tuff. The wellhead is completed below ground surface with a waterproof well cap flush with an asphalt roadway.
Period of Record: Well completed June 2005, transducer installed June 2006, periodic measurements through 2010. Transducer equipment problems occurred in 2008.
Remarks: The surface completion was reworked in 2007. Surface water enters the well protective cover at times and may enter the well.

03-B-13 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	21.50	31.5	7436.8	7426.8	10.0	None	None	31.5	7426.8	32.0	0.5	0.3	I	Qbt3

Note: Ground elevation is 7458.26 ft; all depths from this elevation

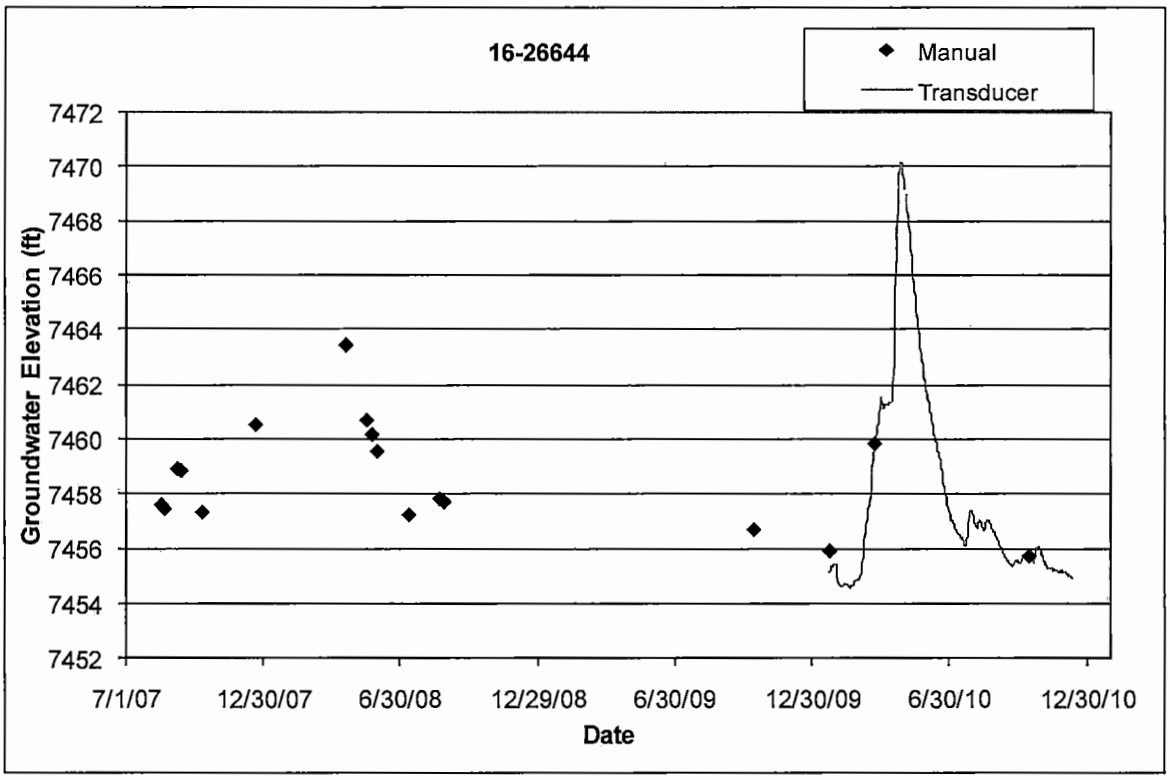


4.2 16-26644

Location: 16-26644 is located at TA-16 southeast and downgradient of the 90LP Pond and about 70 ft west of well 90LP-SE-16-02669.
Completion Type: Single completion in an intermediate zone in Unit 3 of the Bandelier Tuff.
Period of Record: Well drilled in August 2007, periodic manual measurements through 2009. A dedicated Bennett pump and transducer were installed in January 2010; data through 2010.
Remarks: The well has contained water when checked since completion of drilling, but several nearby boreholes and wells to a similar depth are dry. The groundwater appears to respond to precipitation and nearby runoff events.

16-26644 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	130.0	145.0	7461.4	7446.4	15.0	144.4	7447.0	145.0	7446.4	150.0	5.0	3.1	1	Qbt3
Note: Ground Elevation: 7591.43 ft; all measurements are from this elevation														



4.3 90LP-SE-16-02669

Location: 90LP-SE-16-02669 is located at TA-16 downgradient of the 90LP Pond. 90LP-SE-16-02669 is about 70 ft east-northeast of 16-26644
Completion Type: Single completion in an intermediate zone in Unit 3 of the Bandelier Tuff.
Period of Record: Well drilled in March 1998, periodic measurements through 2010.
Remarks: The borehole contained water at the completion of drilling, but since completion of the well, water has not been present in the well; the well was last checked April 29, 2010.

90LP-SE-16-02669 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	131.5	163.0	7451.8	7420.3	31.5	None	None	163.0	7420.3	163.4	0.4	0.2	I	Qbt3

Note: Ground Elevation: 7583.26 ft; all measurements are from this elevation

4.4 CdV-16-1(i)

Location: CdV-16-1(i) is located at TA-16 downgradient of the TA-6-260 outfall and about 360 ft north of intermediate well R-25b and R-25 and about 550 ft northwest of CDV-16-4ip.

Completion Type: Single completion in an intermediate zone. The screen is located at similar depth as R-25 screen 1 and R-25b.

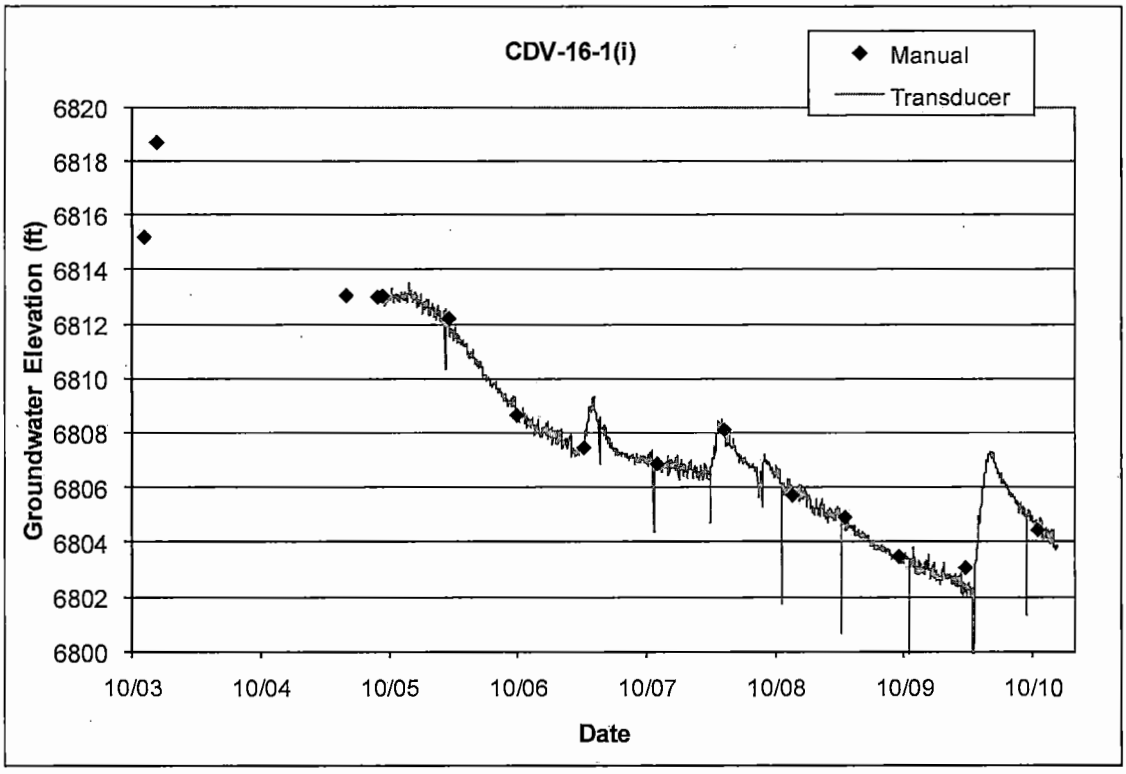
Period of Record: Well drilled in November 2003. Transducer installed September 2005; data through 2010.

Remarks: Well completed in an intermediate zone in the Otowi Member of the Tshirege Formation; the water level is about 50 ft above the top of the screen. The screen is at a similar elevation as R-25b and R-25 screen 1; the bottom of the screen is about 105 ft higher than the top of the screen at CDV-16-4ip. The well is 100% barometrically efficient; the groundwater does not respond to atmospheric pressure fluctuations. The intermediate groundwater rose in response to snowmelt runoff in the spring of 2007, 2008, and 2010 and responded to drilling activities at R-25b and R-35c in 2008.

CDV-16-1(i) Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	624.0	634	6758.2	6748.2	10.0	618.8	6763.4	634.0	6748.2	657.8	23.8	73.1	I	Qbo

Note: Ground Elevation: 7382.17 ft; all measurements are from this elevation



4.5 CdV-16-2(i)r

Location: CdV-16-2(i)r is located at TA-16 downgradient of the TA-6-260 outfall and about 1450 ft east of R-25.

Completion Type: Single completion in intermediate zone in the Puye Formation.

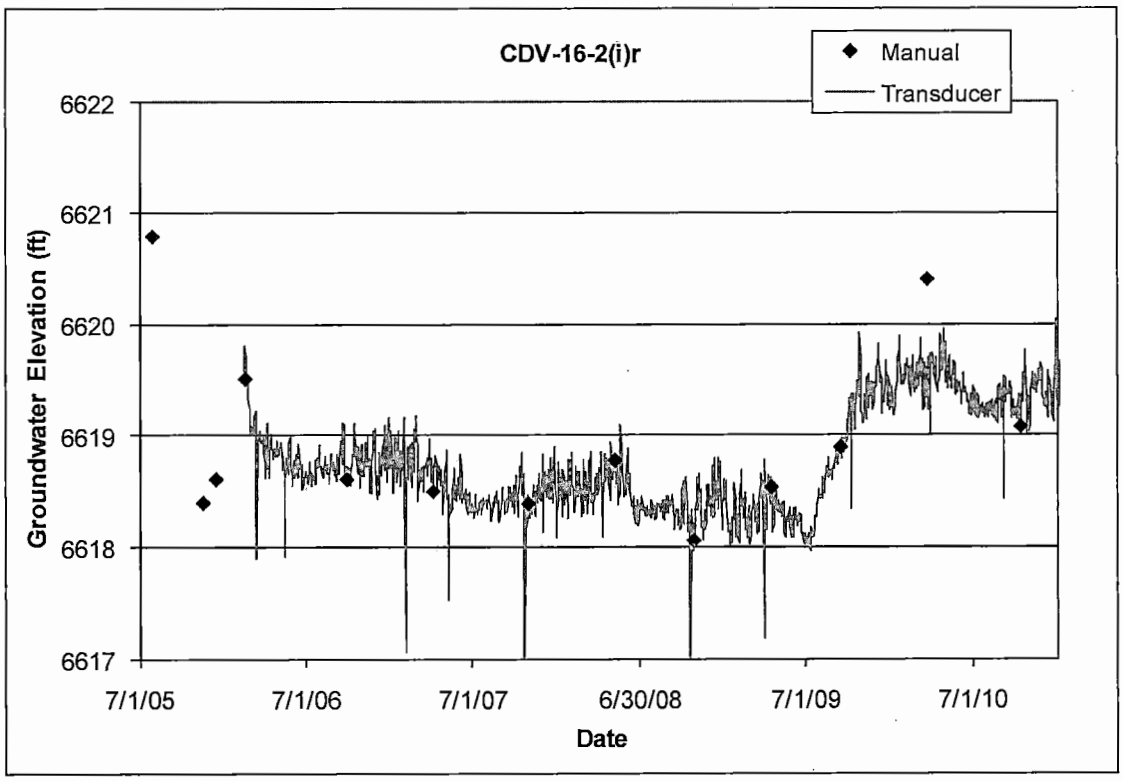
Period of Record: Well completed July 2005, periodic manual measurements in 2005. A transducer was installed February 16, 2006; data through 2010.

Remarks: Well replaces CdV-16-2(i). The water level is about 20 ft above bottom of screen. The well is about 90% barometrically efficient. The groundwater did not indicate a response to snowmelt runoff in 2007 but may have shown a small response to snowmelt runoff in the spring of 2008 and 2010. Nearby dry well CdV-16-2(i) was plugged and abandoned in July 2009 (LANL August 2009b). The groundwater level at CdV-16-2(i)r began to recover on July 9, 2009, when pressure grouting activities commenced during plugging of the nearby well; the water level recovered about 1.3 ft after CdV-16-2(i) was plugged.

CDV-16-2(i)r Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Unit Code	Geo Unit Code
1	850.0	859.7	6606.7	6597.0	9.7	855.12	6601.6	859.7	6597.0	863.2	3.5	10.8	I	Tpf

Note: Ground Elevation: 7456.67 ft; all measurements are from this elevation



4.6 CDV-16-4ip

Location: CdV-16-2(i)r is located at TA-16 downgradient of the TA-66-260 outfall and about 430 ft east of R-25 and 750 ft southeast of CdV-16-1(i).

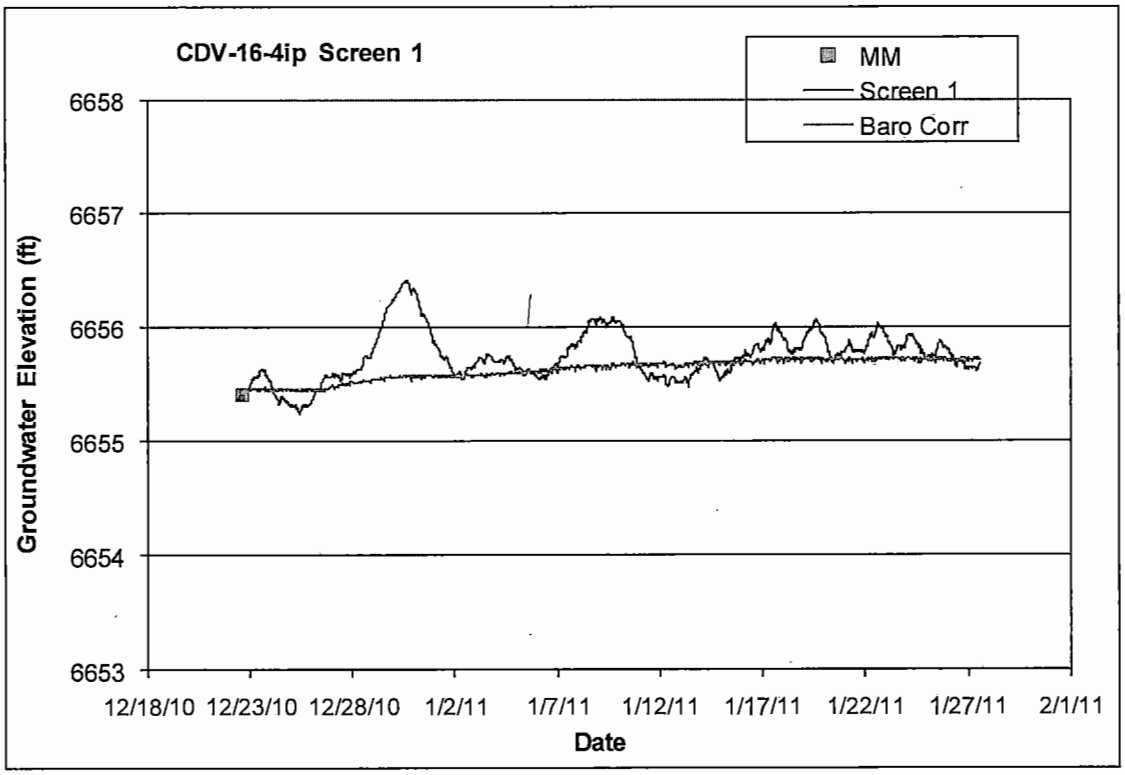
Completion Type: Dual completion in two intermediate zones in the Puye Formation.

Period of Record: Well completed August 2010. Temporary transducer installed at screen 1 above a temporary packer December 22, 2010, to monitor drilling activities at R-63. Installation of permanent transducers is pending.

Remarks: The upper screen is at a similar elevation as R-25 screen 2 and is 105 ft lower than the screen at CdV-16-1(i). The lower screen is at a similar elevation as R-25 screen 4. The water level at screen 1 is about 11 ft above the top of the screen. Screen 1 is 100% barometrically efficient; the groundwater does not respond to atmospheric pressure changes. Groundwater level data from screen 2 are pending.

CDV-16-4ip Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	APV Intake Depth (ft)	APV Intake Elev (ft)	Packer Top/ Bottom Depth (ft)	Packer Top/ Bottom Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (gal.)	Hydro Zone Code	Geo Unit Code
1	815.6	879.2	6648.3	6584.7	63.6		7463.9						I	Tpf
2	1110	1141.1	6353.9	6322.8	31.1		7463.9			1146.0	4.9	5.0	I	Tpf
Note: Brass Cap Ground Elevation: 7463.91 ft; all measurements are from this elevation														



4.7 CDV-37-1(i)

Location: CDV-37-1(i) is located in Water Canyon near the confluence with Cañon de Valle and about 0.9 mi west and upstream of R-27i.

Completion Type: Single completion in an intermediate zone in the Puye Formation fanglomerates.

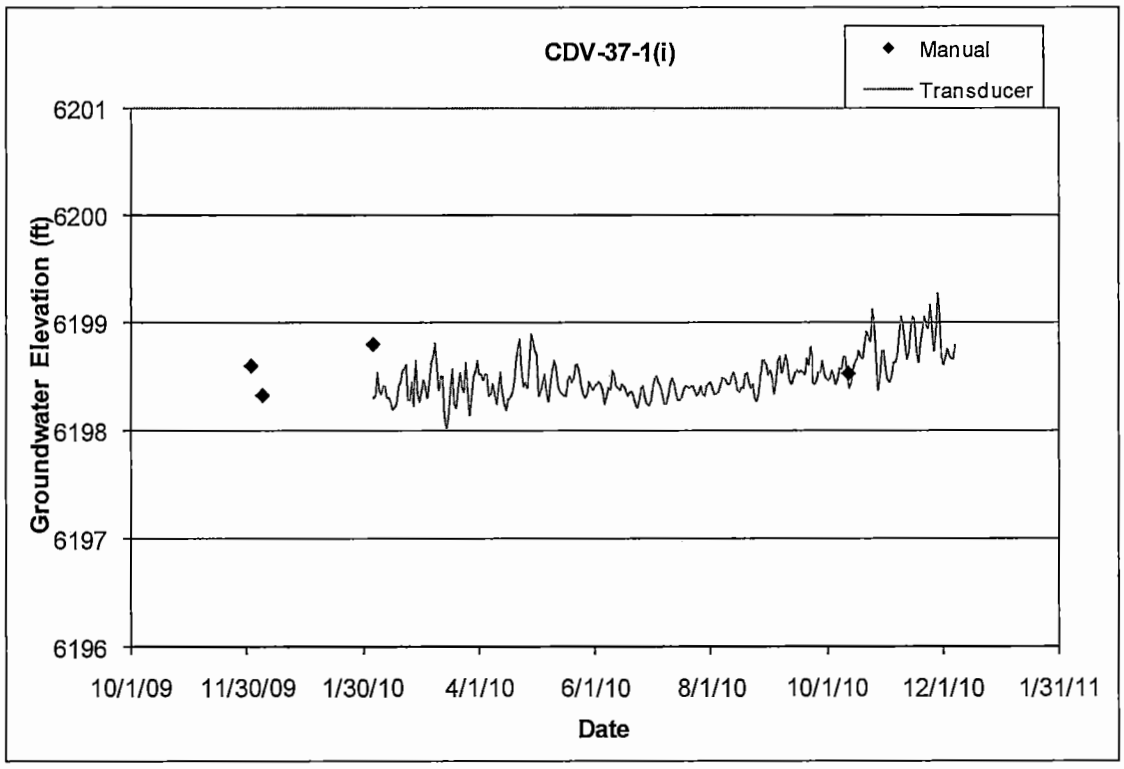
Period of Record: Well completed December 2009. Transducer installed February 5, 2010; data through 2010.

Remarks: A dedicated Bennett submersible pump was installed in January 2010.The screen is located about 4 ft below the level of the perched intermediate groundwater. The well is 100% barometrically efficient; the groundwater does not respond to atmospheric pressure fluctuations.

CDV-37-1(i) Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Bottom of Well Elev (ft)	Hydro Zone Code	Geo Unit Code
1	632.0	652.5	6194.5	6174.0	20.5	647.3	6179.2	652.5	6174.0	657.8	5.3	6168.7	I	Tpf

Note: Brass Cap Elevation: 6826.49 ft; all measurements are from this elevation



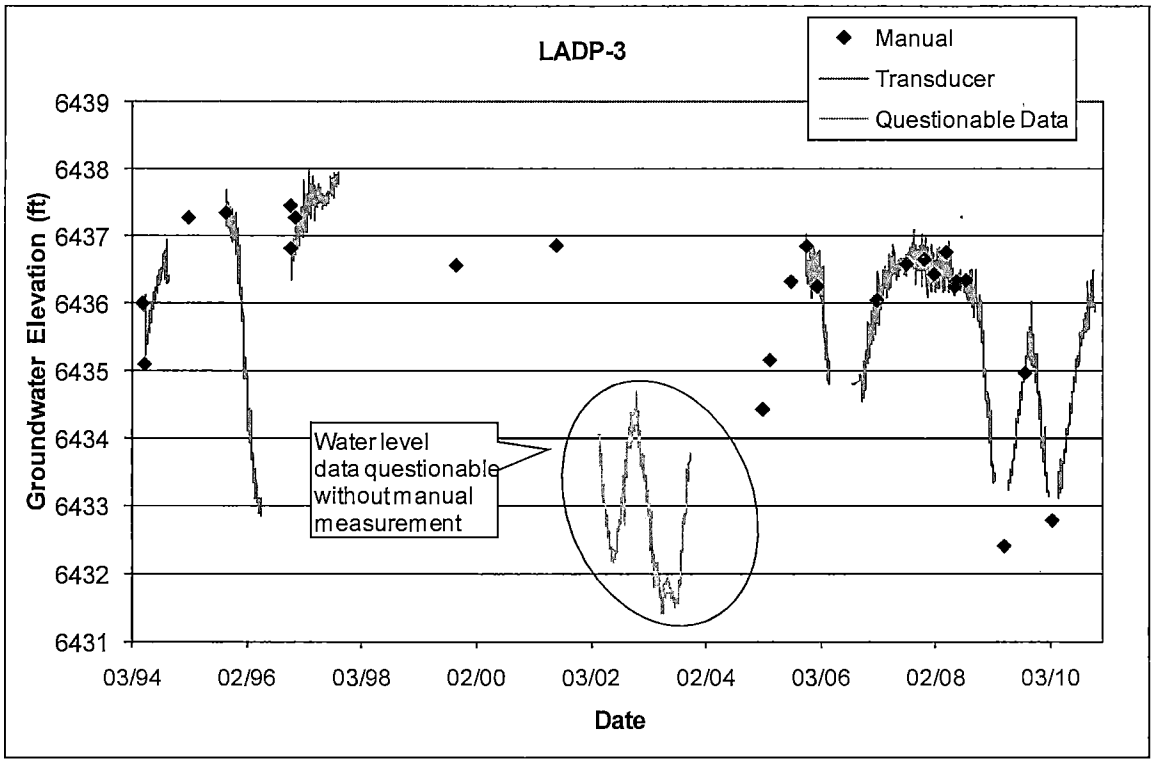
4.8 LADP-3

Location: LADP-3 is located in middle Los Alamos Canyon downgradient of TA-21 and about 0.9 mi upstream of the confluence with DP Canyon.
Completion Type: Single completion in an intermediate zone in the Guaje Pumice bed.
Period of Record: Well drilled in 1993. Transducer first installed May 1994, reinstalled in May 2005, intermittent transducer data through 2010.
Remarks: No manual measurement available for April 2002 transducer installation, data from April 2002 to November 2003 questionable. The water level declined below the transducer from April 2006 to November 2006 and again from March 2009 to June 2009. The well is 100% barometrically efficient; the groundwater does not respond to atmospheric pressure fluctuations. The groundwater did not indicate a response to snowmelt runoff in 2007, 2008, and 2010. A dedicated Bennett pump was installed in July 2008.

LADP-3 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	316.0	326	6440.7	6430.7	10.0	325.0	6431.7	326.0	6430.7	326	0.0	0.0	I	Qbog

Note: LADP-3 Ground Elevation: 6756.7 ft; all measurements are from this elevation



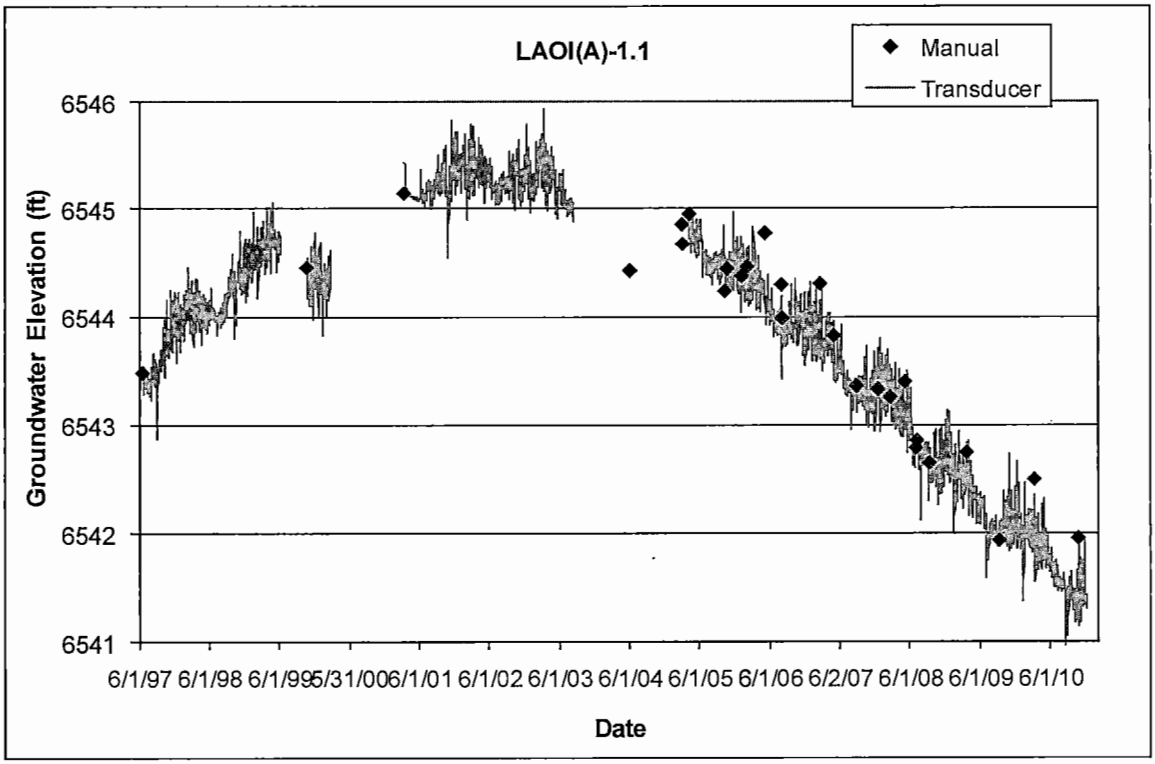
4.9 LAOI(a)-1.1

Location: LAOI(a)-1.1 is located in middle Los Alamos Canyon downstream of TA-2 and TA-41.
Completion Type: Single completion in an intermediate zone in the Guaje Pumice bed.
Period of Record: Well drilled in 1994. Transducer initially installed June 1997, reinstalled in April 2005; transducer data through 2010.
Remarks: The well is 100% barometrically efficient; the groundwater does not respond to atmospheric pressure fluctuations. The groundwater did not indicate a response to snowmelt runoff in 2007, 2008, and 2010. A dedicated Bennett pump was installed July 2008.

LAOI(A)-1.1 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	295.2	305	6540.0	6530.2	9.8	308.0	6527.2	305.0	6530.2	309.8	4.8	6.7	1	Qbog

Note: LAOI(A)-1.1 Ground Elevation: 6835.2 ft; all measurements are from this elevation



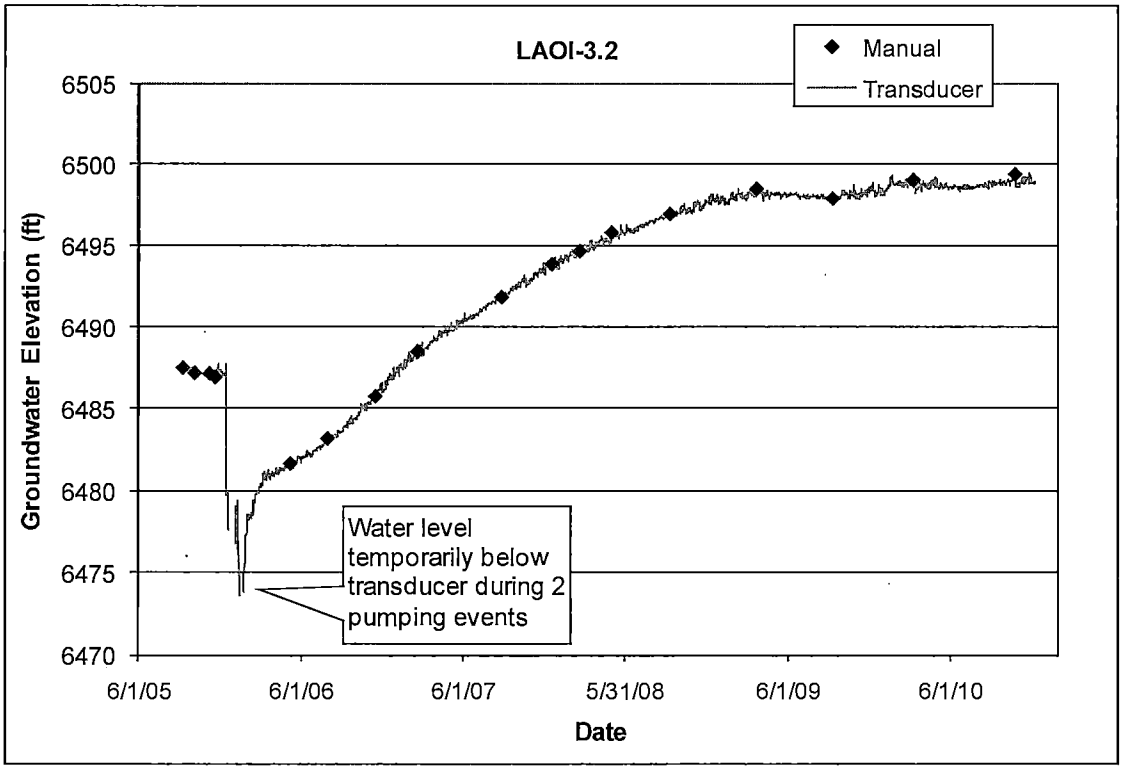
4.10 LAOI-3.2

Location: LAOI-3.2 is located in middle Los Alamos Canyon at the confluence with DP Canyon.
Completion Type: Single completion in an intermediate zone in the Guaje Pumice bed.
Period of Record: Well completed in March 2005. Transducer installed September 2005; transducer data through 2010.
Remarks: The transducer was removed in October 2005 for pump installation. The transducer was reinstalled in November 2005. The water level declined below the level of the transducer for a time during pumping of the well in December 2005. The well is 100% barometrically efficient; the groundwater does not respond to atmospheric pressure fluctuations. The groundwater did not indicate a response to snowmelt runoff in 2007, 2008, and 2010.

LAOI-3.2 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	153.3	162.8	6469.3	6459.8	9.5	159.3	6463.3	162.8	6459.8	165	2.2	1.5	I	Qbog

Note: Ground Elevation: 6622.6 ft; all measurements are from this elevation



4.11 LAOI-3.2a

Location: LAOI-3.2a is located in middle Los Alamos Canyon near the confluence with DP Canyon and about 50 ft northwest of LAOI-3.2.

Completion Type: Single completion in an intermediate zone in Puye fanglomerate.

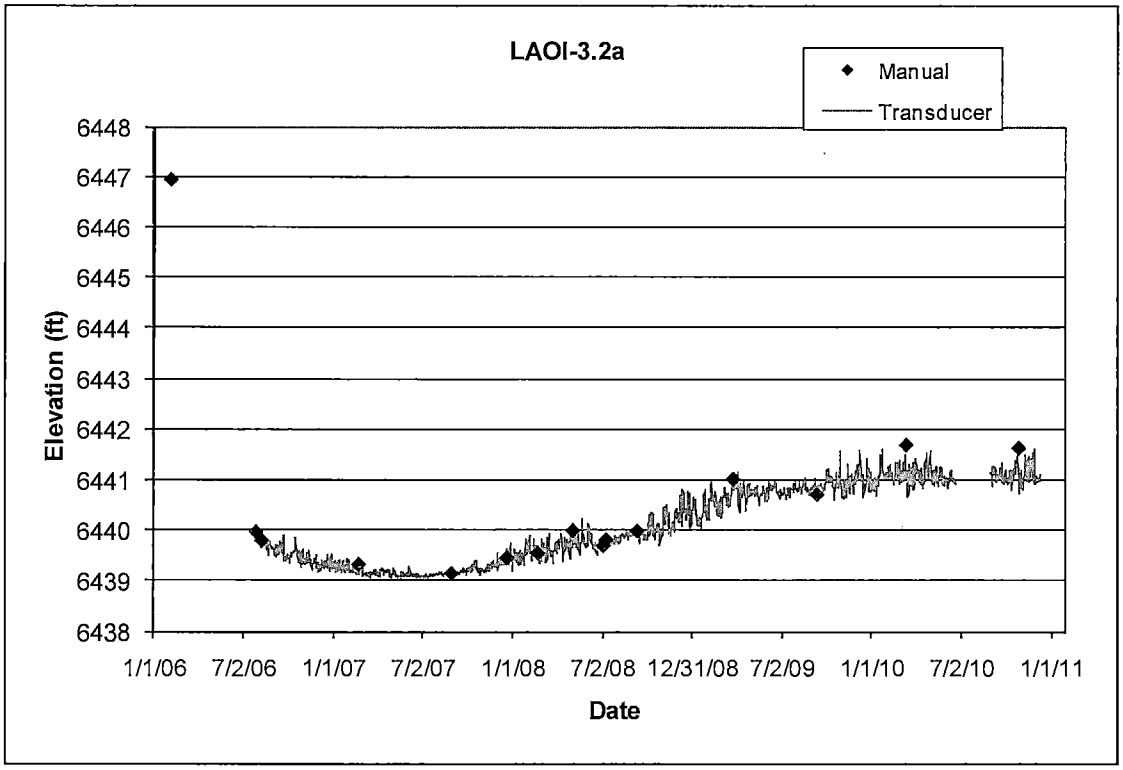
Period of Record: Well completed in January 2006. Transducer installed August 2006; transducer data through 2010.

Remarks: The water level is about 6 ft above the bottom of the screen. The well is 100% barometrically efficient, the groundwater does not respond to atmospheric pressure fluctuations. The groundwater did not indicate a response to snowmelt runoff in 2007, 2008, and 2010.

LAOI-3.2a Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	181.4	191	6443.0	6433.4	9.6	189	6435.4	191.0	6433.4	191.4	0.4	0.6	I	Tpf

Note: Ground Elevation: 6624.43 ft; all measurements are from this elevation



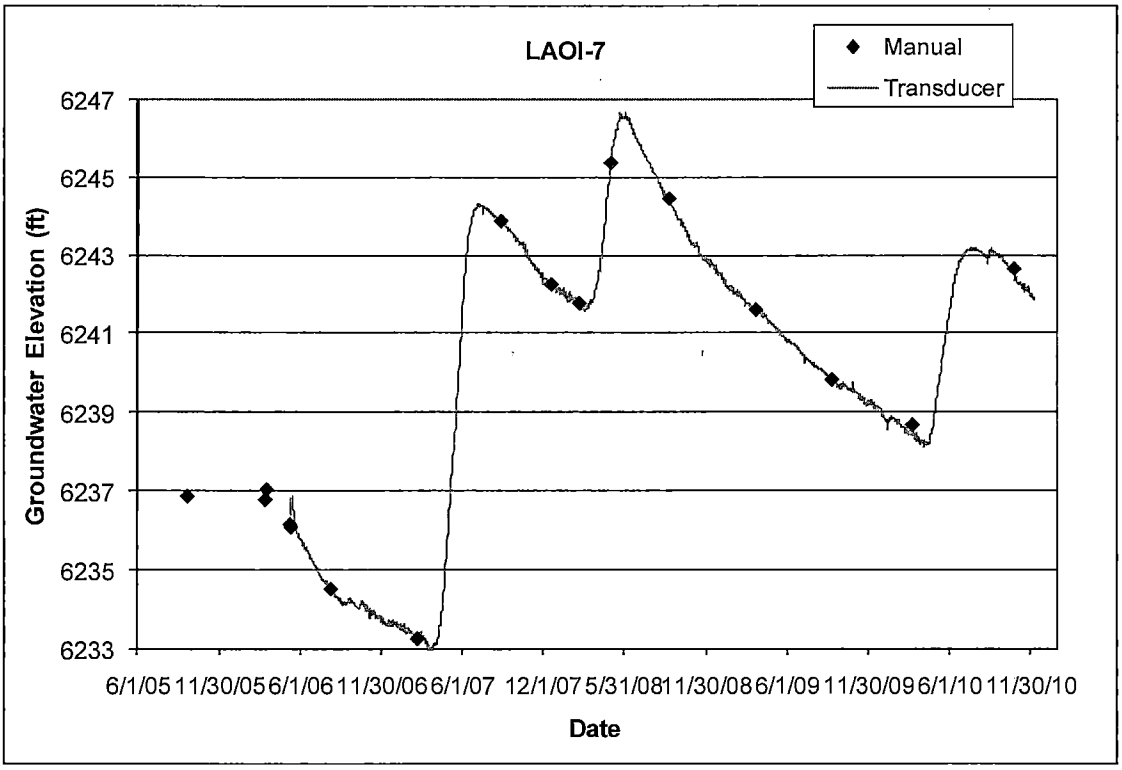
4.12 LAOI-7

Location: LAOI-7 is located in middle Los Alamos Canyon about 0.75 mi upstream of R-9i.
Completion Type: Single completion in an intermediate zone in Cerros del Rio basalt.
Period of Record: Well completed in September 2005, transducer installed May 2006, data through 2010.
Remarks: The well has an estimated 18% barometric efficiency (Kleinfelder 2006a); the groundwater shows a delayed, partial response to atmospheric pressure fluctuations. The groundwater rose about 11 ft in response to snowmelt runoff in 2007, about 5 ft in 2008, and about 5 ft in 2010.

LAOI-7 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	240.0	259.6	6218.4	6198.8	19.6	240.0	6218.4	259.6	6198.8	264.9	5.3	7.4	I	Tb4

Note: Brass Cap Elevation: 6458.35 ft; all measurements are from this elevation



4.13 MCOBT-4.4

Location: MCOBT-4.4 was located in lower Mortandad Canyon near the confluence with Ten Site Canyon.

Completion Type: Single completion at the base of the Puye Formation fanglomerate member and the top of Cerros del Rio basalt.

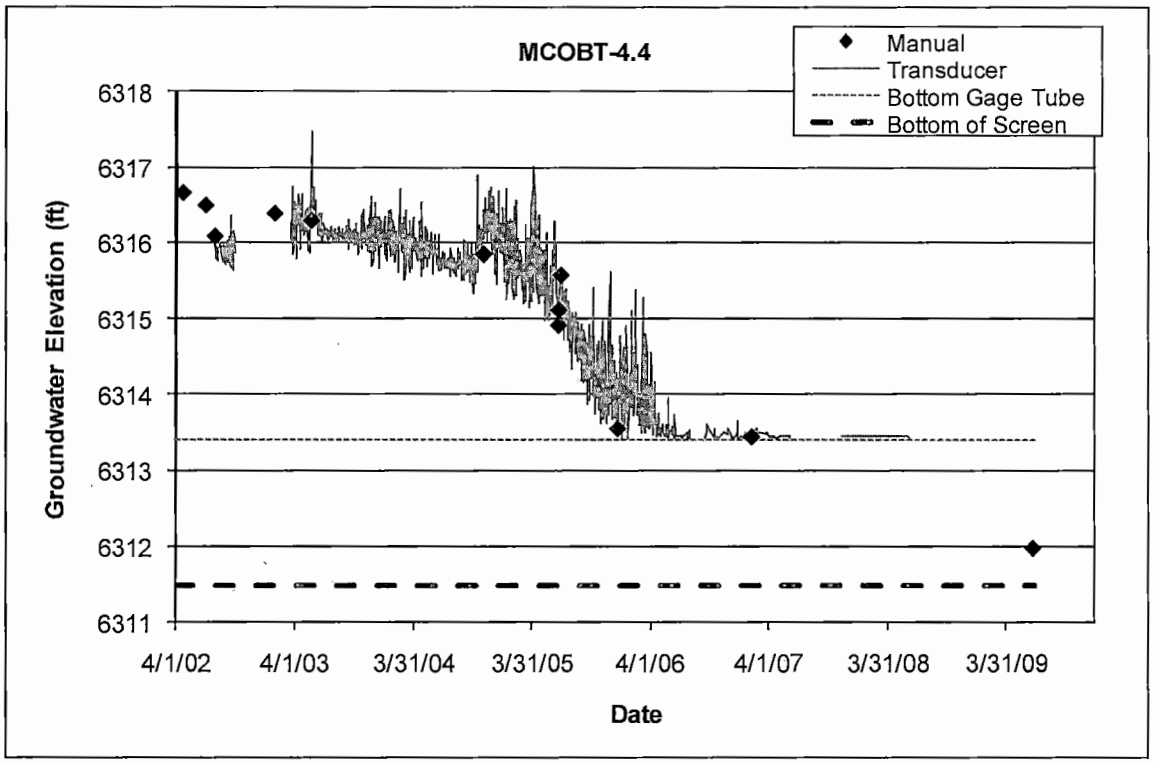
Period of Record: Well completed in June 2001, transducer installed July 2002, data to June 19, 2008, when the transducer was removed and monitoring ceased due to lack of measureable water.

Remarks: MCOI-4 was located about 70 ft west of MCOBT-4.4; the water level at MCOBT-4.4 declined after the installation of MCOI-4. The bottom of the transducer gage tube was located above the pump and about 1.2 ft above the bottom of the screen. The water level declined below the gage tube for portions of 2006 and most of 2007 and 2008. The water level remained near the bottom of the screen after 2006. MCOBT-4.4 was plugged and abandoned in July 2009 (LANL September 2009b).

MCOBT-4.4 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	485.4	524.0	6350.8	6312.2	38.6	524	6312.2	524.0	6312.2	545.0	21.0	64.5	1	Tpf

Note: Brass Cap Elevation: 6836.18 ft; all measurements are from this elevation. Well plugged and abandoned 7/29/09



4.14 MCOI-1

Location: MCOI-1 is located adjacent to upper Mortandad Canyon below the confluence with Effluent Canyon.

Completion Type: Single completion in the Puye Formation.

Period of Record: Well completed in January 2005. Periodic manual checks for water through 2007. Monitoring of well ceased in 2007.

Remarks: MCOI-1 was dry when completed and has not contained water during periodic checks. Soundings for water throughout 2006 and 2007 have been dry with a total depth of about 814 ft below ground surface, encountering sand at total depth. This total depth is above the screen; thus it appears that the well screen in the 1-in.-diameter PVC may have parted from the tubing or has been somehow damaged, potentially rendering the well inoperative.

MCOI-1 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	815.0	825.5	6291.2	6280.8	10.5	None	None	825.5	6280.8	825.58	0.1	0.0	I	Tp

Note: Ground Elevation: 7106.20 ft; all measurements are from this elevation

4.15 MCOI-4

Location: MCOI-4 is located in lower Mortandad Canyon near the confluence with Ten Site Canyon and was about 70 ft upstream of MCOBT-4.4.

Completion Type: Single completion at the base of the Puye Formation fanglomerate member and the top of Cerros del Rio basalt.

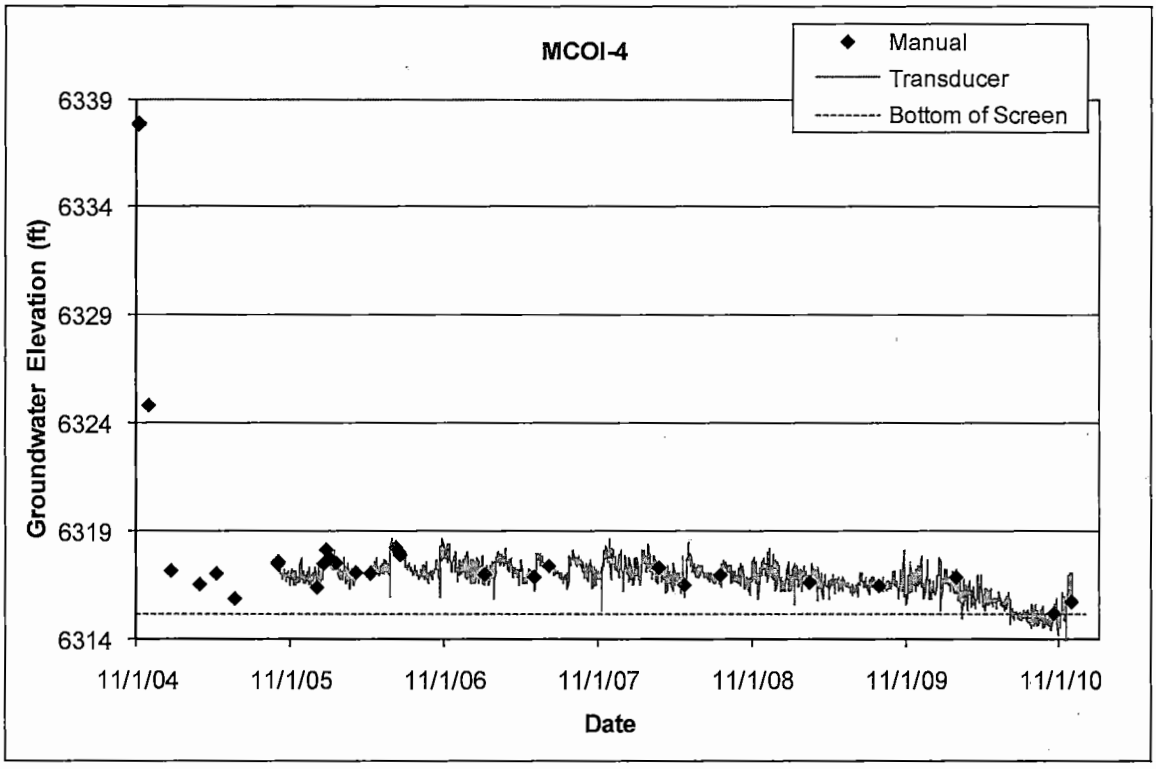
Period of Record: Well completed in November 2004, transducer installed October 2005, data through 2010.

Remarks: From 2006 to 2009, the water level in MCOI-4 was 2 to 3 ft higher than in adjacent well MCOBT-4.4 and relatively constant about 1 ft above the bottom of the screen. During plugging operations at MCOBT-4.4 from July 15 to 17, 2009, the water level at MCOI-4 rose about 1 ft and then declined over the next two weeks. The water level in the sump fluctuates indicating that the sump is not competent.

MCOI-4 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	499.0	522.0	6338.2	6315.2	23.0	524.0	6313.2	522.0	6315.2	525.7	3.7	11.6	I	Tpf

Note: Ground Elevation: 6837.20 ft; all measurements are from this elevation



4.16 MCOI-5

Location: MCOI-5 is located in lower Mortandad Canyon about 70 ft northwest of regional aquifer well R-15.

Completion Type: Single completion in Cerros del Rio basalt.

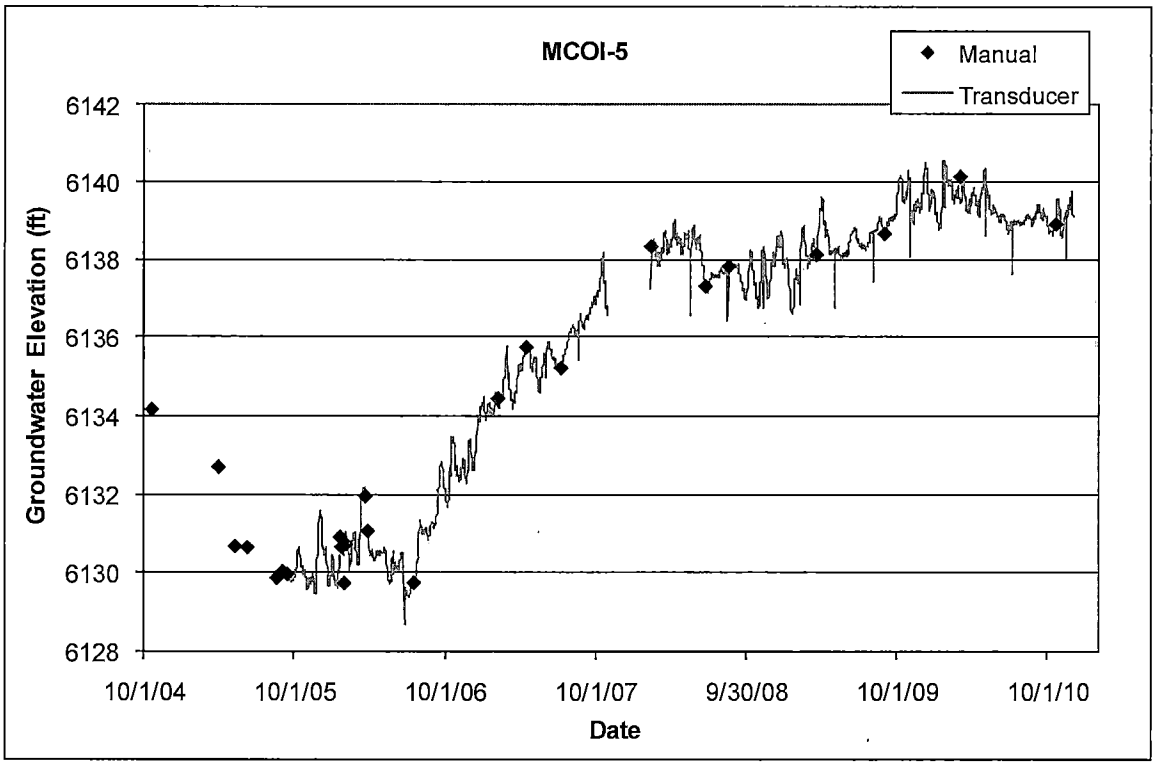
Period of Record: Well completed in October 2004, transducer installed August 2005, data through 2010.

Remarks: The transducer was removed for bailing sampling in 2005. A dedicated submersible pump was installed March 2006. The intermediate groundwater has a delayed response to atmospheric pressure fluctuations.

MCOI-5 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	689.0	699.0	6130.7	6120.7	10.0	696.0	6123.7	699.0	6120.7	702.7	3.7	11.6	I	Tb4

Note: Brass cap elevation: 6819.70 ft; all measurements are from this elevation



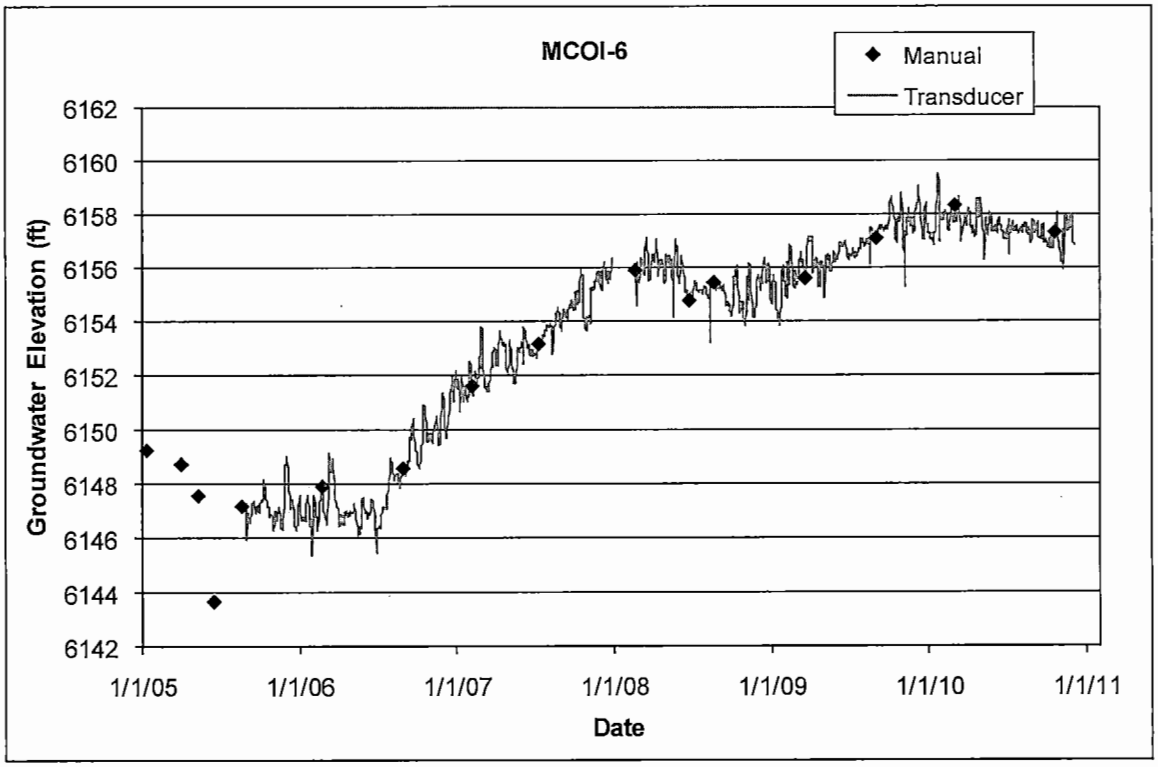
4.17 MCOI-6

Location: MCOI-6 is located in lower Mortandad Canyon about 160 ft northeast of MCOI-5.
Completion Type: Single completion in Cerros del Rio basalt.
Period of Record: Well completed in January 2005, transducer installed August 2005, data through 2010.
Remarks: The groundwater level is about 20 ft above the top of the screen and 17 to 18 ft higher than at MCOI-5. The intermediate groundwater has a delayed response to atmospheric pressure fluctuations.

MCOI-6 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	686.0	708.3	6125.1	6102.8	22.3	689.0	6122.1	708.3	6102.8	713.2	4.9	15.3	I	Tb4

Note: Brass cap elevation: 6811.10 ft; all measurements are from this elevation



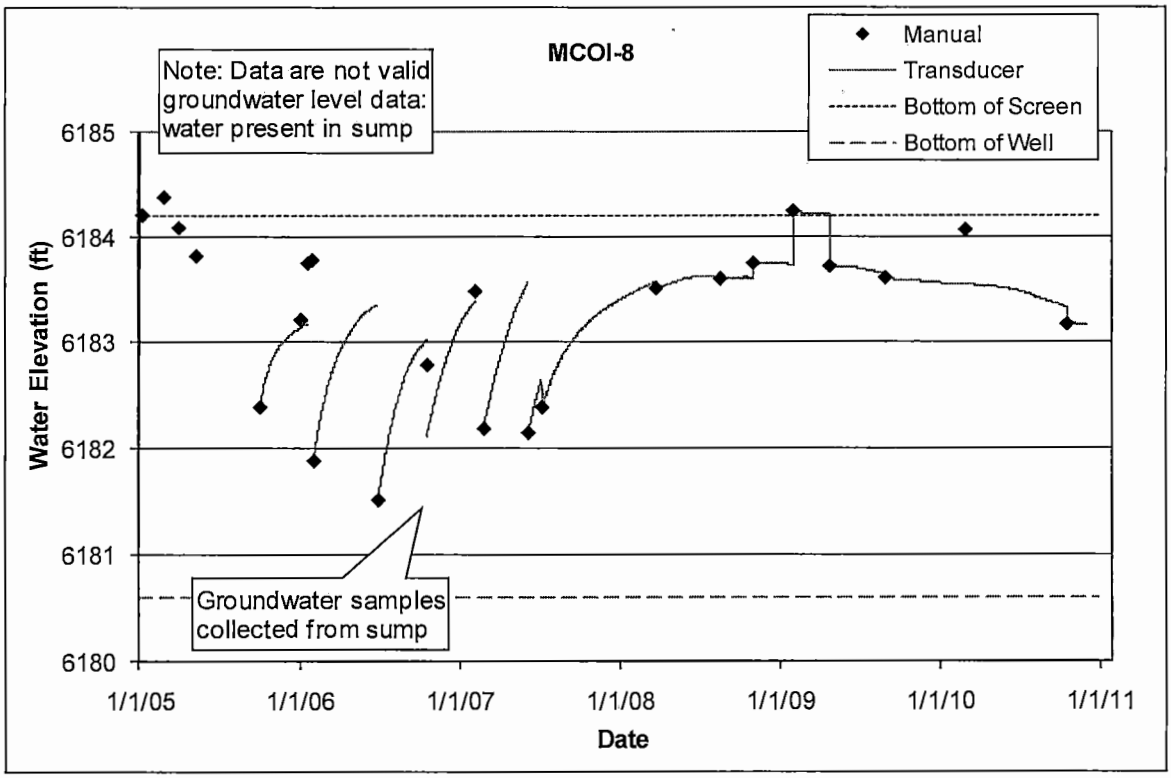
4.18 MCOI-8

Location: MCOI-8 is located in lower Mortandad Canyon above the confluence with Ten Site Canyon.
Completion Type: Single completion in Cerros del Rio basalt.
Period of Record: Well completed in January 2005, transducer installed August 2005, data through 2010.
Remarks: Since well completion, water has been measured in the sump of the well; thus data are not valid groundwater level data.

MCOI-8 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	665.0	675.0	6194.2	6184.2	10.0	None	None	675.0	6184.2	678.6	3.6	11.4	I	Tb4

Note: Ground Elevation: 6859.20 ft; all measurements are from this elevation



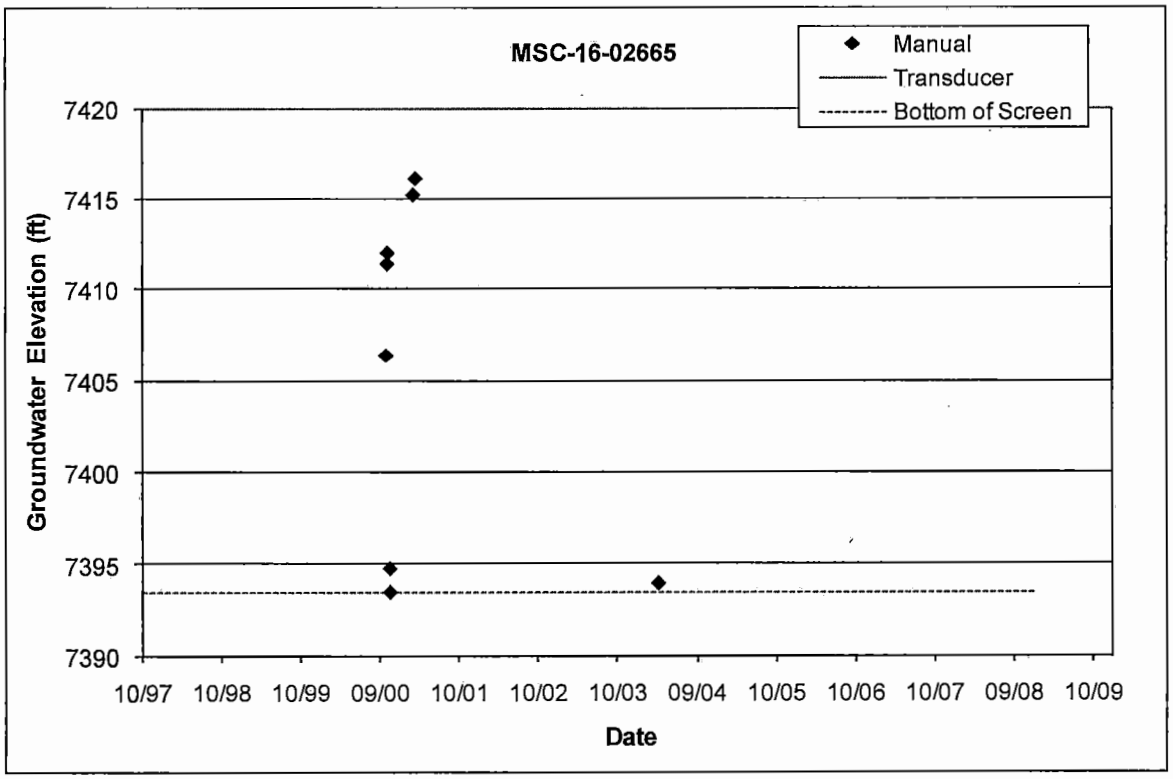
4.19 MSC-16-02665

Location: MSC-16-02665 is located at TA-16 at the head of Martin Spring Canyon (S-Site Canyon) about 1500 ft west of R-48 and about 700 ft northwest of Martin Spring.
Completion Type: Single completion in Unit 3 of the Bandelier tuff.
Period of Record: Well completed October 1997, no transducer has been installed, periodic manual measurements through April 2010.
Remarks: MSC-16-02665 has usually been dry; water has been observed in the well after heavy precipitation periods and snowmelt runoff (LANL 2003, p. 4-58). The well was dry when checked in the spring of 2005, 2006, 2007, 2008, 2009, and 2010.

MSC-16-02665 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	93.5	123.5	7423.4	7393.4	30.0	None	None	123.5	7393.4	124.0	0.5	0.3	I	Qbt3

Note: Ground Elevation: 7516.92 ft; all measurements are from this elevation



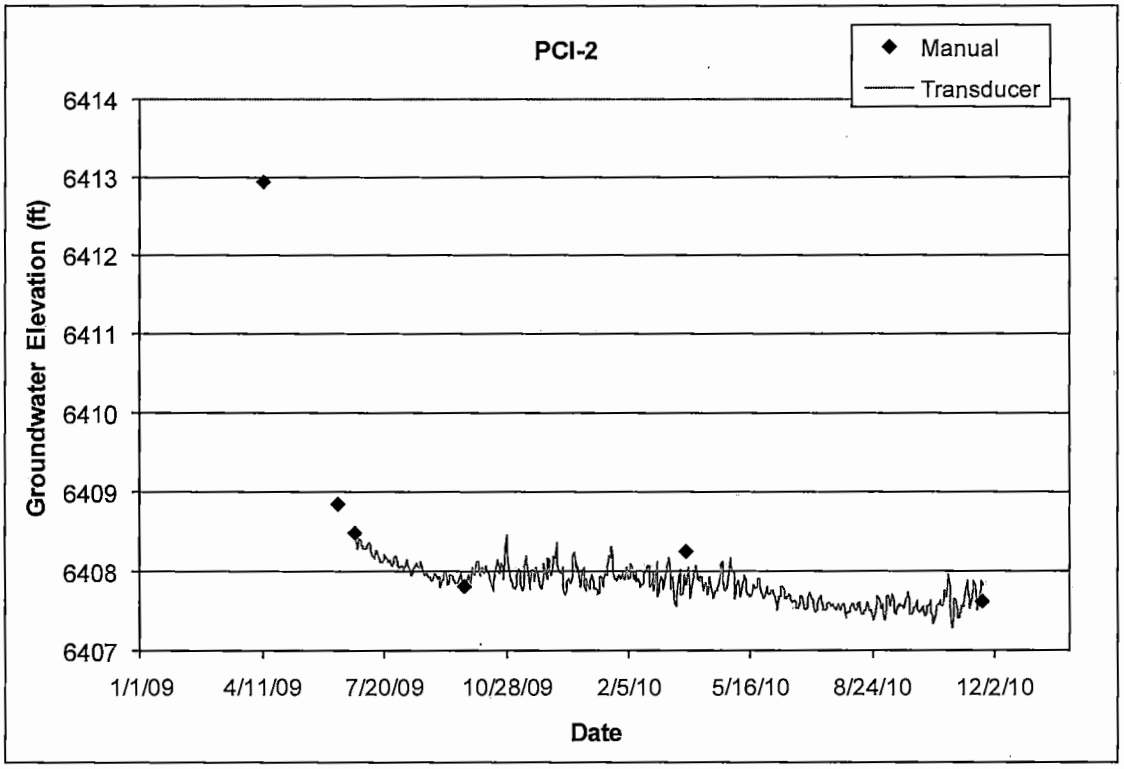
4.20 PCI-2

Location: PCI-2 is located in middle Pajarito Canyon about 150 ft west and upstream of R-17.
Completion Type: Single completion in the Puye fanglomerates and about 35 ft above Tschicoma dacite (LANL September 2009c).
Period of Record: Well completed April 2009, transducer installed June 25, 2009; data through 2010.
Remarks: The well is 100% barometrically efficient; however, the aquifer exhibits a delayed response to atmospheric pressure fluctuations.

PCI-2 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (Gal.)	Hydro Zone Code	Geo Unit Code
1	512.0	522.0	6409.0	6399.0	10.0	529.3	6391.7	522.0	6399.0	533.3	11.3	2.9	I	Tpf

Note: Brass Cap Elevation: 6920.95 ft; all measurements are from this elevation



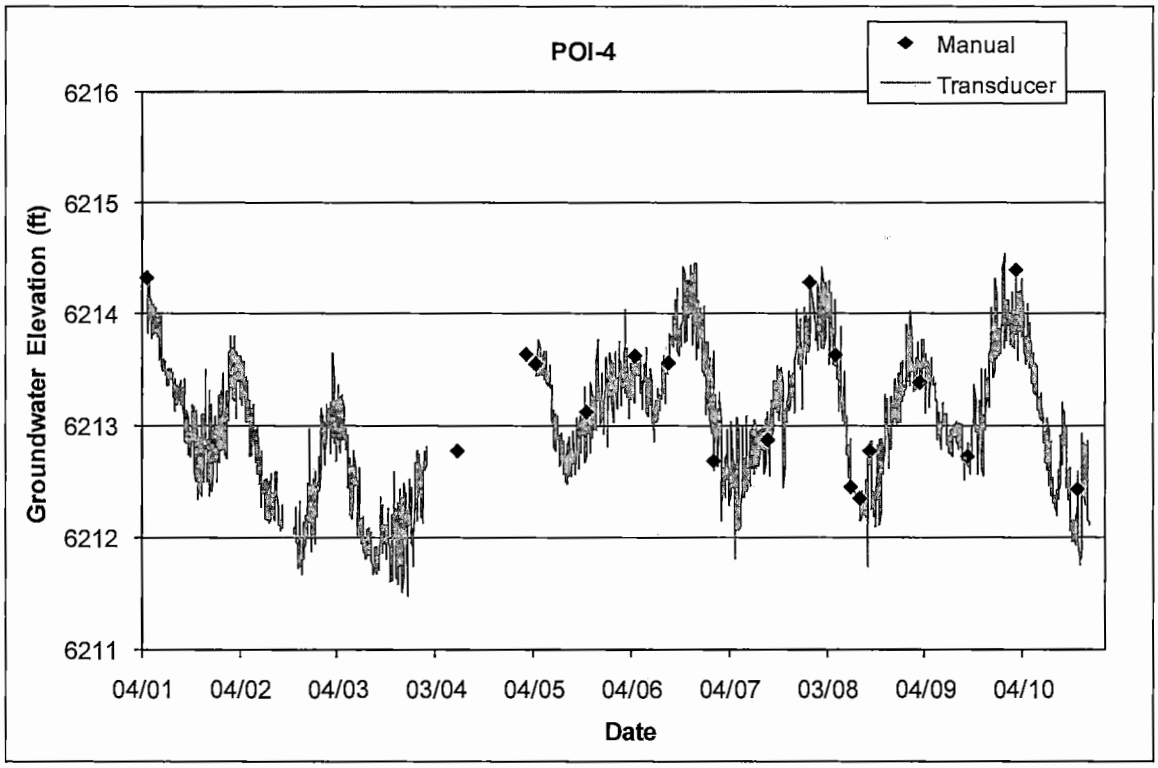
4.21 POI-4

Location: POI-4 is located in lower Pueblo Canyon about 800 ft upstream of TW-1 and about 370 ft north of supply well O-1.
Completion Type: Single completion in Cerros del Rio basalt.
Period of Record: Well completed in 1996, transducer installed April 2001 and again in April 2005; data through 2010.
Remarks: The well is 100% barometrically efficient; the groundwater displays a delayed response to atmospheric pressure fluctuations. The intermediate groundwater shows a seasonal water level fluctuation, generally lower in the summer and higher in the winter.

POI-4 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	159.0	174.0	6213.3	6198.3	15.0	173.0	6199.3	174.0	6198.3	176.5	2.5	6.2	I	Tb4

Note: Ground Elevation: 6372.29 ft; all measurements are from this elevation



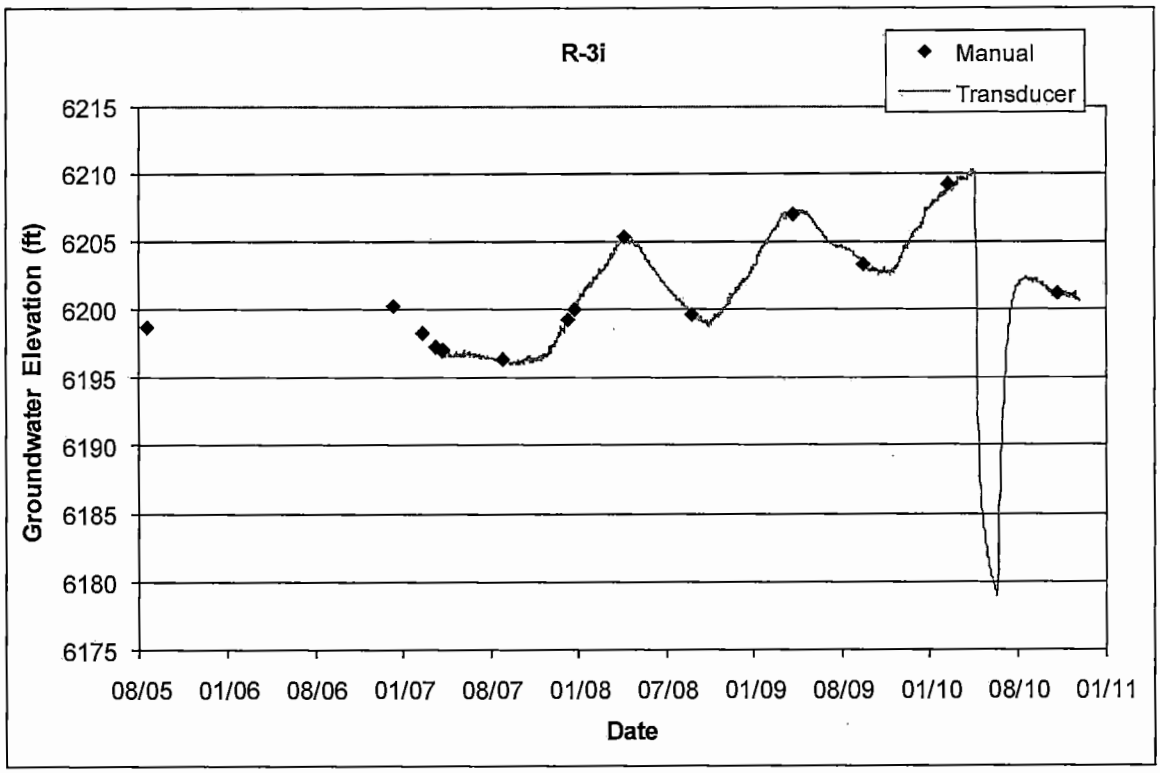
4.22 R-3i

Location: R-3i is located in lower Pueblo Canyon about 240 ft west of intermediate well POI-4 and about 425 ft northwest of supply well O-1.
Completion Type: Single completion in the Cerros del Rio basalt.
Period of Record: Well completed August 2005, transducer installed April 2007, data through 2010.
Remarks: The well is 100% barometrically efficient; the groundwater does not respond to atmospheric pressure fluctuations. The groundwater level rises during winter and falls during summer, but did not show a significant response to snowmelt runoff in 2007, 2008, or 2010. The intermediate groundwater appears to show a seasonal water level fluctuation similar to POI-4, but the water level at R-3i is 10 to 15 ft lower than at POI-4. The perched intermediate groundwater at R-3i responded to drilling activities at R-3 in the summer of 2010. When the base of the Cerros del Rio basalt was penetrated at R-3, the groundwater apparently drained into deeper units through the R-3 borehole until the casing was set and the annular seal emplaced at R-3.

R-3i Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	215.2	220	6175.0	6170.2	4.8	217.0	6173.2	220.0	6170.2	220.34	0.3	0.2	I	Tb4

Note: Ground Elevation: 6390.15 ft; all measurements are from this elevation



4.23 R-6i

Location: R-6i is located at the eastern extent of DP Mesa near the confluence of DP Canyon and Los Alamos Canyon and adjacent to regional aquifer monitoring well R-6.

Completion Type: Single completion in the Puye Formation fanglomerate member.

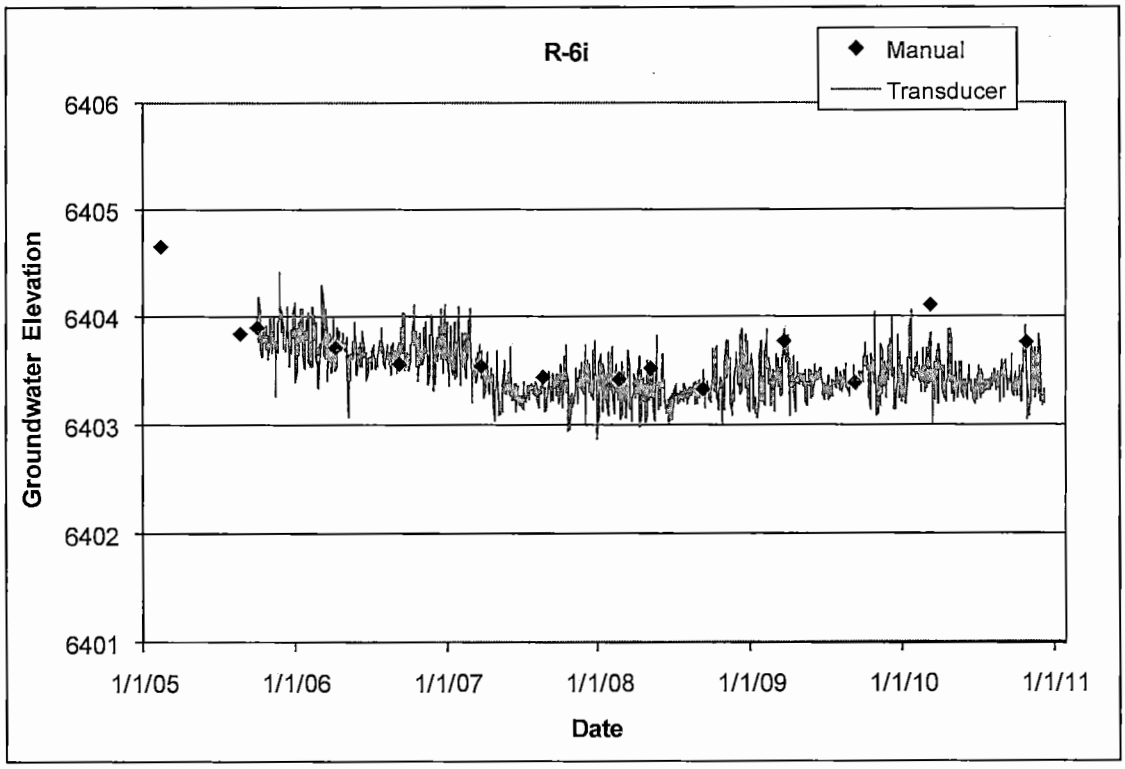
Period of Record: Well completed December 2004, transducer installed October 2005, data through 2010.

Remarks: The well is 100% barometrically efficient; the groundwater does not respond to atmospheric pressure fluctuations. The perched intermediate groundwater did not respond to snowmelt runoff in 2007, 2008, or 2010.

R-6i Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	602.0	612	6394.9	6384.9	10.0	609.0	6387.9	612.0	6384.9	615	3.0	9.2	I	Tpf

Note: Brass Cap Ground Elevation: 6996.9 ft; all depths are from this elevation



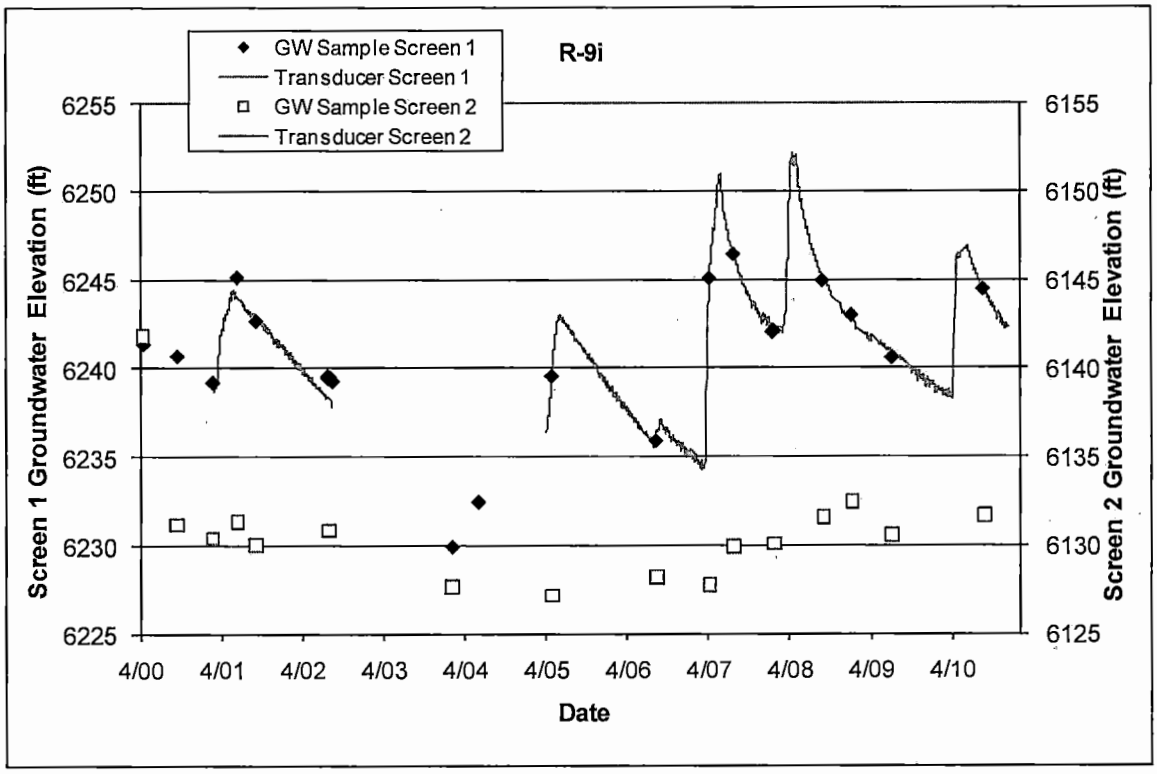
4.24 R-9i

Location: R-9i is located in Los Alamos Canyon near the eastern LANL boundary and adjacent to R-9.
Completion Type: Dual Westbay® completion; both screens in Cerros del Rio basalt.
Period of Record: Well completed March 2000, transducers installed March 2001, intermittent data through 2010.
Remarks: The screens are about 70 ft apart and the heads in the two intermediate zones are about 110 ft apart. The water level at screen 1 is about 40 ft above the top of the screen; the water level at screen 2 is about 15 ft above the top of the screen. Groundwater at screen 1 appears to be recharged from large runoff events in lower Los Alamos Canyon; the water level responded to snowmelt runoff in 2001, 2005, 2007, 2008, and 2010 and to large storm runoff events in the summer of 2006, while the water level at screen 2 shows a reduced response.

R-9i Construction and Port Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Hydro Zone Code	Geo Unit Code	Port	Port Depth (ft)	Port Elev (ft)	Distance from Bottom of Screen (ft)	Sump Vol (L)	Comment
1	189.1	199.5	6194.1	6183.7	10.4	I	Tb4	**MP1A**	198.8	6184.4	0.7		Within screen
								PP1	204.1	6179.1	-4.6	13.3	Below screen
								MP1B	209.8	6173.4	-10.3	29.8	Below screen
2	269.6	280.3	6113.6	6102.9	10.7	I	Tb4	**MP2A**	278.8	6104.4	1.5		Within screen
								PP2	284.1	6099.1	-3.8	11.0	Below screen
								MP2B	289.8	6093.4	-9.5	27.5	Below screen

Note: Brass Cap Elevation is 6383.2 ft; all measurements are from this elevation;
MP = Monitoring Port, PP = Pumping Port; Ports shown in Bold are instrumented with transducers



4.25 R-12 (Intermediate)

Location: R-12 is located in lower Sandia Canyon near SR-4 and supply well PM-1.

Completion Type: Multiple completion, originally two screens in intermediate zones, one screen at the top of the regional aquifer—until September 2006 when the well was recompleted as two intermediate screens; screen 3 was plugged and abandoned on December 13, 2007.

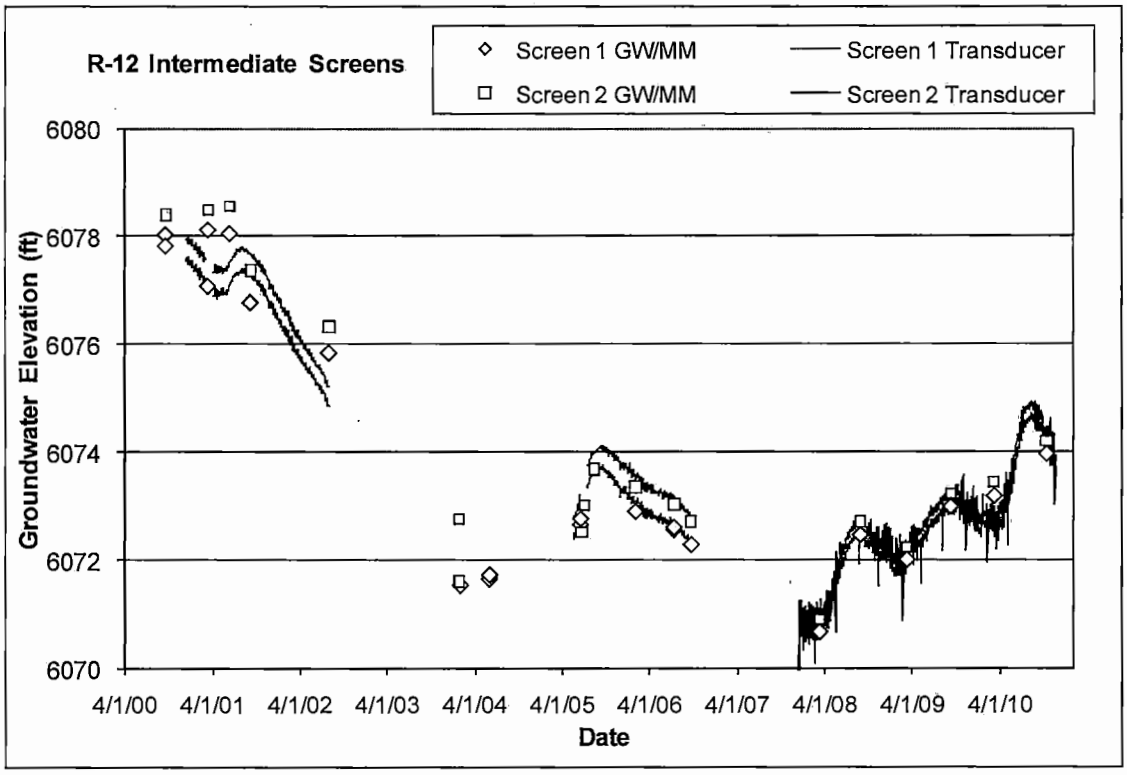
Period of Record: Westbay® system installed March 21, 2000, transducers installed December 14, 2000, intermittent data to September 21, 2006, when transducers were removed for removal of the Westbay® system for well rehabilitation and conversion. No water level data for most of 2007. Transducers were reinstalled at screens 1 and 2 on December 13, 2007; data through 2010.

Remarks: In December 2007, screen 3 was abandoned and a Baski packer with dual pump sampling system was installed at the two intermediate screens. Intermediate screens 1 and 2 have similar head values about 380 ft above the regional aquifer; intermediate screen 2 has a slightly higher head than screen 1. The intermediate screens responded to snowmelt runoff events in Los Alamos Canyon in 2001, 2005, 2008, and 2010; no data available during 2007 and no snowmelt runoff in 2009. The groundwater at screens 1 and 2 show a delayed response to atmospheric pressure fluctuations with a barometric efficiency of about 70%.

R-12 Construction Infomration

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Packer/ Sump Depth (ft)	Top of Packer/ Sump Elev (ft)	Sump Bottom Dept (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	459.0	467.5	6040.6	6032.1	8.5	465.0	6034.6	470.7	6028.9	470.7	3.2	10.0	I	Tb4
2	504.5	508.0	5995.1	5991.6	3.5	501.0	5998.6	508.0	5991.6	540.8	32.8	102.6	I	Tp
3	801.0	839.0	5698.6	5660.6	38	Screen 3 Plugged and Abandoned December 2007							RT	Tsfb

Brass Cap Elevation: 6499.60 ft; all measurements are from this elevation



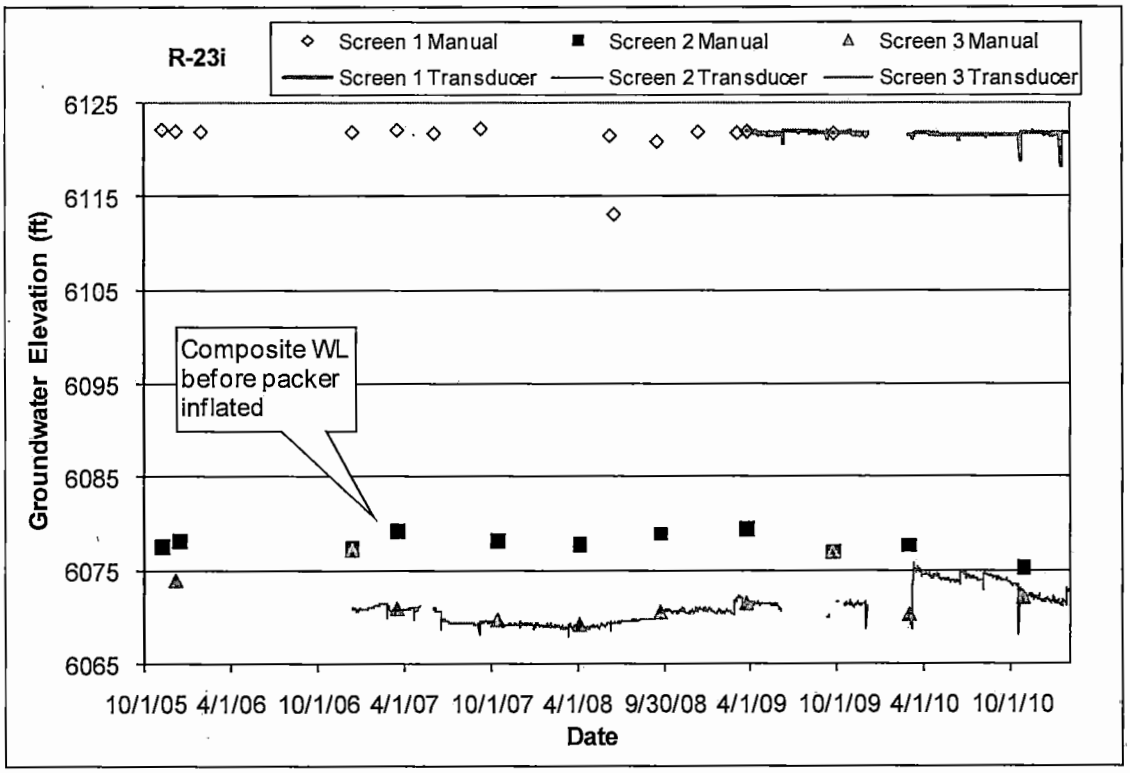
4.26 R-23i

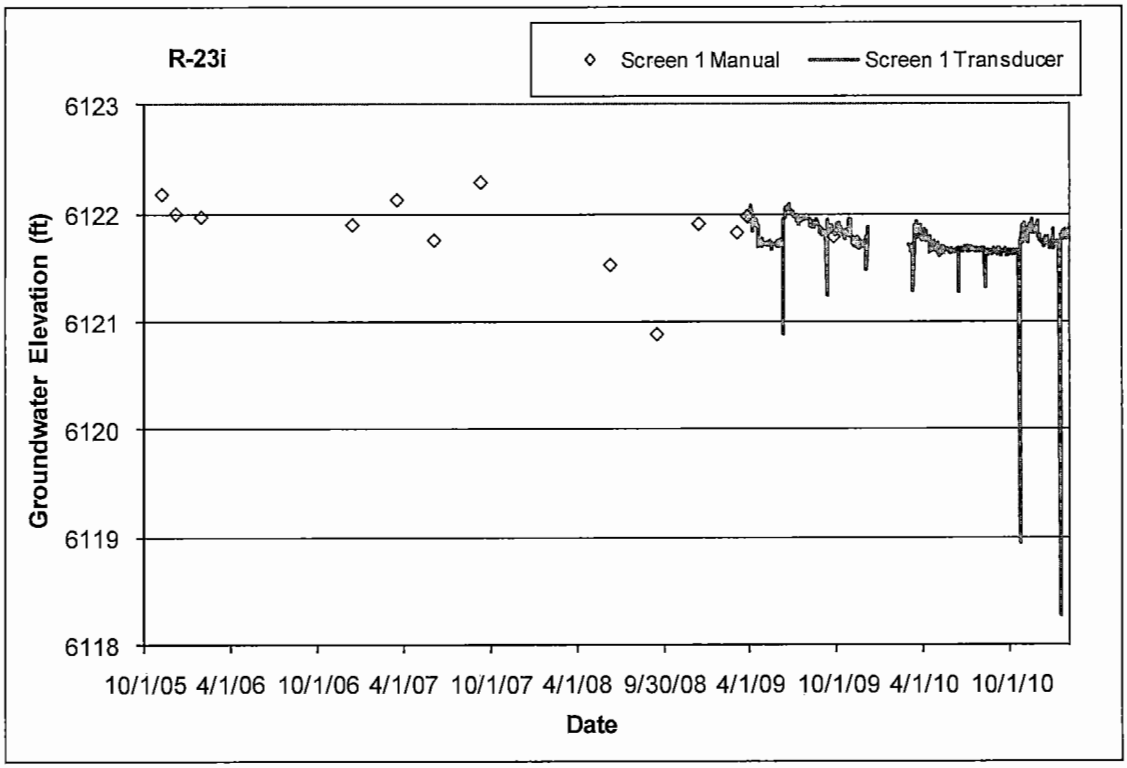
Location: R-23i is located in lower Pajarito Canyon near SR-4 and adjacent to regional well R-23.
Completion Type: Multiple completion, three screens, screen 1 is in a 2.1-in.-diameter piezometer and screens 2 and 3 are in a 4-in.-diameter well. A Baski packer and dual pump sampling system was installed at screens 2 and 3 in December 2006. All screens are in Cerros del Rio basalt.
Period of Record: Well completed November 2005; transducers installed at screens 2 and 3 in December 2006, transducer installed at screen 1 March 2009; data through 2010.
Remarks: The water levels at screens 2 and 3 are typically about 9 ft apart; the water level at screen 1 is about 44 ft higher than screen 2. The screen 3 gage tubing through the packer has shown occasional partial plugging, but water levels in the tubing appear to be representative of screen 3. Possible response to snowmelt runoff at screens 2 and 3 in the spring of 2008. Packer inflation problems in 2009 caused loss of screens 2 and 3 groundwater level data. The Baski system was removed from the well in December 2009 to repair the packer system. The repaired system was reinstalled March 2, 2010. During purging of cross flow at screen 3 in March 2010, the screen 3 water level increased with coincident water level fall at screen 2, indicating possible intermittent cross flow between screens 2 and 3, possibly through the formation.

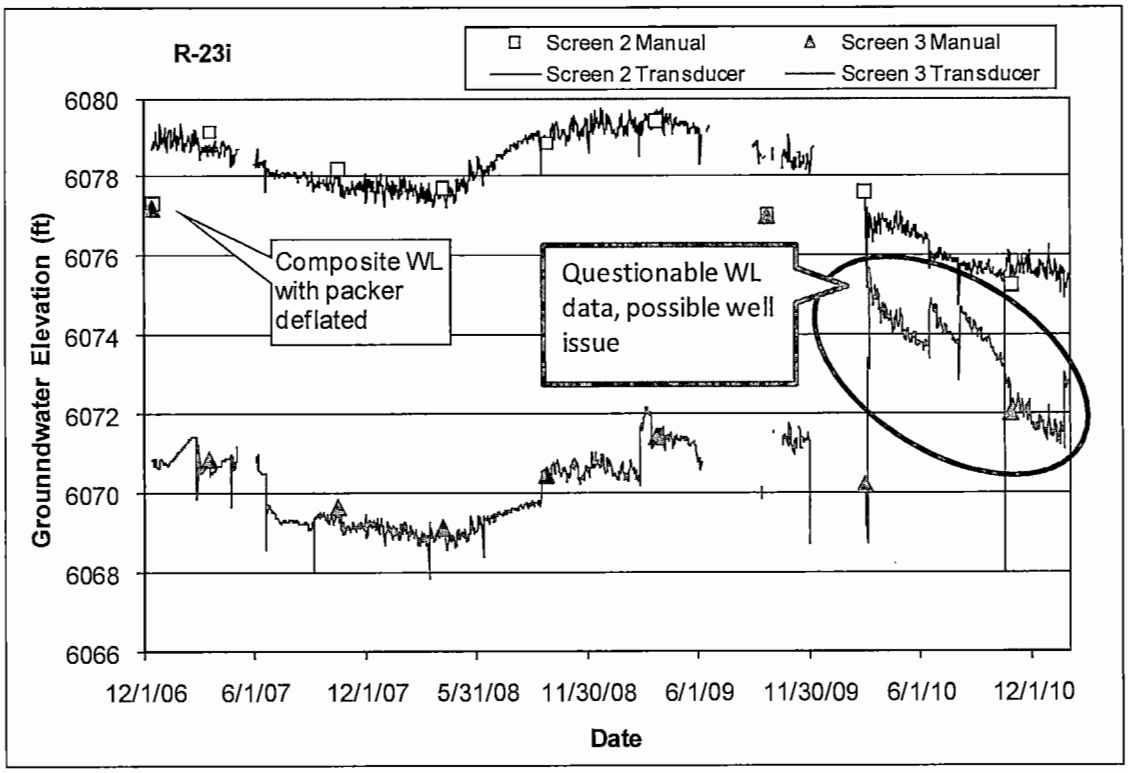
R-23i Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Depth to Top of Packer/ Sump (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (Gal.)	Hydro Zone Code	Geo Unit Code	Comment
1	400.3	420.0	6127.6	6107.9	19.7			420.0	6107.9	425.3	5.3	4.4	I	Tb4	2.1 in. Piez
2	470.2	480.1	6057.7	6047.8	9.9	477.1	6050.8	495.3	6032.5	495.3	15.2	12.6	I	Tb4	4.5 in. well
3	524.0	547.0	6003.9	5980.9	23.0	516.7	6011.2	547.0	5980.9	550.7	3.7	3.1	I	Tb4	4.5 in. well

Note: Brass Cap Ground Elevation: 6527.88 ft; all measurements are from this elevation




R-23i
Screen 1 Manual
Screen 1 Transducer
Groundwater Elevation (ft)
6123
6122
6121
6120
6119
6118
10/1/05 4/1/06 10/1/06 4/1/07 10/1/07 4/1/08 9/30/08 4/1/09 10/1/09 4/1/10 10/1/10
Date


R-23i
Screen 2 Manual
Screen 3 Manual
Screen 2 Transducer
Screen 3 Transducer
Grounndwater Elevation (ft)
6080
6078
6076
6074
6072
6070
6068
6066
Composite WL with packer deflated
Questionable WL data, possible well issue
12/1/06 6/1/07 12/1/07 5/31/08 11/30/08 6/1/09 11/30/09 6/1/10 12/1/10
Date

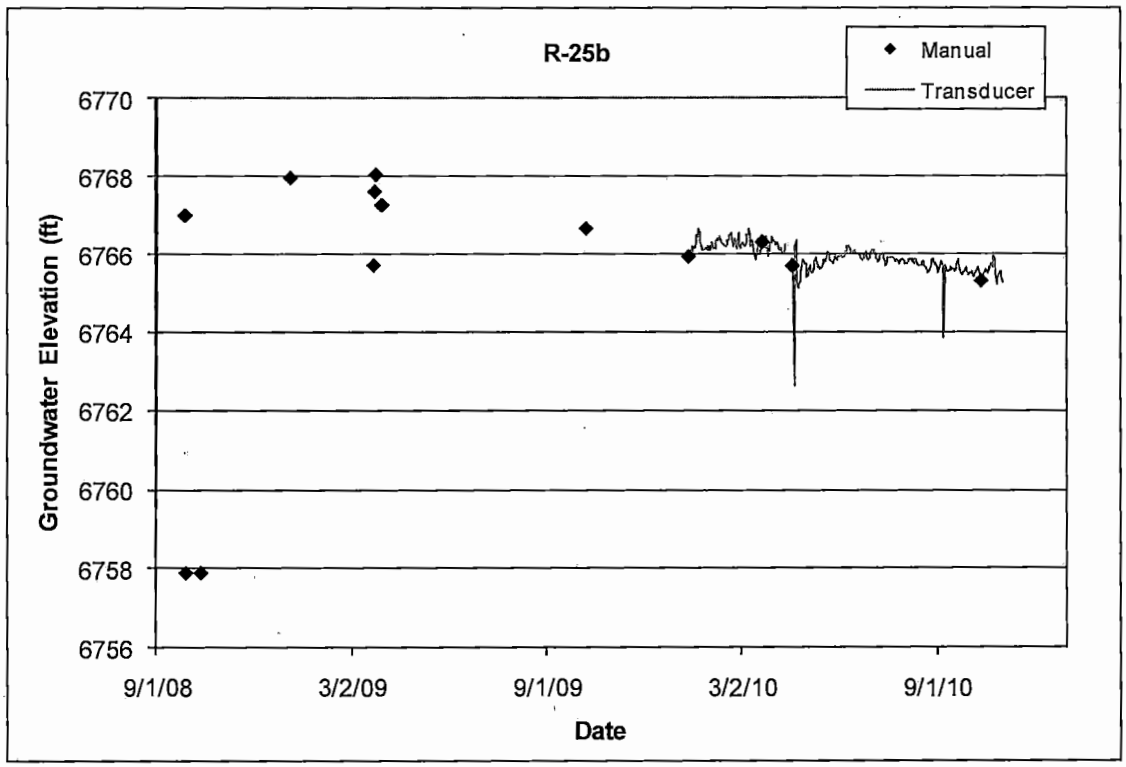
4.27 R-25b

Location: R-25b is located at TA-16 about 50 ft west of monitoring well R-25.
Completion Type: Single completion, one screen in the Otowi Member of the Bandelier Tuff at a similar elevation as R-25 screen 1.
Period of Record: Well completed October 2008. Transducer installed January 13, 2010; transducer data through 2010.
Remarks: R-25b is screened adjacent to R-25 screen 1.

R-25b Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Bottom of Well Elev (ft)	Hydro Zone Code	Geo Unit Code
1	750.0	770.8	6767.0	6746.2	20.8	770.0	6747.0	770.8	6746.2	782.3	11.5	6734.7	I	Qbo

Note: Brass Cap Ground Elevation: 7517.00 ft; all measurements are from this elevation



4.28 R-25c

Location: R-25c is located at TA-16 about 50 ft west of monitoring well R-25b and about 100 ft west of monitoring well R-25.

Completion Type: Single completion, one screen in the Puye fanglomerates at a similar elevation as R-25 screen 3.

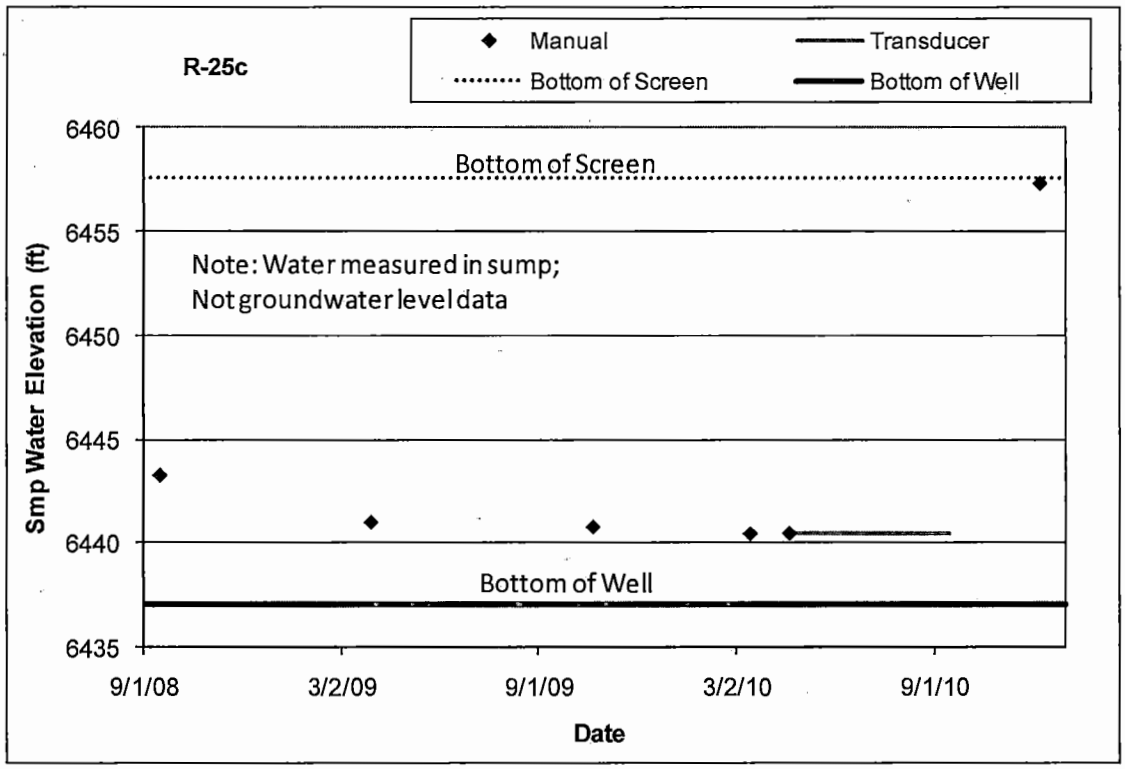
Period of Record: Well completed September 2008, transducer installed December 16, 2009. Data through 2010.

Remarks: R-25c is a replacement for R-25 screen 3. The borehole contained water during drilling, but the well was dry (some water in sump) at completion and did not retain water during attempted slug testing (LANL December 2008). A seismometer was installed at the bottom of the well in September 2010. The sump water was raised to near the bottom of the screen during the seismometer installation.

R-25c Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Bottom of Well Elev (ft)	Hydro Zone Code	Geo Unit Code
1	1039.6	1060.0	6478.0	6457.6	20.4	None	None	1080.6	20.6	6437.0	I	Tpf

Note: Brass Cap Ground Elevation: 7517.59 ft; all measurements are from this elevation



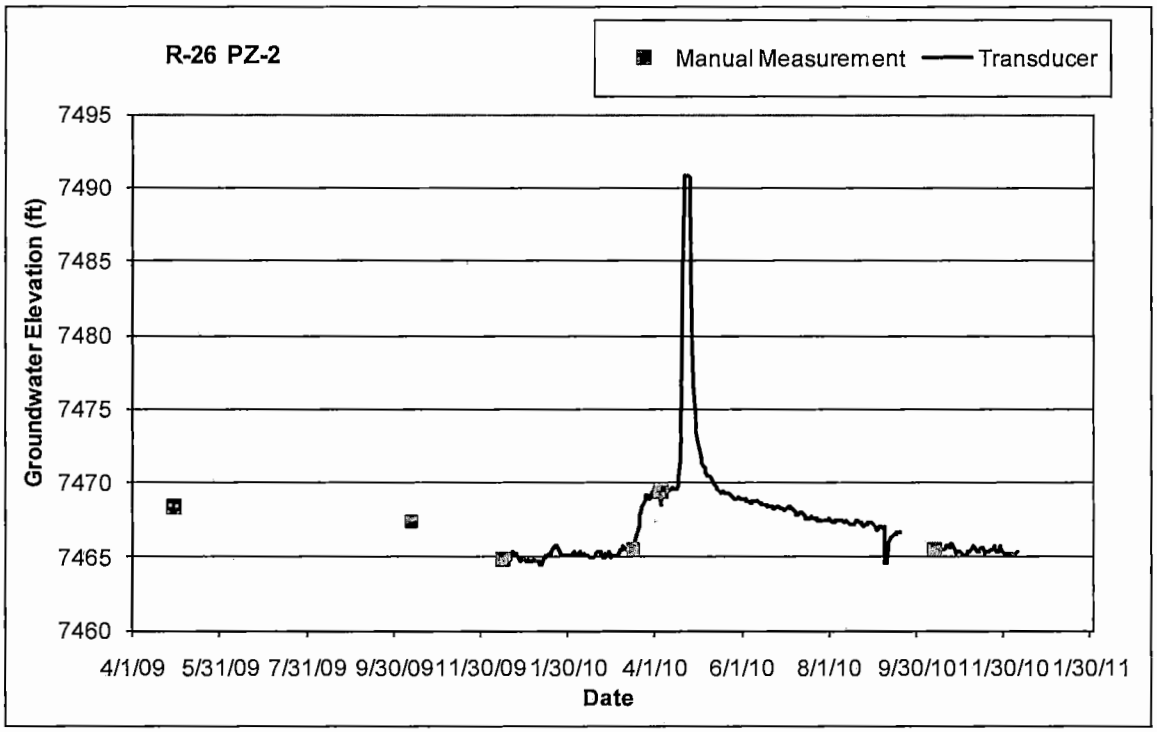
4.29 R-26 PZ-2

Location: R-26 PZ-2 is located at TA-16 about 90 ft southwest of monitoring well R-26.
Completion Type: Dual completion, R-26 PZ-1 is the deeper piezometer and R-26 PZ-2 is the shallower piezometer. Both screens are located in Unit 3 of the Tshirege Member of the Bandelier Tuff.
Period of Record: Piezometer installed October 2003, manual measurements began in April 2009, and transducer installed December 16, 2009; transducer data through 2010. The transducer malfunctioned September 2010 and was replaced October 2010.
Remarks: R-26 PZ-1 has always been dry when checked. The groundwater at R-26 PZ-2 appears to have responded to snowmelt runoff in the spring of 2010.

R-26 Piezometer Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Bottom of Sump Depth (ft)	Bottom of Sump Elev (ft)	Sump Length (ft)	Sump Vol (gal.)	1 CV Purge Vol (gal.)	Hydro Zone Code	Geo Unit Code
PZ-1	230.0	250.0	7409.6	7389.6	20.0	250.0	7389.6	0.0	0.0	0.0	I	Qbt3t
PZ-2	150.0	180.0	7489.6	7459.6	30.0	185.0	7454.6	5.0	0.8	1.5	I	Qbt3t

Note: R-26 Ground Elevation: 7639.56 ft; all measurements are from this elevation; Top of Casing Elevation: 7641.9



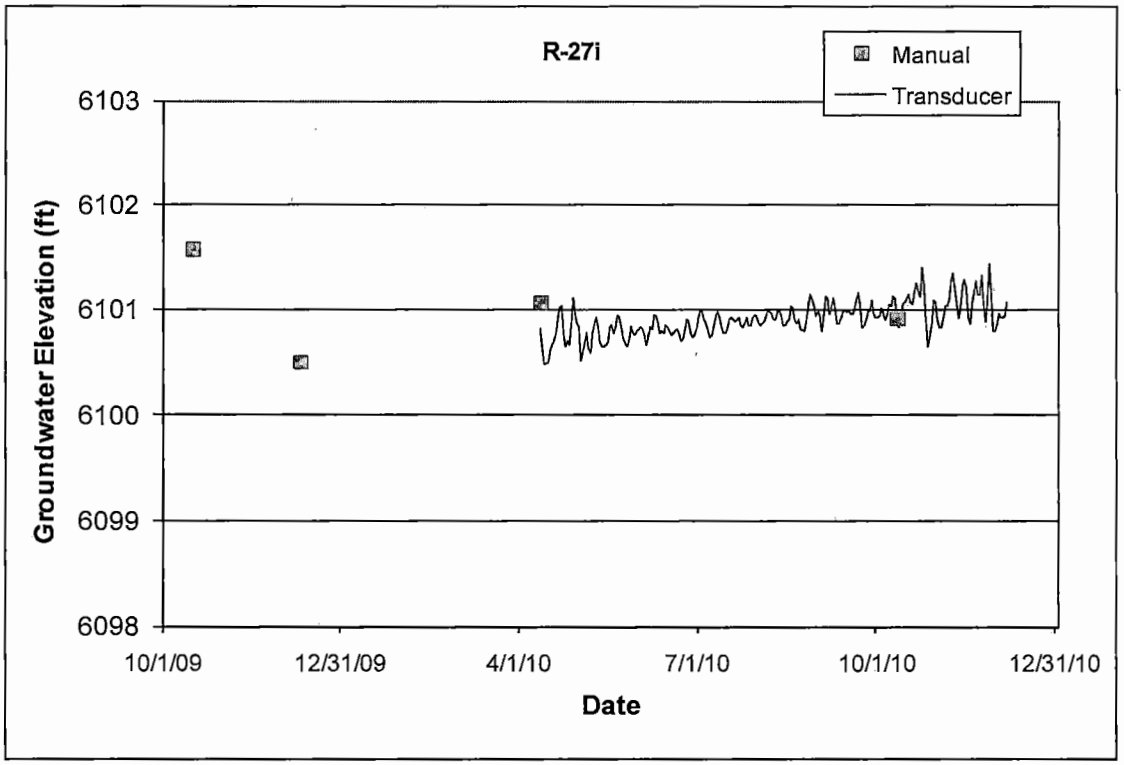
4.30 R-27i

Location: R-27i is located in Water Canyon near monitoring well R-27.
Completion Type: Single completion in an intermediate perched zone; one screen in the Puye fanglomerates.
Period of Record: Well completed October 2009. Dedicated Bennett pump and transducer installed April 13, 2010; transducer data through 2010.
Remarks: The groundwater level is about 2 ft above the top of the screen. The well is 100% barometrically efficient; the groundwater has no immediate response to atmospheric pressure fluctuations, however, the groundwater shows a delayed response to atmospheric pressure fluctuations.

R-27i Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Sump Bottom Depth (ft)	Bottom of Well Elev (ft)	Sump Length (ft)	Sump Vol (gal)	Hydro Zone Code	Geo Unit Code
1	619.0	629.0	6099.0	6089.0	10.0	627.9	6090.1	630.2	6087.8	1.2	1.2	I	Tpf

Note: Brass Cap Ground Elevation: 6717.97 ft; all measurements are from this elevation



4.31 R-47i

Location: R-47i is located at TA-14 downgradient from TA-16 and about 0.5 mi east of well CdV-16-2(i)r and about 0.8 mi northwest of well CdV-R-15-3.

Completion Type: Single completion in an intermediate perched zone; one screen in the Puye fanglomerates.

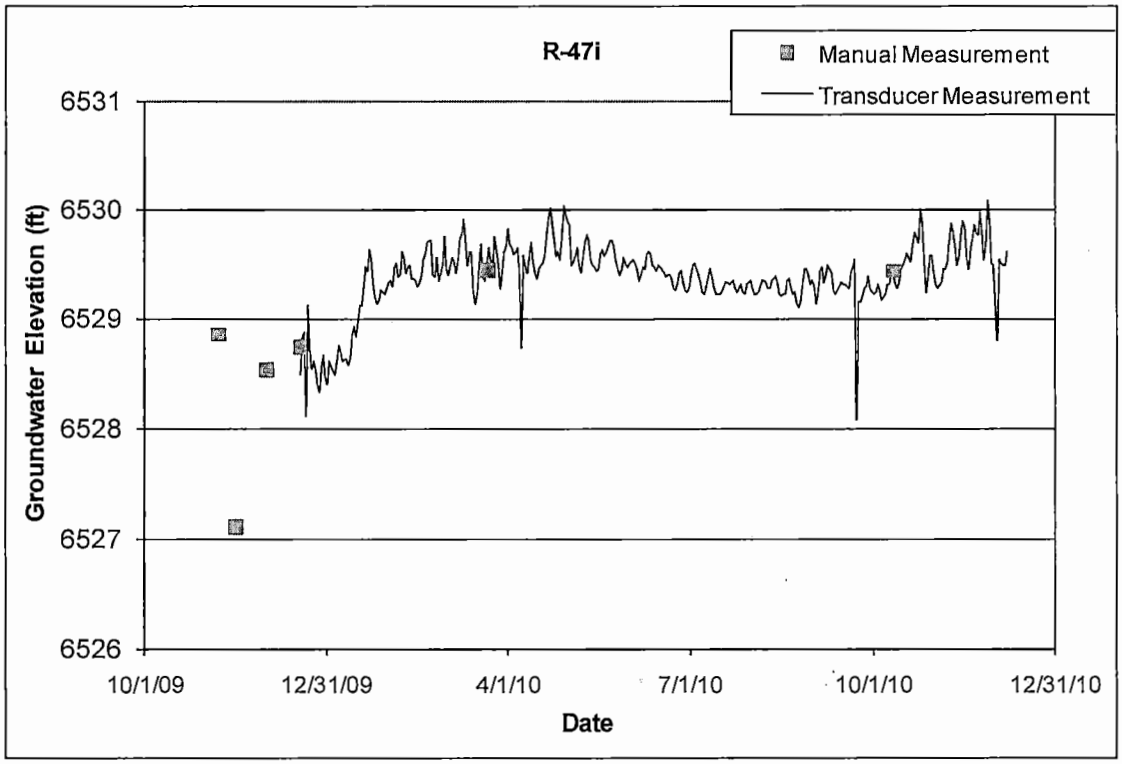
Period of Record: Well completed November 15, 2009. Dedicated submersible pump and transducer installed December 18, 2009; transducer data through 2010.

Remarks: The groundwater level is about 11 ft above the top of the screen. The well is 100% barometrically efficient; the groundwater has no immediate response to atmospheric pressure fluctuations.

R-47i Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Sump Bottom Depth (ft)	Bottom of Well Elev (ft)	Sump Length (ft)	Sump Vol (gal)	Hydro Zone Code	Geo Unit Code
1	840.0	860.6	6518.4	6497.8	20.6	860.3	6498.1	865.5	6492.9	4.9	5.0	I	Tpf

Note: Brass Cap Ground Elevation: 7358.41ft; all measurements are from this elevation



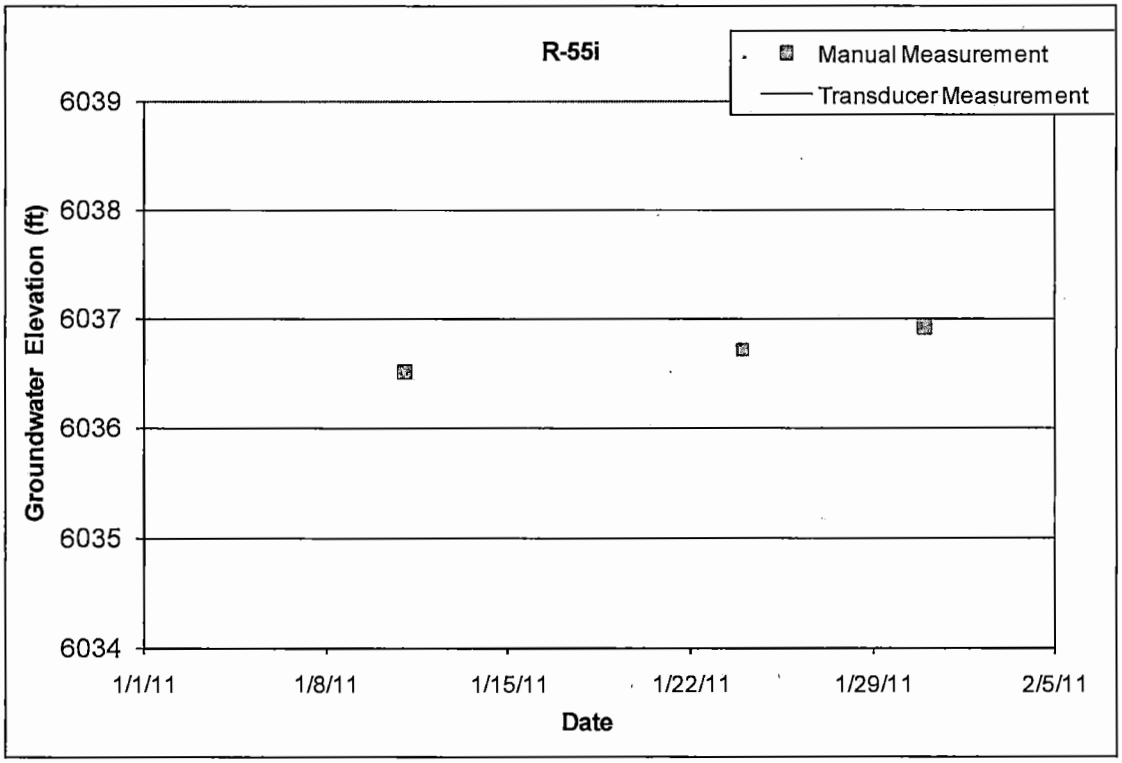
4.32 R-55i

Location: R-55i is located in lower Cañada del Buey adjacent to R-55.
Completion Type: Single completion in an intermediate perched zone; one screen in unconsolidated sediments associated with basaltic lava flows of the Cerros del Rio basalts.
Period of Record: Well completed January 2011. Transducer installation is pending.
Remarks: The groundwater level before aquifer testing on January 31, 2011, was 498.0 ft below ground surface at an elevation of 6036.91 ft.

R-55i Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Sump Bottom Depth (ft)	Bottom of Well Elev (ft)	Sump Length (ft)	Sump Vol (gal)	Hydro Zone Code	Geo Unit Code
1	510.0	531.1	6024.9	6003.8	21.1			541.4	5993.5	10.3	10.5	I	Tb4

Note: Brass Cap Ground Elevation: 6534.91 ft; all measurements are from this elevation



4.33 SCI-1

Location: SCI-1 is located in Sandia Canyon between intermediate wells LAOI-3.2 in Los Alamos Canyon to the north and MCOI-6 in Mortandad Canyon to the southwest.

Completion Type: Single completion in the Puye Formation fanglomerate member; the screen is located above the Cerros del Rio basalt.

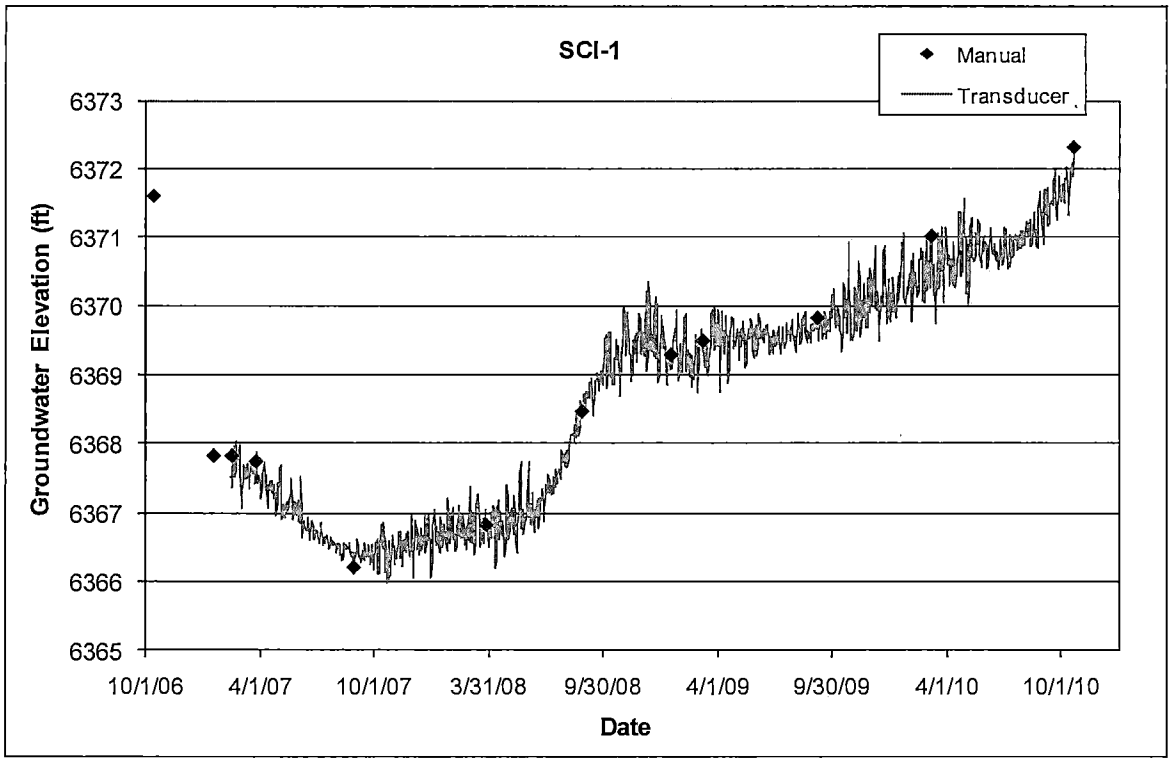
Period of Record: Well completed October 2006, transducer installed in February 2007, data through 2010.

Remarks: Originally drilled as core hole SCC-1, completed as intermediate well and named SCI-1. The well is immediately 100% barometrically efficient; however the groundwater shows a delayed response to atmospheric pressure fluctuations.

SCI-1 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	358.4	377.9	6379.9	6360.4	19.5	376.0	6362.3	377.9	6360.4	377.9	0.0	0.0	I	Tpf

Note: Brass Cap Elevation: 6738.27 ft; all measurements are from this elevation



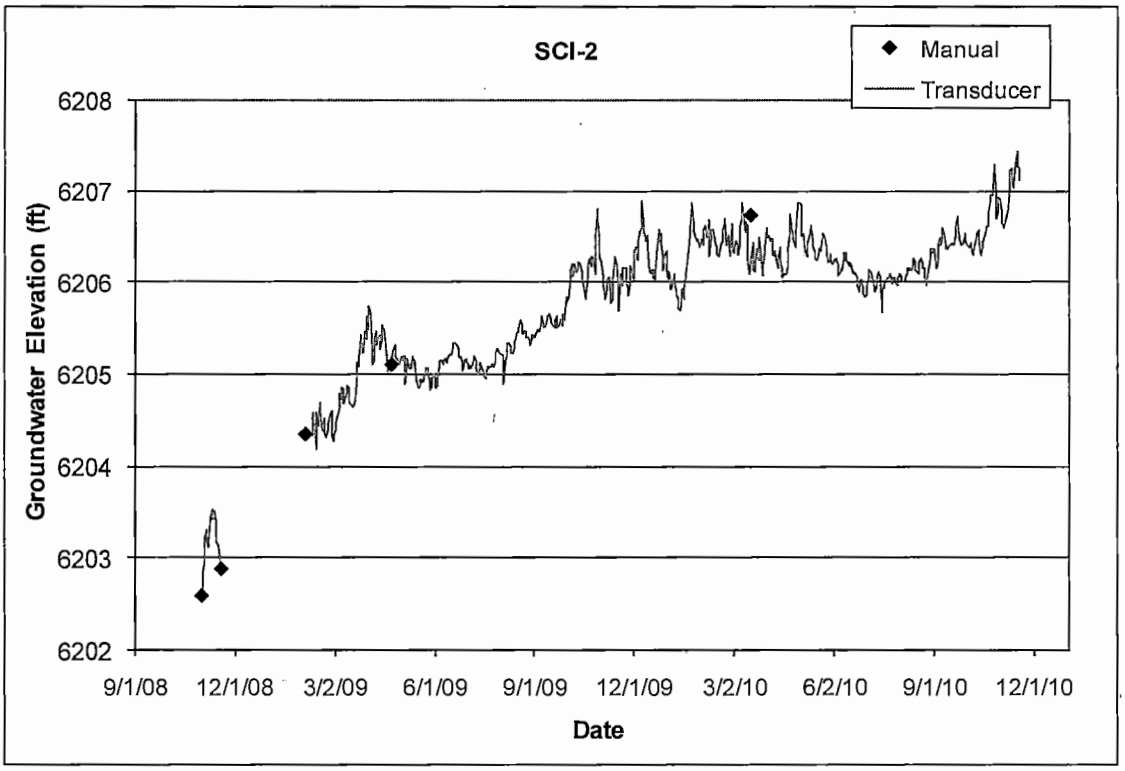
4.34 SCI-2

Location: SCI-2 is located in middle Sandia Canyon adjacent to regional monitoring well R-43.
Completion Type: Single completion in an intermediate perched zone in the Cerros del Rio basalt.
Period of Record: Well completed August 2008, temporary transducer installed November 2008 for R-42 and R-43 aquifer testing; dedicated Bennett pump and transducer installed February 10, 2009; data through 2010.
Remarks: The initial groundwater elevation at completion of the well was 6221.4 ft; subsequent measurements have been about 15 ft lower. The well is 100% barometrically efficient, the groundwater does not respond to atmospheric pressure fluctuations; however, the groundwater shows a delayed response to atmospheric pressure fluctuations.

SCI-2 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	548.0	568.0	6187.7	6167.7	20.0	548.7	6187.0	568.0	6167.7	570	2.0	0.2	I	Tb4

Note: Brass Cap Elevation: 6735.70 ft; all measurements are from this elevation



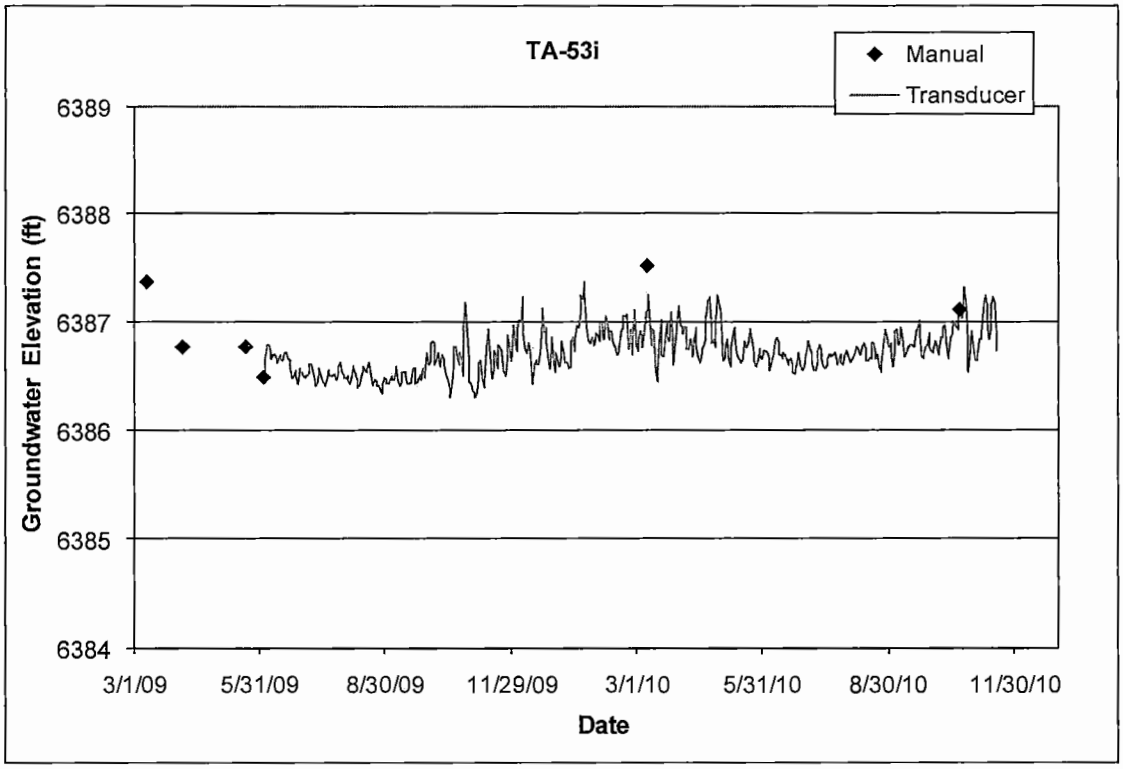
4.35 TA-53i

Location: TA-53i is located on Mesita de Los Alamos at TA-53 about 1400 ft northwest of SCI-1.
Completion Type: Single completion in a perched intermediate zone in the Puye fanglomerates just above the Cerros del Rio basalt.
Period of Record: Well completed March 2009, transducer installed June 2009; data through 2010.
Remarks: The well is 100% barometrically efficient, the groundwater has no immediate response to atmospheric pressure fluctuations; however, the aquifer shows a delayed response to atmospheric pressure fluctuations.

TA-53i Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	600.0	610	6387.2	6377.2	10.0	610.8	6376.4	610.0	6377.2	620.8	10.8	41.7	I	Tpf

Note: Brass Cap Elevation: 6987.17 ft; all measurements are from this elevation



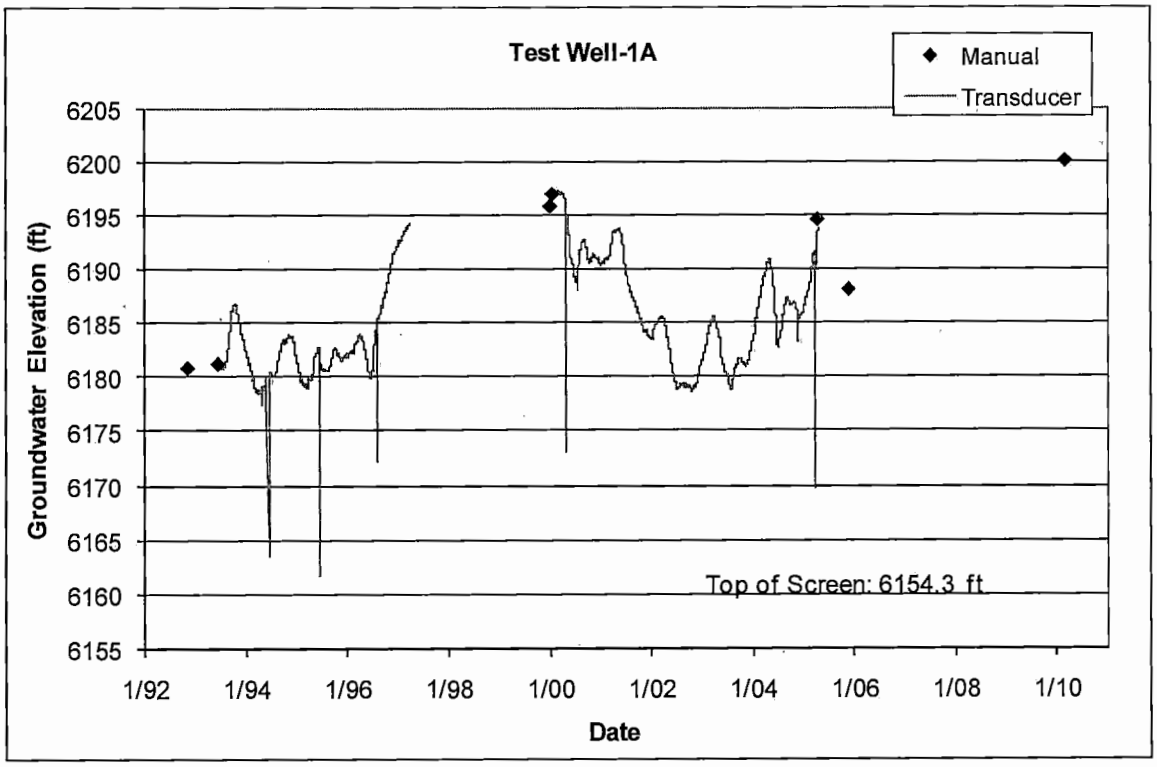
4.36 Test Well 1A

Location: TW-1A is located in lower Pueblo Canyon adjacent to TW-1.
Completion Type: Single completion in Cerros del Rio basalt.
Period of Record: Well completed in 1950, transducer installed June 1993, intermittent data to April 2005 when problems were encountered with equipment and the transducer was removed from the well.
Remarks: The wellhead equipment was removed from the well in February 2006 in preparation for plugging and abandonment of the well. The well was plugged and abandoned March 15, 2010 (LANL April 2010).

TW-1A Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	215.0	225	6154.3	6144.3	10.0	None	None	225.0	6144.3	225	0.0	0.0	I	Tb4

Note: TW-1A Ground Elevation: 6369.28 ft; all measurements are from this elevation



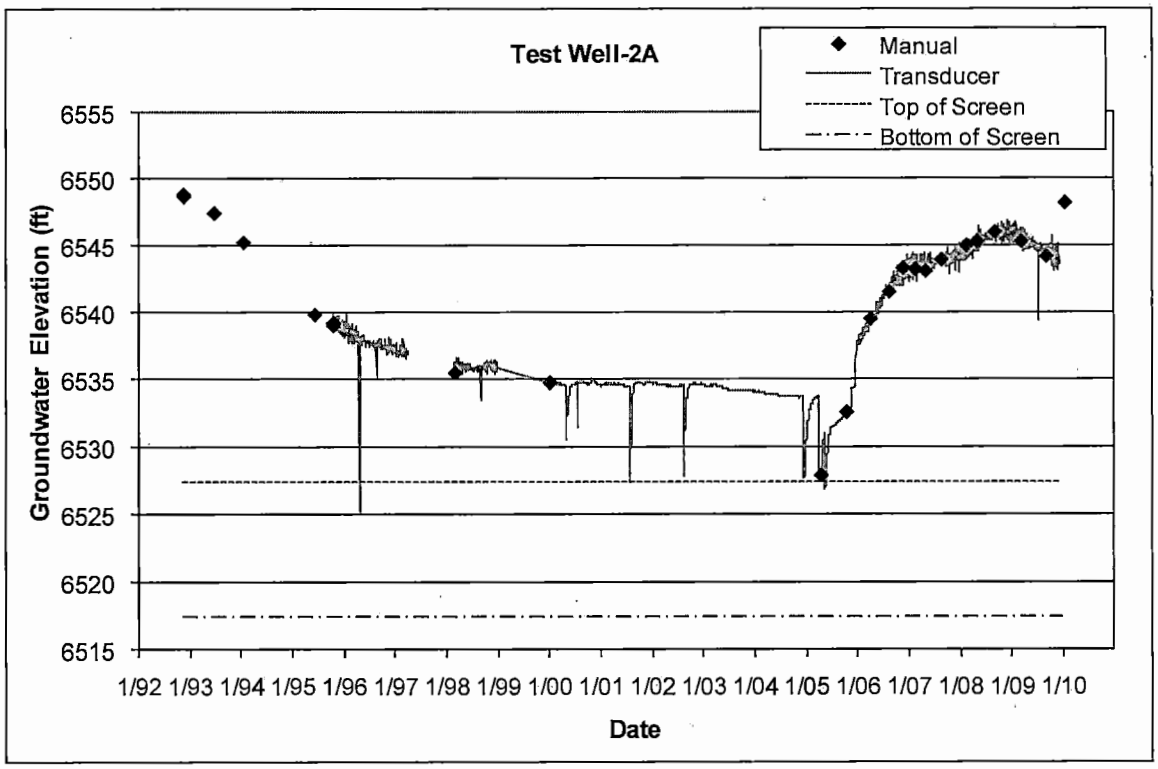
4.37 Test Well 2A

Location: TW-2A is located in middle Pueblo Canyon adjacent to TW-2.
Completion Type: Single completion in the Puye Formation.
Period of Record: Well completed in 1950, transducer installed January 1994 but equipment problems preclude data until 1995; intermittent data through 2009.
Remarks: Recent pumping of TW-2A when the water level is below 6535 ft has shown slow recovery of the intermediate groundwater. The well was plugged and abandoned February 8, 2010 (LANL March 2010).

TW-2A Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	123.0	133.0	6527.4	6517.4	10.0	130.0	6520.4	133.0	6517.4	133.0	0.0	0.0	I	Tp

Note: TW-2A Ground Elevation: 6650.4 ft; all measurements are from this elevation



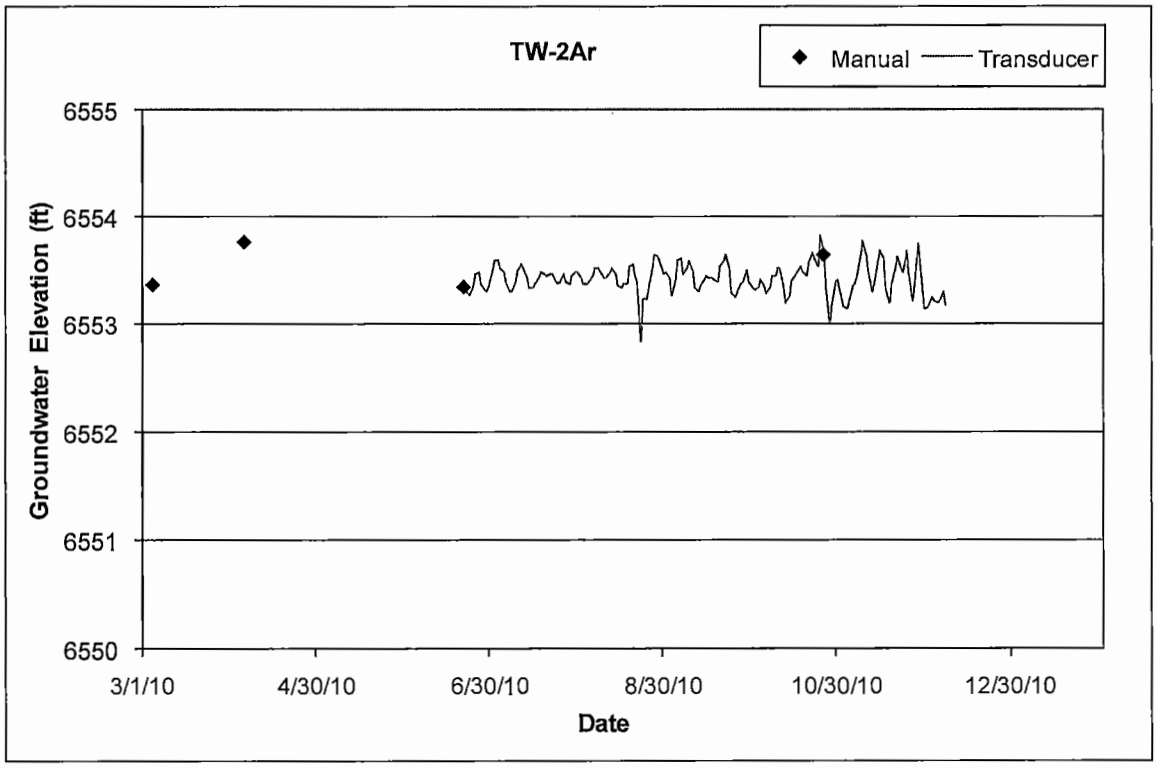
4.38 TW-2Ar

Location: TW-2Ar is located in middle Pueblo Canyon adjacent to former wells TW-2 and TW-2A.
Completion Type: Single completion in the Puye Formation.
Period of Record: Well completed March 4, 2010, transducer installed June 22, 2010; transducer data through 2010.
Remarks: TW-2Ar is a replacement well for former well TW-2A. The perched intermediate groundwater level is about 3 ft above the top of the screen. The well is 100% barometrically efficient, the groundwater does not indicate an immediate response to atmospheric pressure fluctuations; however, the groundwater shows a delayed response to atmospheric pressure fluctuations.

TW-2Ar Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Hydro Zone Code	Geo Unit Code
1	102.0	112.0	6549.7	6539.7	10.0	110.2	6541.5	112.0	6539.7	113.9	1.9	I	Tpf

Note: TW-2Ar Brass cap elevation: 6651.67 ft; all measurements are from this elevation



5.0 Groundwater Level Data from Alluvial Wells

Table 5-1 lists the alluvial wells that were monitored for groundwater levels in 2010. The table provides the well name, date of completion, well depth, surveyed location coordinates, ground surface elevation, and the screen top and bottom depths for each well. Figure 5-1 shows the locations of the wells. In the following alluvial groundwater sections, the first hydrograph for each well represents the entire period of record, while the second hydrograph represents groundwater level data for recent years. Alluvial groundwater levels respond to snowmelt runoff, storm runoff, and, in some canyons, effluent discharges. Some alluvial wells have been historically dry and do not show a seasonal response to precipitation and runoff.

Table 5-1. Information and Location Data for Alluvial Aquifer Wells at LANL

Well Name	Date Completed	Completed Depth (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Screen Top Depth (ft)	Screen Bottom Depth (ft)
18-BG-1	08/01/94	35.0	1634152.90	1762575.36	6776.45	10.0	35.0
18-MW-11	08/11/94	47.0	1636001.69	1761139.83	6740.13	27.0	47.0
18-MW-18	07/31/95	23.0	1639925.00	1758247.20	6654.70	12.5	23.0
18-MW-8	08/04/94	37.9	1634714.26	1760658.14	6747.79	8.0	38.0
18-MW-9	07/21/94	21.0	1635949.81	1760893.56	6732.91	6.0	21.0
3MAO-2	06/04/08	30.0	1633782.48	1760716.45	6759.44	14.7	24.7
APCO-1	08/15/90	19.7	1649209.62	1773020.12	6367.53	4.7	14.7
CDBO-1	04/17/85	13.0	1637968.59	1760943.96	6757.60	5.1	13.1
CDBO-2	04/18/85	18.0	1638119.02	1761103.11	6748.20	5.9	17.9
CDBO-3	04/18/85	12.0	1640677.11	1759611.02	6670.20	4.4	12.4
CDBO-4	04/18/85	12.0	1645474.90	1758546.90	6564.50	4.1	12.1
CDBO-5	06/01/92	17.0	1633583.37	1765818.37	6879.01	7.0	17.0
CDBO-6	06/01/92	49.0	1636209.25	1764759.75	6817.20	34.0	44.0
CDBO-7	06/01/92	44.0	1637400.00	1763301.00	6771.81	29.0	39.0
CDBO-8	06/01/92	23.0	1639294.00	1762366.00	6722.47	3.0	13.0
CDBO-9	06/01/92	34.0	1642119.12	1759702.87	6633.00	19.0	29.0
CDV-16-02655	09/27/97	7.6	1611299.09	1764153.13	7583.70	2.3	7.3
CDV-16-02656	11/05/97	8.2	1613634.46	1764932.79	7443.18	3.0	8.0
CDV-16-02657	10/10/97	5.7	1613813.19	1764850.10	7433.25	0.4	5.4
CDV-16-02658	09/16/97	7.2	1615071.38	1764469.56	7375.60	1.9	6.9
CDV-16-02659	09/08/97	7.0	1616712.08	1765035.06	7300.50	1.7	6.7
CDV-16-611921	02/02/10	12.3	1615097.97	1764439.62	7378.85	6.3	11.3
CDV-16-611923	02/02/10	8.7	1615123.85	1764472.96	7373.83	3.2	8.2
CDV-16-611929	02/02/10	13.3	1615128.56	1764419.45	7378.38	7.0	12.0
CDV-16-611930	02/02/10	13.0	1615131.25	1764435.40	7377.54	7.0	12.0
CDV-16-611931	02/02/10	12.0	1615139.60	1764460.06	7374.18	5.0	10.0
CDV-16-611938	02/02/10	8.5	1615492.23	1764529.67	7356.25	3.0	8.0
FCO-1	08/22/89	12.4	1642414.82	1751181.06	6510.13	2.4	12.4
FLC-16-25278	10/10/05	3.2	1618820.88	1762605.72	7272.20	1.6	3.2
FLC-16-25279	10/10/05	4.3	1617679.48	1762856.43	7309.30	2.7	4.3
FLC-16-25280	10/10/05	4.2	1616646.29	1763365.10	7352.90	2.6	4.2
LAO-0.3	05/17/94	11.3	1624799.00	1774511.60	6968.13	5.9	10.9
LAO-0.6	05/06/94	13.4	1626748.10	1774332.90	6910.74	8.0	13.0
LAO-1	02/01/96	28.0	1629395.00	1773956.37	6836.24	8.0	28.0
LAO-1.6G	03/20/96	30.8	1636083.42	1772557.63	6658.01	10.5	25.5

Well Name	Date Completed	Completed Depth (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Screen Top Depth (ft)	Screen Bottom Depth (ft)
LAO-1.8	04/15/69	18.0	1635446.25	1772661.37	6680.00	8.0	18.0
LAO-2	02/01/96	32.0	1637607.75	1773095.87	6623.00	7.0	32.0
LAO-3A	09/14/89	14.7	1637980.87	1773099.75	6609.10	4.7	14.7
LAO-4.5C	11/01/89	23.3	1643547.37	1772076.50	6486.50	13.3	23.3
LAO-5	02/15/66	25.0	1646202.25	1771424.12	6427.10	5.0	25.0
LAO-6a	08/01/89	14.2	1646221.62	1771344.00	6424.70	4.2	14.2
LAO-B	04/28/94	27.2	1615148.80	1775170.40	7323.59	11.8	26.8
LAUZ-1		10.6	1633435.13	1774809.81	7032.42	5.4	10.4
LLAO-1b	07/16/97	24.2	1659738.70	1772381.65	5850.34	11.3	21.3
LLAO-4	09/30/96	18.1	1671820.23	1774468.01	5515.46	5.2	15.2
MCA-1	01/24/05	5.9	1626586.50	1770410.77	7070.60	2.4	5.4
MCA-5	02/01/05	6.0	1627354.17	1770233.59	7053.80	1.8	5.8
MCA-8	09/29/04	86.3	1641325.48	1767372.92	6668.80	66.0	81.0
MCO-0.6	02/25/99	3.1	1623987.80	1771179.50	7188.28	1.1	3.1
MCO-2	11/01/60	9.0	1625919.25	1770135.12	7136.60	2.0	9.0
MCO-3	03/01/67	12.0	1627362.50	1770236.75	7052.60	2.0	12.0
MCO-4B	08/01/90	33.9	1632036.37	1769697.00	6886.75	8.9	28.9
MCO-5	10/01/60	46.0	1632466.12	1769538.00	6875.66	21.0	46.0
MCO-6	03/01/74	47.0	1633635.37	1769012.75	6849.48	27.0	47.0
MCO-7	10/01/60	69.0	1634517.87	1768509.87	6827.31	39.0	69.0
MCO-7.5	04/01/74	60.0	1635454.87	1768440.50	6808.88	35.0	60.0
MCWB-5	12/06/94	33.0	1632578.31	1769484.60	6876.22	17.0	27.0
MCWB-5.5B	12/22/94	37.5	1633420.54	1769125.78	6856.89	22.5	32.5
MCWB-6.2A	12/07/94	45.5	1633754.49	1768968.15	6848.29	30.5	40.5
MCWB-6.5E	12/21/94	50.0	1633833.36	1768583.81	6843.80	35.0	45.0
MCWB-7.4B	12/13/94	70.0	1635287.73	1768407.84	6813.07	45.0	65.0
MCWB-7.7B	12/20/94	70.0	1635921.84	1768517.26	6798.97	55.0	65.0
MCWB-7A	12/09/94	52.0	1634356.62	1768551.02	6831.17	37.0	47.0
MSC-16-06293	01/27/00	7.3	1615809.67	1761331.78	7370.79	2.0	7.0
MSC-16-06294	01/26/00	7.6	1617848.17	1761298.78	7288.44	2.5	7.3
MSC-16-06295	01/31/00	6.9	1618630.67	1761004.78	7257.03	1.5	6.5
MT-2	11/01/88	64.0	1636019.79	1768544.59	6796.20	44.0	64.0
MT-3	11/01/88	74.0	1635980.95	1768657.83	6796.65	44.0	64.0
MT-4	11/01/88	74.0	1636558.75	1768634.37	6783.59	54.0	64.0
PAO-1	10/30/98	13.7	1624165.85	1778988.72	6954.97	5.9	10.9
PAO-2	11/02/98	13.9	1625040.90	1778710.00	6930.98	6.1	11.1
PAO-4	07/24/97	9.8	1646090.28	1775098.35	6437.37	2.0	7.0
PCAO-5	05/03/08	30.0	1627159.64	1765953.14	6943.29	14.7	24.7
PCAO-6	06/05/08	20.0	1627610.36	1765888.72	6921.40	8.0	15.0
PCAO-7a	05/30/08	25.0	1636938.56	1760549.16	6711.97	9.7	19.7
PCAO-7b1	05/21/08	60.0	1636831.47	1760490.10	6713.62	44.0	54.0
PCAO-7b2	05/27/08	25.0	1636846.45	1760481.06	6713.39	10.0	20.0
PCAO-7c	05/16/08	25.0	1636706.72	1760335.39	6714.57	9.7	19.7
PCAO-8	06/02/08	25.0	1643865.52	1756372.09	6584.45	9.7	19.7
PCAO-9	06/12/08	21.0	1645540.81	1755980.24	6558.60	6.0	16.0

Well Name	Date Completed	Completed Depth (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Screen Top Depth (ft)	Screen Bottom Depth (ft)
PCO-2	06/30/85	9.5	1641700.37	1757442.75	6618.30	1.5	9.5
PCO-3	06/30/85	17.7	1646088.62	1755489.37	6546.30	5.7	17.7
SCA-1	08/25/06	2.1	1622482.45	1773264.59	7211.22	1.3	1.9
SCA-1-DP	02/18/09	2.7	1622482.45	1773264.59	7211.20	2.2	2.7
SCA-2	08/24/06	15.6	1636114.63	1770283.36	6749.08	10.3	15.0
SCA-3	09/09/06	32.6	1637200.62	1769918.81	6723.22	27.6	32.0
SCA-4	09/10/06	42.0	1638260.55	1769567.21	6703.58	37.0	41.5
SCA-5	09/11/06	64.9	1639878.16	1769726.40	6669.02	55.0	64.4
SCP-1abc	09/12/06	41.8	1638254.68	1769567.80	6703.65	39.4	39.9
SCP-1abc	09/12/06	41.8	1638254.68	1769567.80	6703.65	41.2	41.7
SCP-1abc	09/12/06	41.8	1638254.68	1769567.80	6703.65	37.8	38.3
SCP-2a	09/13/06	45.1	1637209.65	1769911.26	6722.95	44.5	45.0
SCP-2b	09/12/06	50.1	1637205.05	1769914.53	6723.11	49.5	50.0
TMO-1	06/09/08	6.5	1626830.56	1766161.13	6945.20	3.5	6.5
TSCA-6	11/09/04	21.3	1632954.60	1768471.44	6863.20	16.2	20.9
WCO-1r	12/22/09	16.4	1632736.78	1755106.26	6617.12	6.0	16.0
WCO-2	10/26/89	23.5	1636870.37	1753228.37	6524.57	13.5	23.5
WCO-3r	12/22/09	10.1	1640114.87	1750476.65	6437.17	4.7	9.7

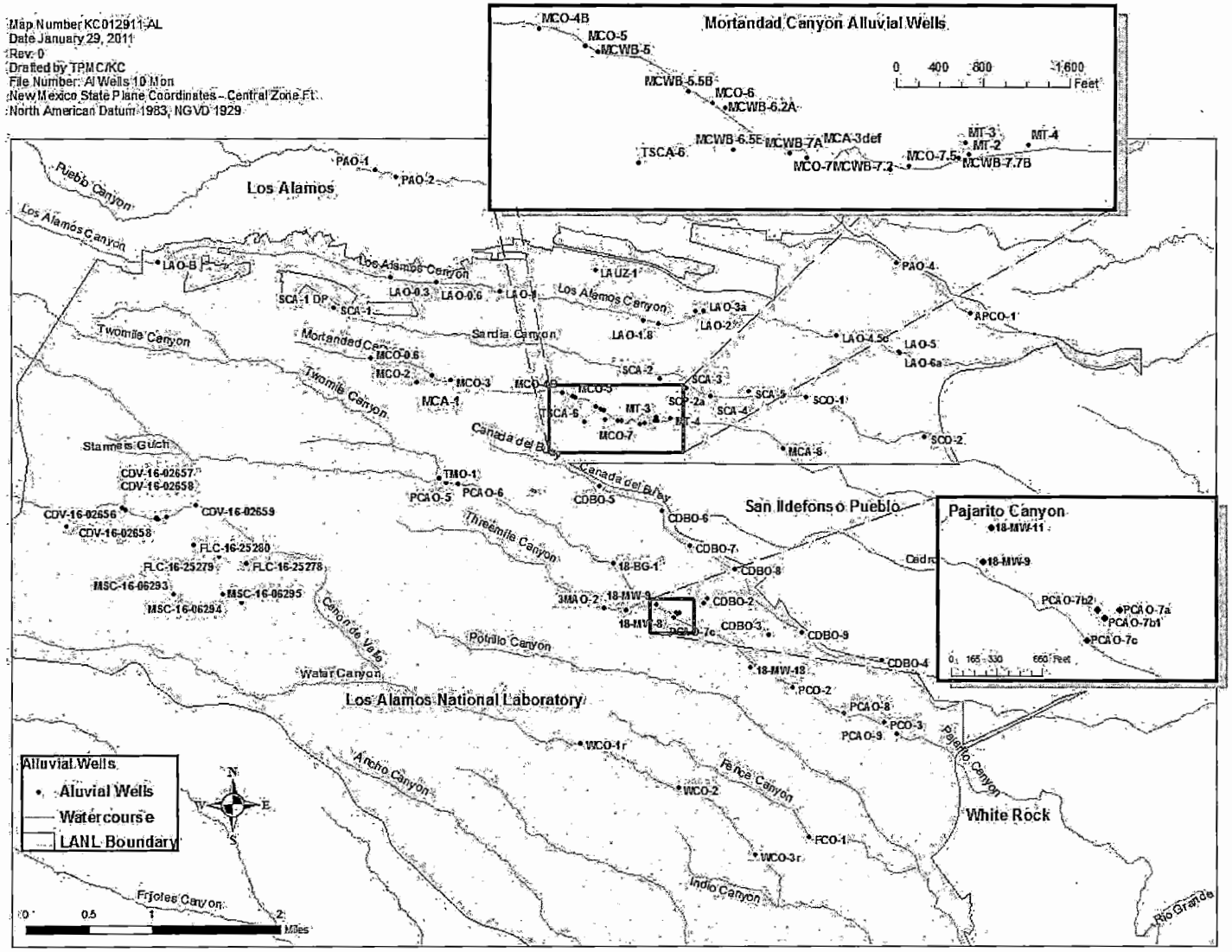


Figure 5-1. Alluvial wells monitored for groundwater levels in 2010.

5.1 Previously Monitored Alluvial Wells:

The following wells have not been monitored since at least December 2008. For information on these wells, refer to the "Groundwater Level Status Report for 2009."

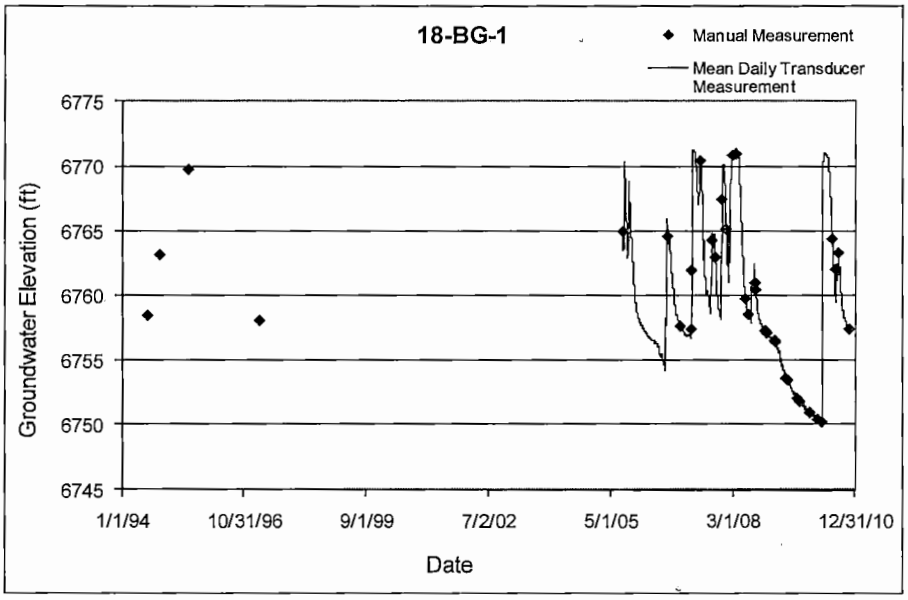
Previously Monitored Wells	
Well	**Date Monitoring Ceased**
18-BG-4	12/1/2008
18-MW-7	12/18/2006
18-MW-17	9/30/2007
MCA-2	11/28/2007
MCA-3abcdef	11/28/2007
MCA-4	11/29/2007
MCA-9	11/29/2007
MT-1	11/27/2007
PCO-1	5/7/2008
TSWB-6	2/7/2008

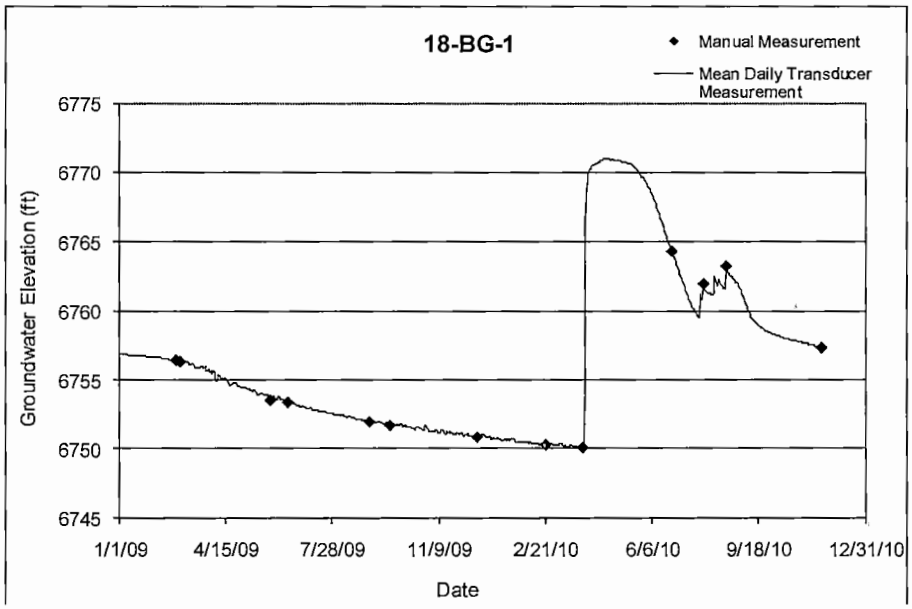
5.2 18-BG-1

Location: Lower Pajarito Canyon, about 0.4 mi west of the TA-18 facilities.
Period of Record: August 1, 1994, through November 18, 2010.
Remarks: None.

18-BG-1 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	10.0	35.0	6766.5	6741.5	25.0			35.0	6741.5	35	0.0	0.0	Alluvial groundwater

Note: Ground Elevation: 6776.45 ft; all depths are from this elevation



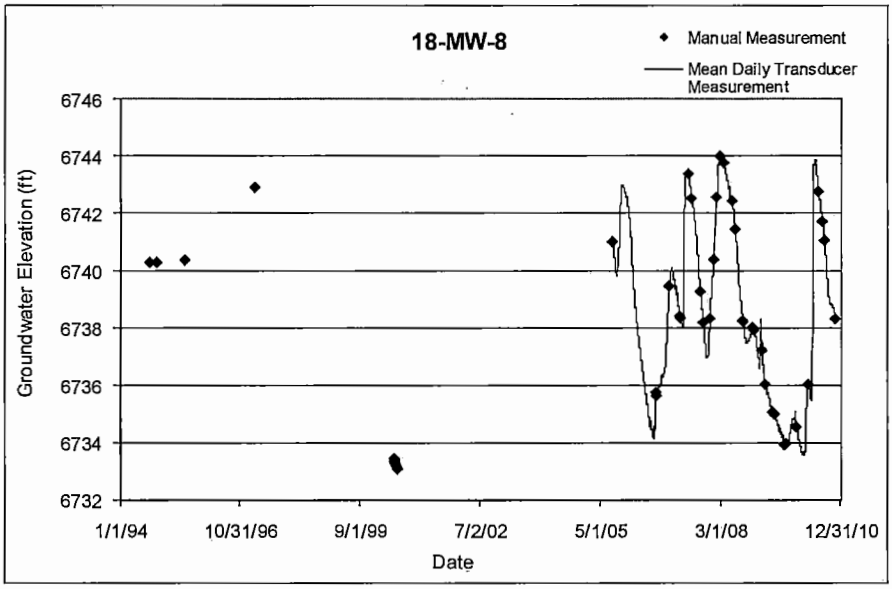


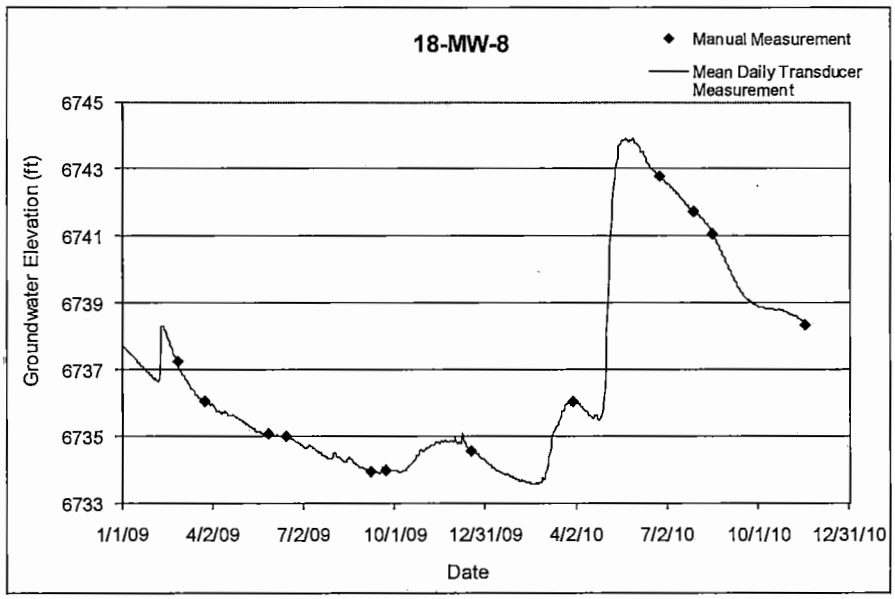
5.3 18-MW-8

Location: In Three-Mile Canyon above the confluence with Pajarito Canyon, about 0.1 mi west of the TA-18 facilities.
Period of Record: September 15, 1994, through November 18, 2010.
Remarks: None.

18-MW-8 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	8.0	38.0	6739.8	6709.8	30.0			38.0	6709.8	38.0	0.0	0.0	Alluvial groundwater

Note: Ground Elevation: 6747.79 ft; all depths are from this elevation





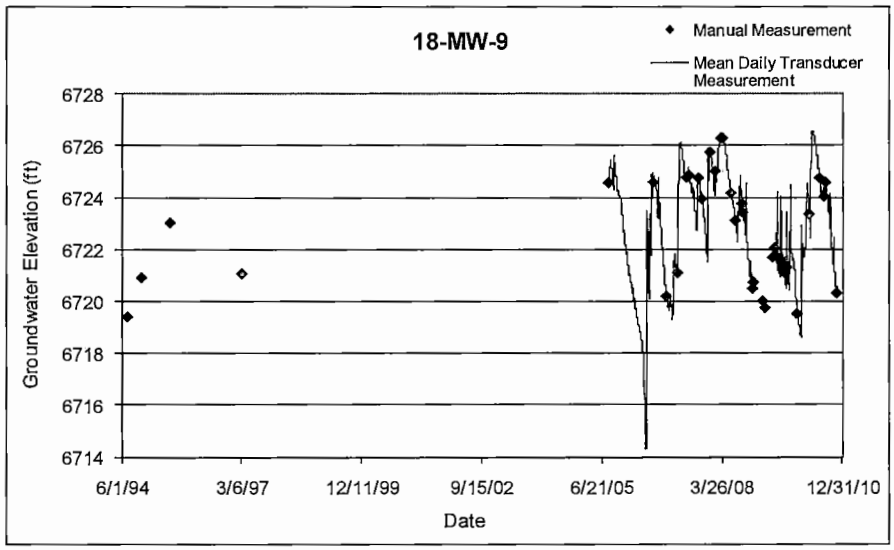
5.4 18-MW-9

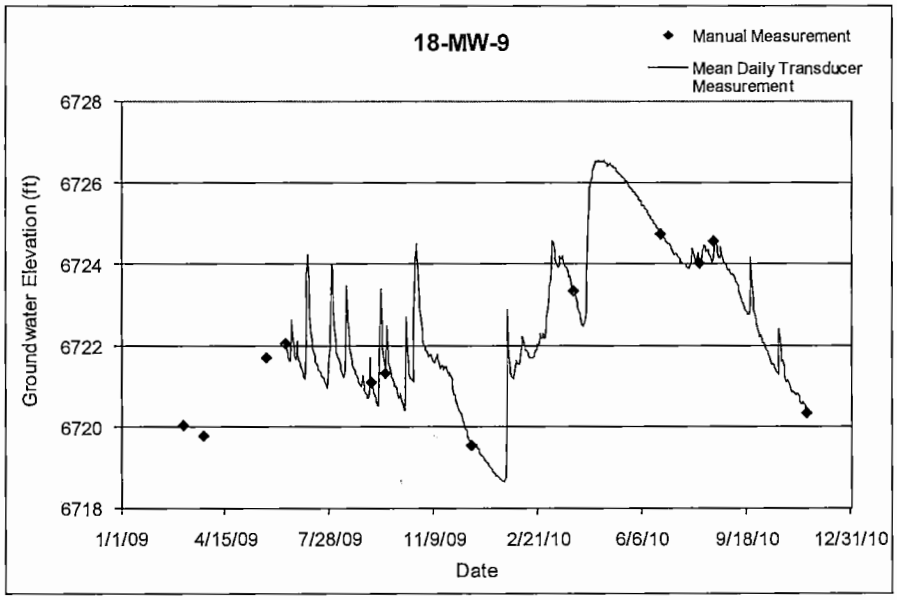
Location: Pajarito Canyon, directly south of the main guard gate to TA-18.
Period of Record: July 21, 1994, through November 18, 2010.
Remarks: Data gap from December 2008 through April 2010 resulted from a succession of malfunctioning transducers.

18-MW-9 Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	6.0	21.0	6726.9	6711.9	15.0			21.0	6711.9	21	0.0	0.0	Alluvial groundwater

Note: Ground Elevation: 6732.91 ft; all depths are from this elevation





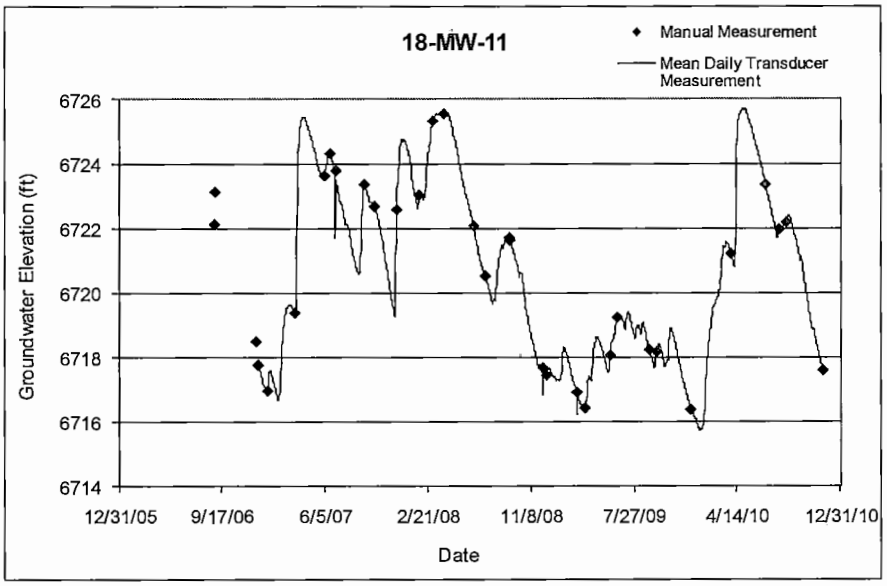
5.5 18-MW-11

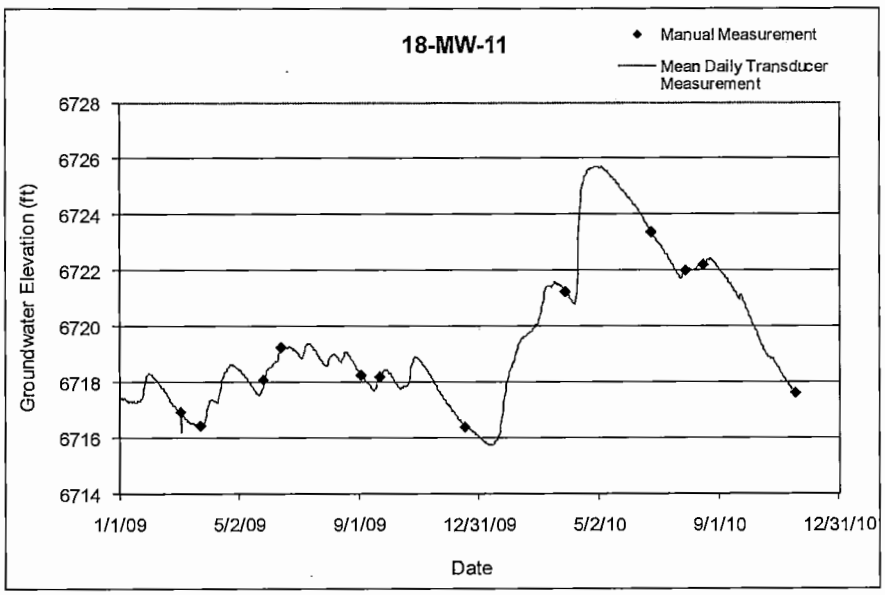
Location: Pajarito Canyon, approximately 200 ft north of 18-MW-9 in the TA-18 parking lot.
Period of Record: August 29, 2006, through November 18, 2010.
Remarks: None.

18-MW-11 Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	27.0	47.0	6713.1	6693.1	20.0			47.0	6693.1	0	0.0	0.0	Alluvial Groundwater

Note: Ground Elevation: 6740.13 ft; all measurements are from this elevation



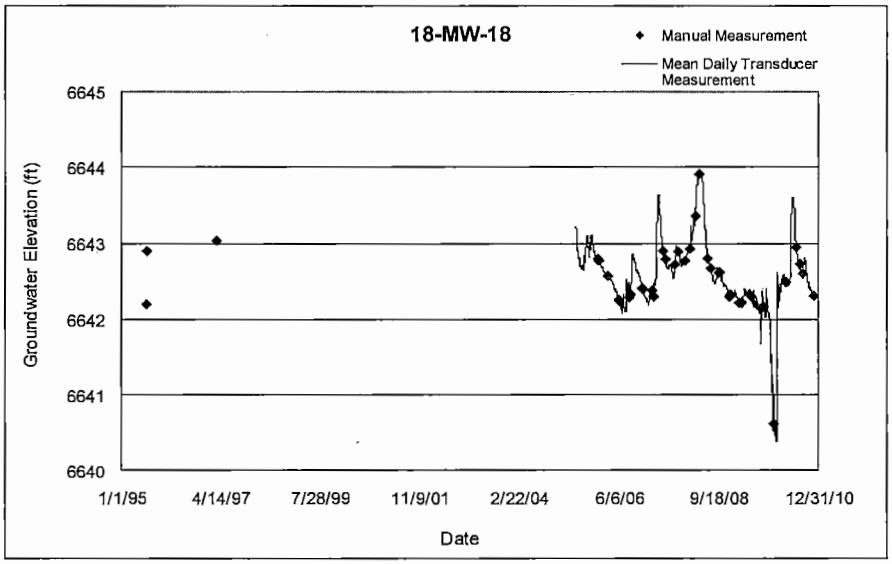


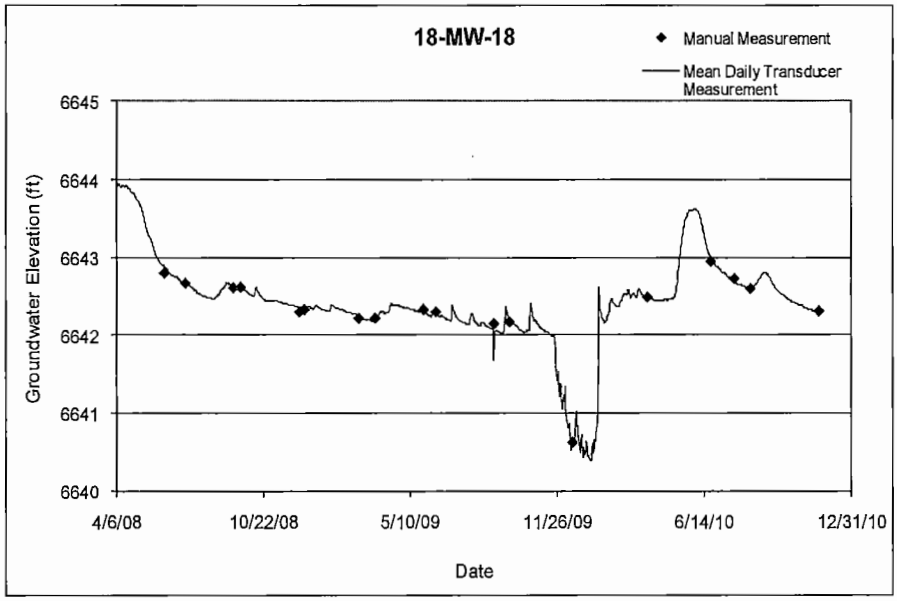
5.6 18-MW-18

Location: Alluvial well 18-MW-18 is located in Pajarito Canyon, 1000 ft east of 18-MW-17.
Period of Record: July 31, 1995, through November 18, 2010.
Remarks: None.

18-MW-18 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	12.5	23	6642.2	6631.7	10.5			23	6631.7	23	0	0	Alluvial groundwater

Note: Ground Elevation: 6654.7 ft; all depths are from this elevation



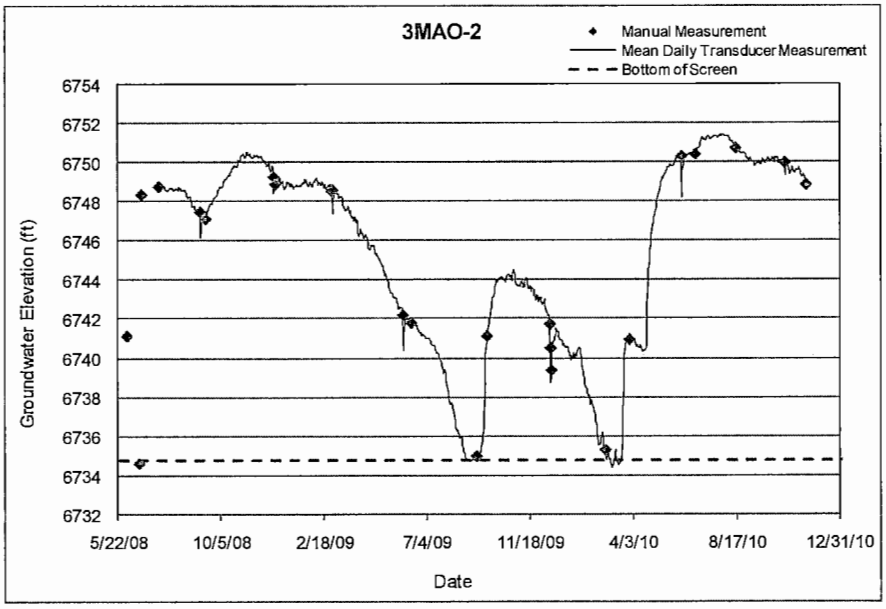


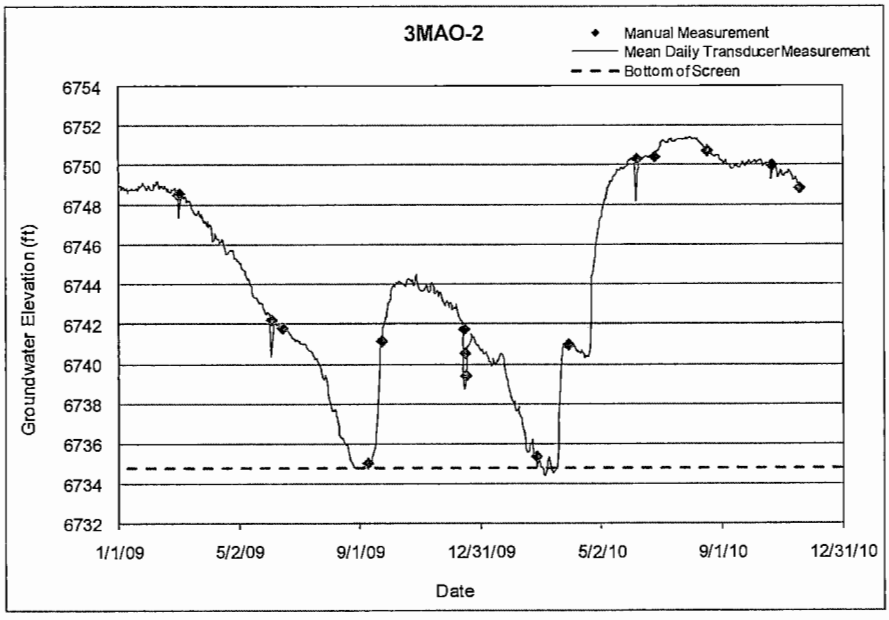
5.7 3MAO-2

Location: In lower Three-Mile Canyon in TA-18, just above the confluence with Pajarito Canyon, on the south bank of the stream; located roughly half way between 18-BG-4 and 18-MW-18.
Period of Record: June 4, 2008, through November 18, 2010.
Remarks: None.

3MAO-2 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	14.7	24.7	6744.7	6734.7	10.0			24.7	6734.7	30.0	5.3	13.1	Alluvial groundwater

Note: Ground elevation is 6759.44 ft; all depths from this elevation





5.8 39-UM-3

Location: Ancho Canyon, TA-39, approximately 2100 ft north of regional well R-31.
Period of Record: March 9, 2006, through July 2, 2009.
Remarks: Well has historically been dry during quarterly manual measurements. There was no transducer installed in this well. Monitoring was discontinued in August 2009.

39-UM-3 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	44.0	54.0	6350.2	6340.2	10.0			54.0	6340.2	54.0	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 6394.20 ft; all depths are from this elevation

39-UM-3 Manual Water Levels	
Date	Comments
3/9/2006	Dry
6/13/2006	Dry
9/7/2006	Dry
11/30/2006	Dry
12/12/2006	Dry
3/15/2007	Dry
5/10/2007	Dry
6/6/2007	Dry
9/5/2007	Dry
11/1/2007	Dry
1/16/2008	Dry
4/7/2008	Dry
7/26/2008	Dry
10/15/2008	Dry
3/31/2009	Dry
7/2/2009	Dry

5.9 39-DM-6

Location: Ancho Canyon, TA-39, approximately 1600 ft north of regional well R-31.
Period of Record: March 9, 2006, through July 2, 2009.
Remarks: Well has historically been dry during quarterly manual measurements. There was no transducer installed in this well. Monitoring was discontinued In August 2009.

39-DM-6 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	50.0	60.0	6334.6	6324.6	10.0			60.0	6324.6	60.0	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 6384.57 ft; all depths are from this elevation

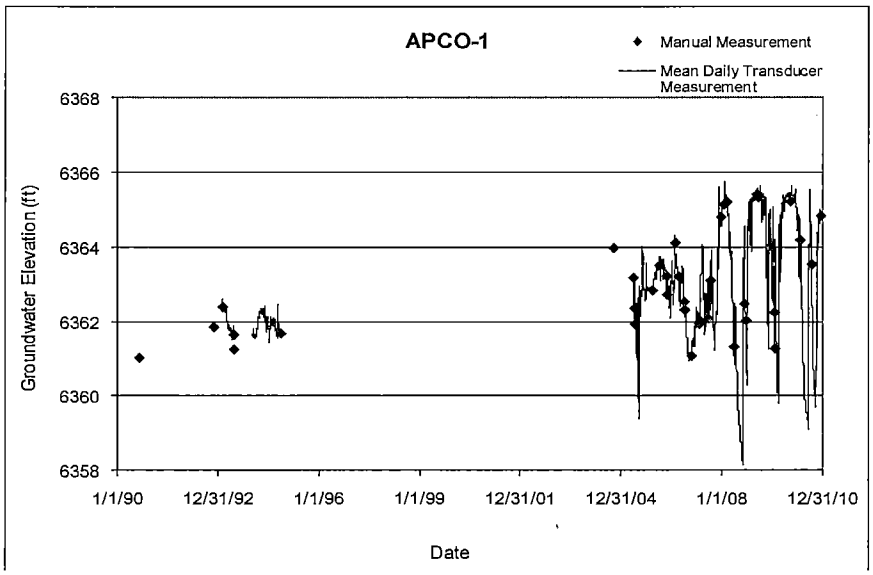
39-DM-6 Manual Water Levels	
Date	Comment
3/9/2006	Dry
6/13/2006	Dry
9/7/2006	Dry
11/30/2006	Dry
12/12/2006	Dry
3/15/2007	Dry
5/10/2007	Dry
6/6/2007	Dry
9/5/2007	Dry
11/1/2007	Dry
1/16/2008	Dry
4/7/2008	Dry
7/26/2008	Dry
10/15/2008	Dry
3/31/2009	Dry
7/2/2009	Dry

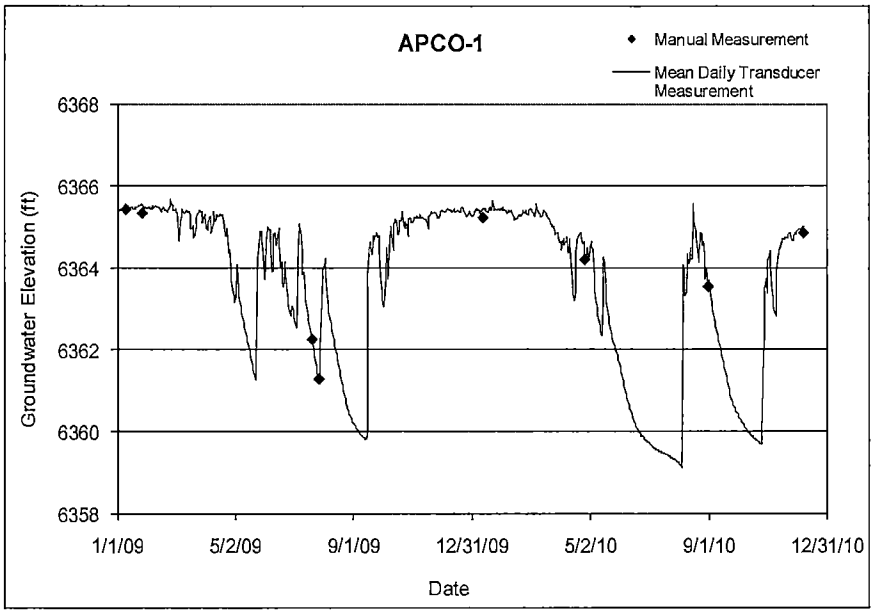
5.10 APCO-1

Location: In lower Pueblo Canyon, approximately 0.1 mi north of POI-4 and R-3i.
Period of Record: August 17, 1990, through December 18, 2010.
Remarks: A pressure transducer was installed in APCO-1 from February 17, 1993, through June 17, 1993; from January 11, 1994, through November 9, 1994; and from May 9, 2005, through present.

APCO-1 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	4.7	14.7	6362.83	6352.83	10.0			14.7	6352.83	19.7	5.0	3.1	Alluvial groundwater

Note: Ground Elevation: 6367.53 ft; all depths are from this elevation





5.11 CDBO-1

Location: Alluvial well CDBO-1 is located in Cañada del Buey, approximately 1320 ft north of regional well R-20.

Period of Record: March 8, 2006, through June 25, 2010.

Remarks: Well has historically been dry during quarterly measurements. There was no transducer installed in this well. Monitoring was discontinued June 25, 2010.

CDBO-1 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	5.1	13.1	6752.5	6744.5	8.0			13.1	6744.5	13.0	0.1	0.2	Alluvial groundwater

Note: Ground elevation is 6757.6 ft; all depths are from this elevation

CDBO-1 Manual Water Levels	
Date	Comments
3/8/2006	Dry
6/26/2006	Dry
9/6/2006	Dry
9/27/2006	Dry
12/8/2006	Dry
2/22/2007	Dry
3/19/2007	Dry
6/5/2007	Dry
6/11/2007	Dry
9/10/2007	Dry
1/24/2008	Dry
2/11/2008	Dry
4/1/2008	Dry
5/22/2008	Dry
7/24/2008	Dry
8/11/2008	Dry
11/3/2008	Dry
2/3/2009	Dry
4/27/2009	Dry
8/25/2009	Dry
6/25/2010	Dry

5.12 CDBO-2

Location: Alluvial well CDBO-2 is located in Cañada del Buey, approximately 260 ft northeast of CDBO-1.

Period of Record: March 8, 2006, through June 25, 2010.

Remarks: Well has historically been dry during quarterly measurements. There was no transducer installed in this well. Monitoring was discontinued June 25, 2010.

CDBO-2 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	5.9	17.9	6742.3	6730.3	12.0			17.9	6730.3	18.0	0.1	0.2	Alluvial groundwater

Note: Ground elevation is 6748.2 ft; all depths are from this elevation

CDBO-2 Manual Water Levels	
Date Time	Comments
3/8/2006	Dry
6/26/2006	Dry
9/6/2006	Dry
9/27/2006	Dry
12/8/2006	Dry
2/22/2007	Dry
3/19/2007	Dry
6/5/2007	Dry
6/11/2007	Dry
6/11/2007	Dry
9/10/2007	Dry
1/24/2008	Dry
2/11/2008	Dry
4/1/2008	Dry
5/22/2008	Dry
7/24/2008	Dry
8/11/2008	Dry
11/3/2008	Dry
2/3/2009	Dry
4/27/2009	Dry
8/25/2009	Dry
6/25/2010	Dry

5.13 CDBO-3

Location: Alluvial well CDBO-3 is located in Cañada del Buey, approximately 630 ft northwest of regional well R-21.

Period of Record: December 6, 2005, through June 25, 2010.

Remarks: Well has historically been dry during quarterly measurements. There was no transducer installed in this well. Monitoring was discontinued June 25, 2010.

CDBO-3 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	4.4	12.4	6665.8	6657.8	8.0			12.4	6657.8	12.0	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 6670.2 ft; all depths are from this elevation

CDBO-3 Manual Water Levels	
Date	Comments
12/6/2005	Dry
3/8/2006	Dry
6/26/2006	Dry
9/6/2006	Dry
9/27/2006	Dry
12/8/2006	Dry
2/22/2007	Dry
3/19/2007	Dry
6/5/2007	Dry
6/11/2007	Dry
9/10/2007	Dry
1/24/2008	Dry
2/11/2008	Dry
4/1/2008	Dry
5/22/2008	Dry
7/24/2008	Dry
8/11/2008	Dry
11/3/2008	Dry
2/3/2009	Dry
4/27/2009	Dry
8/25/2009	Dry
6/25/2010	Dry

5.14 CDBO-4

Location: Alluvial well CDBO-4 is located in Cañada del Buey, approximately 1600 ft north of regional well R-22.

Period of Record: December 7, 2005, through December 2, 2010.

Remarks: Well has historically been dry during quarterly measurements. A transducer was installed in this well January 9, 2009, and has not yet recorded any water in the well.

CDBO-4 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	4.1	12.1	6560.4	6552.4	8.0			12.1	6552.4	12.0	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 6564.5 ft; all depths are from this elevation

CDBO-4 Manual Water Levels	
Date	Comments
12/7/2005	Dry
3/8/2006	Dry
6/26/2006	Dry
9/6/2006	Dry
10/2/2006	Dry
12/8/2006	Dry
2/22/2007	Dry
3/19/2007	Dry
6/5/2007	Dry
6/11/2007	Dry
9/10/2007	Dry
1/24/2008	Dry
2/11/2008	Dry
4/1/2008	Dry
5/22/2008	Dry
7/24/2008	Dry
8/11/2008	Dry
11/3/2008	Dry
1/9/2009	Dry
2/3/2009	Dry
4/27/2009	Dry
7/14/2009	Dry
8/4/2009	Dry
12/14/2009	Dry
3/8/2010	Dry
6/1/2010	Dry
7/27/2010	Dry
12/2/2010	Dry

5.15 CDBO-5

Location: Alluvial well CDBO-5 is located in Cañada del Buey, approximately 0.5 mi west-northwest of CDBO-6.

Period of Record: December 7, 2005, through November 19, 2010.

Remarks: Well has historically been dry during quarterly measurements. A transducer was installed in this well January 12, 2009, and has not yet recorded any water in the well.

CDBO-5 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	7.0	17.0	6872.0	6862.0	10.0			17.0	6862.0	17.0	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 6879.01 ft; all depths are from this elevation

CDBO-5 Manual Water Levels	
Date	Comments
12/7/2005	Dry
10/2/2006	Dry
12/8/2006	Dry
2/22/2007	Dry
3/19/2007	Dry
6/5/2007	Dry
9/11/2007	Dry
1/24/2008	Dry
2/11/2008	Dry
4/1/2008	Dry
5/22/2008	Dry
7/24/2008	Dry
8/11/2008	Dry
11/3/2008	Dry
1/12/2009	Dry
2/3/2009	Dry
4/27/2009	Dry
7/14/2009	Dry
8/4/2009	Dry
12/14/2009	Dry
3/8/2010	Dry
6/1/2010	Dry
7/27/2010	Dry
11/19/2010	Dry

5.16 CDBO-6

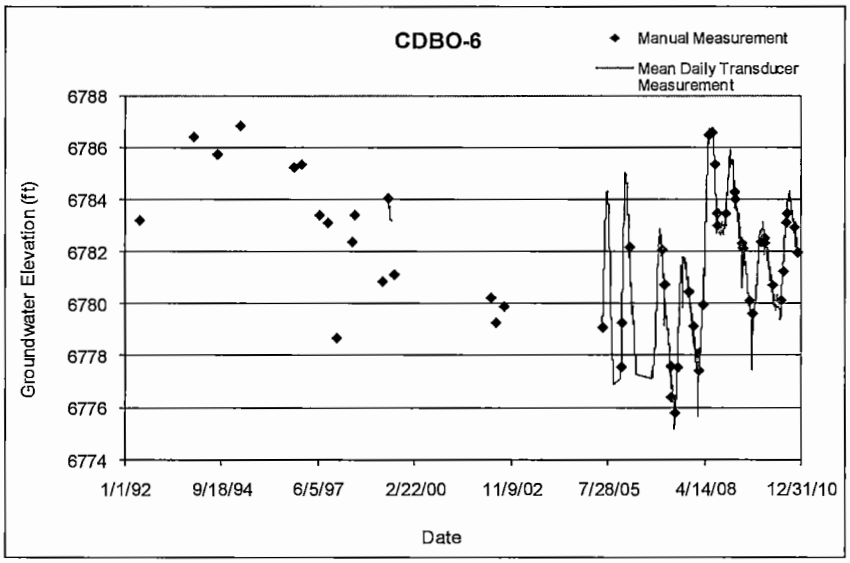
Location: In Cañada del Buey, a branch of Mortandad Canyon, approximately 420 ft east of production well PM-4.

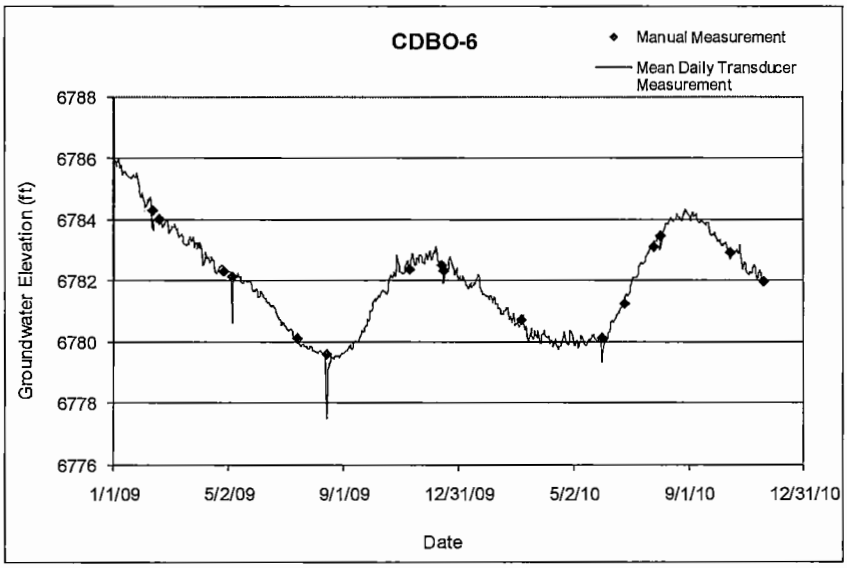
Period of Record: June 1, 1992, through November 19, 2010.

Remarks: A pressure transducer was installed above the pump until April 30, 2007, when the pump was removed from the well. Transducer data before April 30, 2007, do not represent water levels below 6776.83 ft. The dedicated pump was reinstalled November 10, 2009, and the transducer is once again located above the pump.

CDBO-6 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	34.0	44.0	6783.2	6773.2	10.0			44.0	6773.2	49.0	5.0	3.1	Alluvial groundwater

Note: Ground Elevation: 6817.2 ft; all depths are from this elevation





5.17 CDBO-7

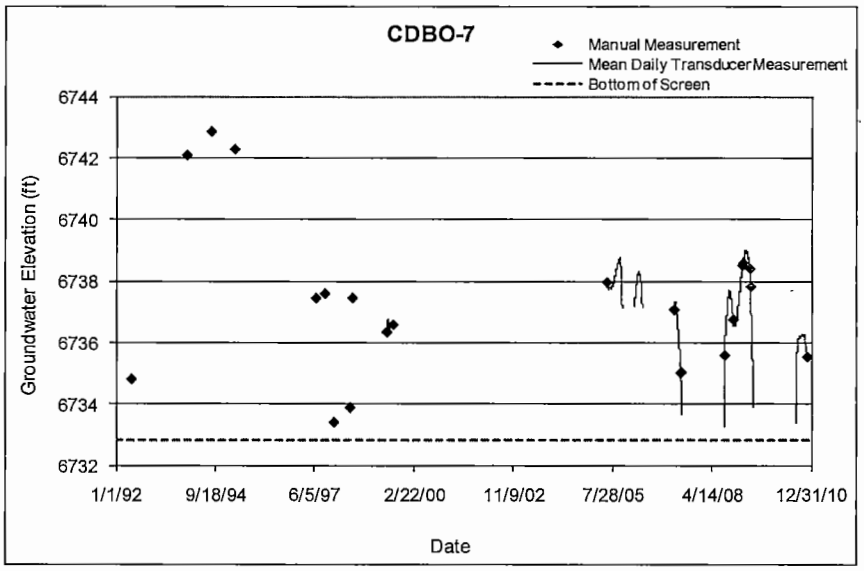
Location: In Cañada del Buey, a branch of Mortandad Canyon, approximately 0.3 mi southeast of CDBO-6.

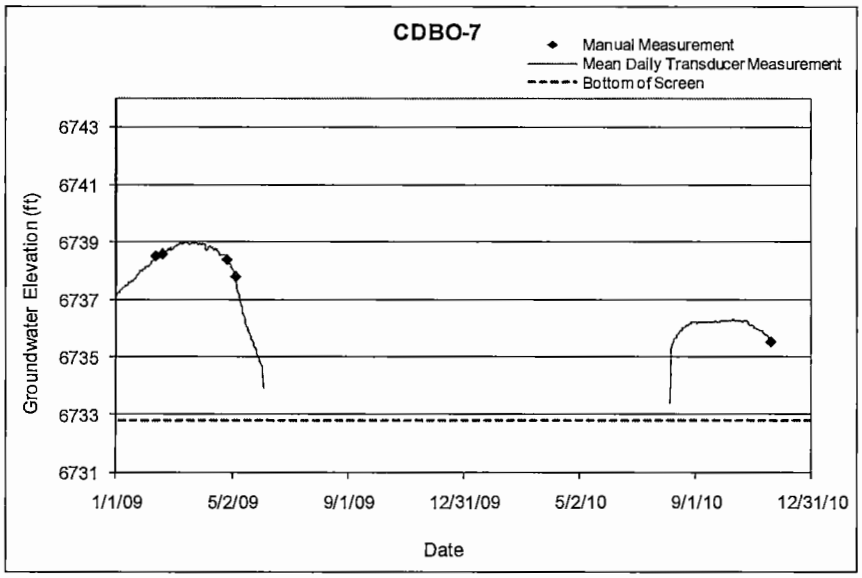
Period of Record: June 1,1992, through December 19, 2010.

Remarks: Initially, a pressure transducer was installed above the well's bladder pump at an elevation of 6737.14 ft. The transducer was lowered in the well after removal of the pump on April 2, 2007. Data before April 2, 2007, do not represent water levels below 6737.14 ft.

CDBO-7 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	29.0	39.0	6742.8	6732.8	10.0			39.0	6732.8	44.0	5.0	3.1	Alluvial groundwater

Note: Ground Elevation: 6771.81 ft; all depths are from this elevation





5.18 CDBO-8

Location: Alluvial well CDBO-8 is located in Cañada del Buey, approximately 0.4 mi southeast of CDBO-7.

Period of Record: July 2, 2001, through December 2, 2010.

Remarks: Well has historically been dry during quarterly measurements. A transducer was installed in this well January 9, 2009, and has not yet recorded any water in the well.

CDBO-8 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	3.0	13.0	6719.5	6709.5	10.0			13.0	6709.5	23.0	10.0	6.2	Alluvial groundwater

Note: Ground elevation is 6722.47 ft; all depths are from this elevation

CDBO-8 Manual Water Levels			
Date	Comments	Date	Comments
7/2/2001	Dry	9/10/2007	Dry
8/22/2001	Dry	1/24/2008	Dry
10/18/2001	Dry	2/11/2008	Dry
4/16/2002	Dry	4/1/2008	Dry
8/27/2002	Dry	5/22/2008	Dry
11/15/2002	Dry	7/24/2008	Dry
2/19/2003	Dry	8/11/2008	Dry
12/7/2005	Dry	11/3/2008	Dry
3/8/2006	Dry	1/12/2009	Dry
6/26/2006	Dry	2/3/2009	Dry
9/7/2006	Dry	4/27/2009	Dry
10/2/2006	Dry	7/14/2009	Dry
12/8/2006	Dry	8/4/2009	Dry
2/22/2007	Dry	12/14/2009	Dry
3/19/2007	Dry	3/8/2010	Dry
6/5/2007	Dry	6/1/2010	Dry
6/8/2007	Dry	7/26/2010	Dry
		12/2/2010	Dry

5.19 CDBO-9

Location: Alluvial well CDBO-9 is located in Cañada del Buey, approximately 0.7 mi southeast of CDBO-8.

Period of Record: July 2, 2001, through December 2, 2010.

Remarks: Well has historically been dry during quarterly measurements. A transducer was installed in this well January 9, 2009, and has not yet recorded any water in the well.

CDBO-9 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	19.0	29.0	6614.0	6604.0	10.0			29.0	6604.0	34.0	5.0	3.1	Alluvial groundwater

Note: Ground elevation is 6633.0 ft; all depths are from this elevation

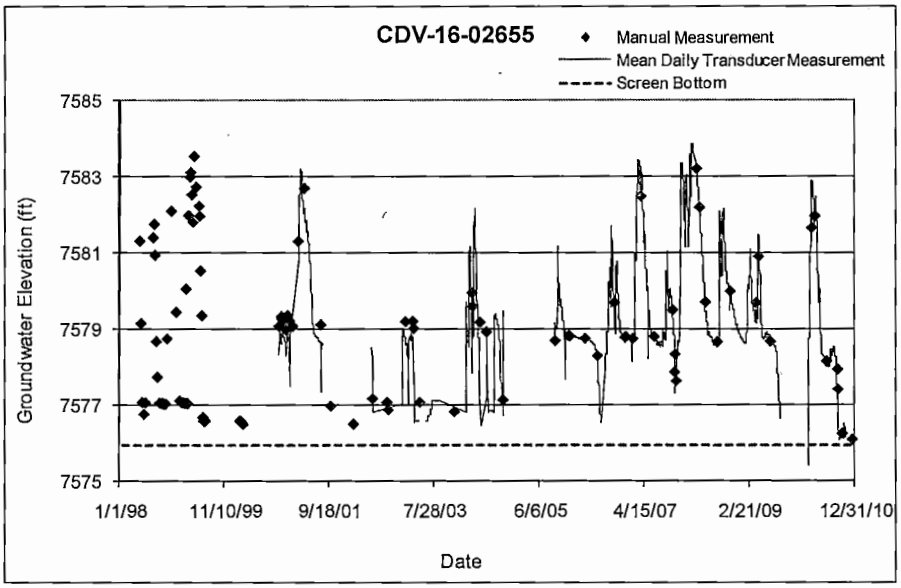
CDBO-9 Manual Water Levels			
Date	Comments	Date	Comments
7/2/2001	Dry	9/10/2007	Dry
8/22/2001	Dry	1/24/2008	Dry
10/18/2001	Dry	2/11/2008	Dry
4/16/2002	Dry	4/1/2008	Dry
8/27/2002	Dry	5/22/2008	Dry
11/15/2002	Dry	7/24/2008	Dry
2/19/2003	Dry	8/11/2008	Dry
6/3/2003	Dry	11/3/2008	Dry
12/6/2005	Dry	1/9/2009	Dry
3/8/2006	Dry	2/3/2009	Dry
6/26/2006	Dry	4/27/2009	Dry
9/6/2006	Dry	7/14/2009	Dry
10/2/2006	Dry	8/4/2009	Dry
12/8/2006	Dry	12/14/2009	Dry
2/22/2007	Dry	3/8/2010	Dry
3/19/2007	Dry	6/1/2010	Dry
6/5/2007	Dry	7/26/2010	Dry
6/8/2007	Dry	12/2/2010	Dry

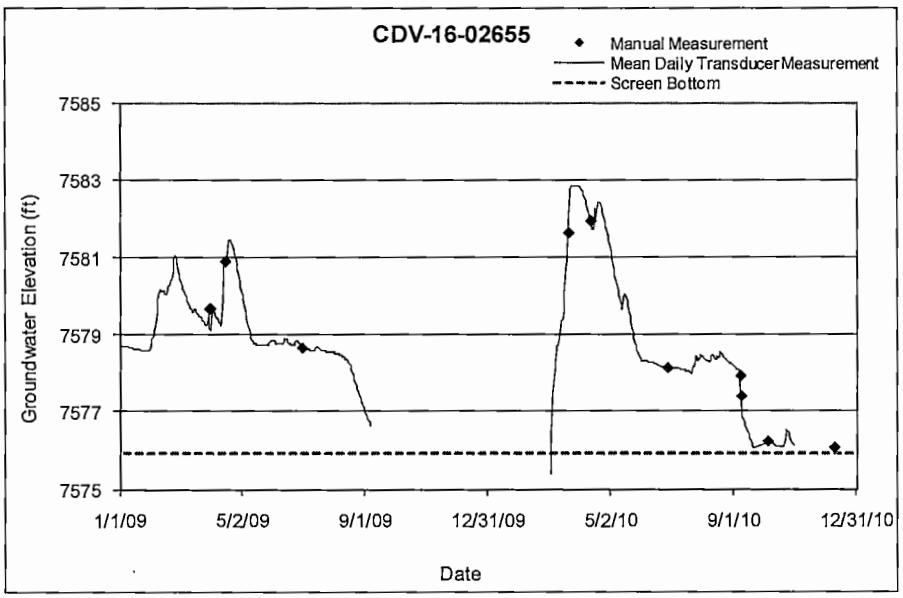
5.20 CDV-16-02655

Location: Westernmost upper Cañon de Valle in TA-16, approximately 800 ft east of Anchor Ranch Road.
Period of Record: May 15, 1998, through December 10, 2010.
Remarks: None.

CDV-16-02655 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	2.3	7.3	7580.91	7575.91	5.0			7.3	7575.91	7.6	0.3	0.7	Alluvial groundwater

Note: Aluminum cap elevation: 7583.70; Ground Elevation: 7583.21 ft; all depth measurements are from this elevation



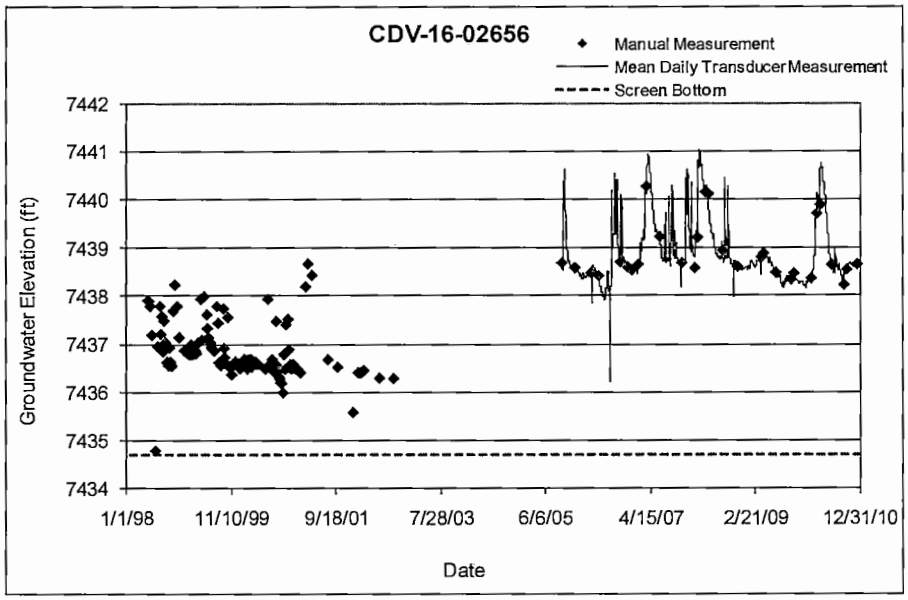


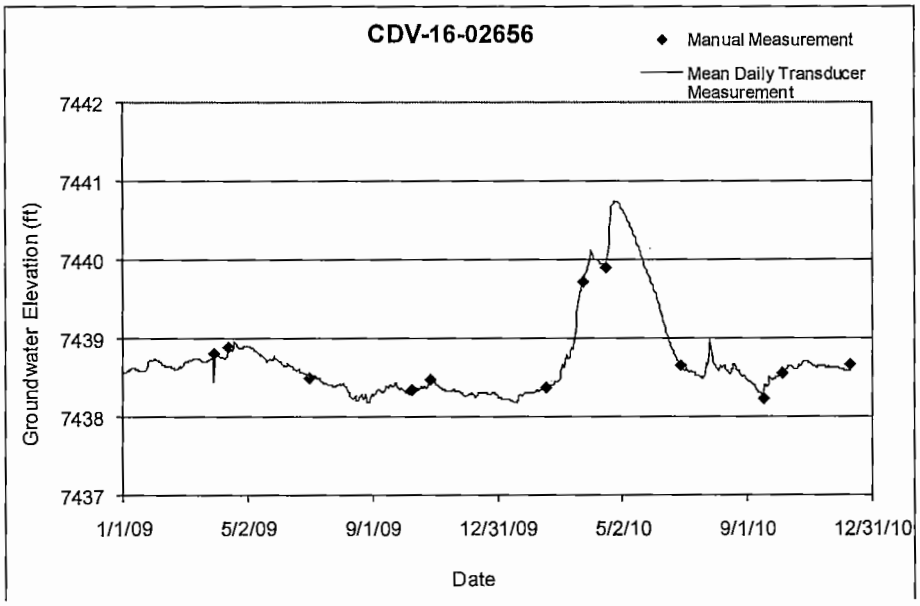
5.21 CDV-16-02656

Location: In upper Cañon de Valle at the northern boundary of TA-16.
Period of Record: May 15, 1998, through December 10, 2010.
Remarks: None.

CDV-16-02656 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	3.0	8.0	7439.69	7434.69	5.0			8.0	7434.69	8.3	0.3	0.7	Alluvial groundwater

Note: Aluminum cap Elevaton: 7443.18 ft; Ground Elevation: 7442.69 ft; all depths are from this elevation





5.22 CDV-16-02657

Location: Upper Cañon de Valle at northern boundary of TA-16, approximately 200 ft east-southeast of well CDV-16-02656.

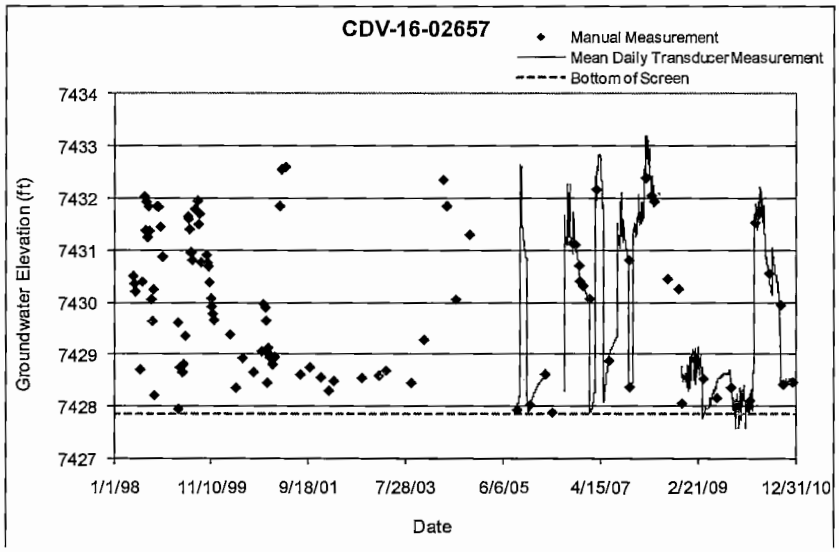
Period of Record: May 15, 1998, through December 10, 2010.

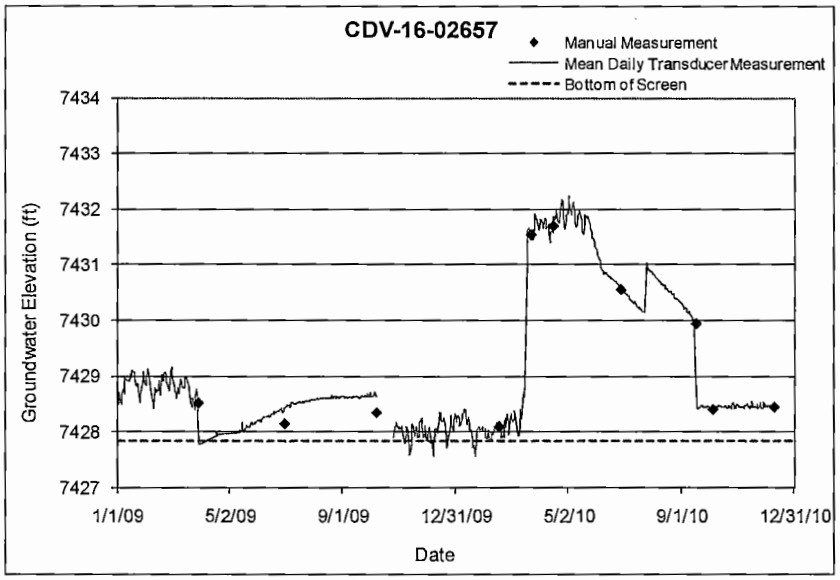
Remarks: Transducer began to malfunction around April 21, 2008; replaced October 31, 2008. This well is closed by a manhole cover, and the cable often cannot vent, resulting in mean daily transducer measurements that differ from the corresponding manual measurements. The erratic values possibly come from a compromised sump.

CDV-16-02657 Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	0.4	5.4	7432.85	7427.85	5.0			5.4	7427.85	5.7	0.3	0.7	Alluvial groundwater

Note: Ground Elevation: 7433.25 ft; all depths are from this elevation

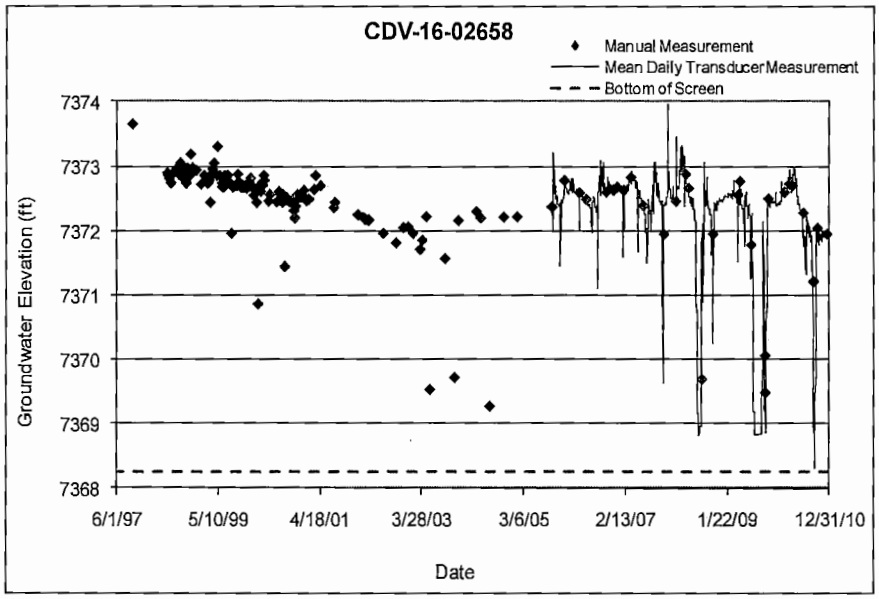


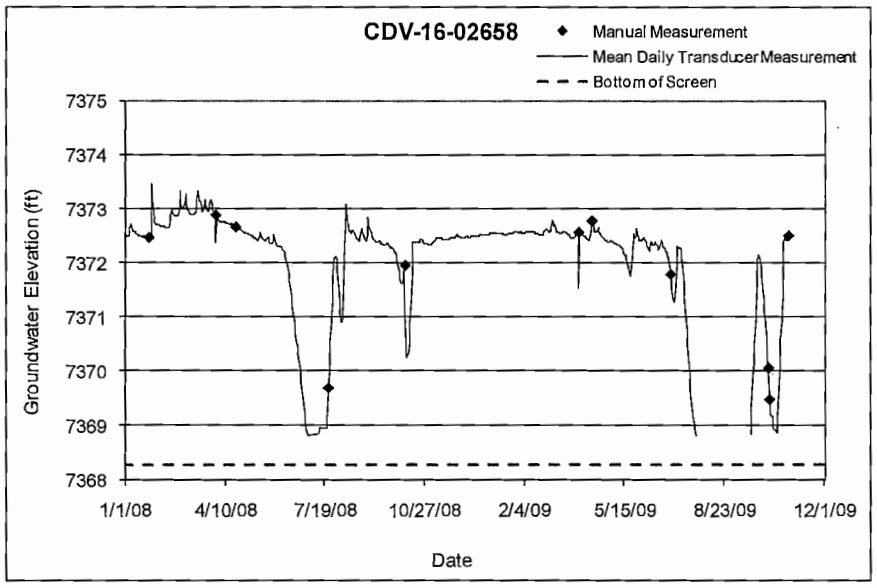


5.23 CDV-16-02658

Location: Upper Cañon de Valle at northern boundary of TA-16, approximately 200 ft east-southeast of well CDV-16-02657 and approximately 800 ft east-southeast of Burning Ground Spring.
Period of Record: September 15, 1997, through December 10, 2010.
Remarks: None.

CDV-16-02658 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	1.9	6.9	7373.26	7368.26	5.0			6.9	7368.26	7.2	0.3	0.7	Alluvial groundwater
Note: Aluminum Cap Elevation: 7375.60 ft; Ground Elevation: 7375.16 ft; all depths are from this elevation													



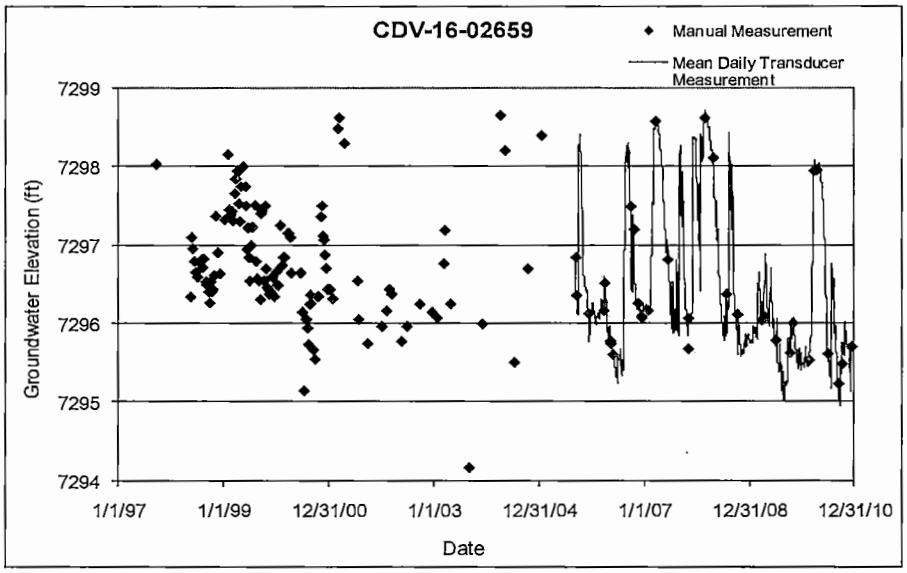


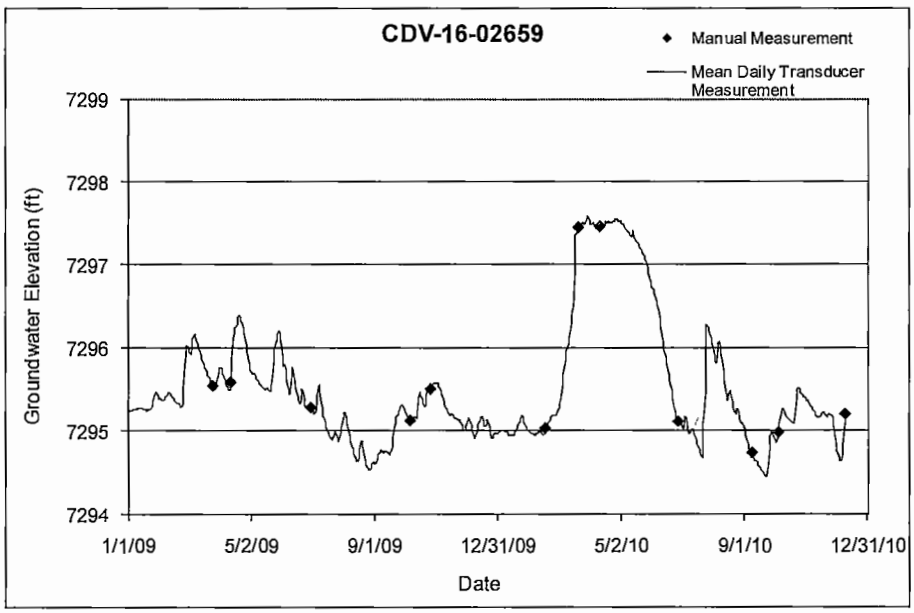
5.24 CDV-16-02659

Location: Upper Cañon de Valle at northern boundary of TA-16, approximately 1800 ft east-northeast of well CDV-16-02657.
Period of Record: September 17, 1997, through December 10, 2010.
Remarks: None.

CDV-16-02659 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	1.7	6.7	7298.32	7293.32	5.0			6.7	7293.32	7.0	0.3	0.7	Alluvial groundwater

Note: Aluminum Cap Elevation: 7300.50 ft, Ground Level: 7300.02; all depths are from this elevation



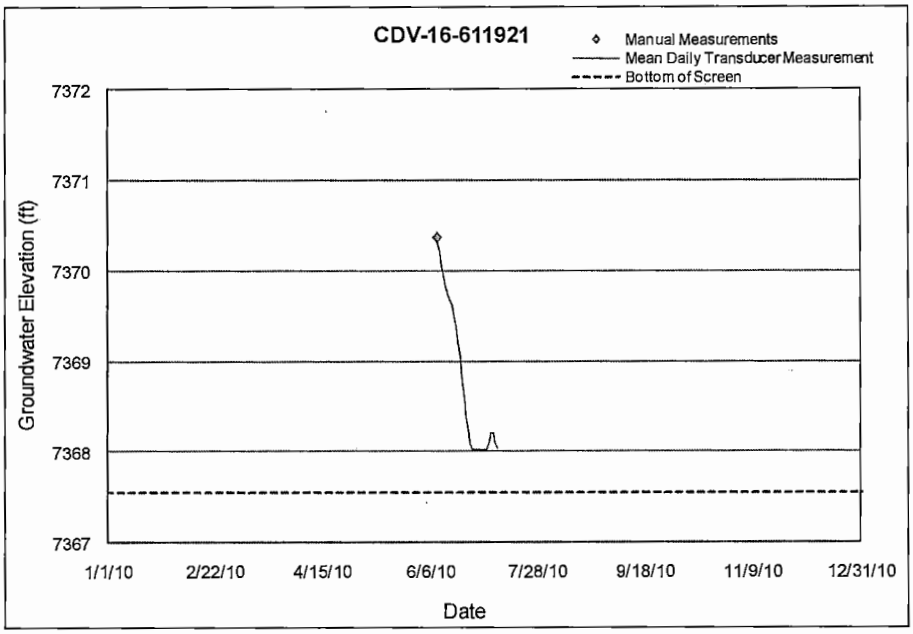


5.25 CDV-16-611921

Location: Upper Cañon de Valle at northern boundary of TA-16, upstream of the Permeable Reactive Barrier (PRB) wall on the south bank.
Period of Record: June 10, 2010, through December 8, 2010.
Remarks: No water in the well since early July 2010.

CDV-16-611921 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	6.3	11.3	7372.6	7367.6	5.0	NA	NA	11.3	7367.6	12.5	1.2	0.7	Alluvial groundwater

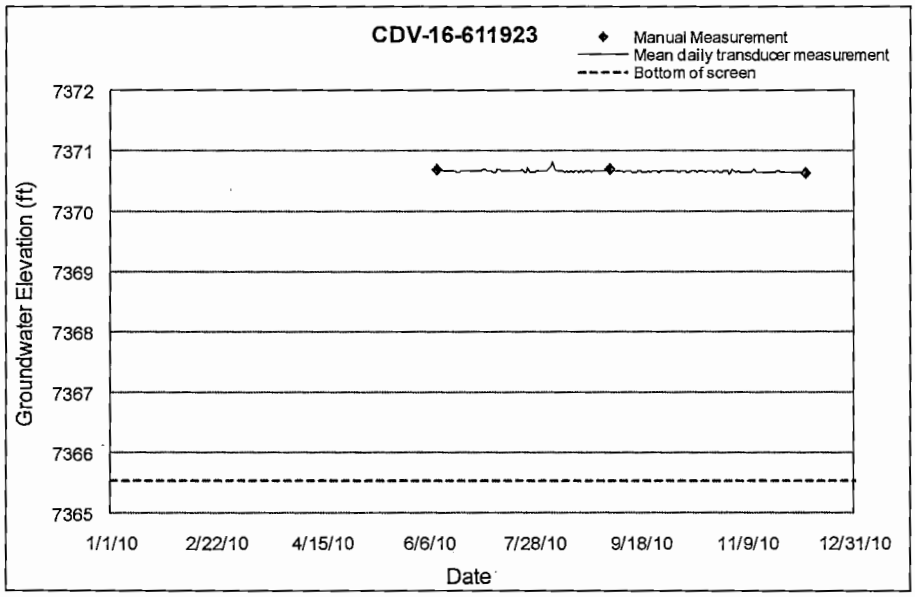
Note: Monument Marker: 7378.85 ft; all depths are from this elevation



5.26 CDV-16-611923

Location: Upper Cañon de Valle at northern boundary of TA-16, upstream of the PRB wall on the north bank.
Period of Record: June 10, 2010, through December 8, 2010.
Remarks:

CDV-16-611923 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Vol (L)	Comment
1	3.2	8.2	7373.6	7368.6	5.0			8.2	7368.6	8.7	0.5	0.3	Alluvial groundwater
Note: Top of Protective Housing: 7376.81 ft; Top of PVC Casing 7376.43 ft; Ground Level 7373.63 ft; all depths are from this elevation													

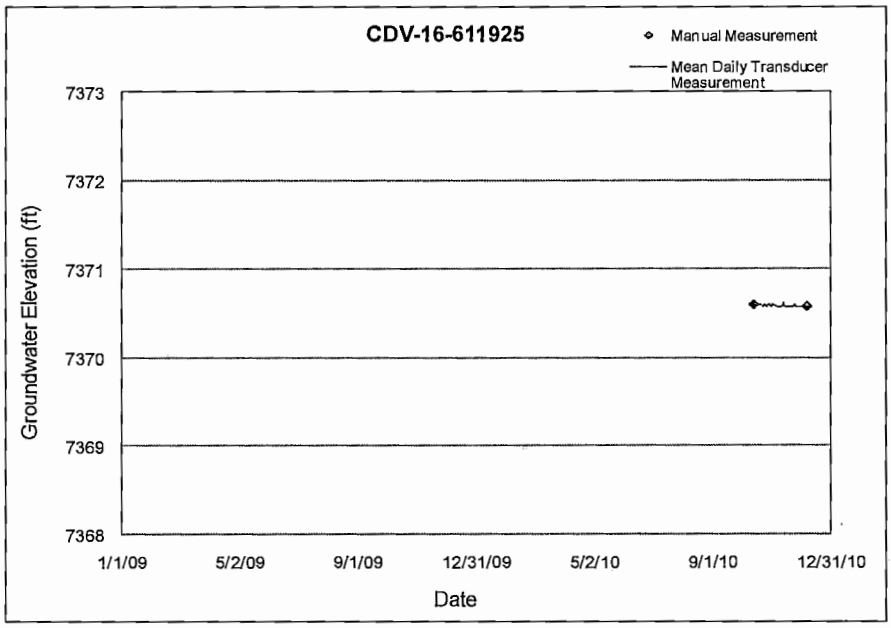


5.27 CDV-16-611925

Location: Upper Cañon de Valle at northern boundary of TA-16, in an access tube within the PRB wall on the south bank.

Period of Record: October 14, 2010, through December 8, 2010.

Remarks: Not a well, but an access tube into the PRB. Purpose of this transducer is to ensure that water is being effectively dammed by the PRB and that water is flowing through the conduits within the wall.

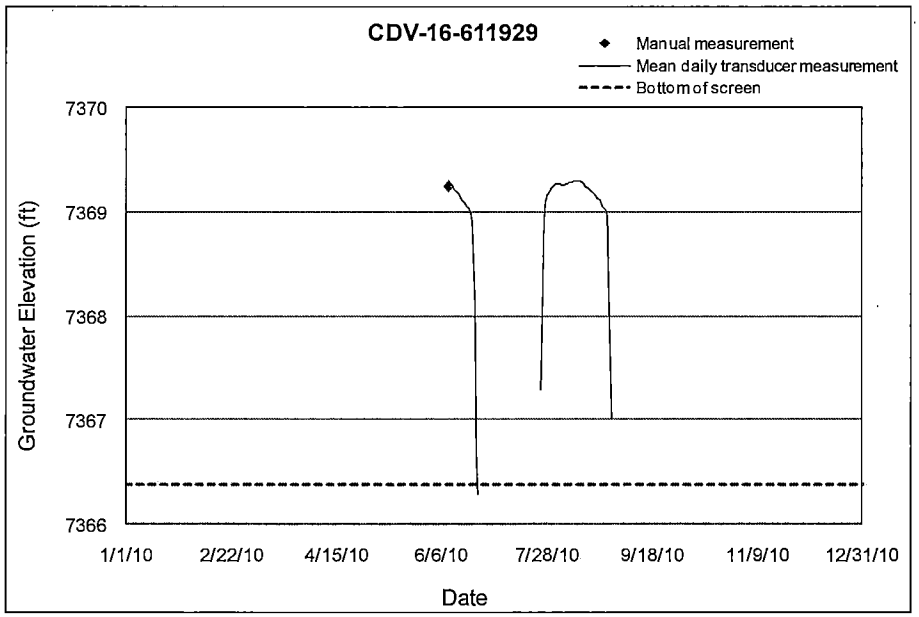


5.28 CDV-16-611929

Location: Upper Cañon de Valle at northern boundary of TA-16, downstream of the PRB wall on the south bank.
Period of Record: October 14, 2010, through December 8, 2010.
Remarks: None.

CDV-16-611929 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	7.0	12.0	7371.4	7366.4	5.0	NA	NA	12.0	7366.4	13.1	1.1	0.7	Alluvial groundwater

Note: Monument Marker: 7378.38 ft; all depths are from this elevation

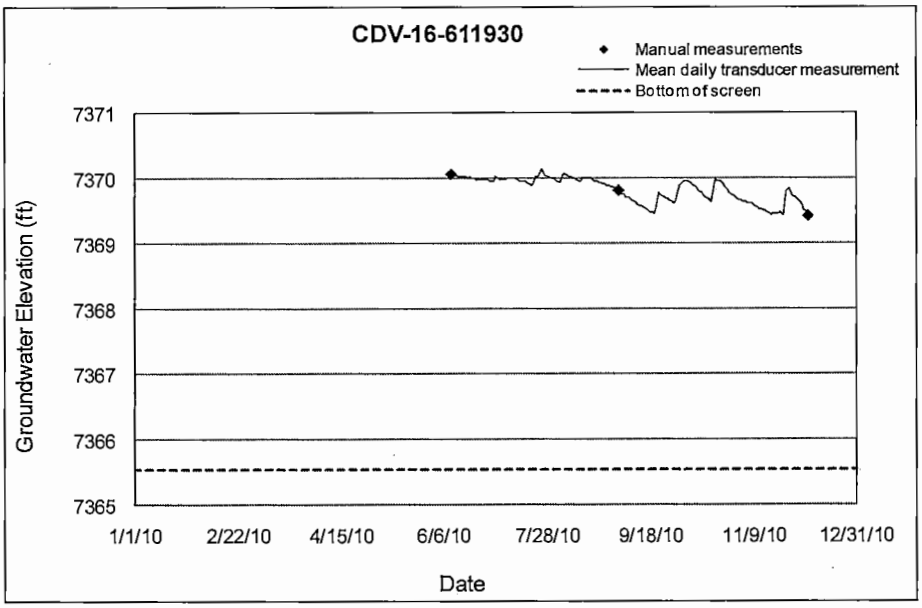


5.29 CDV-16-611930

Location: Upper Cañon de Valle at northern boundary of TA-16, downstream of the PRB wall on the south bank.
Period of Record: June 10, 2010, through December 8, 2010.
Remarks: None.

CDV-16-611930 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	7.0	12.0	7370.5	7365.5	5.0			12.0	7365.5	13.0	1.0	0.6	Alluvial groundwater

Note: Monument Marker: 7377.54 ft; all depths are from this elevation



5.30 CDV-16-611931

Location: Upper Cañon de Valle at northern boundary of TA-16, downstream of the PRB wall on the north bank.
Period of Record: June 10, 2010, through October 14, 2010.
Remarks: None.

CDV-16-611931 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	5.0	10.0	7369.2	7364.2	5.0			10.0	7364.2	12.0	2.0	1.2	Alluvial groundwater

Note: Monument Marker: 7374.18 ft; all depths are from this elevation

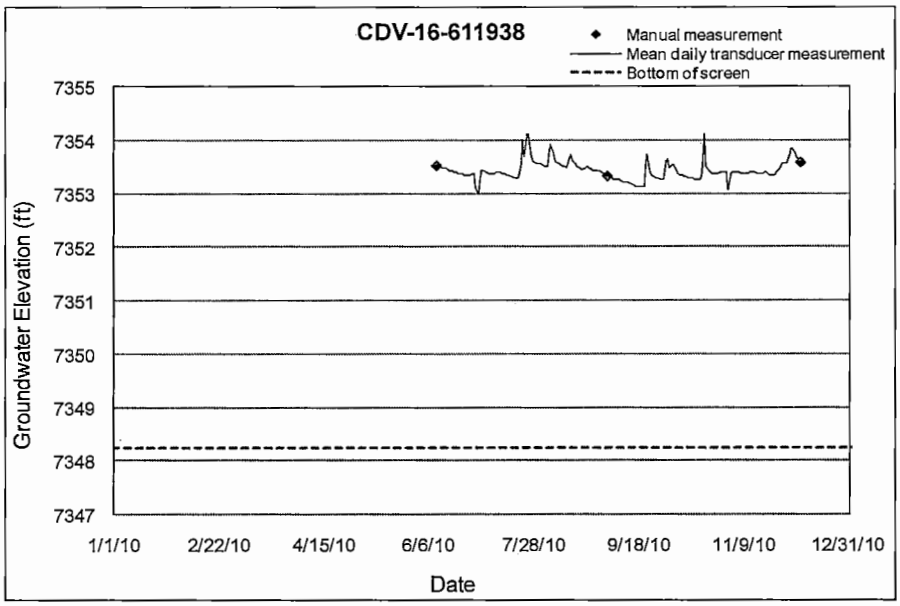
CDV-16-611931 Manual Measurements		
Date	Water Elevation (ft)	Comments
6/10/2010	7362.01	Sump
9/3/2010	7361.99	Sump
10/14/2010	7361.94	Sump

5.31 CDV-16-611938

Location: Upper Cañon de Valle at northern boundary of TA-16, approximately 350 ft downstream of the PRB wall on the south bank.
Period of Record: June 10, 2010, through December 8, 2010.
Remarks: None.

CDV-16-611938 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	3.0	8.0	7353.3	7348.3	5.0			8.0	7348.3	8.5	0.5	0.3	Alluvial groundwater

Note: Ground surface: 7356.25 ft; all depths are from this elevation



5.32 FCO-1

Location: Fence Canyon, approximately 0.1 mi northwest of SR-4.
Period of Record: June 9, 1997, through September 7, 2010.
Remarks: Well has been dry since completion. A transducer was installed January 16, 2008. Well has remained dry since installation. Monitoring was discontinued September 7, 2010.

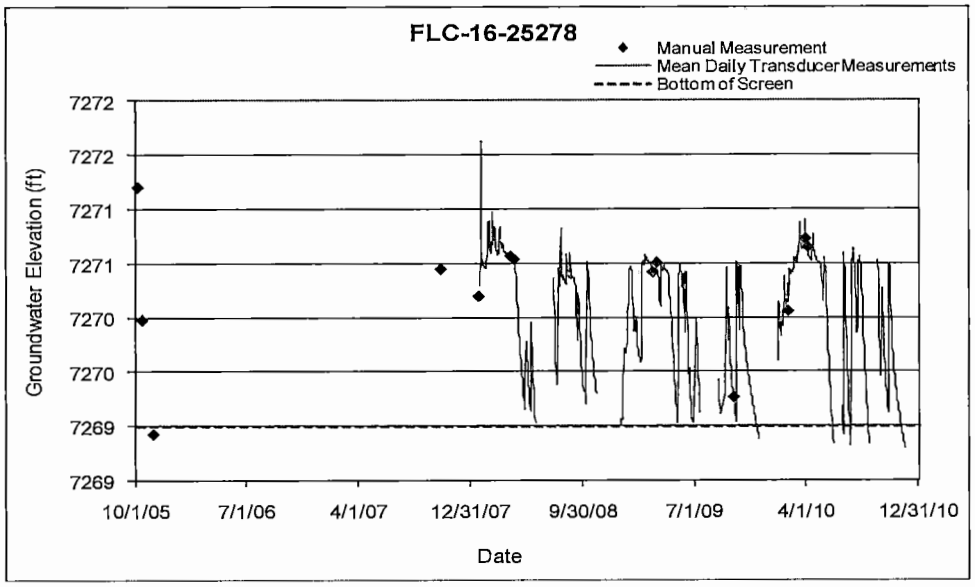
FCO-1 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev(ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Comment
1	2.4	12.4	6507.7	6497.7	10.0			2.4	6507.7	12.4	0.0	0.0	Alluvial groundwater
Note: Ground elevation is 6510.13 ft; all depths are from this elevation													

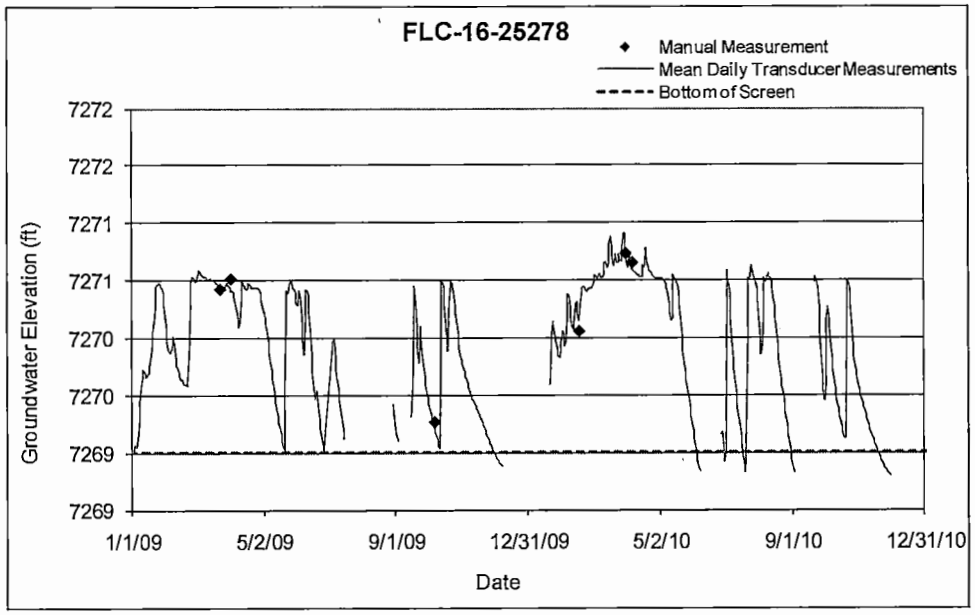
FCO-1 Manual Water Levels			
Date	Comments	Date	Comments
6/9/1997	Dry	9/14/2005	Dry
10/13/1997	Dry	6/23/2006	Dry
3/25/1998	Dry	9/8/2006	Dry
5/29/1998	Dry	12/15/2006	Dry
7/28/1998	Dry	1/24/2007	Dry
3/3/1999	Dry	3/15/2007	Dry
6/23/1999	Dry	5/24/2007	Dry
8/30/1999	Dry	6/6/2007	Dry
11/15/1999	Dry	9/5/2007	Dry
3/26/2000	Dry	10/17/2007	Dry
5/16/2000	Dry	1/16/2008	Dry
8/30/2000	Dry	4/8/2008	Dry
10/8/2000	Dry	4/25/2008	Dry
4/16/2002	Dry	7/18/2008	Dry
8/19/2002	Dry	10/7/2008	Dry
11/13/2002	Dry	4/1/2010	Dry
2/19/2003	Dry	6/29/2010	Dry
5/18/2003	Dry	9/7/2010	Dry
4/7/2004	Dry		

5.33 FLC-16-25278

Location: Fish Ladder Canyon, approximately 0.1 mi southeast of the TA-16 Burning Grounds.
Period of Record: June 9, 1997, through December 8, 2010.
Remarks: Water levels frequently drop below the screen.

FLC-16-25278 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Comment
1	1.6	3.2	7270.6	7269.0	1.6			3.2	7269	3.4	0.2	0.12	Alluvial groundwater
Note: Ground Elevation: 7272.20 ft; all measurements are from this elevation													





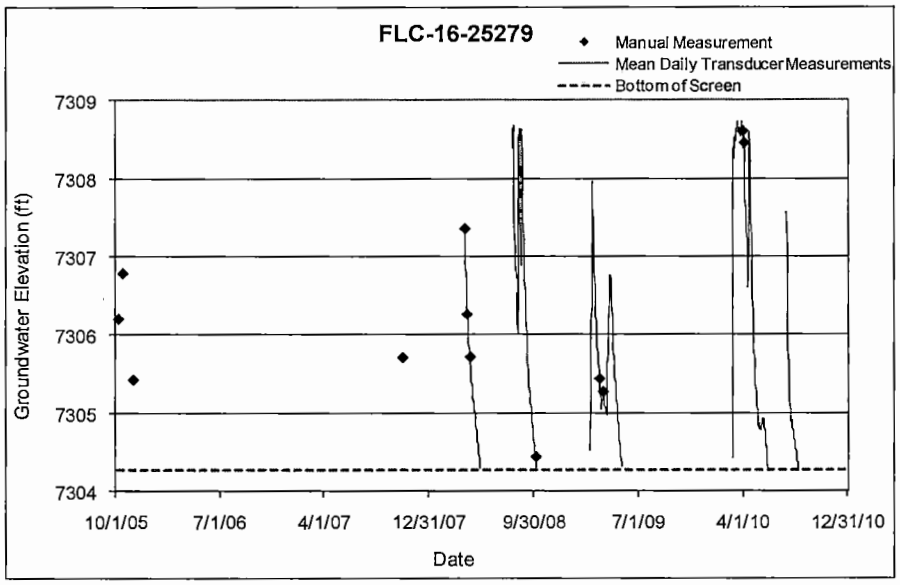
5.34 FLC-16-25279

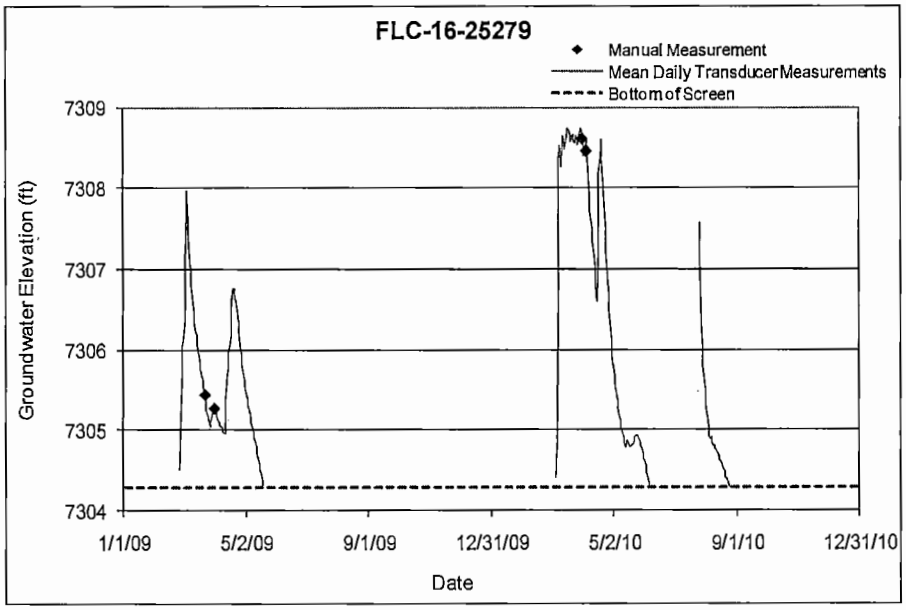
Location: Fish Ladder Canyon, approximately 0.2 mi east of FLC-16-25278.
Period of Record: June 9, 1997, through December 8, 2010.
Remarks: Water levels frequently drop below the screen. Bottom of screen is calculated to be at 7304.29 ft, rather than what was originally reported.

FLC-16-25279 Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	2.7	4.3	7306.60	7305.00	1.6			4.3	7305	4.5	0.2	0.12	Alluvial groundwater

Note: Ground Elevation: 7309.30 ft; all measurements are from this elevation



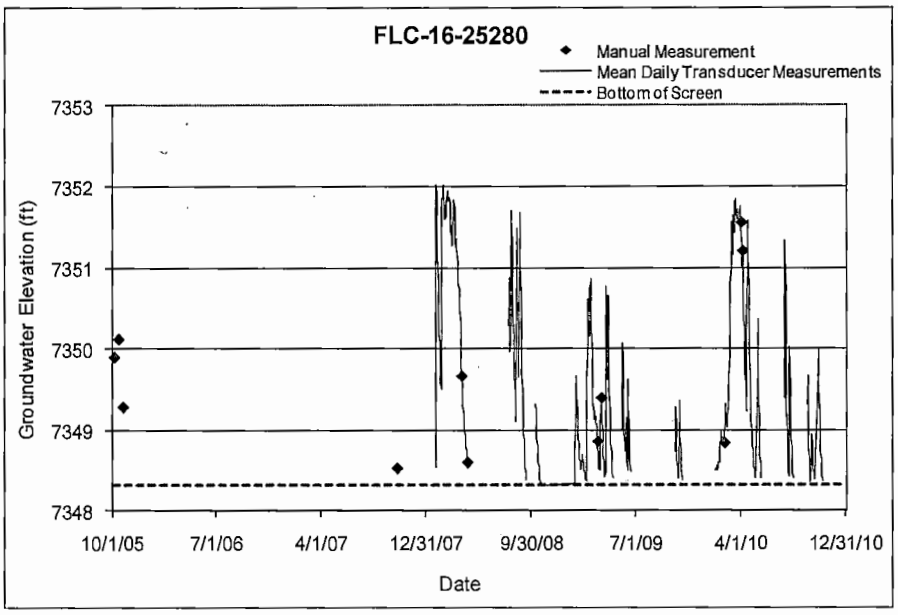


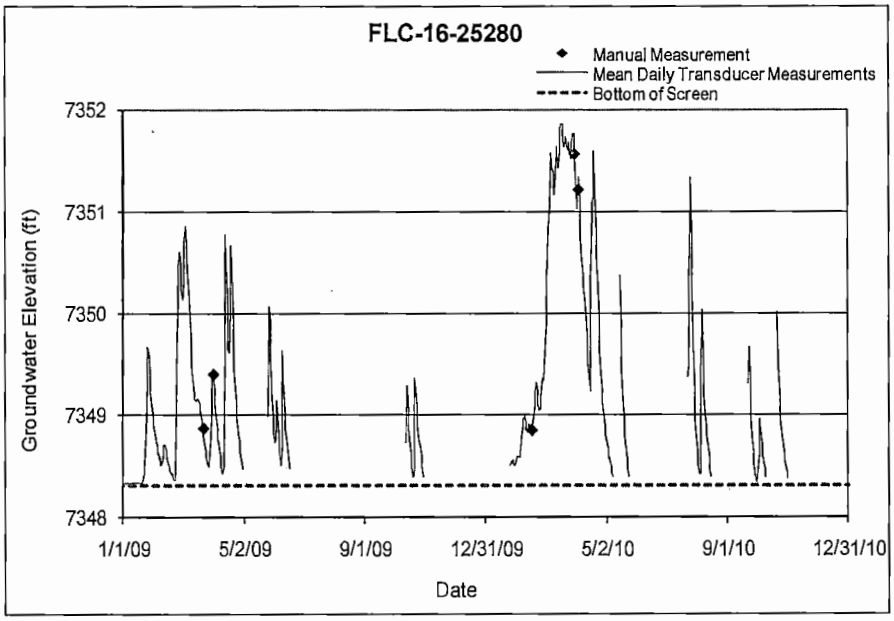
5.35 FLC-16-25280

Location: Fish Ladder Canyon, approximately 0.2 mi east of FLC-16-25279.
Period of Record: June 9, 1997, through December 8, 2010.
Remarks: Water levels frequently drop below the screen.

FLC-16-25280 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	2.6	4.2	7350.3	7348.7	1.6			4.2	7348.7	4.4	0.2	0.12	Alluvial groundwater

Note: Ground Elevation: 7352.90 ft; all measurements are from this elevation



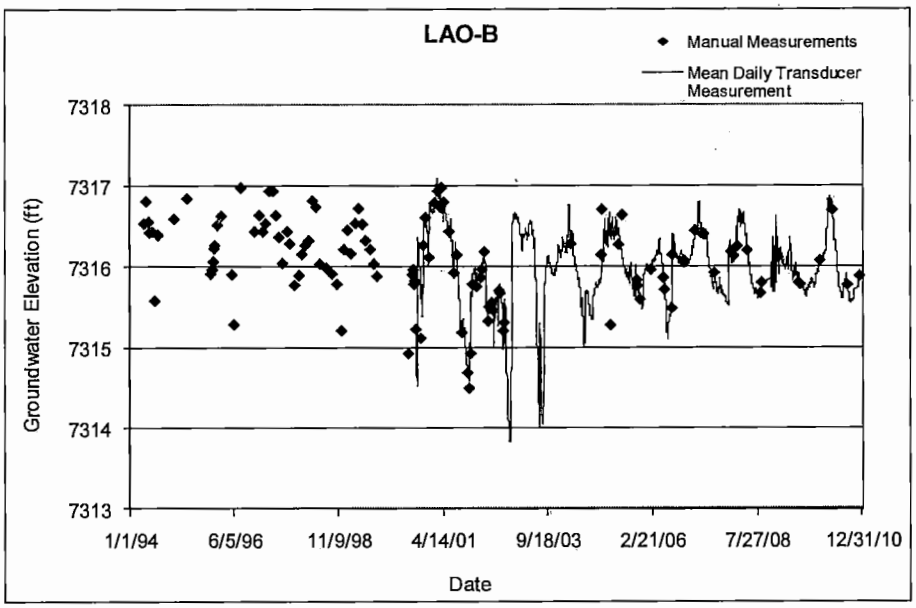


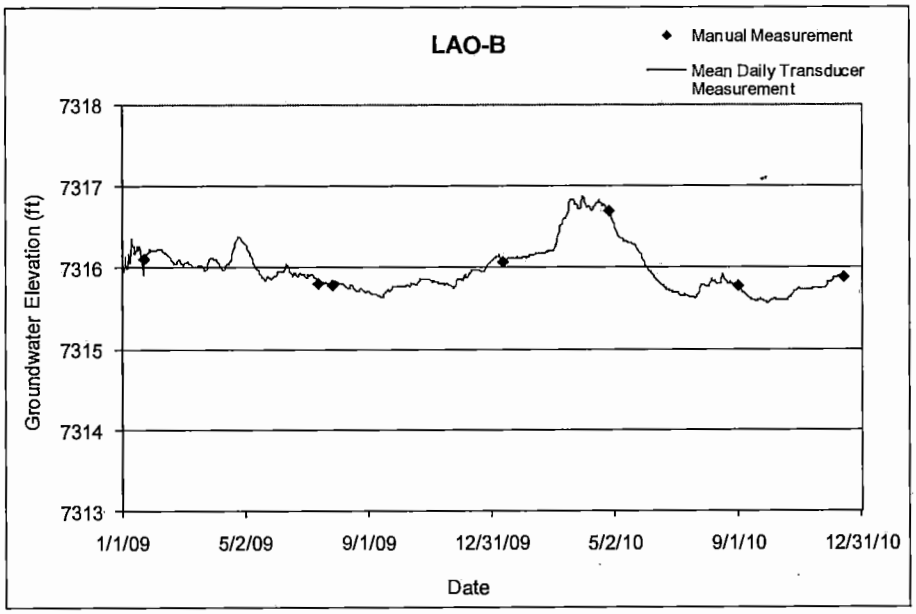
5.36 LAO-B

Location: Upper Los Alamos Canyon, approximately 3000 ft west of the Omega Bridge.
Period of Record: April 28, 1994, through December 14, 2010.
Remarks: None.

LAO-B Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	11.8	26.8	7311.8	7296.8	15.0			26.8	7296.8	27.2	0.4	0.9	Alluvial groundwater

Note: Ground elevation is 7323.59 ft; all depths are from this elevation



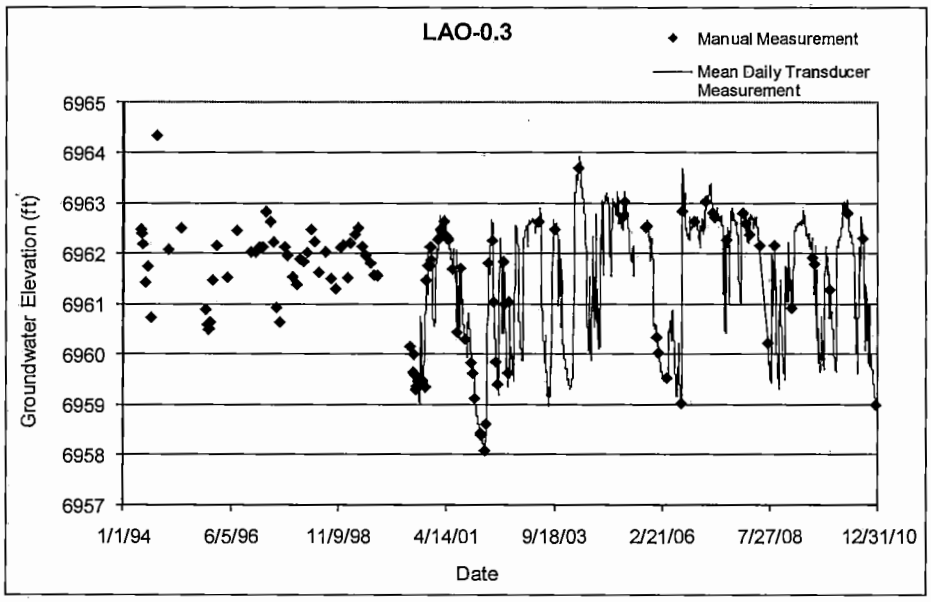


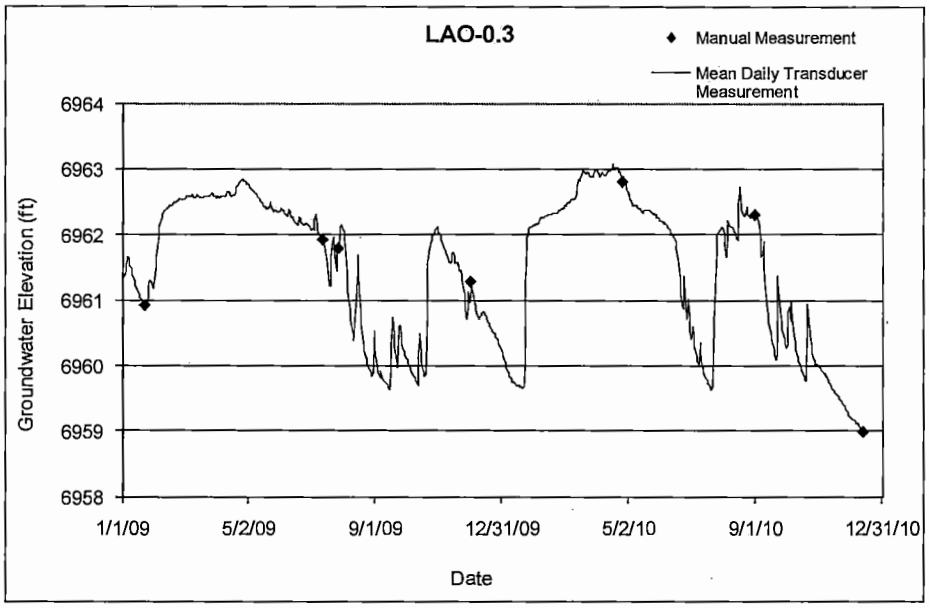
5.37 LAO-0.3

Location: Upper Los Alamos Canyon, approximately 5700 ft east of the Omega Bridge.
Period of Record: June 1, 1994, through December 14, 2010.
Remarks: Transducer readings were not valid from July 7, 2005, through October 12, 2005; the pressure sensor was in the mud at the bottom of the well.

LAO-0.3 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	5.9	10.9	6962.23	6957.23	5.0			10.9	6957.23	11.25	0.35	0.86	Alluvial groundwater

Note: LAO-0.3 Ground elevation is 6968.13 ft; all depths are from this elevation



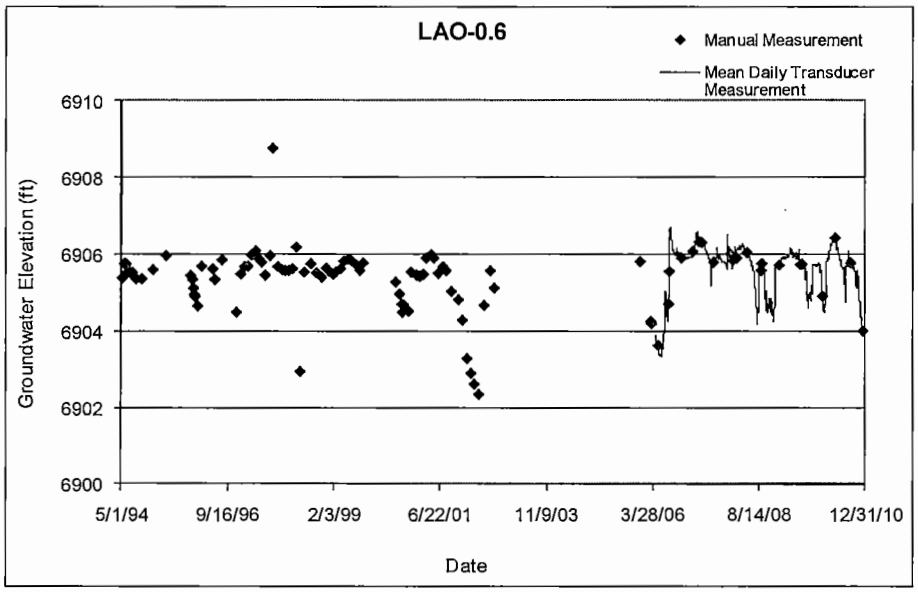


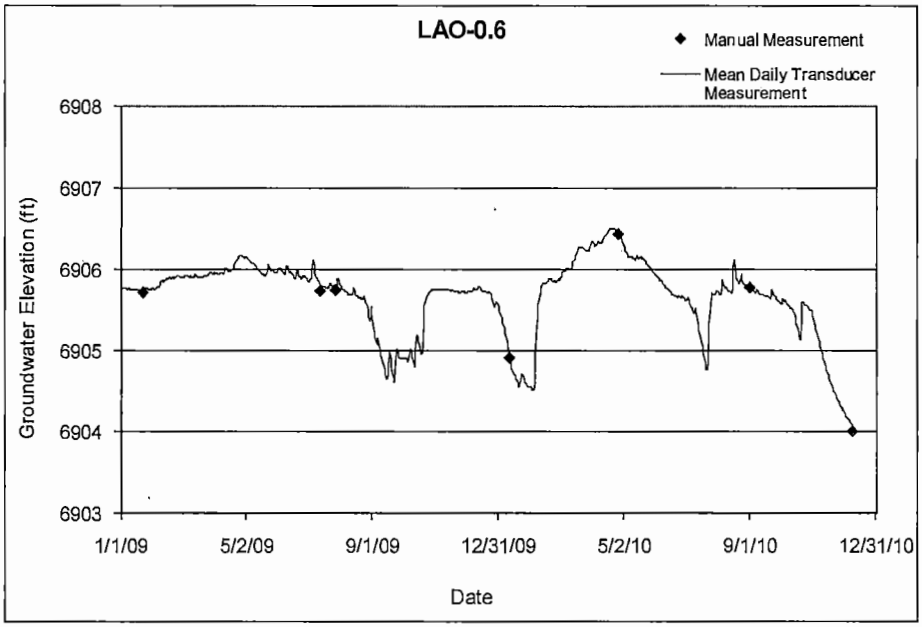
5.38 LAO-0.6

Location: Los Alamos Canyon, approximately 7500 ft east of the Omega Bridge.
Period of Record: May 6, 1994, through December 9, 2010.
Remarks: None.

LAO-0.6 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	8.0	13.0	6902.34	6897.34	5			13.0	6897.34	13.35	0.35	0.86	Alluvial Groundwater

Note: Aluminum Cap Elevation: 6910.74 ft; Ground elevation is 6910.34 ft; all depths are from this elevation



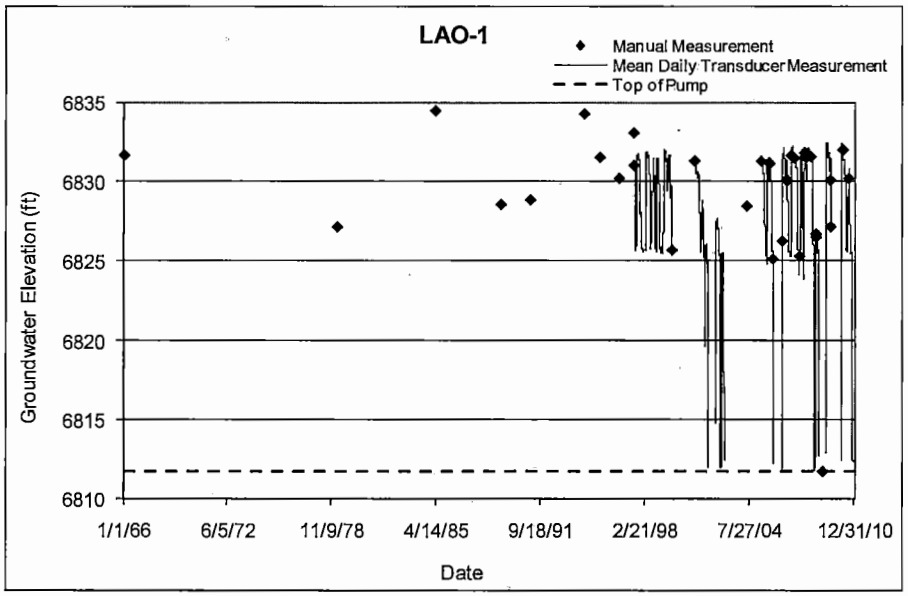


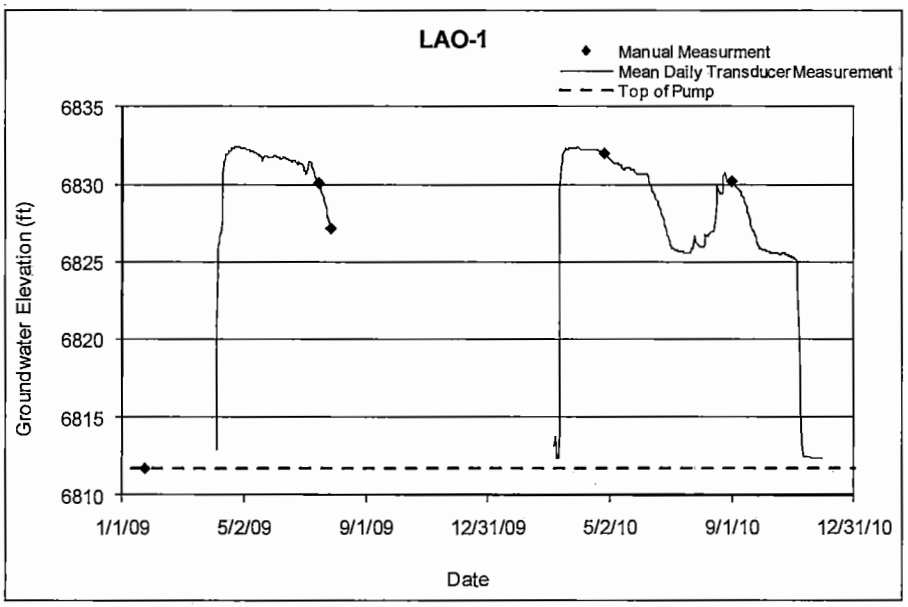
5.39 LAO-1

Location: Los Alamos Canyon, near the eastern border of TA-2.
Period of Record: February 15, 1966, through December 9, 2010.
Remarks: LAO-1 is a 2-in.-diameter well with a dedicated bladder pump. The transducer is sitting on top of the pump. Water levels were below the transducer in December 2008 and January 2009.

LAO-1 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	8	28	6828.24	6808.24	20			28	6808.24	28	0	0	Alluvial groundwater

Note: Ground elevation is 6836.24 ft; all depths are from this elevation



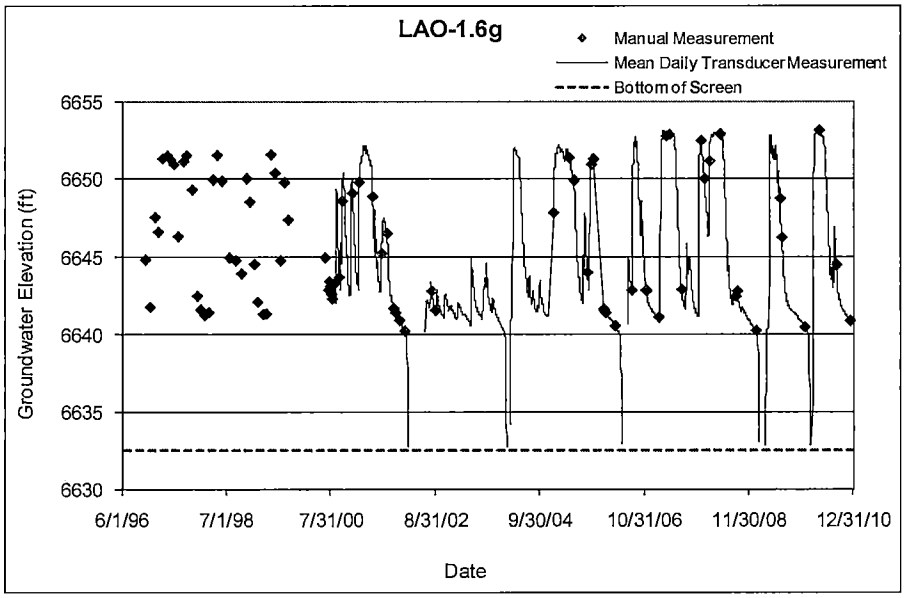


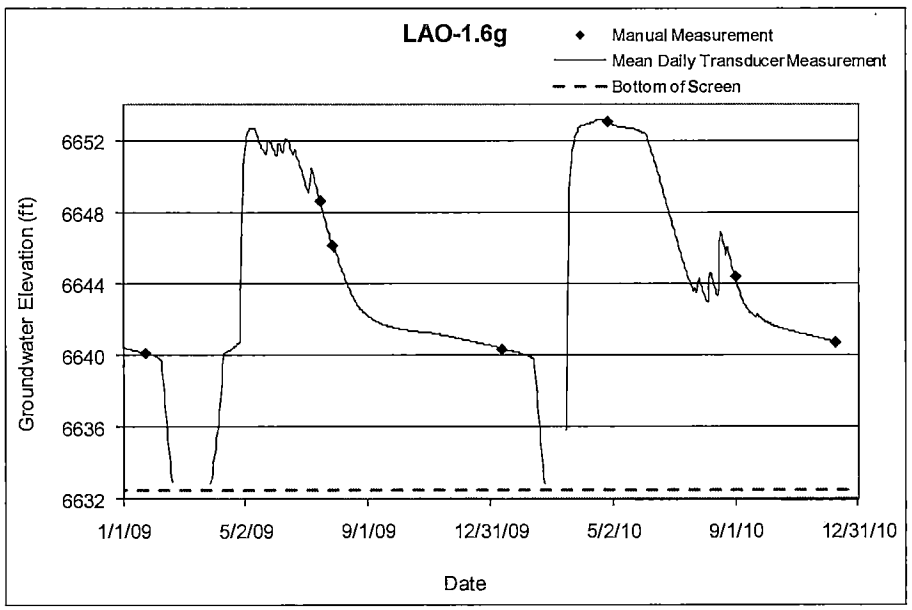
5.40 LAO-1.6g

Location: Los Alamos Canyon, approximately 400 ft west of the confluence with DP Canyon.
Period of Record: November 22, 1996, through December 9, 2010.
Remarks: None.

LAO-1.6G Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	10.5	25.5	6647.5	6632.5	15.0		6658.0	25.5	6632.5	30.82	5.4	13.2	Alluvial well

Note: Ground elevation is 6658.01 ft; all depths are from this elevation





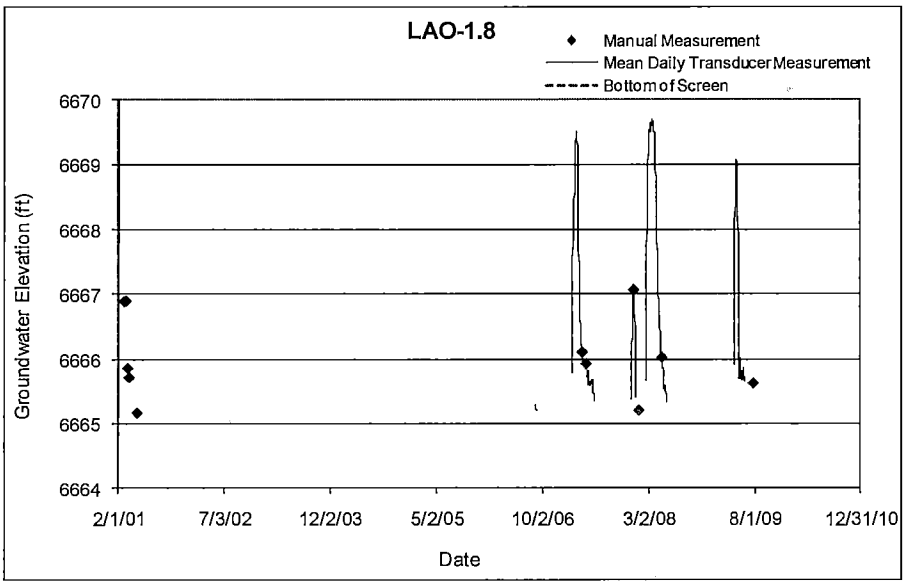
5.41 LAO-1.8

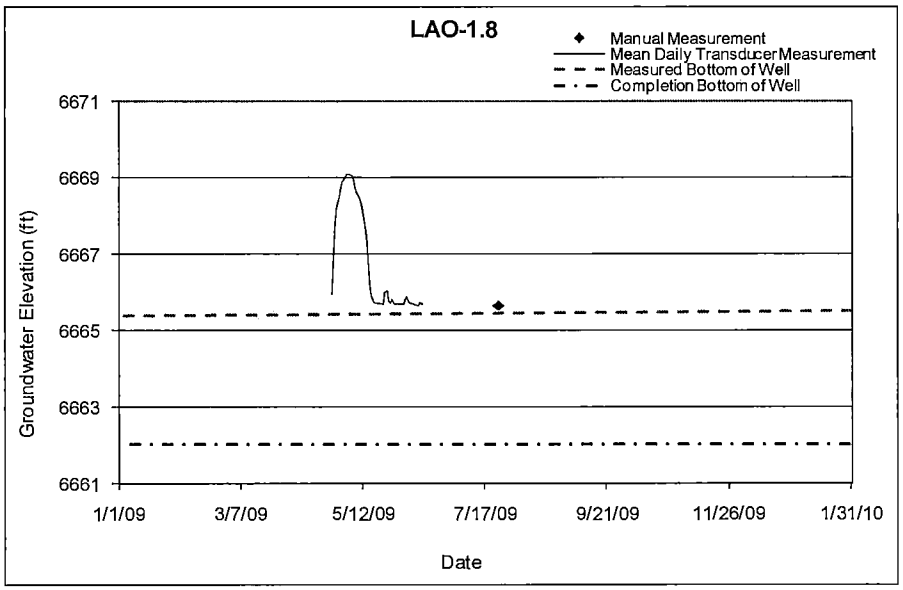
Location: Los Alamos Canyon, approximately 650 ft west of LAO-1.6g.
Period of Record: January 8, 2001, through January 7, 2010.
Remarks: This well frequently runs dry. The total depth of the well has changed over the years as it silts in, and is currently around 6665.6 ft. Monitoring in this well ceased on January 7, 2010.

LAO-1.8 Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	8	18	6672.00	6662.00	10			18	6662.00	18	0	0	Alluvial Groundwater

Note: Brass Cap Elevation: 6680.00 ft; all depths are from this elevation

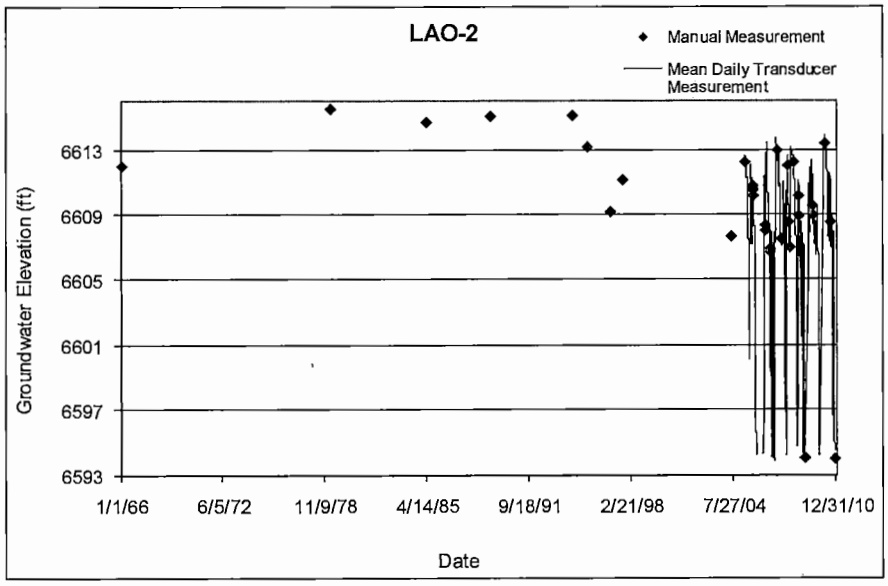


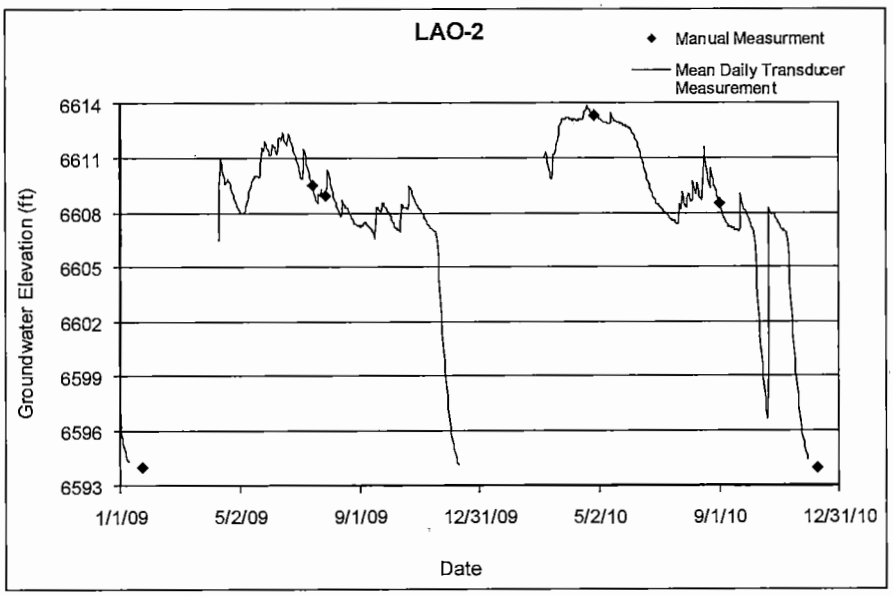


5.42 LAO-2

Location: Los Alamos Canyon, approximately 75 ft north of the confluence with DP Canyon.
Period of Record: February 1, 1966, through December 9, 2010.
Remarks: The transducer in this well is installed above the top of the pump with the transducer sensor at 6563.88 ft. Water level elevations below 6563.88 ft are not represented by transducer data.

LAO-2 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Comment
1	12	32	6611	6591	20			32	6591.0	32.0	0	0	Alluvial Groundwater
Note: Brass Cap Elevation is 6623.00 ft; all depths are from this elevation													

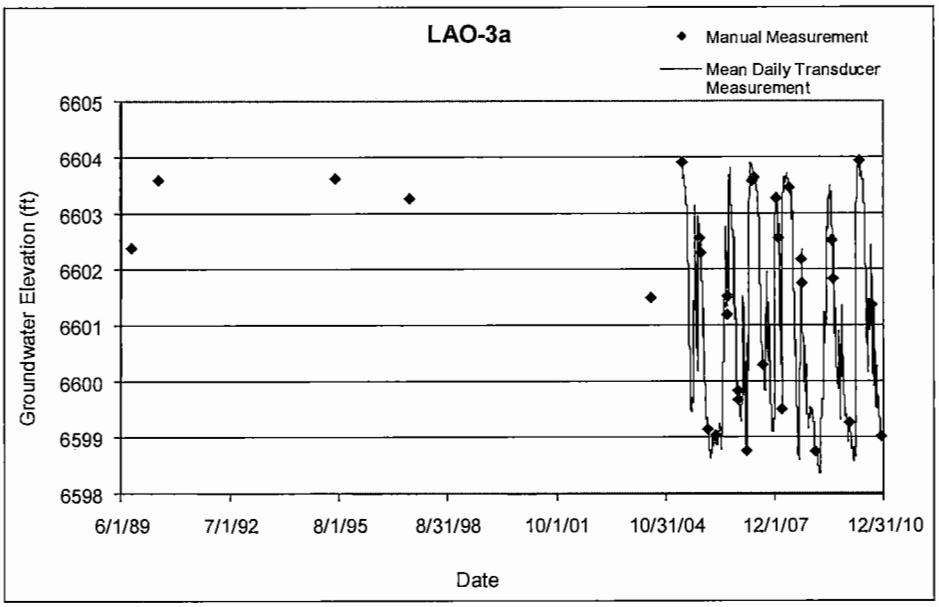


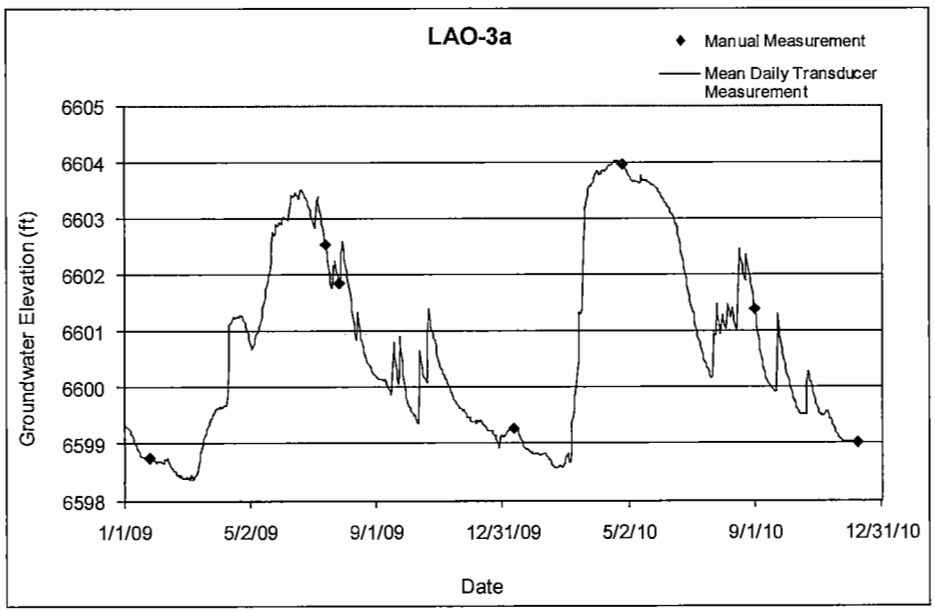


5.43 LAO-3a

Location: Los Alamos Canyon, approximately 1000 ft east of the confluence with DP Canyon.
Period of Record: September 15,1989, through December 9, 2010.
Remarks: None.

LAO-3a Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Comment
1	4.7	14.7	6604.4	6594.4	10.0			14.7	6594.4	15	0.3	0.2	Alluvial groundwater
Note: Ground elevation is 6609.10 ft; all depths are from this elevation													

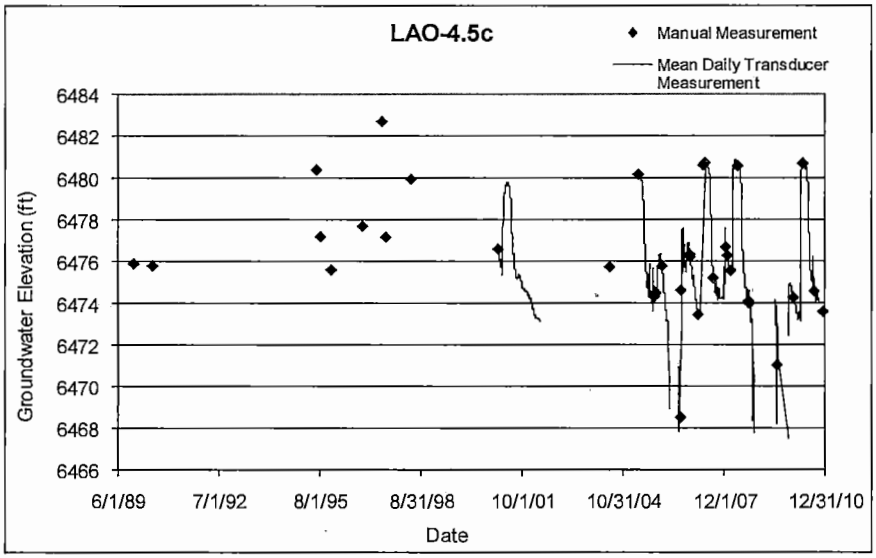


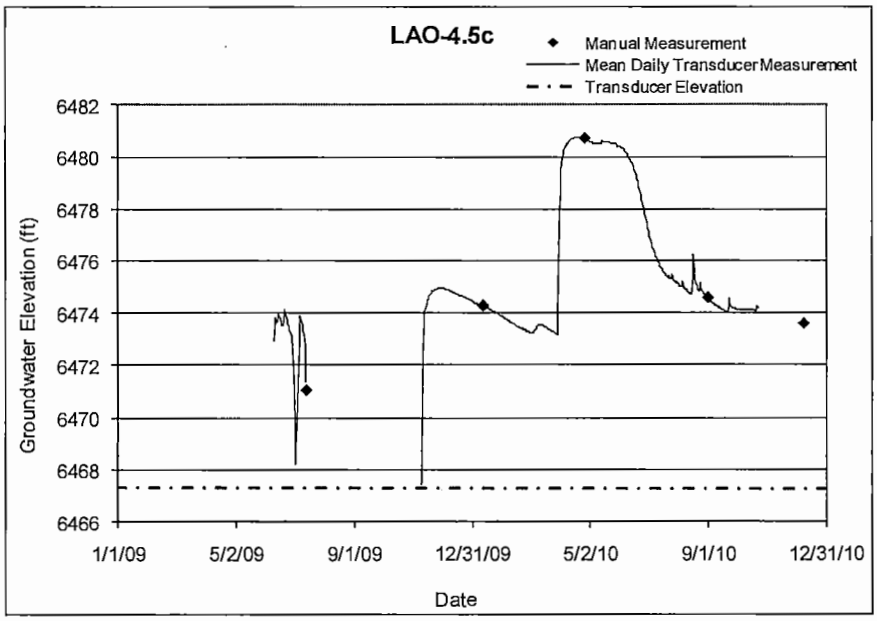


5.44 LAO-4.5c

Location: Los Alamos Canyon, approximately 1.25 mi east of the confluence with DP Canyon.
Period of Record: November 22, 1989, through December 8, 2010.
Remarks: The transducer is resting on top of the bladder pump; water levels below 6438.34 ft are not recorded by the transducer. This well also tends to run dry.

LAO-4.5c Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Comment
1	13.3	23.3	6473.2	6463.2	10.0			23.3	6463.2	23.3	0.0	0.0	Alluvial groundwater
Note: Ground elevation is 6486.50 ft; all depths are from this elevation													

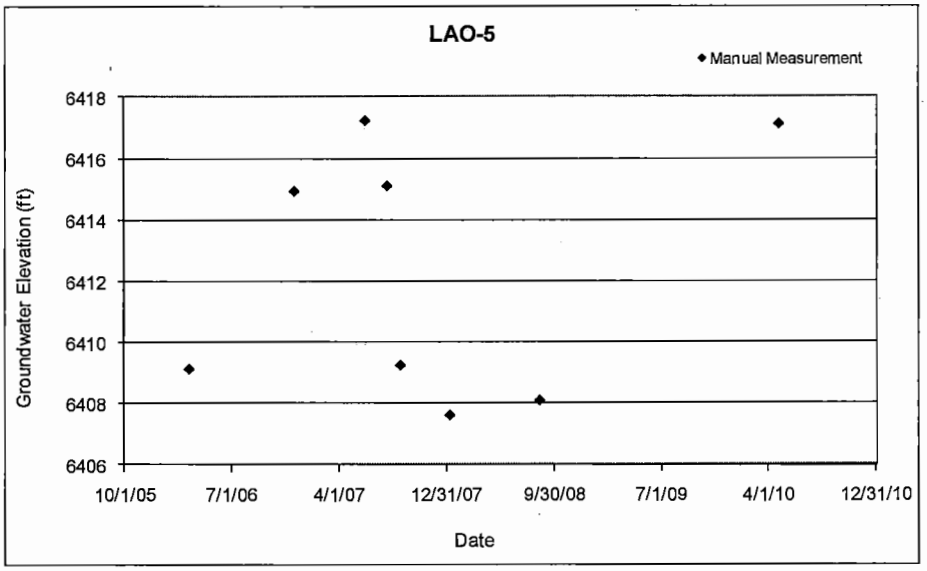




5.45 LAO-5

Location: Los Alamos Canyon, approximately 1 mi west of SR-4.
Period of Record: December 14, 2005, through December 8, 2010.
Remarks: LAO-5 was not installed with a pressure transducer and was measured manually on a quarterly schedule. Regular monitoring of the well was discontinued January 9, 2008, and manual water levels are currently only taken for sampling events.

LAO-5 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Comment
1	5.0	25.0	6422.1	6402.1	20.0			25.0	6402.1	25.0	0.0	0.0	Alluvial groundwater
Note: Ground elevation is 6427.10 ft; all depths are from this elevation													



LAO-5 Manual Water Levels	
Date	Manual Water Level (ft)
12/14/05	Dry
3/14/06	6409.12
6/13/06	Dry
8/2/06	Dry
8/3/06	Dry
9/7/06	Dry
12/8/06	6414.92
3/13/07	Dry
6/7/07	6417.22
8/3/07	6415.1
9/5/07	6409.23
1/9/08	6407.6
8/25/08	6408.08
1/6/09	Dry
7/8/09	Dry
1/7/2010	Dry
4/27/2010	6417.11
9/1/2010	6409.38
12/8/2010	Dry

5.46 LAO-6

Location: Los Alamos Canyon, approximately 1 mi west of SR-4.
Period of Record: June 26, 1995, through January 28, 2009.
Remarks: Regular monitoring of this well was discontinued January 2, 2008, and manual water levels were obtained for sampling events only. All monitoring of this well was discontinued as of July 28, 2009.

LAO-6 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	6.0	16.0	6389.3	6379.3	10.0			16.0	6379.3	16.0	0.0	0.0	Alluvial groundwater

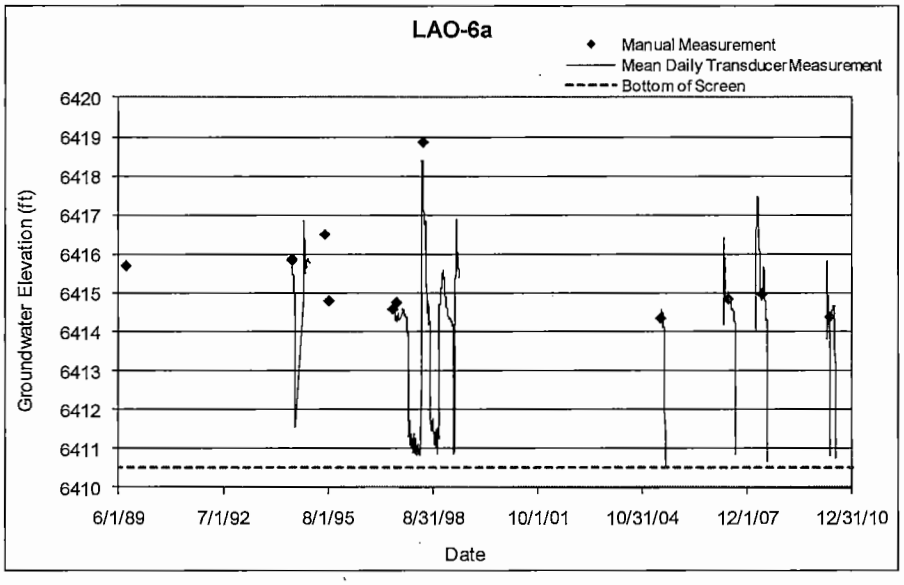
Note: Ground elevation is 6395.3 ft; all depths are from this elevation

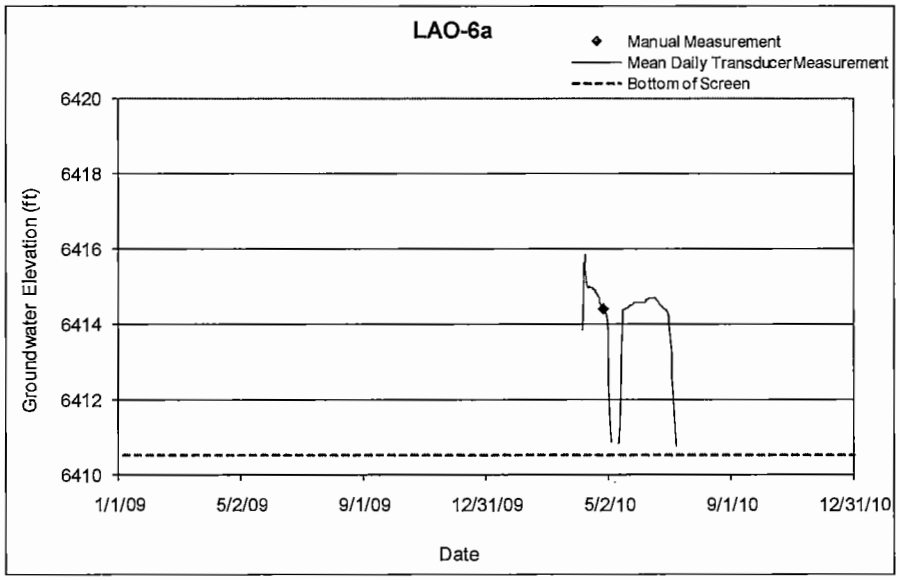
LAO-6	
Date	Manual Water Level (ft)
6/26/1995	6413.8
8/8/1995	6413.3
12/7/1995	6411.7
3/14/2006	Dry
4/19/2006	Dry
6/13/2006	Dry
7/27/2006	Dry
9/7/2006	Dry
12/8/2006	Dry
3/13/2007	Dry
6/7/2007	6411.67
9/5/2007	Dry
1/9/2008	Dry
1/7/2009	Dry
7/28/2009	Dry

5.47 LAO-6a

Location: Los Alamos Canyon, approximately 1 mi west of SR-4.
Period of Record: August 17, 1989, through December 8, 2010.
Remarks: Well is seasonally dry.

LAO-6a Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Comment
1	4.2	14.2	6420.5	6410.5	10.0			14.2	6410.5	14.2	0.0	0.0	Alluvial groundwater
Note: Ground elevation is 6424.70 ft; all depths are from this elevation													



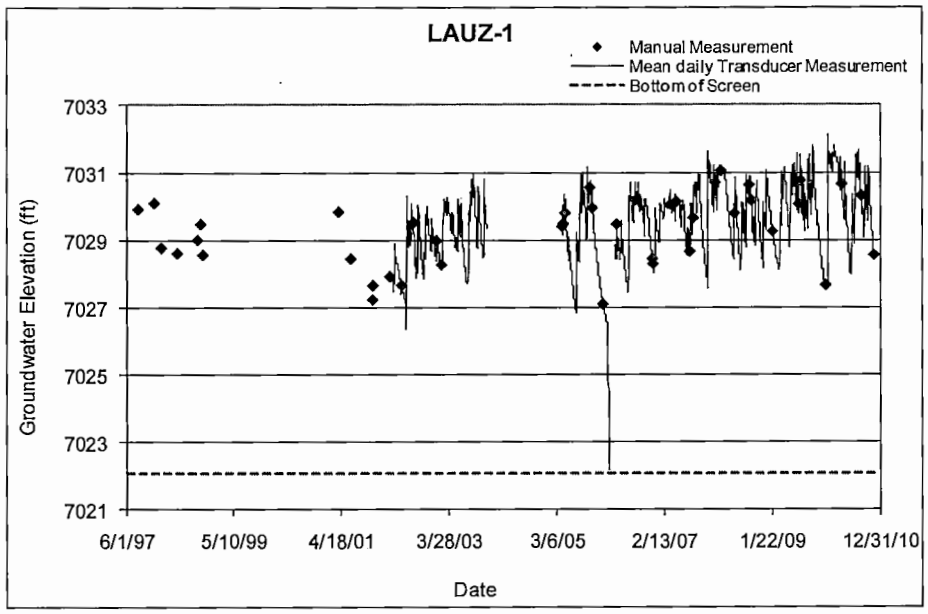


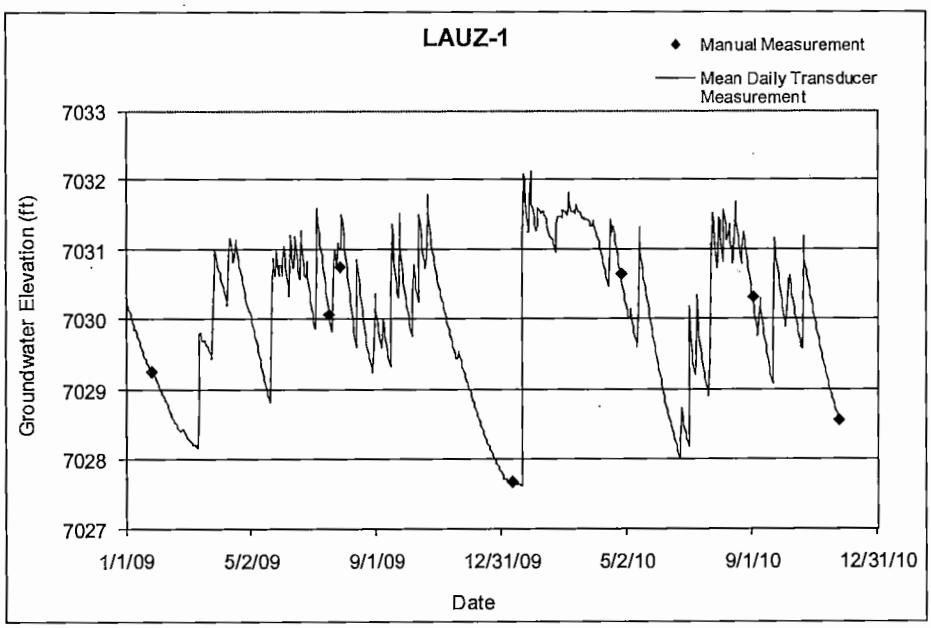
5.48 LAUZ-1

Location: DP Canyon, north of TA-21.
Period of Record: August 20, 1997, through November 24, 2010.
Remarks: None.

LAUZ-1 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	5.35	10.35	7027.07	7022.07	5.00			10.35	7022.07	10.55	0.20	0.49	Alluvial groundwater

Note: Ground elevation is 7032.42 ft; all depths are from this elevation





5.49 LLAO-1b

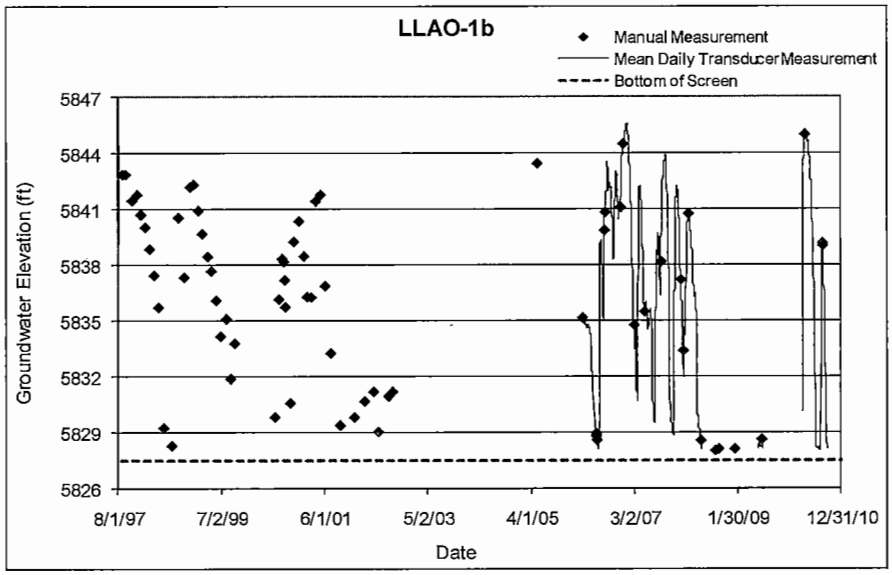
Location: Lower Los Alamos Canyon, approximately 3000 ft southwest of Totavi on San Ildefonso Pueblo land.

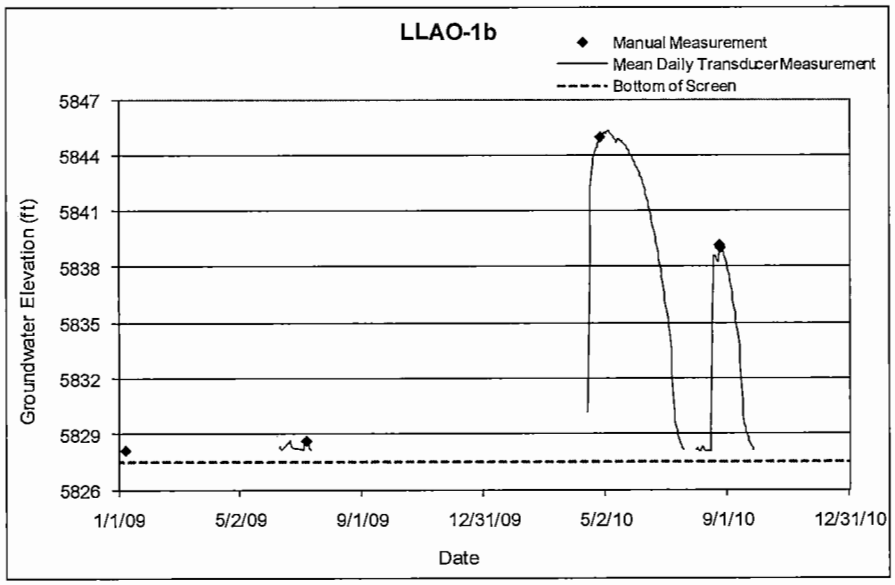
Period of Record: August 27, 1997, through December 7, 2010.

Remarks: Well has mostly remained dry since June 1, 2008, with the exception of a brief rise in June 2009.

LLAO-1b Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	11.32	21.32	5837.52	5827.52	10.00			21.32	5827.52	24.17	2.85	7.04	Alluvial groundwater

Note: Ground elevation is 5850.34 ft; all measurements are from this elevation



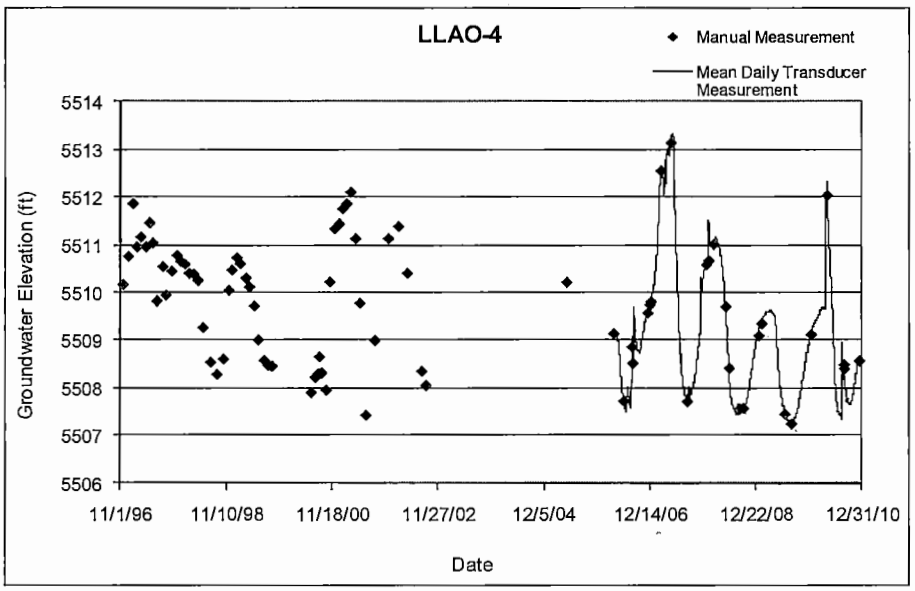


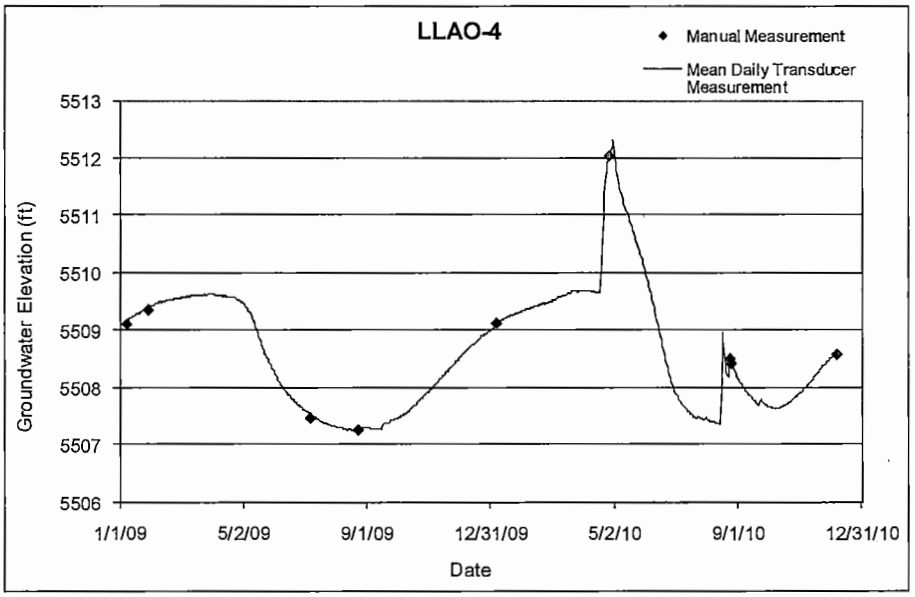
5.50 LLAO-4

Location: Lower Los Alamos Canyon, approximately 700 ft northwest of the Rio Grande at SR-502 on San Ildefonso Pueblo land.
Period of Record: November 22, 1996, through December 8, 2010.
Remarks: None.

LLAO-4 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	5.24	15.24	5509.97	5499.97	10.00			15.24	5499.97	18.09	2.85	7.04	Alluvial groundwater

Note: Ground elevation is 5515.46 ft; all depths are from this elevation



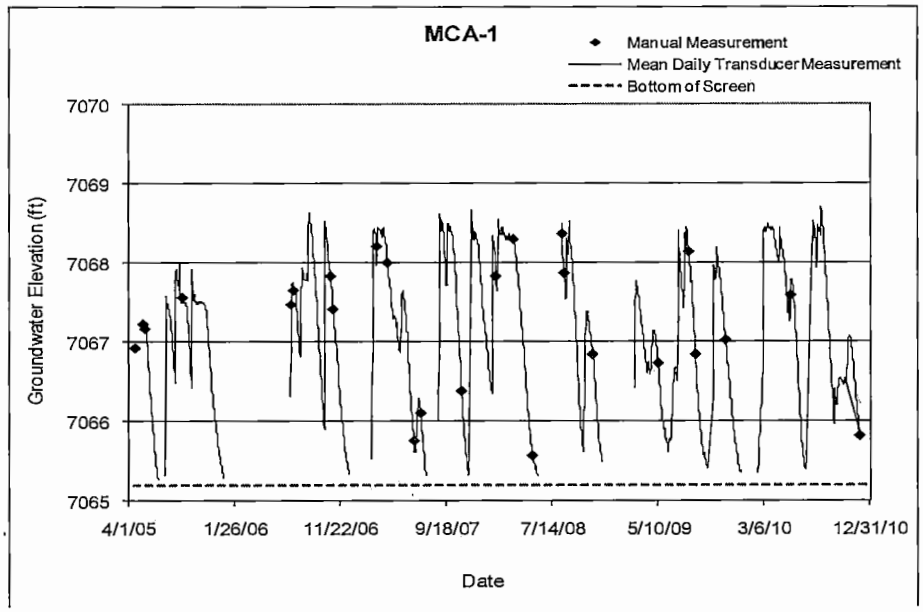


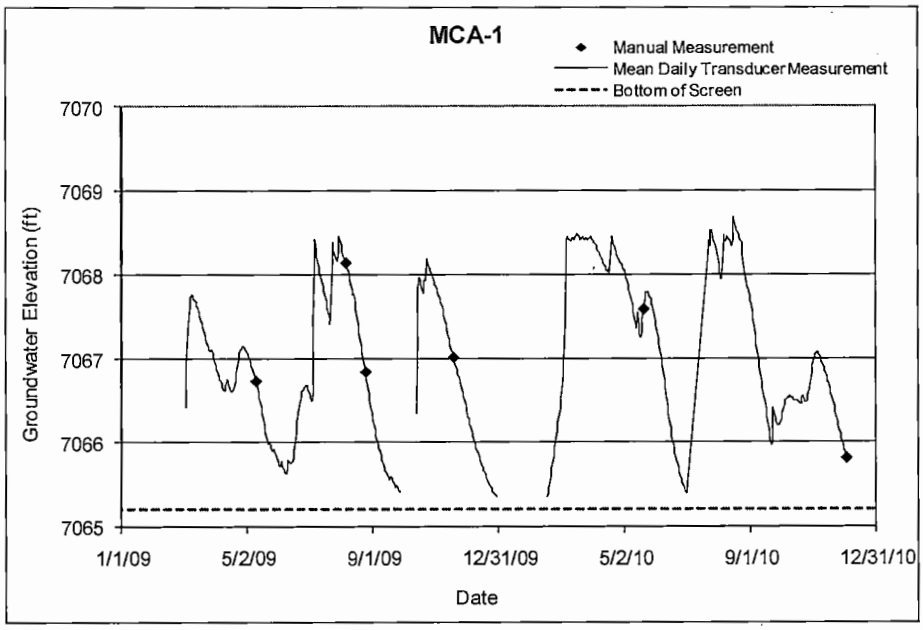
5.51 MCA-1

Location: Upper Mortandad Canyon, approximately 700 ft northeast of the TA-50 outfall.
Period of Record: April 20, 2005, through December 3, 2010.
Remarks: None.

MCA-1 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	2.4	5.4	7068.2	7065.2	3.0			5.4	7065.2	5.9	0.5	0.1	Alluvial groundwater

Note: Ground Elevation: 7070.6 ft; all depths are from this elevation



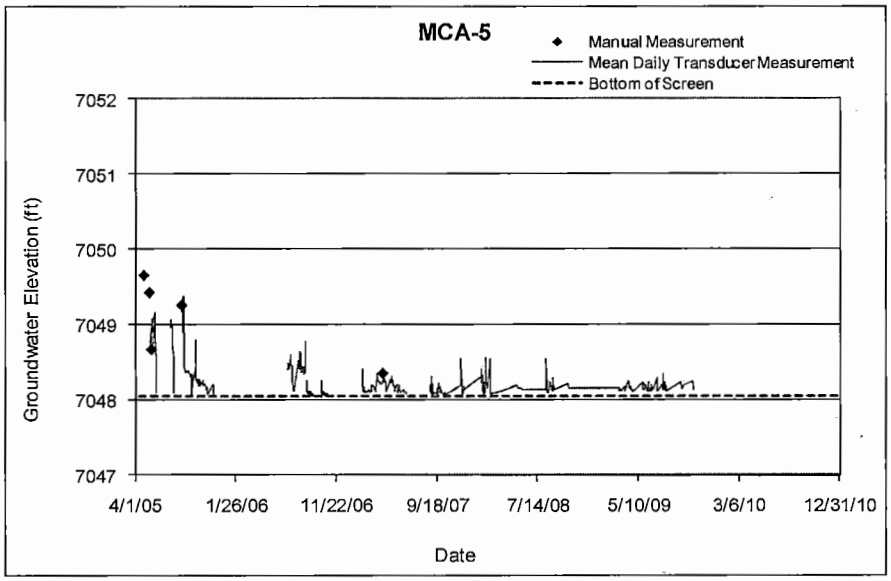


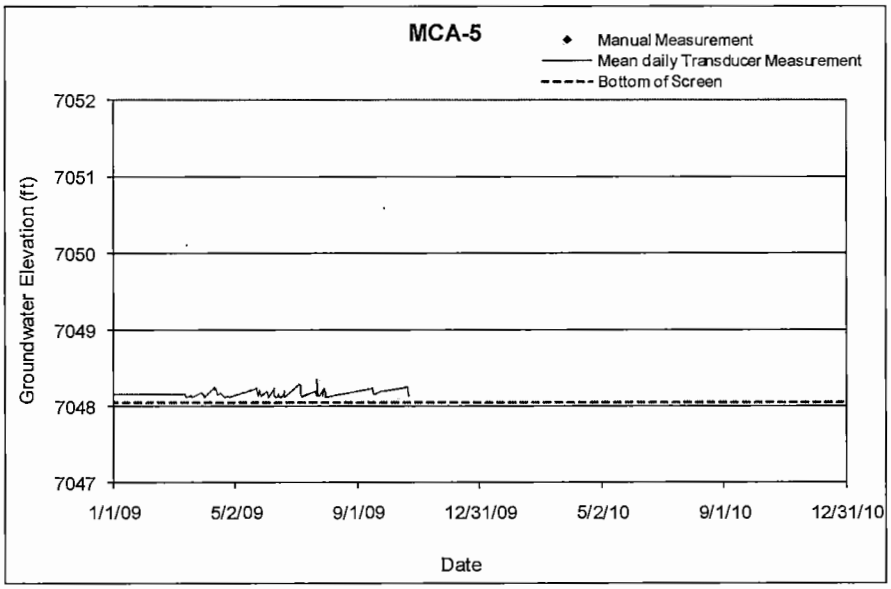
5.52 MCA-5

Location: Upper Mortandad Canyon, approximately 1250 ft downstream of TA-50 outfall.
Period of Record: April 25, 2005, through February 11, 2010.
Remarks: This well is intermittently dry. Monitoring was discontinued February 11, 2010, and moved exclusively to MCO-3.

MCA-5 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	1.75	5.75	7052.05	7048.05	4.0			5.75	7048.05	6.0	0.25	0.04	Alluvial groundwater

Note: Ground elevation is 7053.8 ft; all depths are from this elevation





5.53 MCA-8

Location: Lower Mortandad Canyon.
Period of Record: October 3, 2005, through February 10, 2010.
Remarks: No valid water level data exist for this well. Water has occurred only in the sump since completion on September 29, 2004. Monitoring was discontinued February 10, 2010.

MCA-8 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	66	81	6602.7	6587.7	15			81	6587.7	86.3	5.3	14.4	Alluvial groundwater

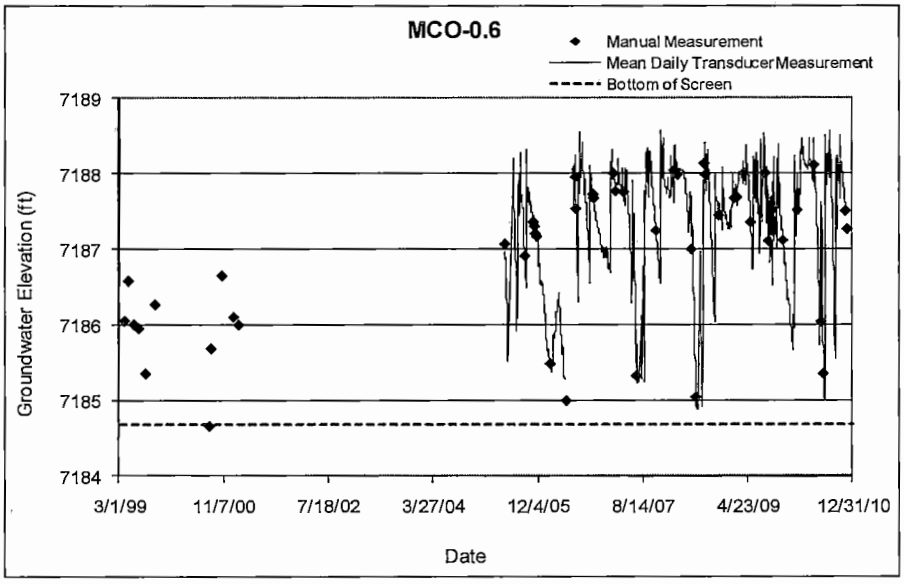
Note: Brass Cap Ground elevation is 6668.8 ft; all depths are from this elevation

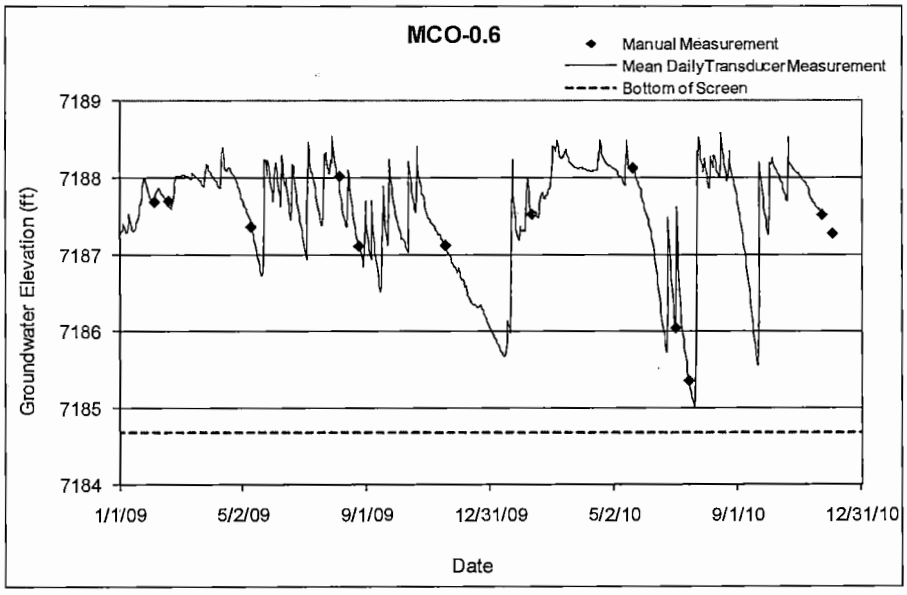
MCA-8 Manual Water Levels		
Date	Water Level (ft)	Comments
10/3/2005	6582.43	Sump water
1/4/2006	6583.52	Sump water
4/13/2006	6584.09	Sump water
7/18/2006	6584.14	Sump water
10/30/2006	6584.17	Sump water
9/5/2006	6584.16	Sump water
1/26/2007	6584.12	Sump water
4/12/2007	6584.11	Sump water
7/3/2007	6584.1	Sump water
11/29/2007	6584.11	Sump water
12/5/2007	6583.94	Sump water
3/26/2008	6583.99	Sump water
6/19/2008	6584.09	Sump water
8/11/2008	6584.1	Sump water
8/19/2008	6584.01	Sump water
8/19/2008	6584.01	Sump water
2/19/2009	6584.01	Sump water
5/19/2009	6584.13	Sump water
8/25/09	6584.11	Sump water
11/18/09	6584.11	Sump water
2/10/10	6583.96	Sump water

5.54 MCO-0.6

Location: Upper Mortandad Canyon, north of TA-48.
Period of Record: March 31, 1999, through December 3, 2010.
Remarks: None.

MCO-0.6 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	1.05	3.05	7186.68	7184.68	2.00			3.05	7184.68	3.10	0.05	0.04	Alluvial groundwater
Note: Brass Cap elevation: 7188.28 ft; Ground elevation: 7187.73 ft; all depths are from this elevation													





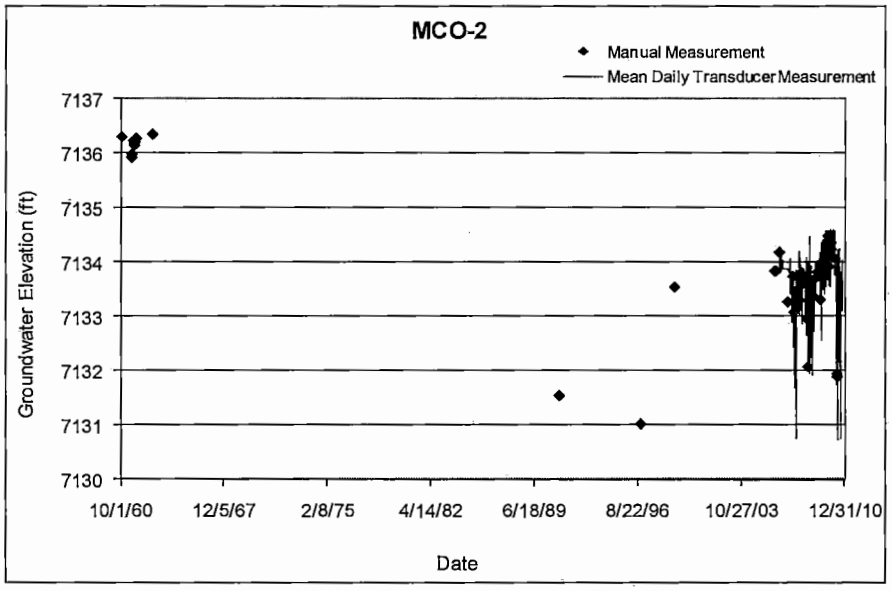
5.55 MCO-2

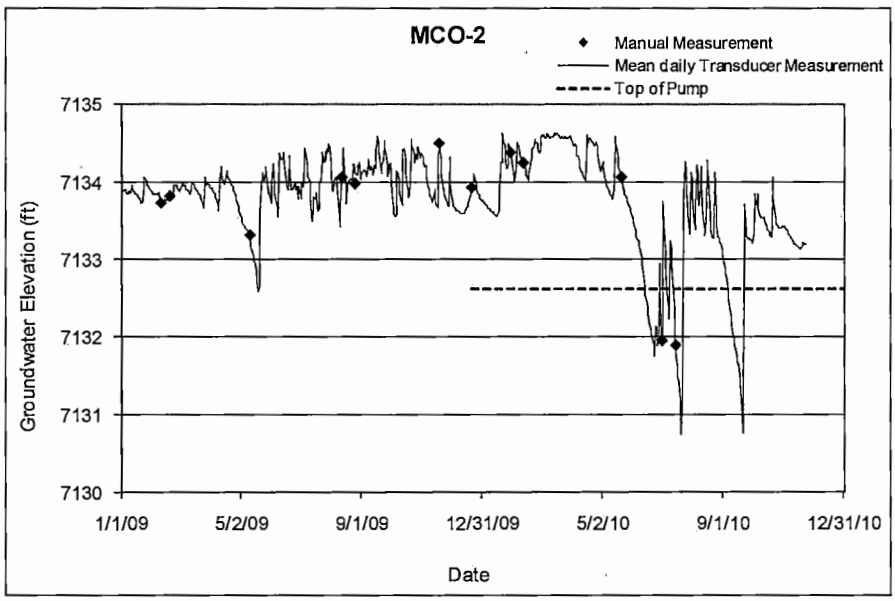
Location: Upper Effluent Canyon, approximately 200 ft west of TA-50 outfall.
Period of Record: November 1, 1960, through November 23, 2010.
Remarks: The transducer was sitting on top of the bladder pump in a 2-in.-diameter well at an elevation of 7133.8 ft until April 12, 2007. The pump was removed from the well on April 12, 2007, and the transducer was lowered to a more functional level.

MCO-2 Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	2.0	9.0	7134.6	7127.6	7.0			9.0	7127.6	9.0	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 7136.6 ft; all depths are from this elevation



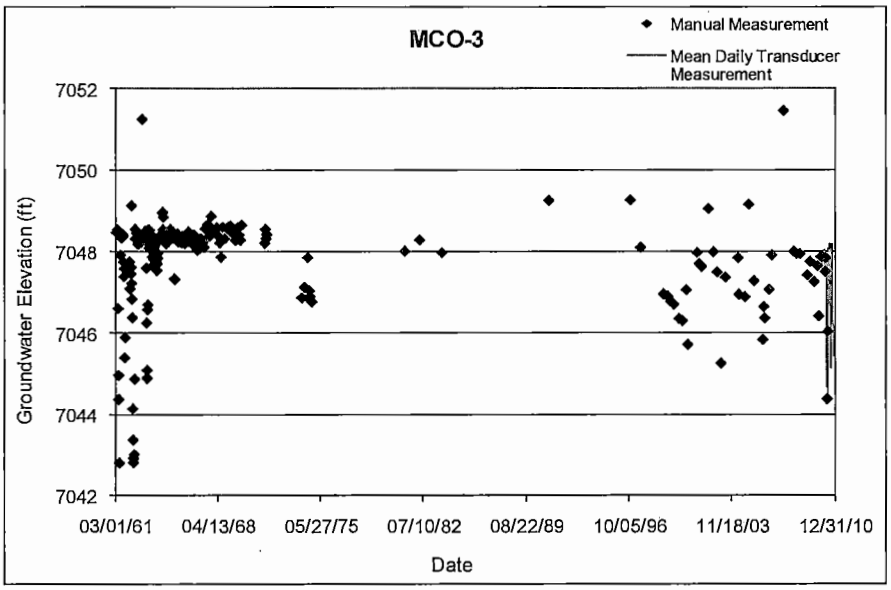


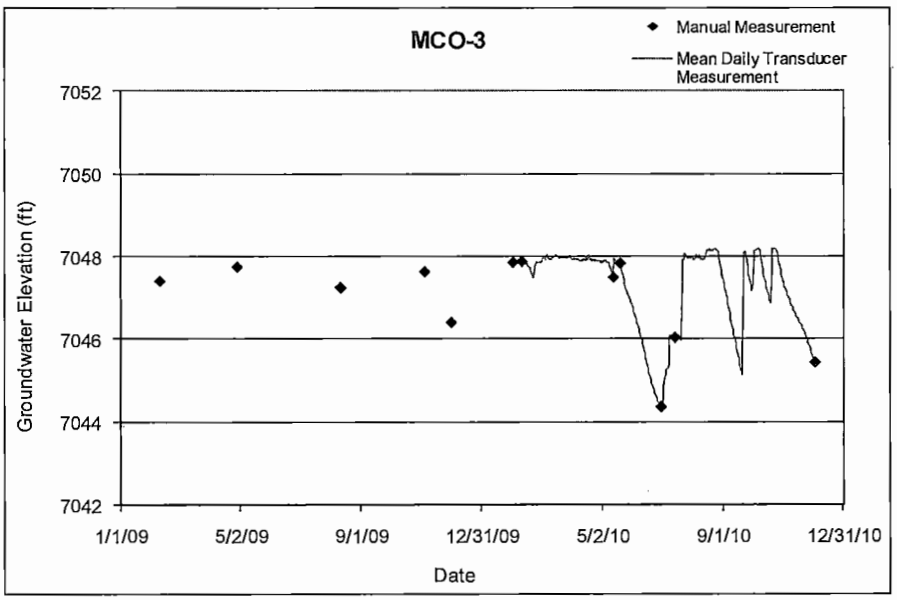
5.56 MCO-3

Location: Upper Mortandad Canyon, approximately 1250 ft downstream of TA-50 outfall and 8 ft east of MCA-5.
Period of Record: March 27, 1961, through December 3, 2010.
Remarks: There was no transducer installed in this well until February 11, 2010; continuous monitoring switched from MCA-5 to this well since MCO-3 is the well which is sampled.

MCO-3 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	2.0	12.0	7050.6	7040.6	10.0			12.0	7040.6	12.0	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 7052.6 ft; all depths are from this elevation



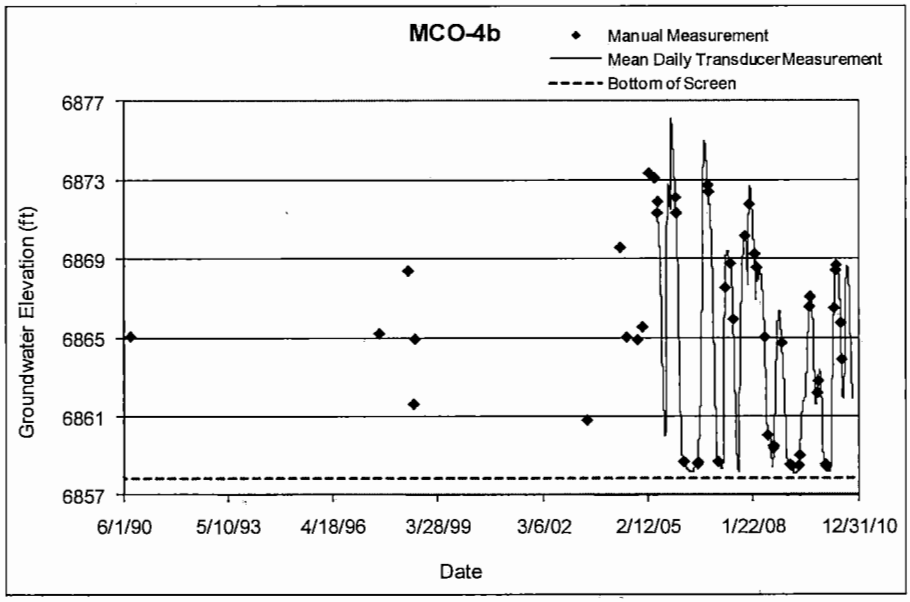


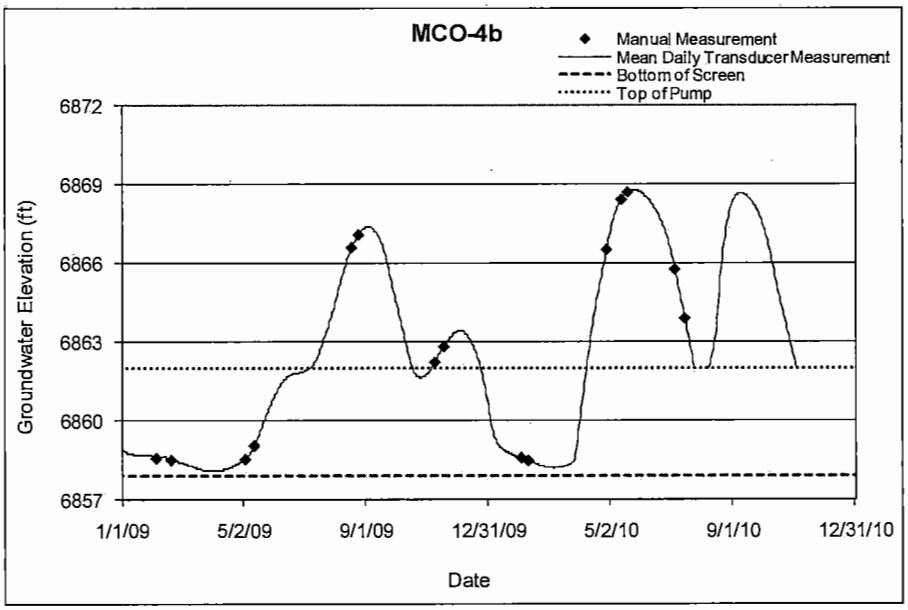
5.57 MCO-4b

Location: Middle Mortandad Canyon, approximately 3000 ft up canyon from sediment traps.
Period of Record: August 21, 1990, through December 2, 2010.
Remarks: Pump was removed for maintenance, and transducer was relocated above pump at that time.

MCO-4b Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	8.9	28.9	6877.9	6857.9	20.0			28.9	6857.9	33.9	5.0	3.1	Alluvial groundwater

Note: Ground elevation is 6886.75 ft; all depths are from this elevation



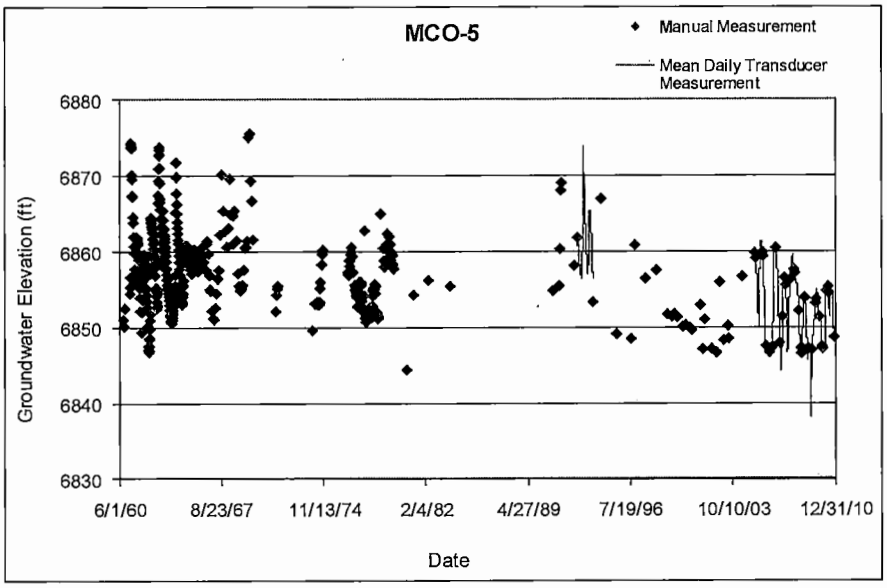


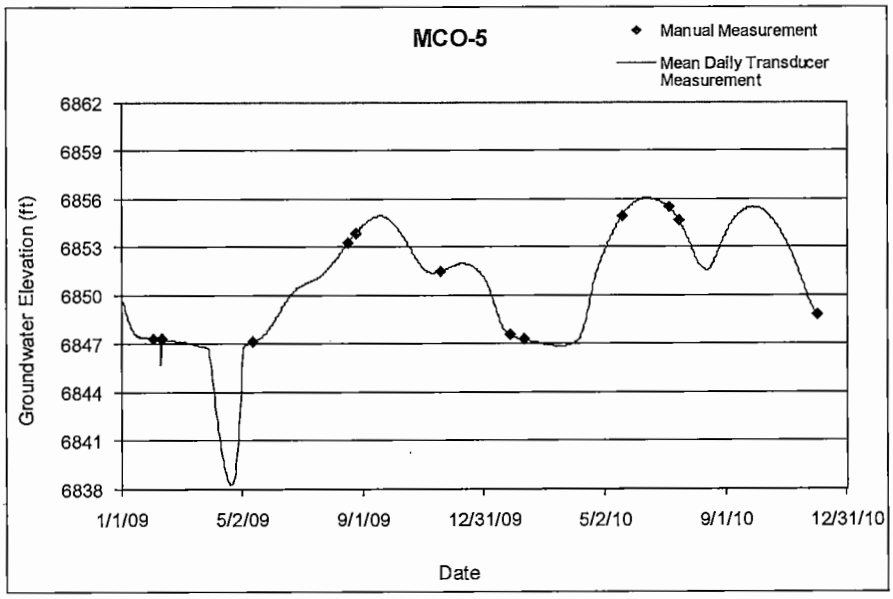
5.58 MCO-5

Location: Middle Mortandad Canyon, approximately 2300 ft up canyon from sediment traps.
Period of Record: October 1, 1960, through December 2, 2010.
Remarks: None.

MCO-5 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	21.0	46.0	6854.66	6829.66	25.0			46.0	6829.66	46.0	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 6875.66 ft; all depths are from this elevation



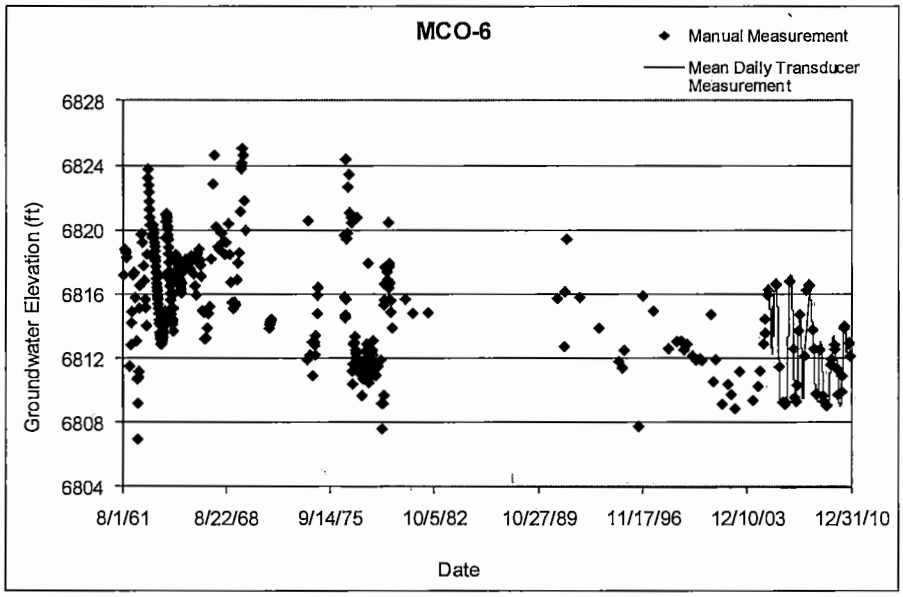


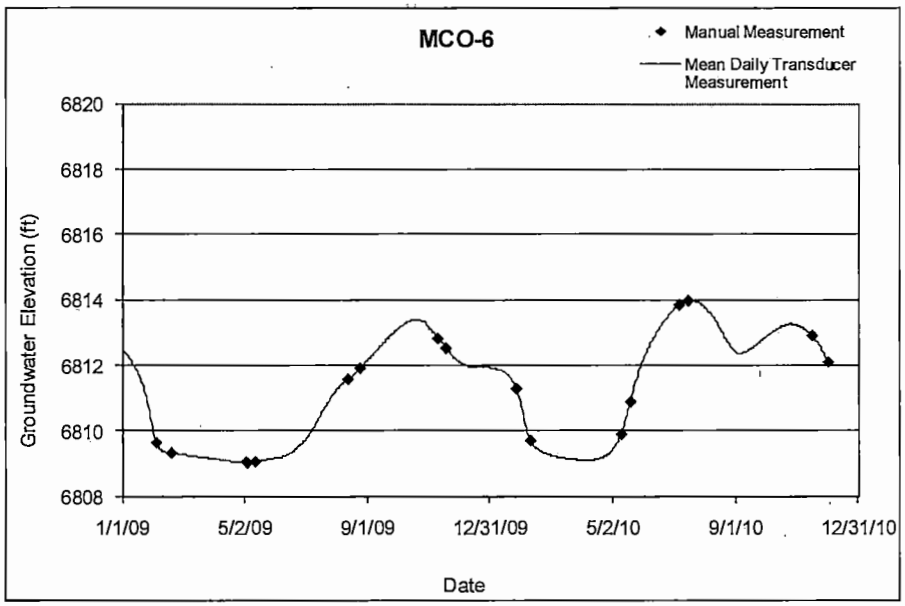
5.59 MCO-6

Location: Middle Mortandad Canyon, approximately 0.25 mi east of MCO-5.
Period of Record: August 25, 1961, through December 2, 2010.
Remarks: The transducer was removed from the well October 30, 2007, and replaced February 28, 2008.

MCO-6 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	27.0	47.0	6822.5	6802.5	20.0	-		47.0	6802.5	47.0	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 6849.48 ft; all depths are from this elevation



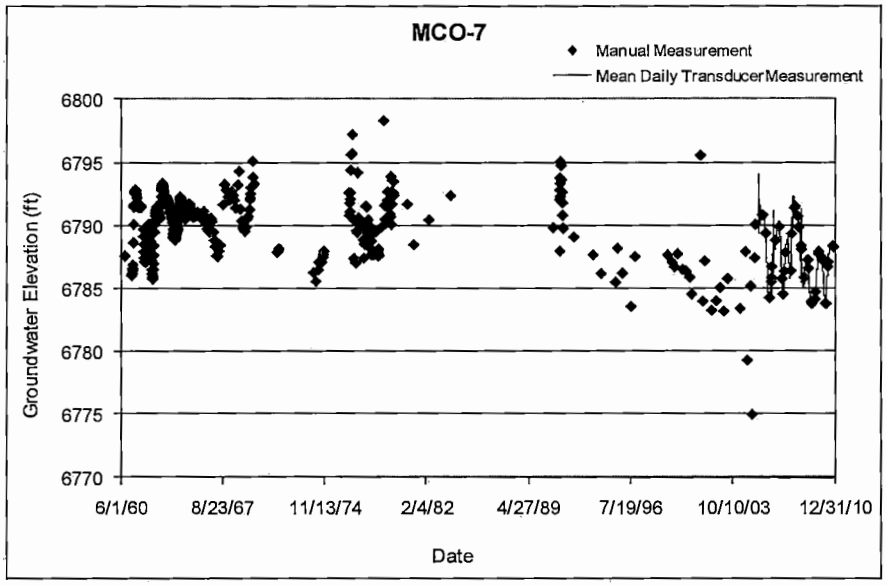


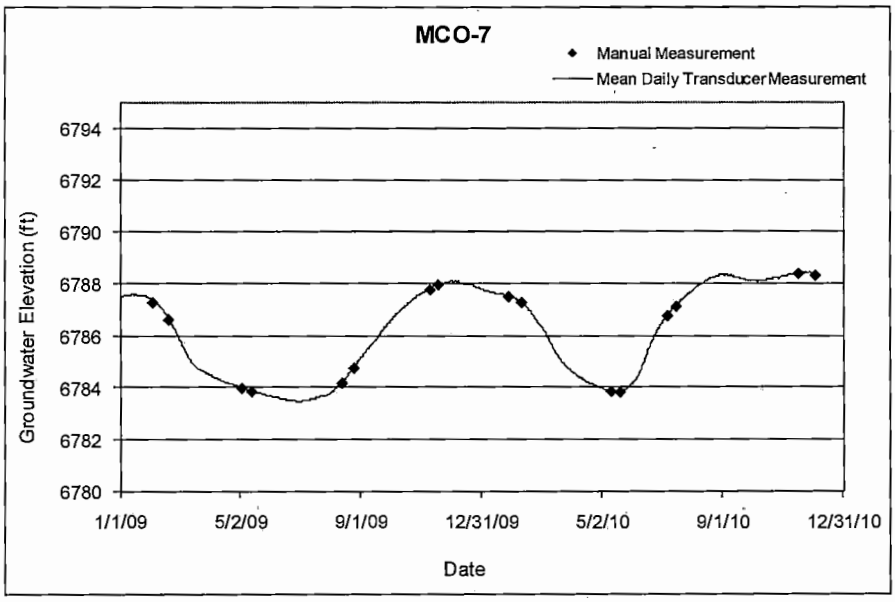
5.60 MCO-7

Location: Middle Mortandad Canyon, approximately 0.2 mi east of MCO-6.
Period of Record: October 1, 1960, through December 3, 2010.
Remarks: None.

MCO-7 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	39	69	6788.31	6758.31	30			69	6758.31	69	0	0	Alluvial groundwater

Note: Ground elevation is 6827.31 ft; all depths are from this elevation



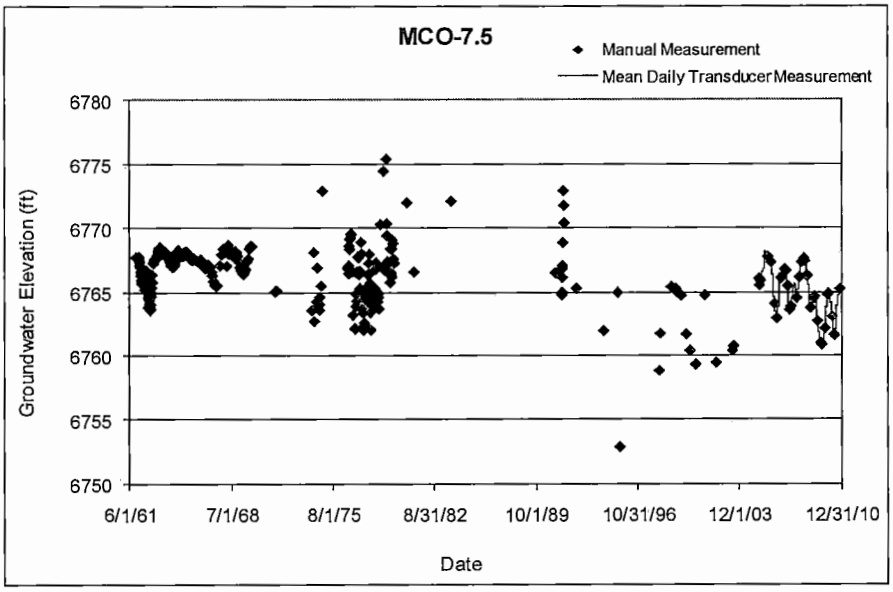


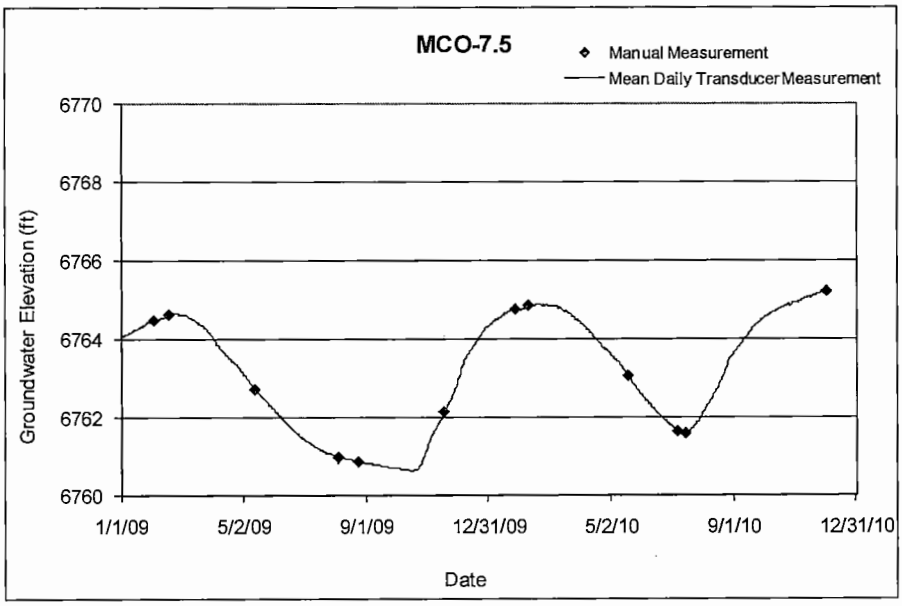
5.61 MCO-7.5

Location: Middle Mortandad Canyon, approximately 0.2 mi east of MCO-7.
Period of Record: November 1, 1961, through December 3, 2010.
Remarks: None.

MCO-7.5 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	35	60	6773.88	6748.88	25			60	6748.88	60	0	0	Alluvial groundwater

Note: Ground Elevation: 6808.881 ft; all depths are from this elevation



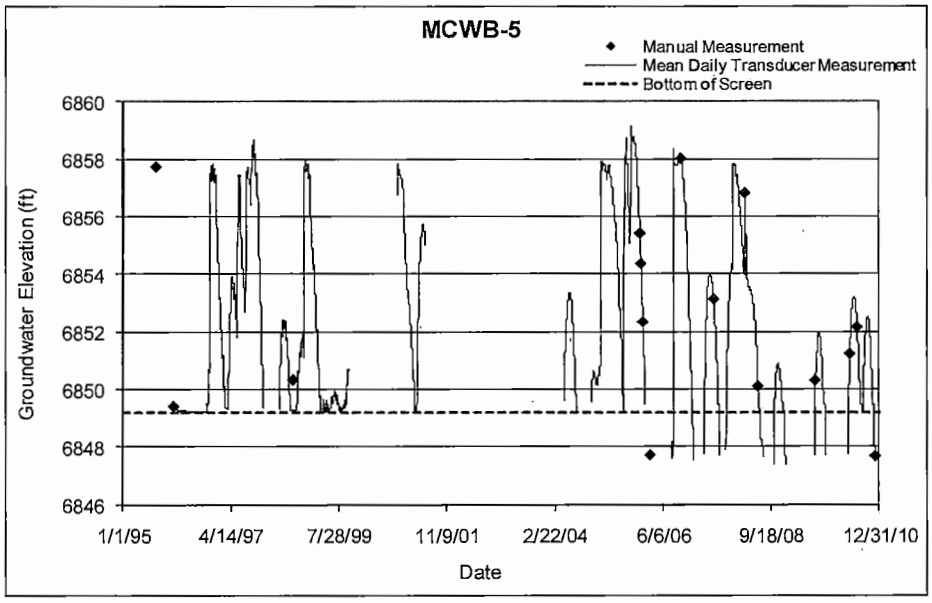


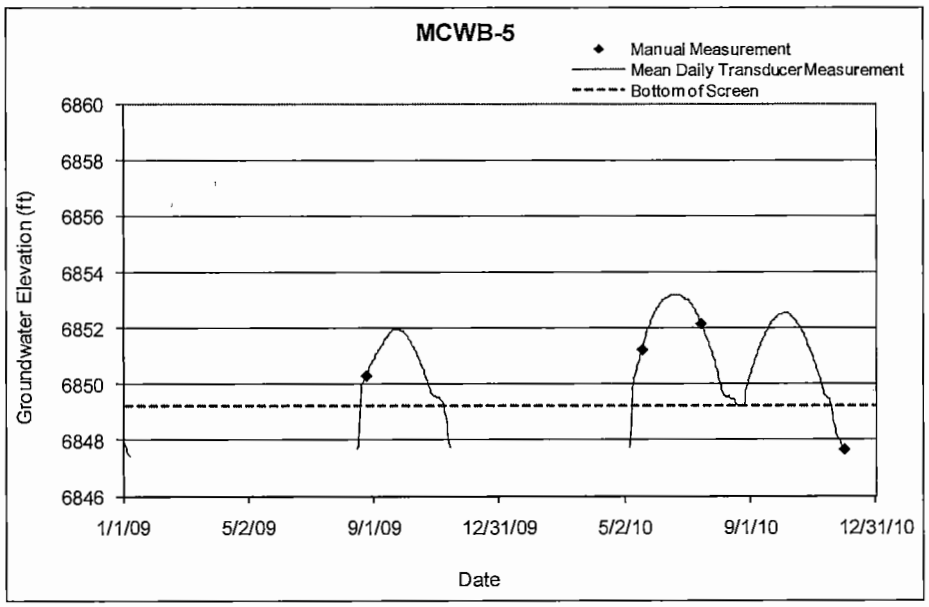
5.62 MCWB-5

Location: Middle Mortandad Canyon, up canyon from the sediment traps.
Period of Record: January 9, 1995, through December 2, 2010.
Remarks: Water in the sump is not considered invalid as it appears to respond to groundwater level fluctuations. Transducer hangs above bottom of well; groundwater elevations below 6847 ft are not recorded by the transducer.

MCWB-5 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	17.0	27.0	6859.2	6849.2	10.0			27.0	6849.2	32.0	5.0	7.0	Alluvial groundwater

Note: Ground elevation is 6876.22 ft; all depths are from this elevation



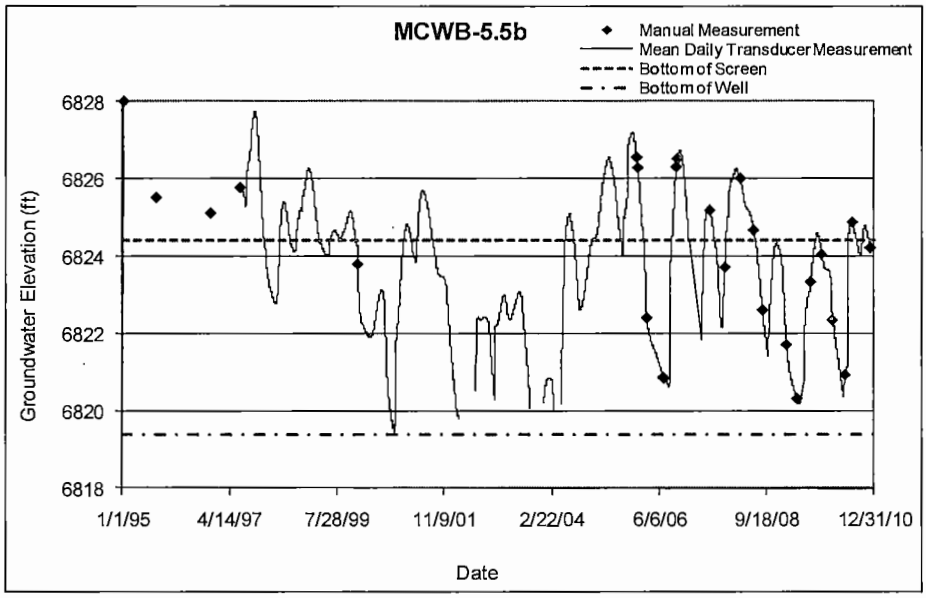


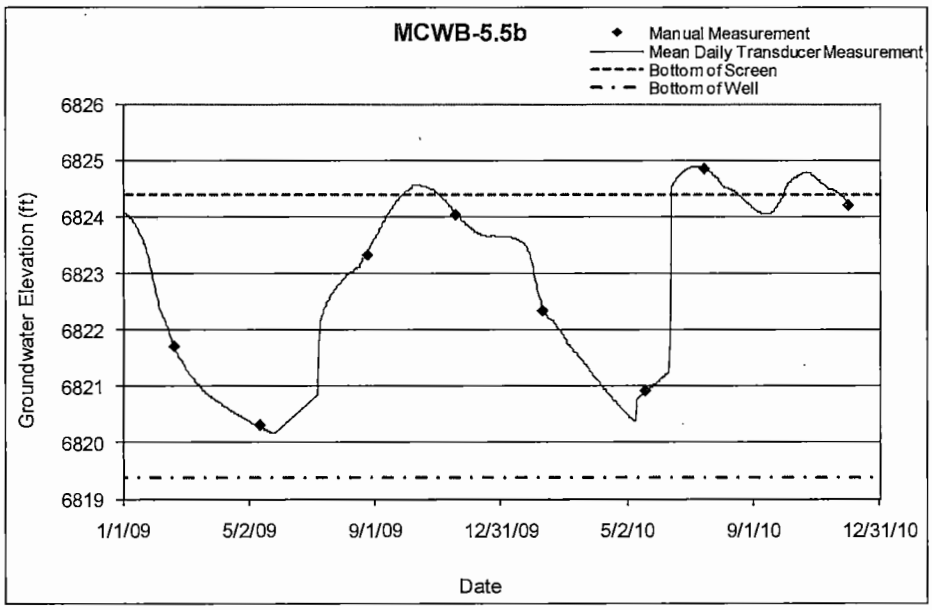
5.63 MCWB-5.5b

Location: Middle Mortandad Canyon, up canyon from sediment traps.
Period of Record: January 9, 1995, through December 2, 2010.
Remarks: Water in sump is not invalidated as it appears to represent formation water.

MCWB-5.5b Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	22.5	32.5	6834.4	6824.4	10.0			32.5	6824.4	37.5	5.0	7.0	Alluvial groundwater

Note: Ground elevation is 6856.89 ft; all depths are from this elevation





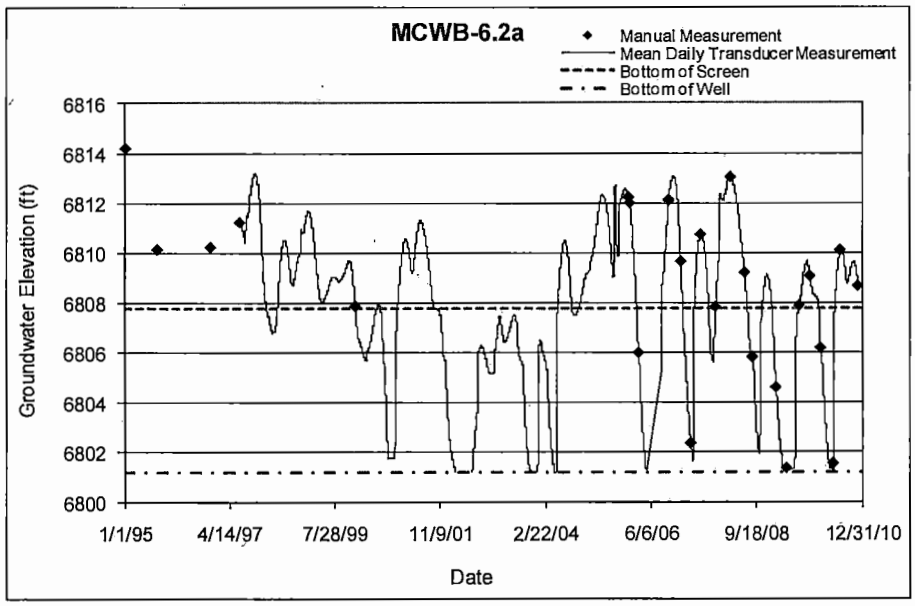
5.64 MCWB-6.2a

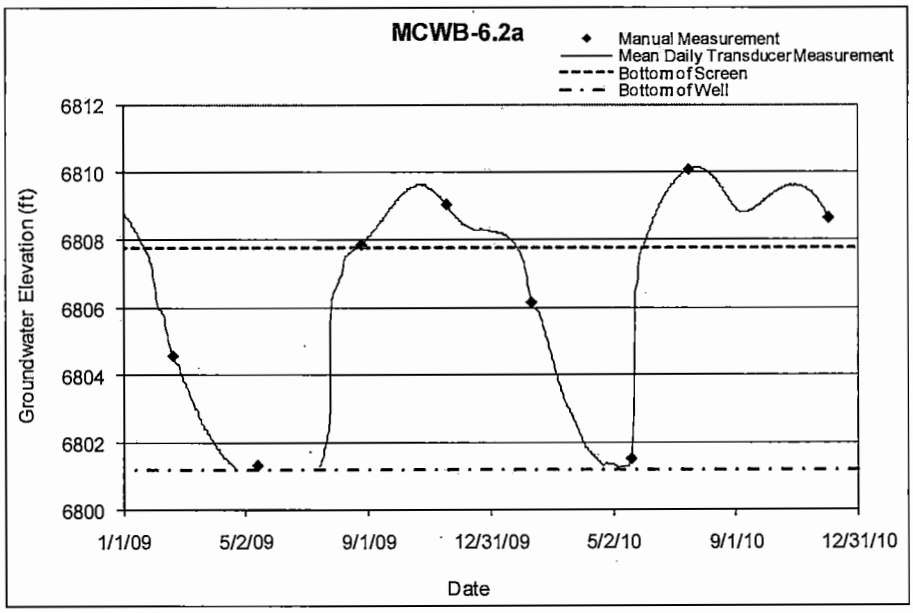
Location: Middle Mortandad Canyon, up canyon from sediment traps.
Period of Record: January 9, 1995, through December 2, 2010.
Remarks: Water in the sump is not invalidated, as it appears to respond to groundwater level fluctuations. Transducer data indicate that the bottom of the well is at 6801.2 ft.

MCWB-6.2a Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	30.5	40.5	6817.8	6807.8	10.0			40.5	6807.8	45.5	5.0	7.0	Alluvial groundwater

Note: Ground elevation is 6848.29 ft; all depths are from this elevation





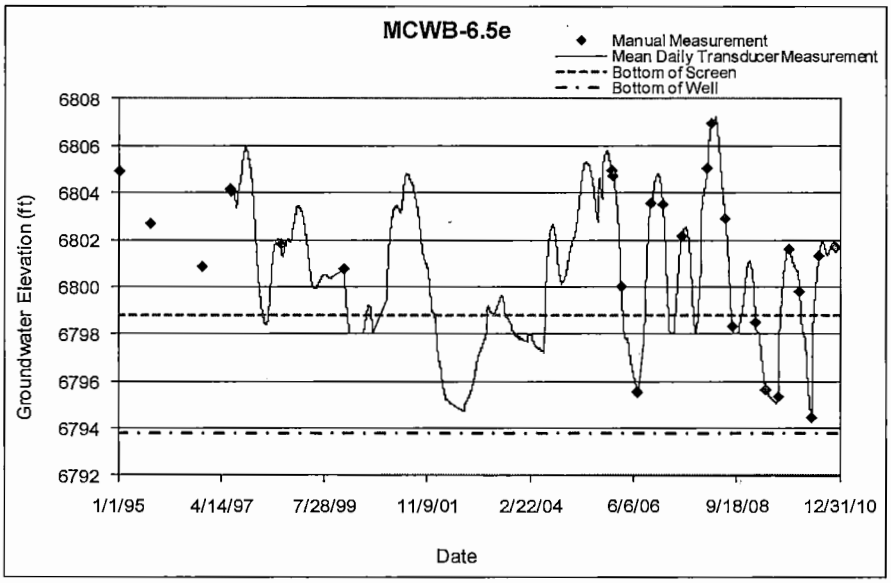
5.65 MCWB-6.5e

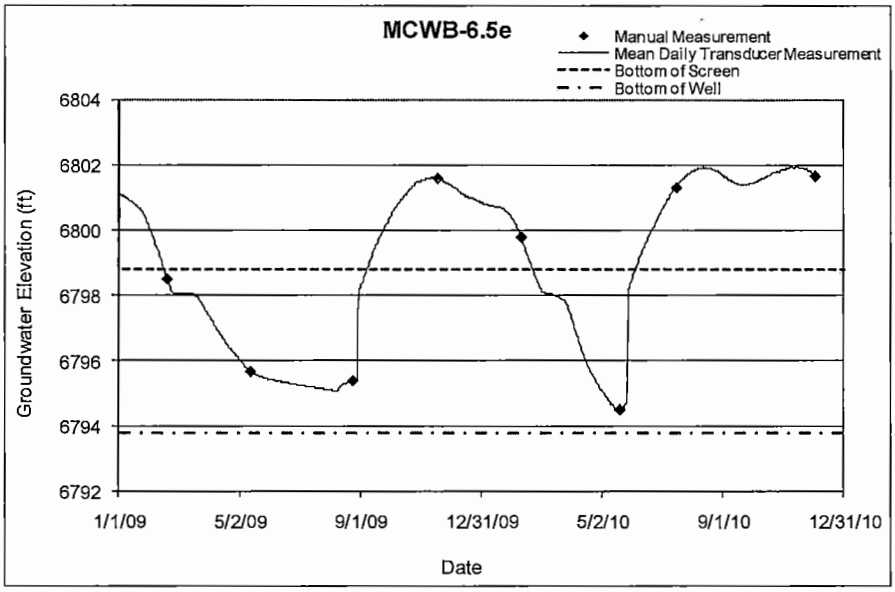
Location: Middle Mortandad Canyon, up canyon of the sediment traps.
Period of Record: January 9, 1995, through December 2, 2010.
Remarks: Water in sump is not invalidated, as it appears to respond to groundwater level fluctuations. Water is below transducer from March 23, 2007, to May 4, 2008, and from August 26, 2008, to October 8, 2008.

MCWB-6.5e Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	35.0	45	6808.8	6798.8	10.0			45.0	6798.8	50.0	5.0	7.0	Alluvial groundwater

Note: Ground elevation is 6843.80 ft; all depths are from this elevation





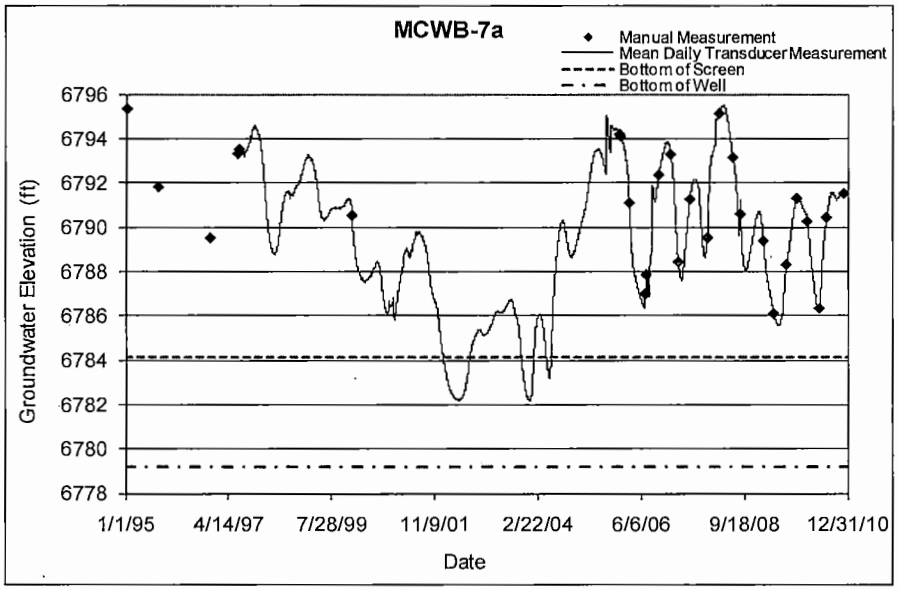
5.66 MCWB-7a

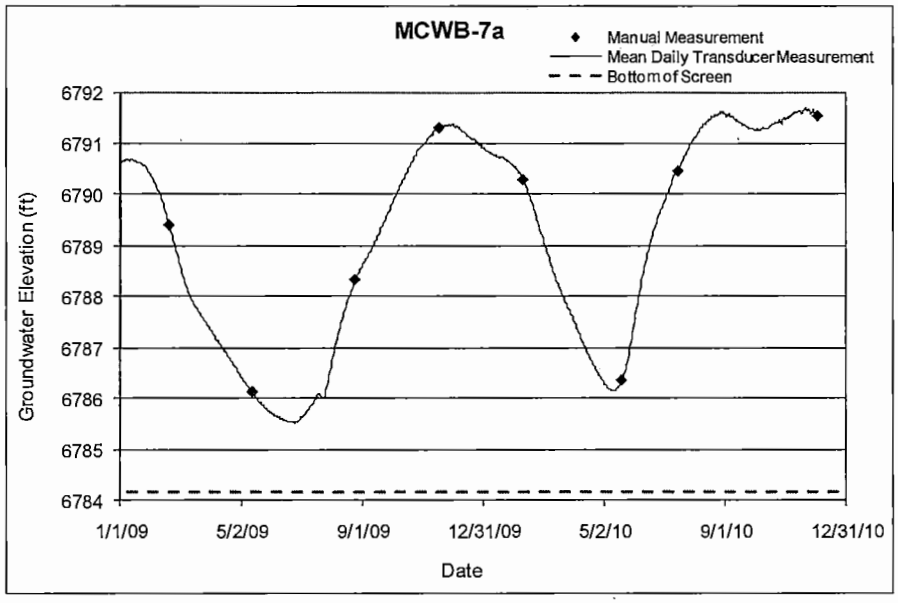
Location: Middle Mortandad Canyon, near sediment traps.
Period of Record: January 9, 1995, through December 3, 2010.
Remarks: Water in sump is not invalidated, as it appears to respond to groundwater level fluctuations.

MCWB-7a Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	37.0	47.0	6794.17	6784.17	10.0			47.0	6784.2	52.0	5.0	7.0	Alluvial groundwater

Note: Ground elevation is 6831.17 ft; all depths are from this elevation



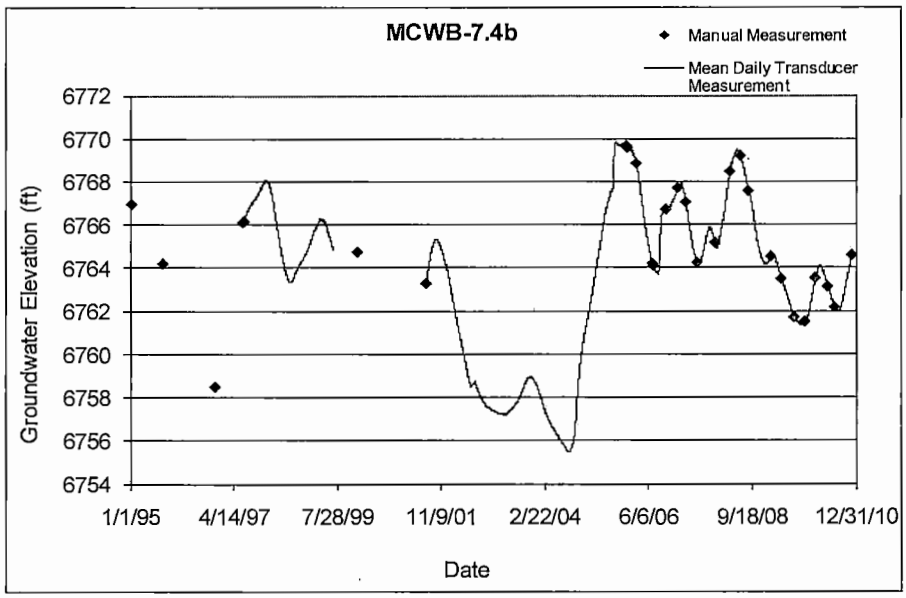


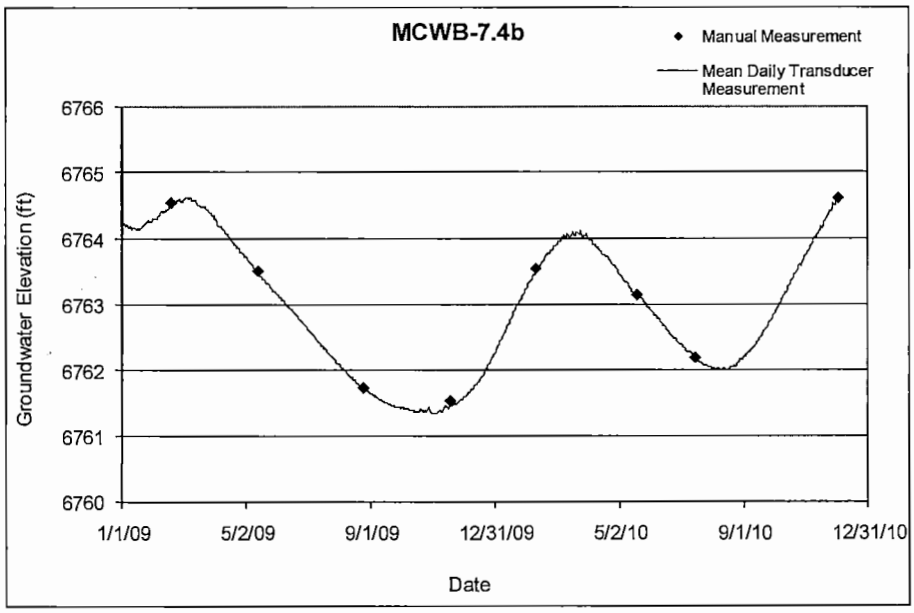
5.67 MCWB-7.4b

Location: Middle Mortandad Canyon, down canyon from sediment traps.
Period of Record: January 9, 1995, through December 3, 2010.
Remarks: None.

MCWB-7.4b Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	45.0	65.0	6768.07	6748.07	20.0			65.0	6748.1	70.0	5.0	7.0	Alluvial groundwater

Note: Ground elevation is 6813.07 ft; all depths are from this elevation



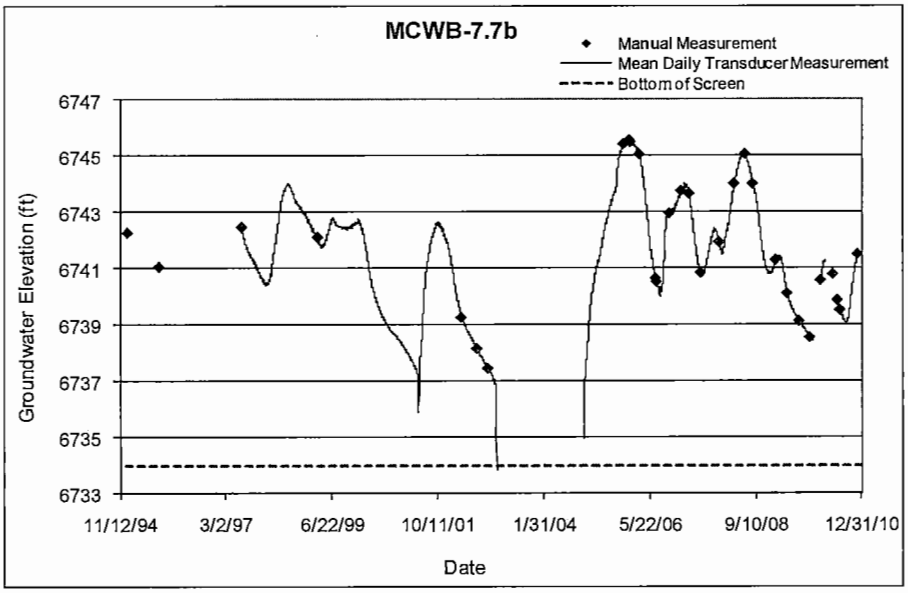


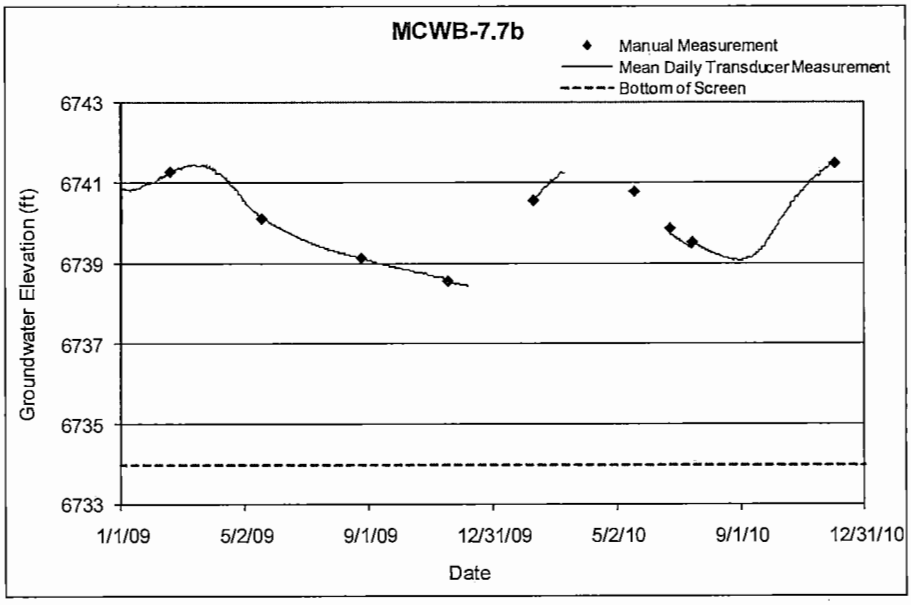
5.68 MCWB-7.7b

Location: Middle Mortandad Canyon, down canyon from sediment traps.
Period of Record: January 9, 1995, through December 3, 2010.
Remarks: None.

MCWB-7.7b Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	55.0	65	6744.0	6734.0	10.0			65.0	6734.0	70	5.0	7.0	Alluvial groundwater

Note: Ground elevation is 6798.97 ft; all depths are from this elevation



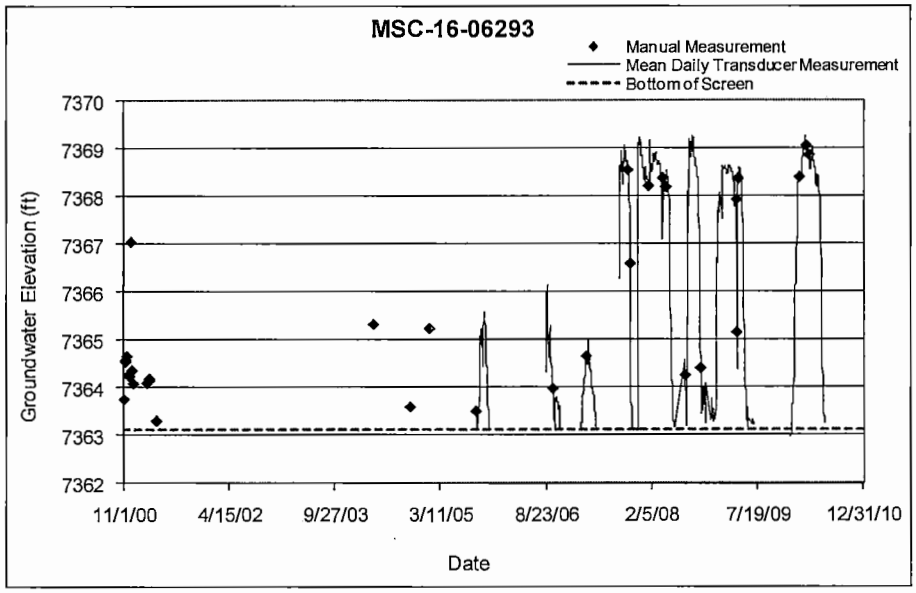


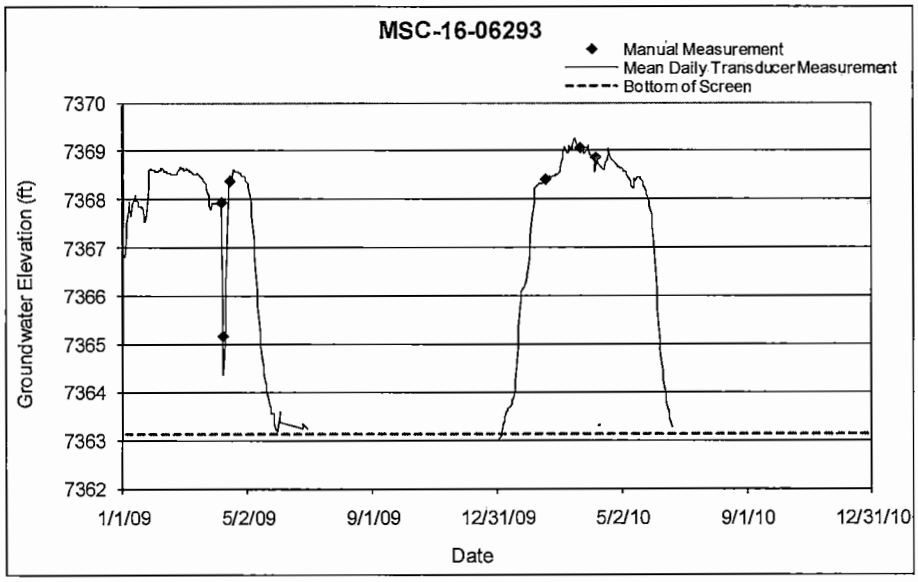
5.69 MSC-16-06293

Location: Martin Spring Canyon, about 1600 ft downstream from the Martin Spring outlet.
Period of Record: November 6, 2000, through December 8, 2010.
Remarks: This well periodically runs dry.

MSC-16-06293 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	2.3	7.3	7368.14	7363.14	5.0			7.30	7363.14	7.84	0.54	1.33	Alluvial groundwater

Note: Brass Cap Elevation: 7370.79 ft; Ground elevation: 7370.44 ft; all depths are from this elevation



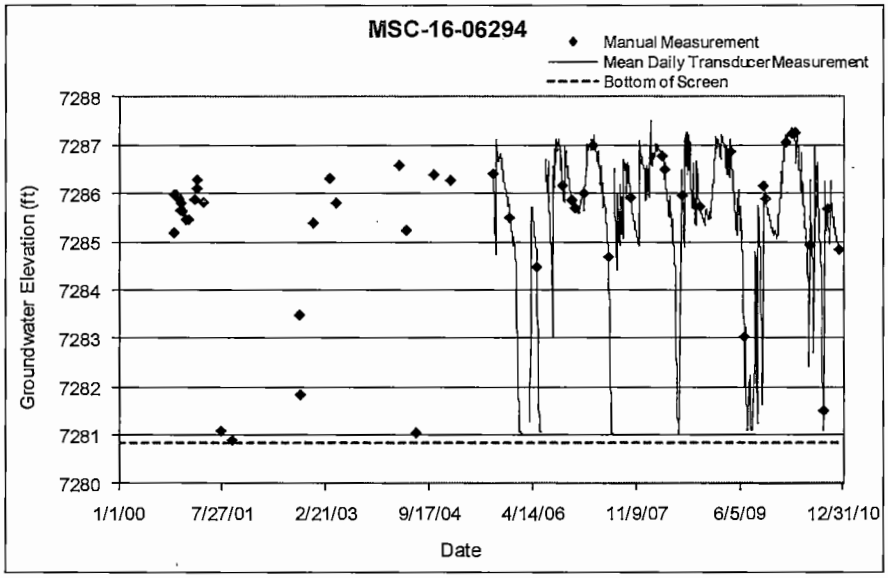


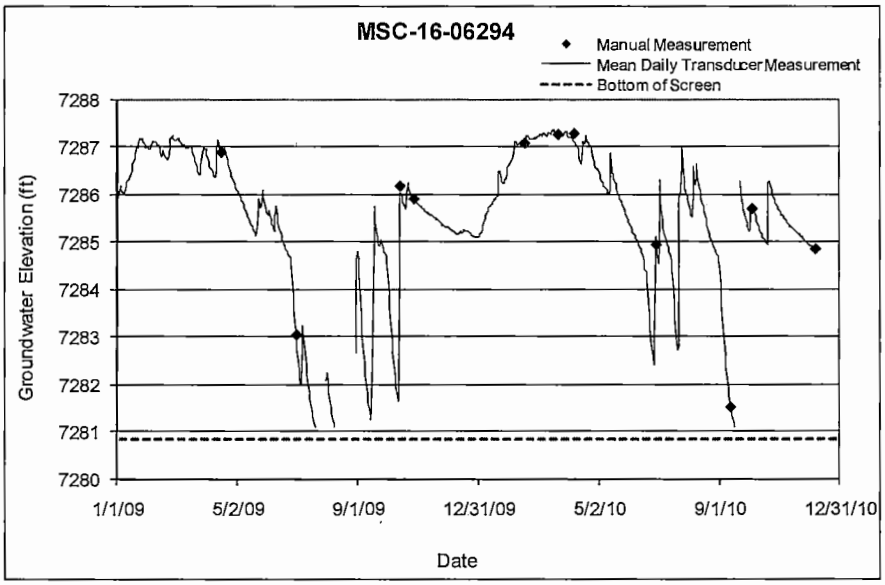
5.70 MSC-16-06294

Location: Martin Spring Canyon, about 1600 ft upstream of the K-site wetlands.
Period of Record: November 6, 2000, through December 8, 2010.
Remarks: None.

MSC-16-06294 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	2.3	7.3	7285.84	7280.84	5.0			7.3	7280.84	7.65	0.35	0.86	Alluvial groundwater

Note: Brass Cap Elevation: 7288.44; Ground elevation: 7288.14 ft; all depths are from this elevation



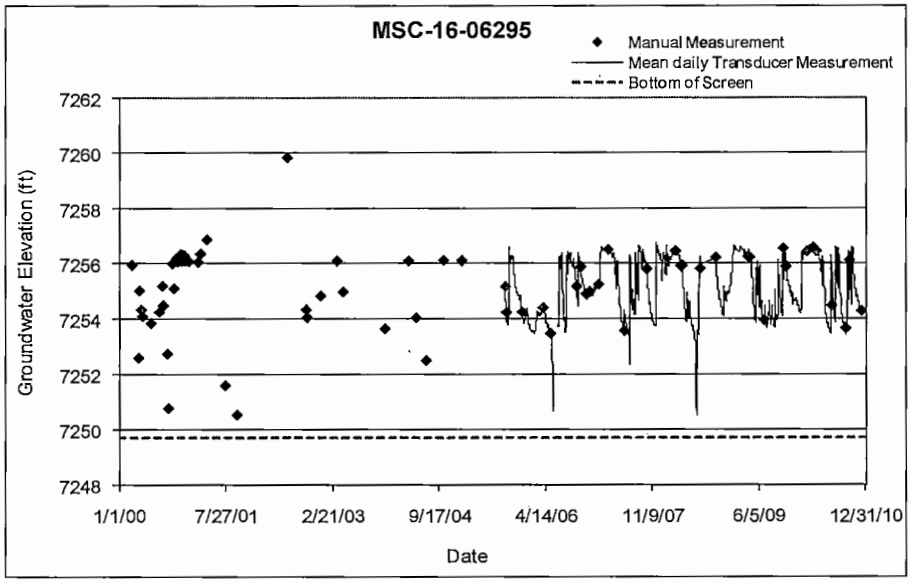


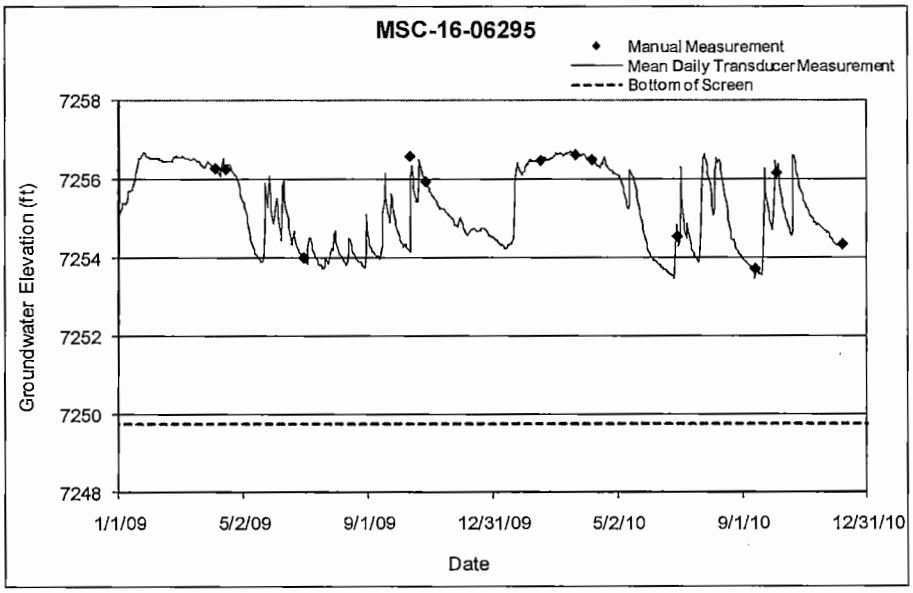
5.71 MSC-16-06295

Location: Martin Spring Canyon, just downstream of the K-site wetlands and north of the TA-11 drop tower.
Period of Record: March 10, 2000, through December 8, 2010.
Remarks: Transducer malfunctioned from July 2008 through October 2008.

MSC-16-06295 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	1.5	6.5	7254.74	7249.74	5.0			6.50	7249.74	6.85	0.35	0.86	Alluvial groundwater

Note: Brass Cap Elevation: 7257.03 ft; Ground elevation: 7256.24 ft; all depths are from this elevation





5.72 MT-2

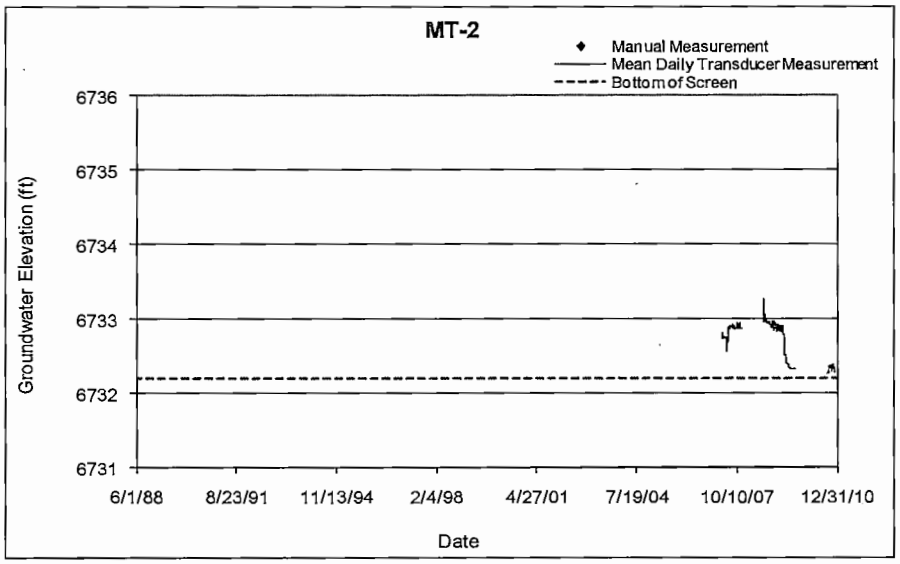
Location: Middle Mortandad Canyon, down canyon of sediment traps, approximately 0.12 mi east of MT-1.

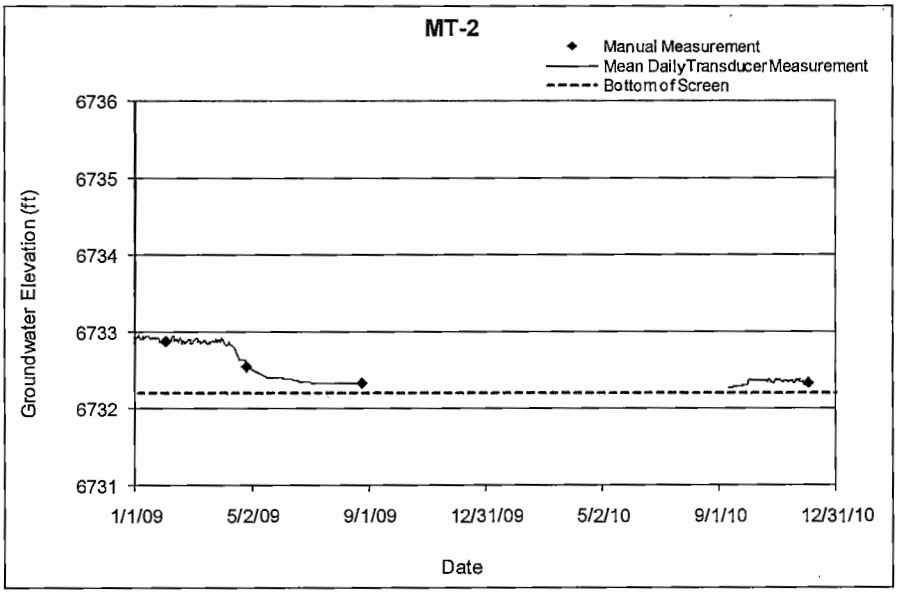
Period of Record: November 1, 1988, through December 3, 2010.

Remarks: The transducer was above the pump until April 17, 2007; transducer data before April 17, 2007, do not represent water levels below 6749.3 ft. Transducer was removed from well from November 28, 2007, through August 19, 2008.

MT-2 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	44.0	64	6752.2	6732.2	20.0			64.0	6732.2	64.3	0.3	0.2	Alluvial groundwater

Note: Ground elevation is 6796.20 ft; all depths are from this elevation



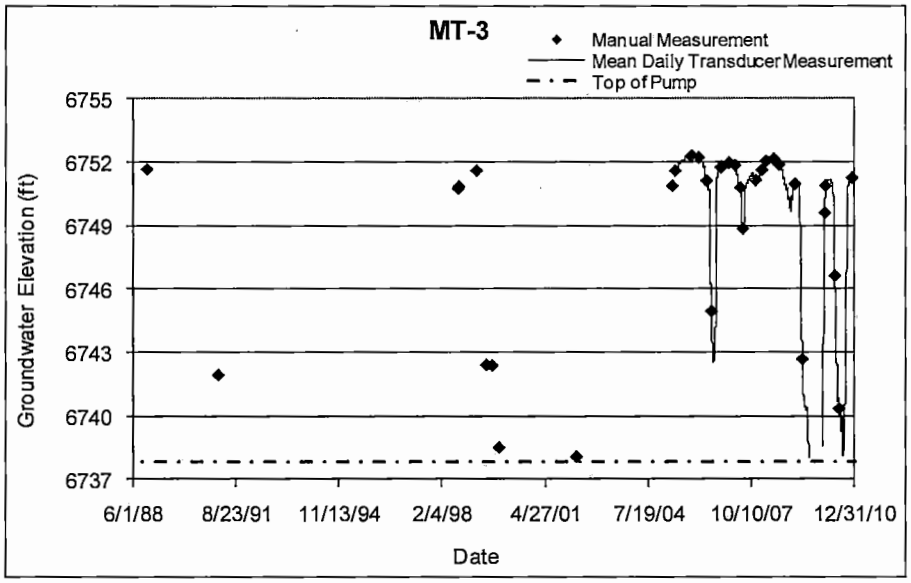


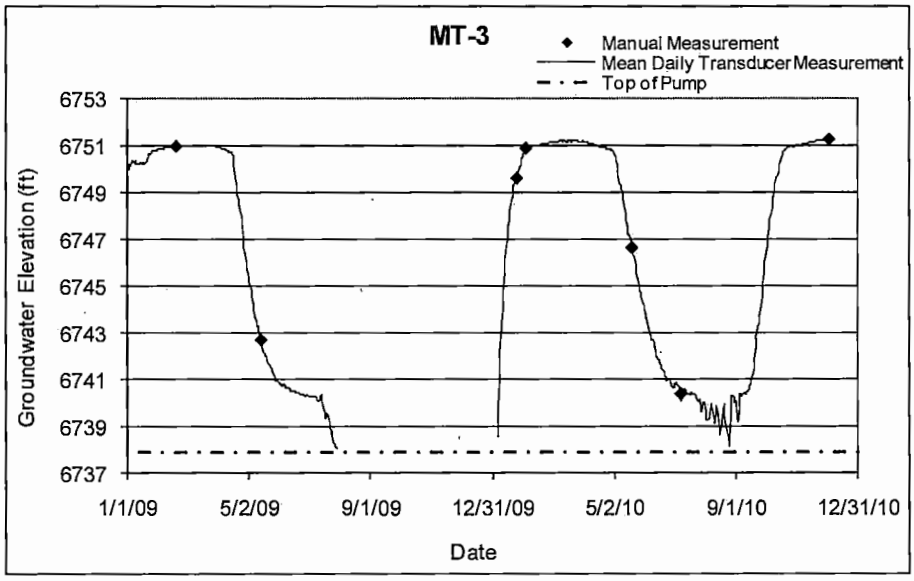
5.73 MT-3

Location: Middle Mortandad Canyon, down canyon of sediment traps, approximately 0.12 mi east of MT-1 and approximately 50 ft north of MT-2.
Period of Record: November 1, 1988, through December 3, 2010.
Remarks: None.

MT-3 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	44.0	64.0	6752.7	6732.7	20.0			64.0	6732.7	74.0	10.0	6.2	Alluvial groundwater

Note: Ground elevation is 6796.65 ft; all depths are from this elevation



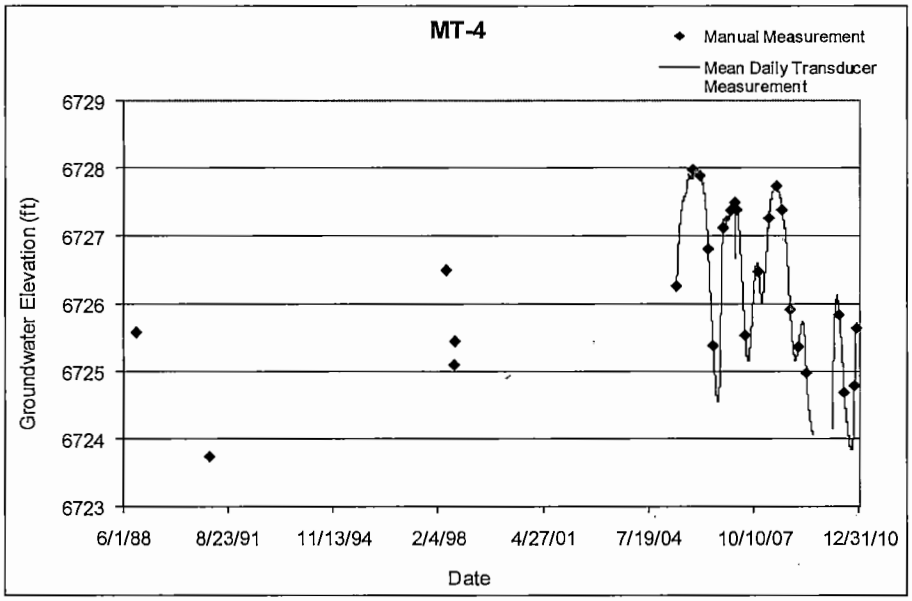


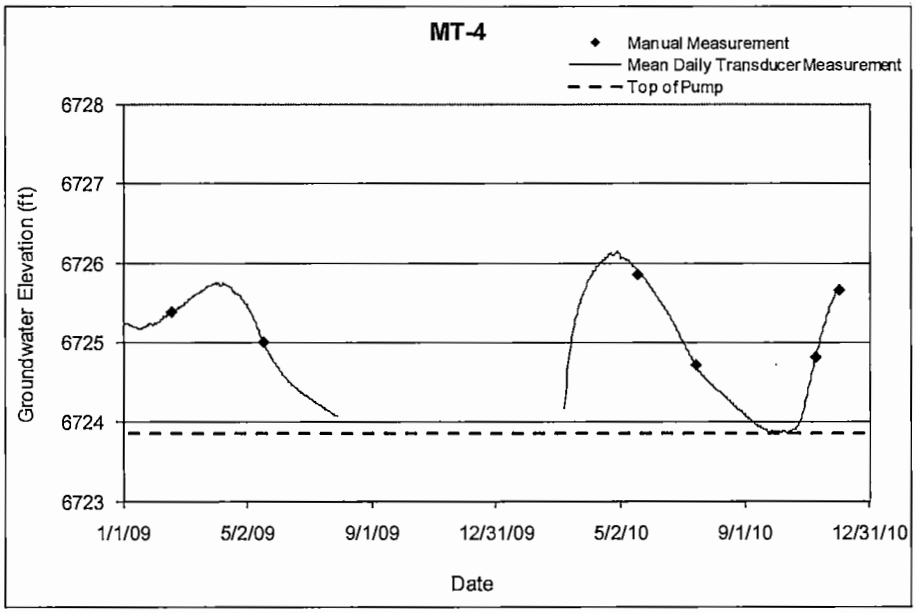
5.74 MT-4

Location: Middle Mortandad Canyon, down canyon of the sediment traps, approximately 525 ft east of MT-3.
Period of Record: November 1, 1988, through December 3, 2010.
Remarks: Pump was removed December 3, 2010 to enable transducer to record deeper water levels.

MT-4 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	54	64	6729.59	6719.59	10			64	6719.59	74	10	6	Alluvial groundwater

Note: Ground elevation is 6783.59 ft; all depths are from this elevation



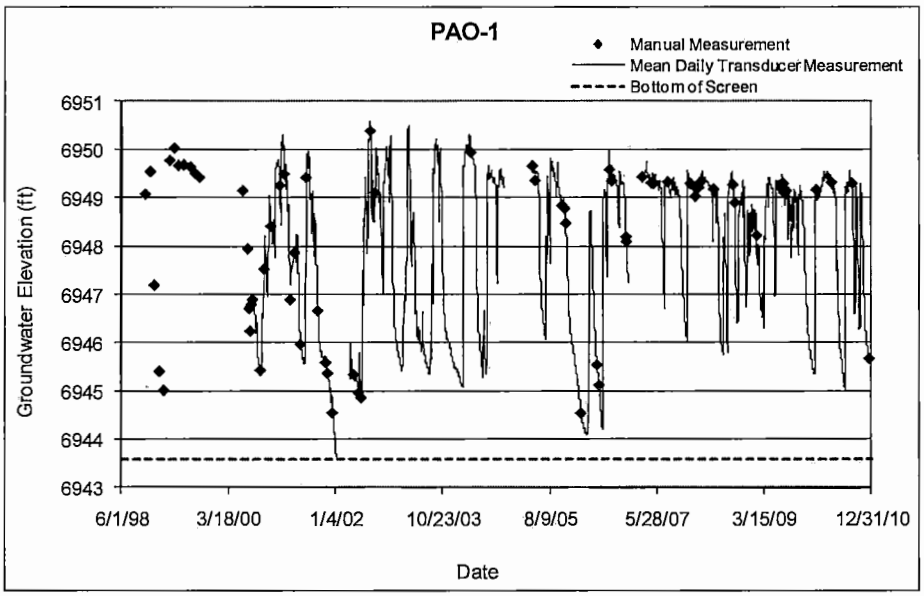


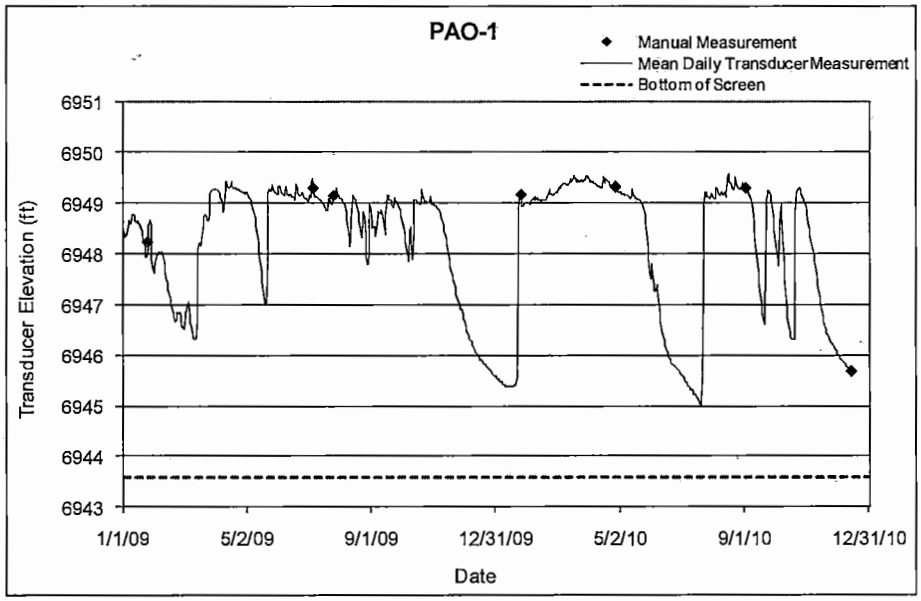
5.75 PAO-1

Location: Upper Pueblo Canyon, approximately 1000 ft west of the confluence with Acid Canyon.
Period of Record: October 29,1998, through December 14, 2010.
Remarks: The transducer batteries failed on December 3, 2006, and were replaced on February 27, 2007.

PAO-1 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	5.89	10.89	6948.58	6943.58	5.00			10.89	6944.08	13.74	2.85	7.04	Alluvial groundwater

Note: Brass Cap Elevation: 6954.97 ft; Ground elevation is 6954.47 ft; all depths are from this elevation



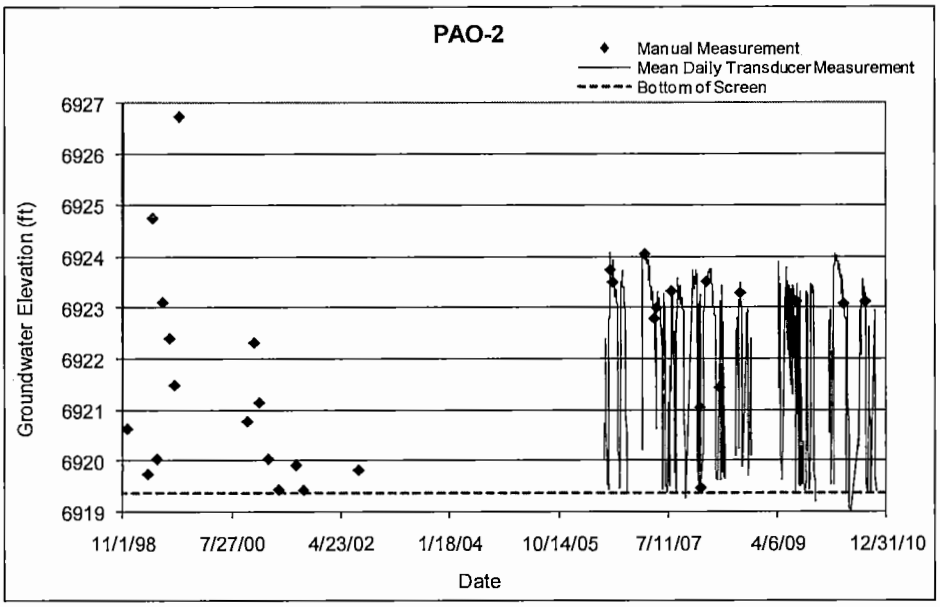


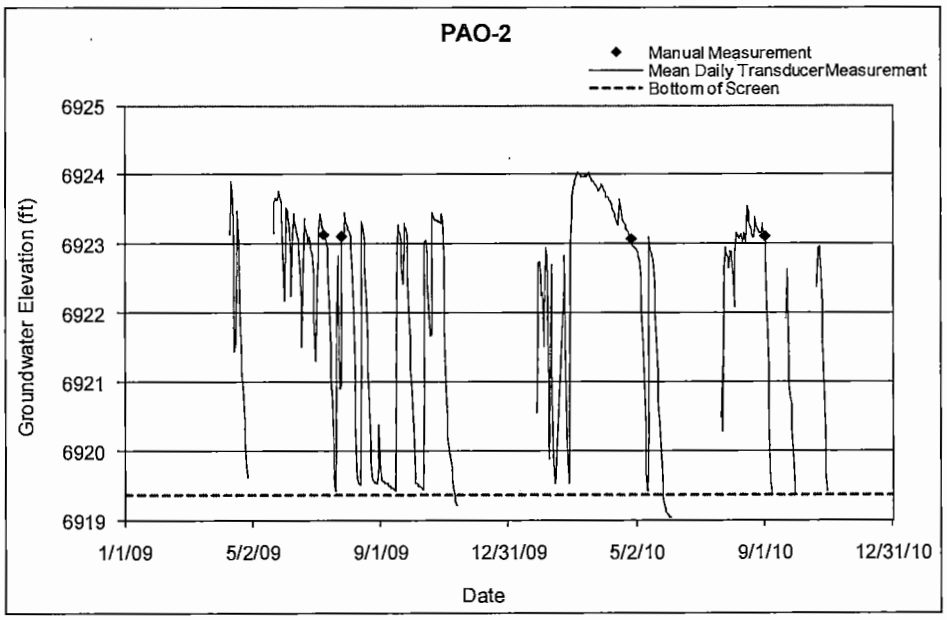
5.76 PAO-2

Location: Upper Pueblo Canyon, approximately 500 ft east of the Acid Canyon confluence.
Period of Record: November 30, 1998, through November 29, 2010.
Remarks: The water level frequently drops below the screen.

PAO-2 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	6.06	11.06	6914.37	6919.37	5.00			11.06	6919.37	13.91	2.85	7.04	Alluvial groundwater

Note: Ground elevation is 6930.98 ft; all measurements are from this elevation





5.77 PAO-4

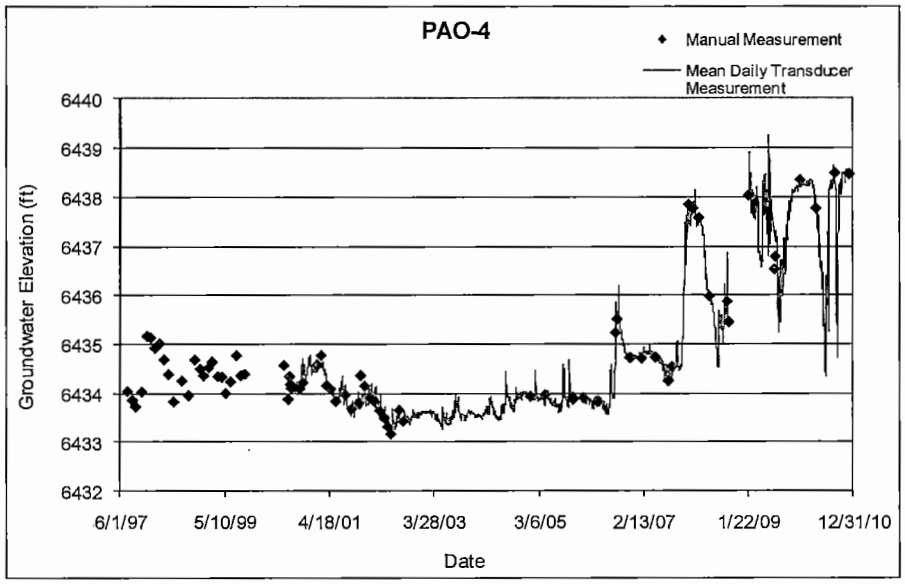
Location: Lower Pueblo Canyon, approximately 3100 ft southeast of the old LAC Sewage Treatment Plant location.

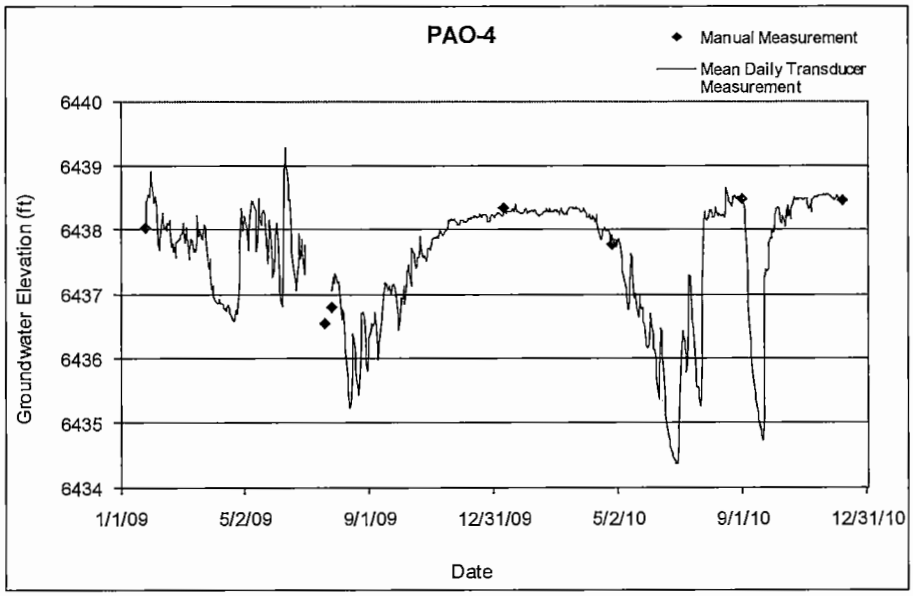
Period of Record: July 24, 1997, through December 8, 2010.

Remarks: Transducer failed from September 2008 through January 2009, and from June 2009 through July 2009.

PAO-4 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	1.97	6.97	6435.07	6430.07	5.00			6.97	6430.07	9.82	2.85	7.04	Alluvial groundwater

Note: Brass Cap Elevation: 6437.37 ft; Ground elevation: 6437.04 ft; all depths are from this elevation





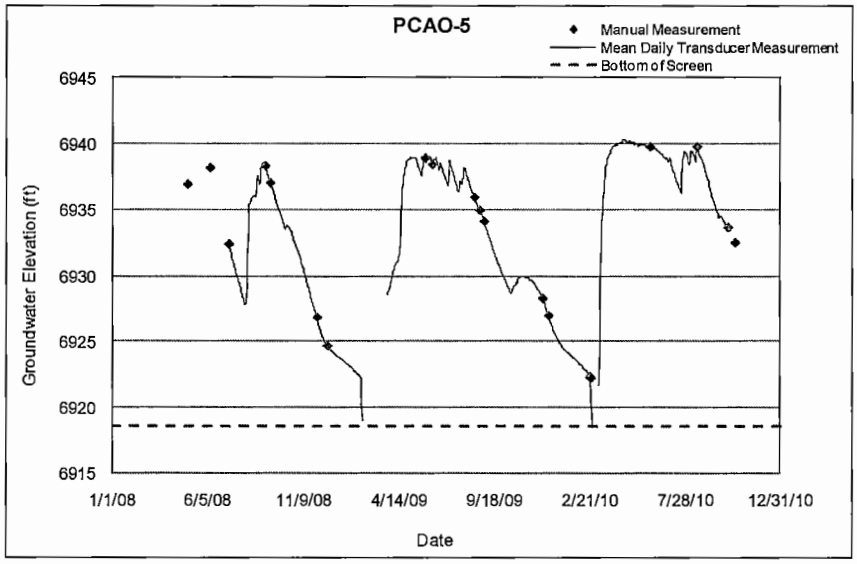
5.78 PCAO-5

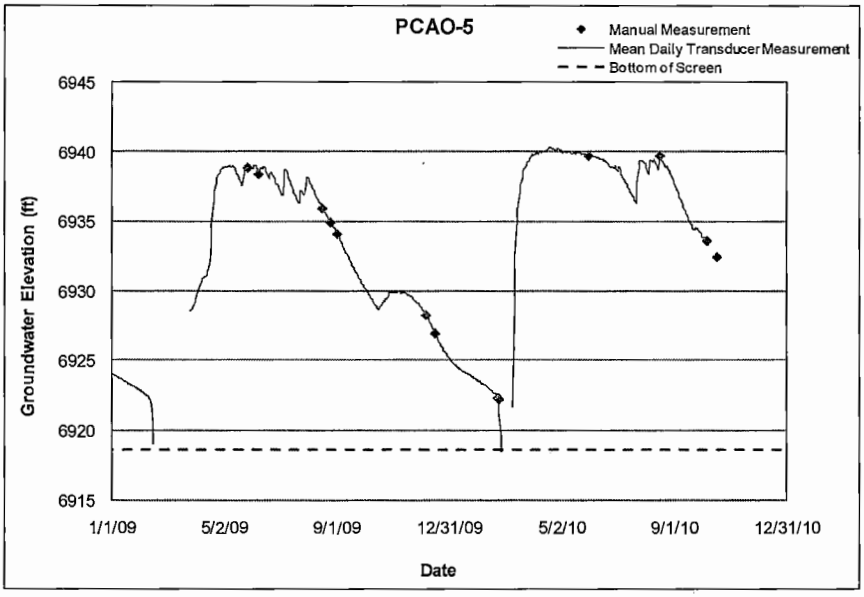
Location: Middle Pajarito Canyon, adjacent to and on the north side of the stream channel, approximately 100 ft upstream of the flood retention dam.
Period of Record: May 3, 2008, through October 18, 2010.
Remarks: None.

PCAO-5 Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	14.7	24.7	6928.6	6918.6	10.0			24.7	6918.6	30.0	5.3	13.1	Alluvial Groundwater

Note: Ground elevation is 6943.29 ft; all depths from this elevation



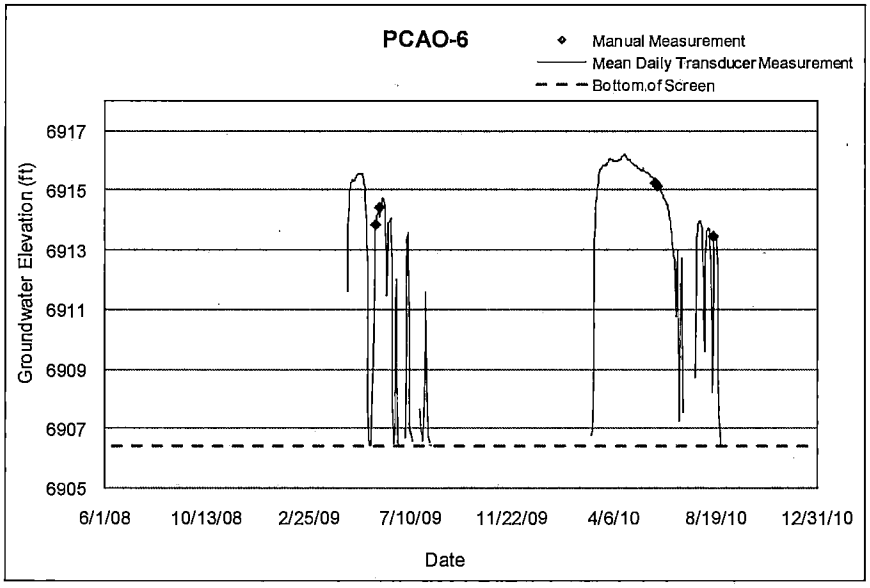


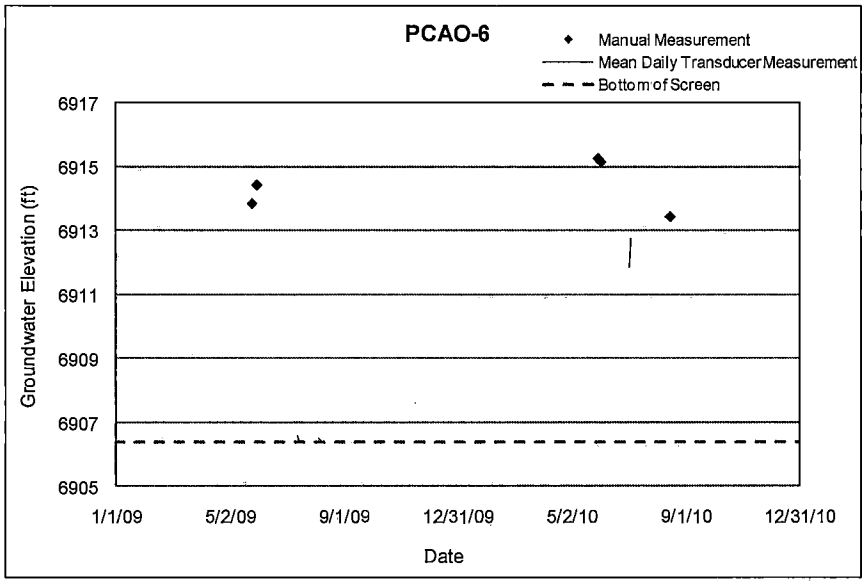
5.79 PCAO-6

Location: Middle Pajarito Canyon, on the south side of the stream channel, approximately 300 ft downstream of the flood retention dam, and approximately 100 ft west of regional well R-17.
Period of Record: June 5, 2008, through October 7, 2010.
Remarks: Well was purged dry during drilling (less than one gallon of water). Until April 2009, water did not rise above the sump. Well remained wet during the summers of 2009 and 2010.

PCAO-6 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	8.0	15.0	6913.4	6906.4	7.0			15.0	6906.4	20.0	5.0	12.4	Alluvial Groundwater

Note: Ground elevation is 6921.40 ft; all depths from this elevation



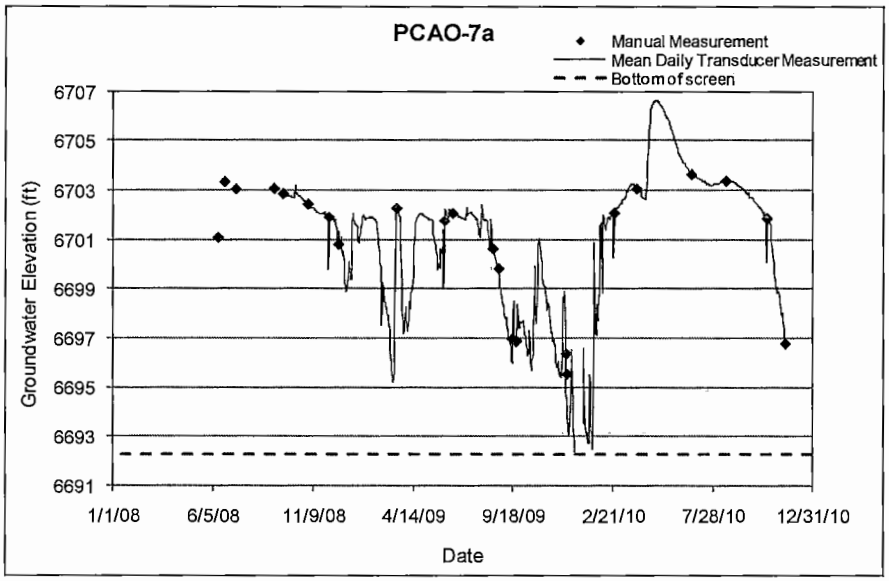


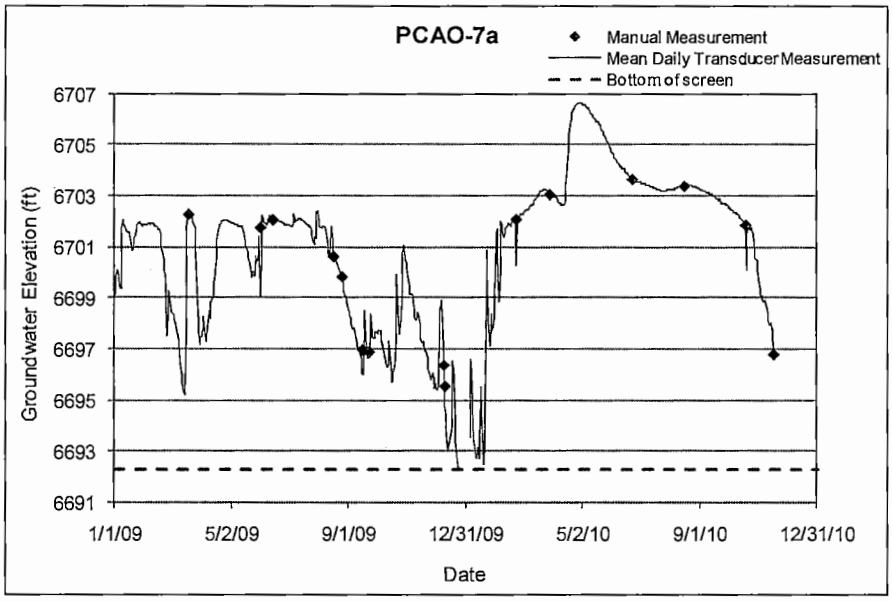
5.80 PCAO-7a

Location: In TA-18 in lower Pajarito Canyon on the north side of Pajarito Road, approximately 100 ft from the TA-18 entrance.
Period of Record: June 12, 2008, through November 18, 2010.
Remarks: None.

PCAO-7a Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	9.7	19.7	6702.3	6692.3	10.0			19.7	6692.3	24.7	5.0	12.4	Alluvial Groundwater

Note: Ground elevation is 6711.97 ft; all depths are from this elevation.





5.81 PCAO-7b1

Location: In lower Pajarito Canyon, in TA-18, on the north side of Pajarito Road directly across from the TA-18 entrance. PCAO-7b1 and PCAO-7b2 are approximately 10 ft apart.
Period of Record: May 21, 2008, through November 18, 2010.
Remarks: Well was bailed dry during drilling, and water has not risen above the sump since.

PCAO-7b(1) Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	44.0	54	6669.6	6659.6	10.0			54.0	6659.6	59.3	5.3	13.1	Alluvial groundwater

Note: Ground elevation is 6713.62 ft; all depths from this elevation

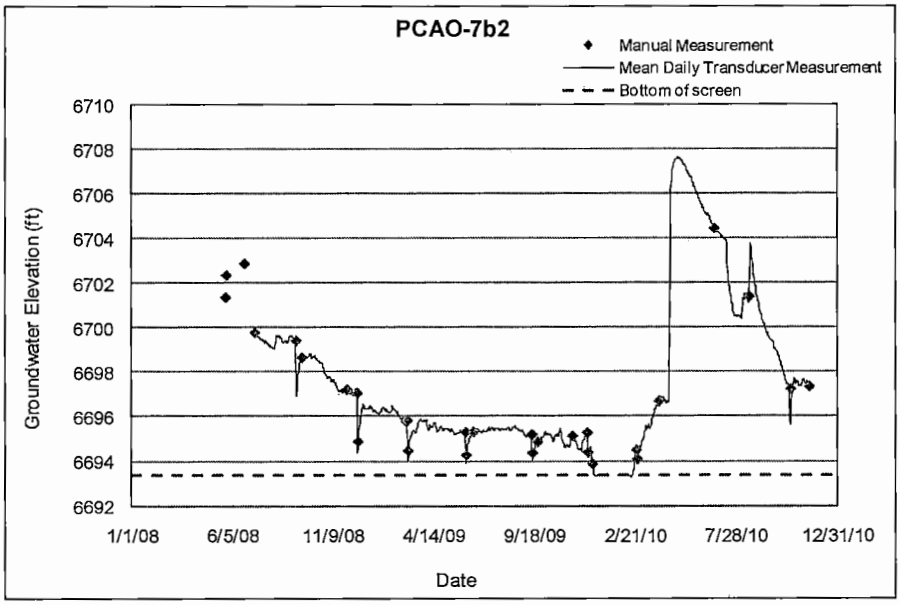
PCAO-7b1 Manual Water Levels		
Date	Water Level (ft)	Comments
5/21/2008	6656.7	Sump water
5/28/2008	6657.34	Sump water
6/24/2008		Dry
7/11/2008	6653.82	Sump water
7/11/2008	6653.82	Sump water
9/8/2008	6653.86	Sump water
12/1/2008	6653.85	Sump water
3/3/2009	6653.85	Sump water
5/28/2009	6653.83	Sump water
9/23/2009	6653.85	Sump water
12/17/2009	6653.83	Sump water
3/30/2010		Dry
6/24/2010	6653.86	Sump water
8/17/2010	6653.86	Sump water
11/18/2010	6653.86	Sump water

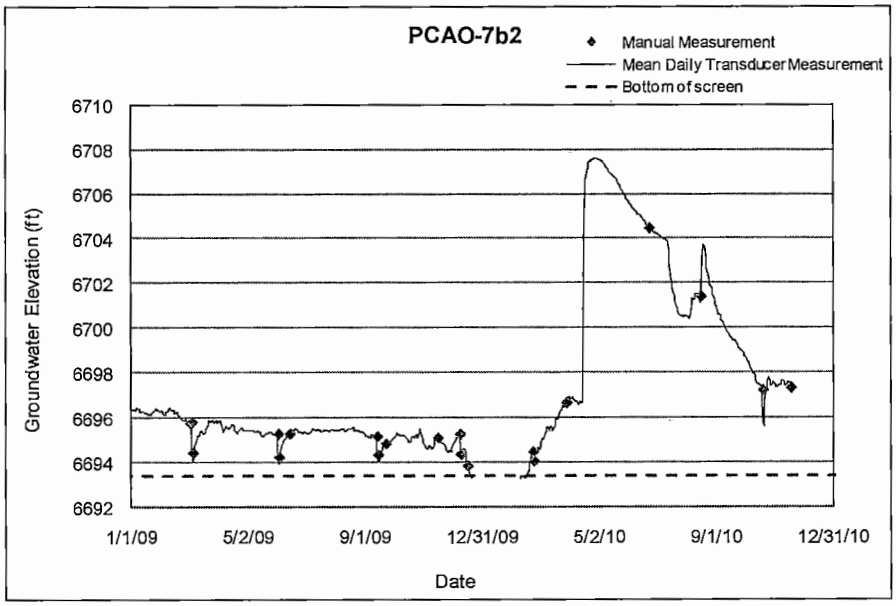
5.82 PCAO-7b2

Location: In lower Pajarito Canyon, in TA-18, on the north side of Pajarito Road directly across from the TA-18 entrance. PCAO-7b1 and PCAO-7b2 are approximately 10 ft apart.
Period of Record: May 27, 2008, through November 18, 2010.
Remarks: None.

PCAO-7b(2) Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	10.0	20	6703.4	6693.4	10.0			20.0	6693.4	25.0	5.0	12.4	Alluvial groundwater

Note: Ground elevation is 6713.39 ft; all depths are from this elevation



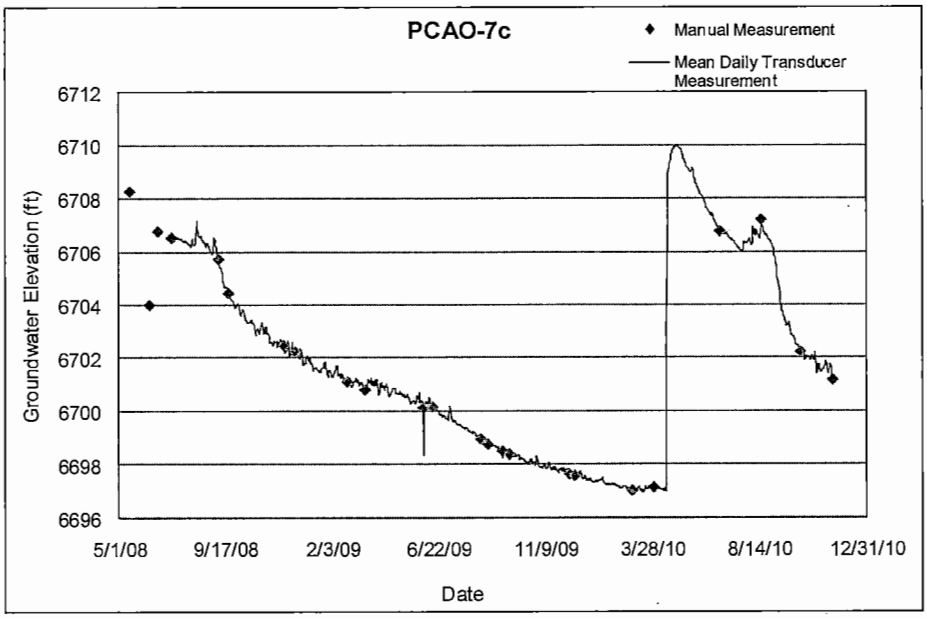


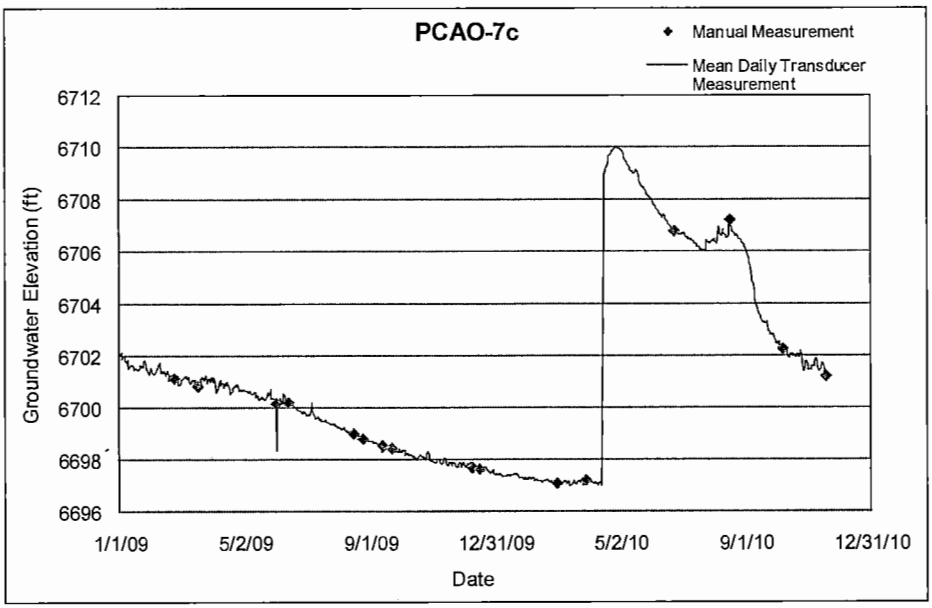
5.83 PCAO-7c

Location: Lower Pajarito Canyon, in TA-18 on the south side of Pajarito Road, approximately 50 ft from the TA-18 entrance.
Period of Record: May 16, 2008, through November 18, 2010.
Remarks: None.

PCAO-7c Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	9.7	19.7	6704.9	6694.9	10.0			19.7	6694.9	25.0	5.3	13.1	Alluvial groundwater

Note: Ground elevation is 6714.57 ft; all depths from this elevation



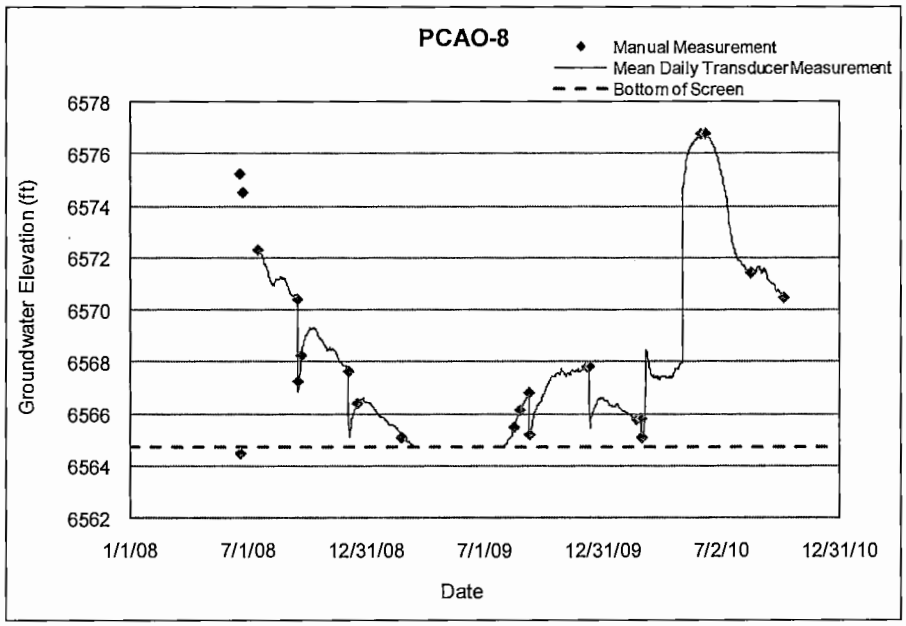


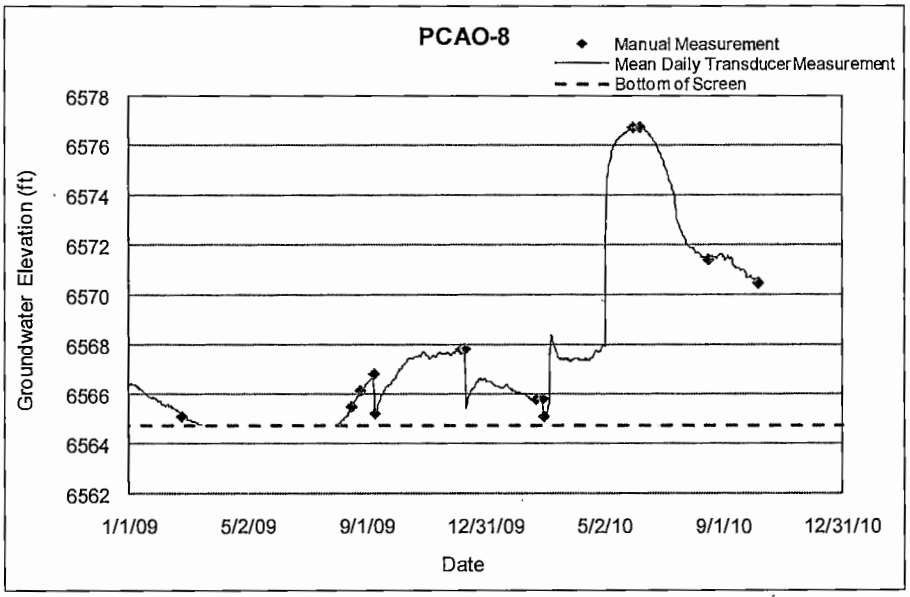
5.84 PCAO-8

Location: In lower Pajarito Canyon, on the south side of Pajarito Road in TA-36, approximately a quarter mile west of PCAO-9.
Period of Record: June 2, 2008, through October 7, 2010.
Remarks: None.

PCAO-8 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	9.7	19.7	6574.8	6564.8	10.0			19.7	6564.8	25.0	5.3	13.1	Alluvial groundwater

Note: Ground elevation is 6584.45 ft; all depths from this elevation



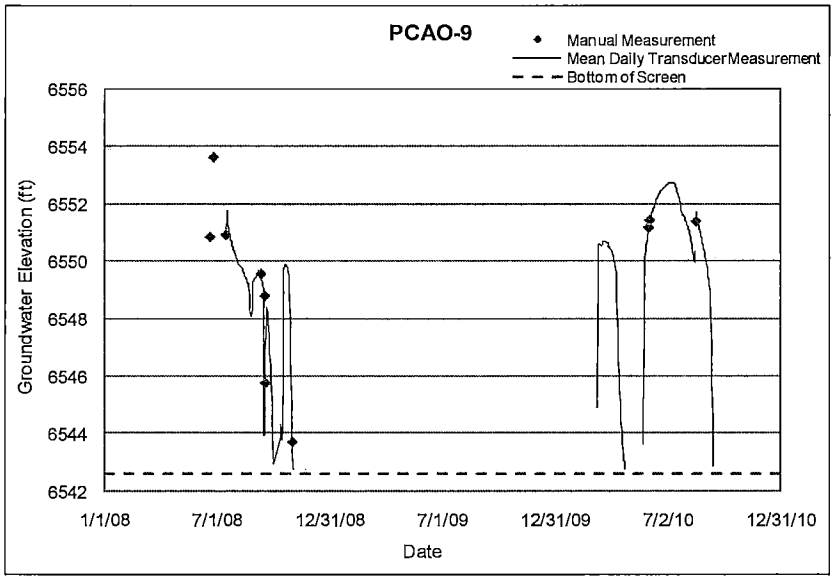


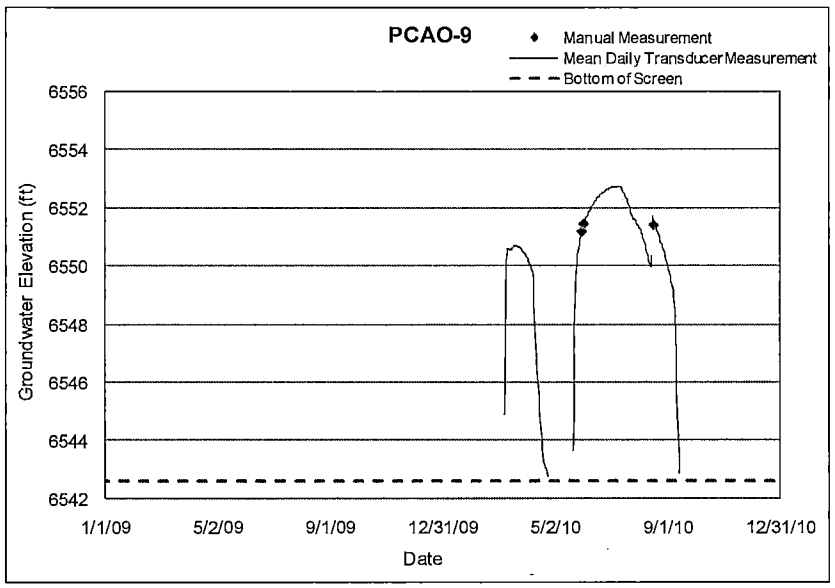
5.85 PCAO-9

Location: In lower Pajarito Canyon on the south side of Pajarito Road in TA-36, approximately a quarter mile west of the security check point, and a quarter mile east of PCAO-8.
Period of Record: June 12, 2008, through October 7, 2010.
Remarks: None.

PCAO-9 Construction Information														
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	6.0	16.0	6552.6	6542.6	10.0			16.0	6542.6	21.0	5.0	12.4	Alluvial groundwater

Note: Ground elevation is 6558.60 ft; all depths from this elevation



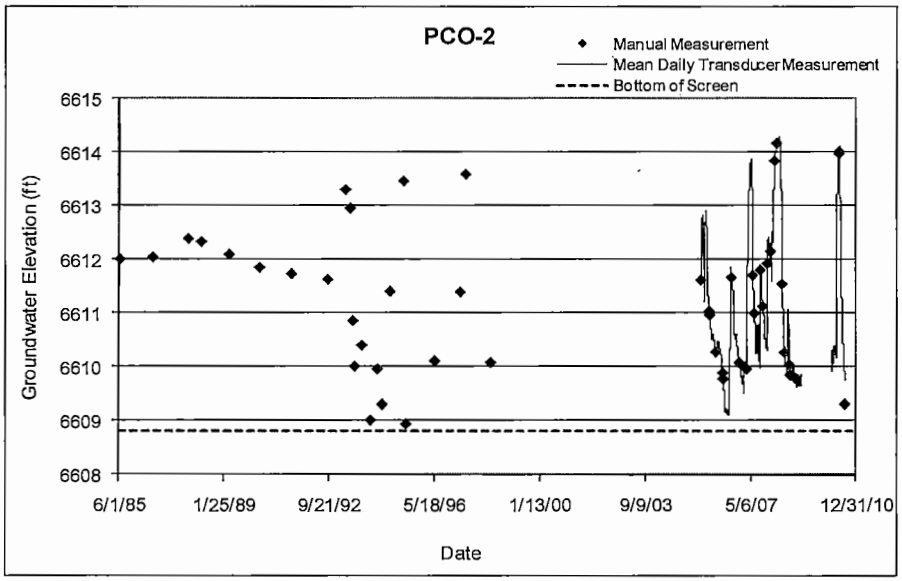


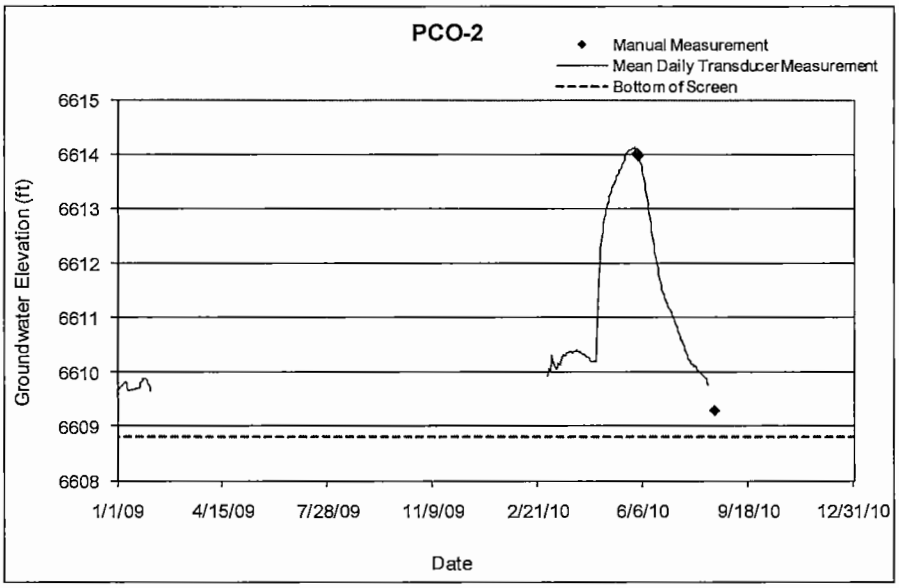
5.86 PCO-2

Location: In lower Pajarito Canyon on the north side of Pajarito Road, approximately 0.1 mi east of R-32.
Period of Record: June 11, 1985, through October 7, 2010.
Remarks: None.

PCO-2 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	1.5	9.5	6616.8	6608.8	8			9.5	6608.8	9.5	0	0	Alluvial groundwater

Note: Ground Elevation: 6618.3 ft; all depths are from this elevation



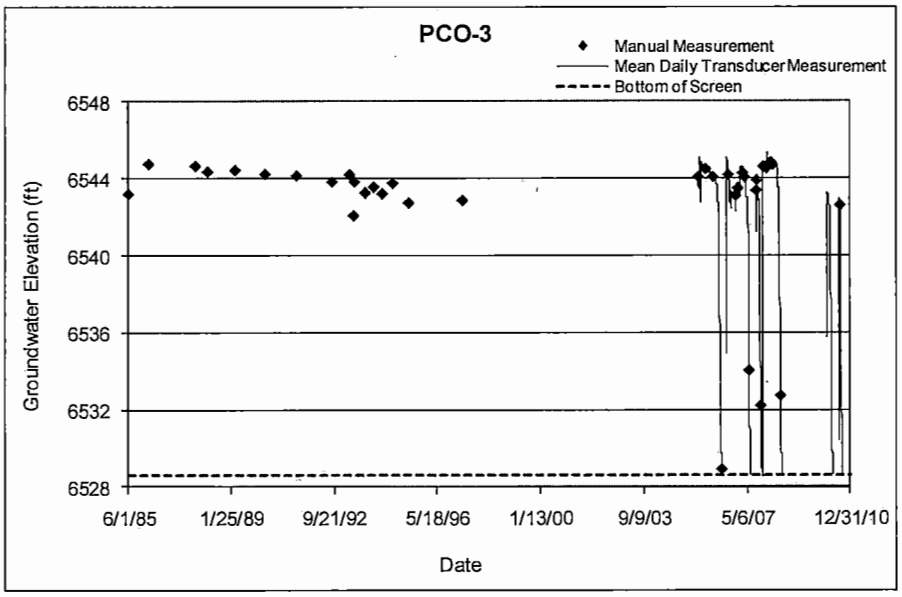


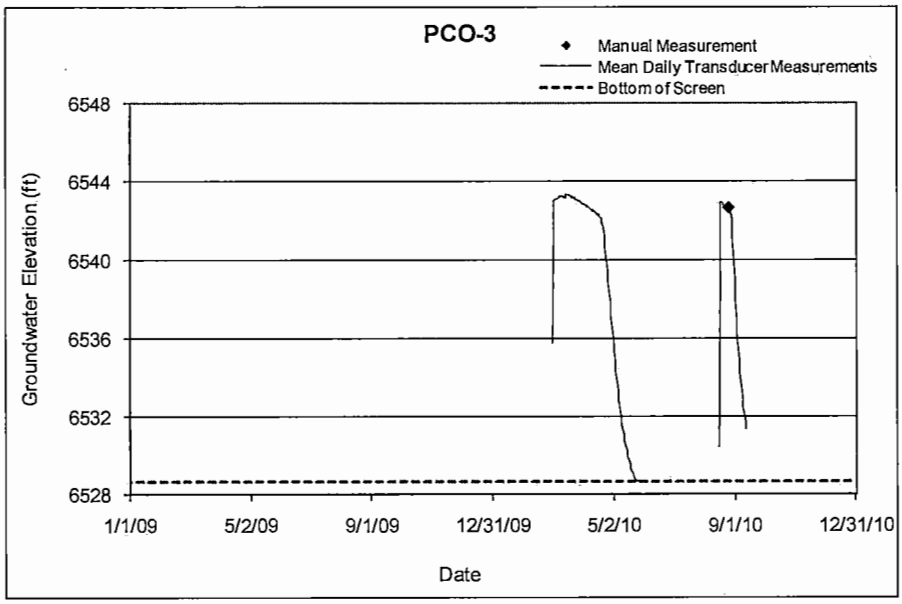
5.87 PCO-3

Location: Lower Pajarito Canyon, approximately 1 mi east of R-32, in wetlands on the south side of Pajarito Road.
Period of Record: June 11, 1985, through December 12, 2010.
Remarks: None.

PCO-3 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	5.7	17.7	6540.6	6528.6	12.0			17.7	6528.6	17.7	0.0	0.0	Alluvial groundwater

Note: Ground Elevation: 6546.30 ft; all depths are from this elevation





5.88 SCA-1 and SCA-1-DP

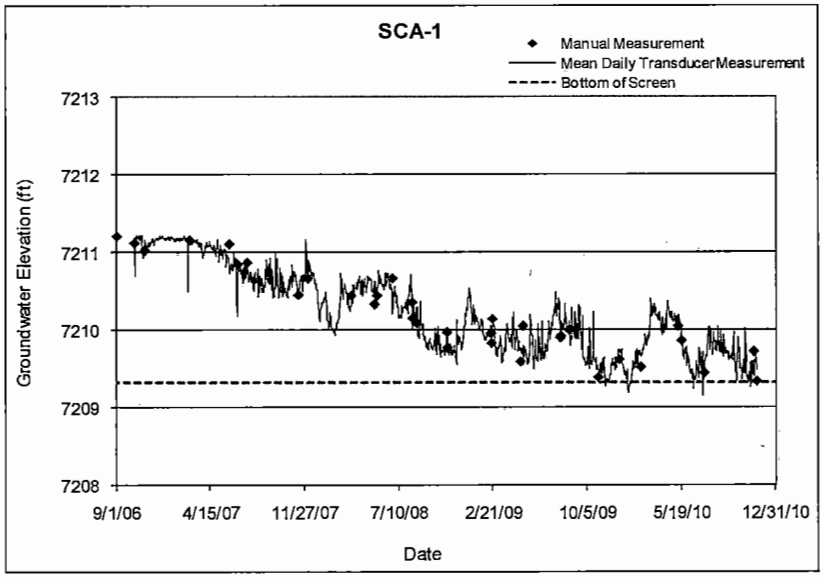
Location: In upper Sandia Canyon, in the wetlands approximately 350 ft upstream from gaging station E123. SCA-1-DP is located approximately 15 ft west of SCA-1.

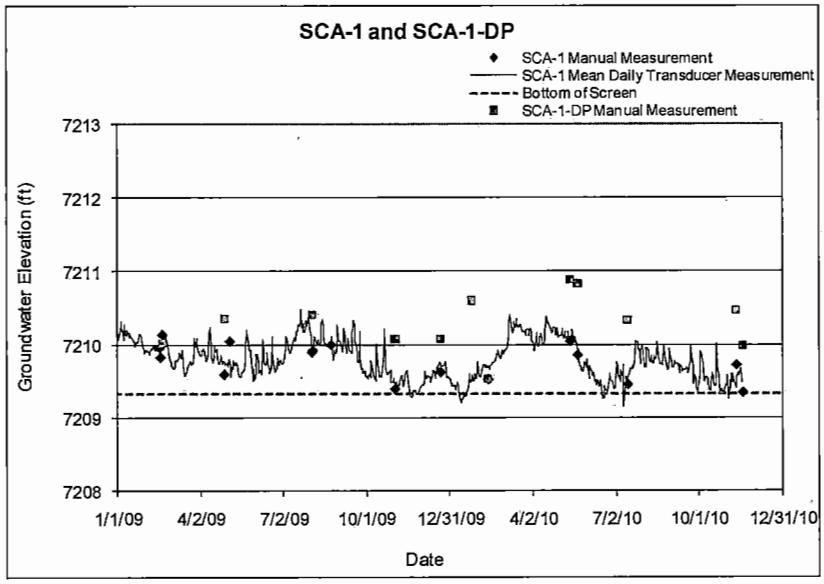
Period of Record: October 13, 2006, through November 18, 2010.

Remarks: SCA-1 is a shallow alluvial well located in a wetland. Recent sampling events have moved to temporary drive point well SCA-1-DP due to silting-in of the screen in SCA-1. Continuous water levels are monitored at SCA-1, and manual measurements are taken in conjunction at SCA-1-DP. SCA-1-DP was removed and replaced in the same hole in November 2010.

SCA-1 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	1.3	1.9	7209.9	7209.3	0.6			1.9	7209.3	2.1	0.2	0.1	Alluvial groundwater

Note: Ground elevation is 7211.22 ft; all depths are from this elevation





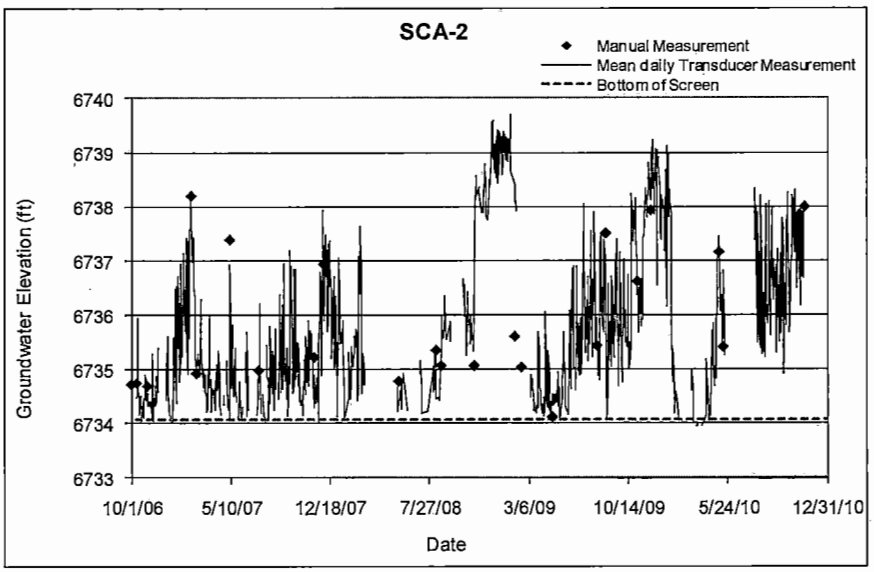
5.89 SCA-2

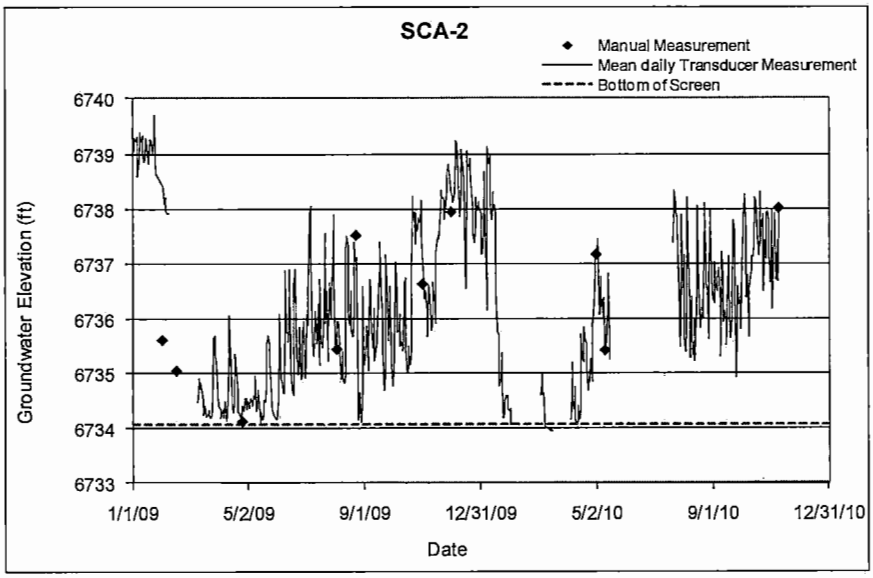
Location: Middle Sandia Canyon, approximately 700 ft upstream of gaging station E124.
Period of Record: October 13, 2006, through November 17, 2010.
Remarks: SCA-2 responds to the sewer treatment plant discharge in upper Sandia Canyon. Water levels frequently drop below the screen. From August 22, 2008, though March 11, 2009, the transducer was set too high in the well, not recording water levels below 6735.7 ft, and not matching manual measurements. Transducer has since been lowered to record all water level data.

SCA-2 Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	10.3	15.0	6738.8	6734.1	4.7			15.0	6733.8	15.6	0.6	0.4	Alluvial groundwater

Note: Groundwater elevation is 6749.08 ft; all depths are from this elevation



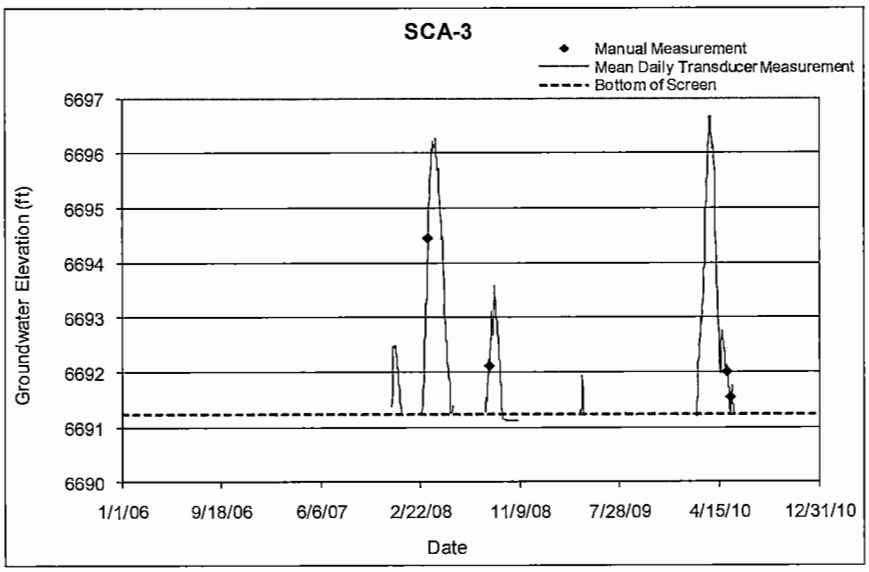


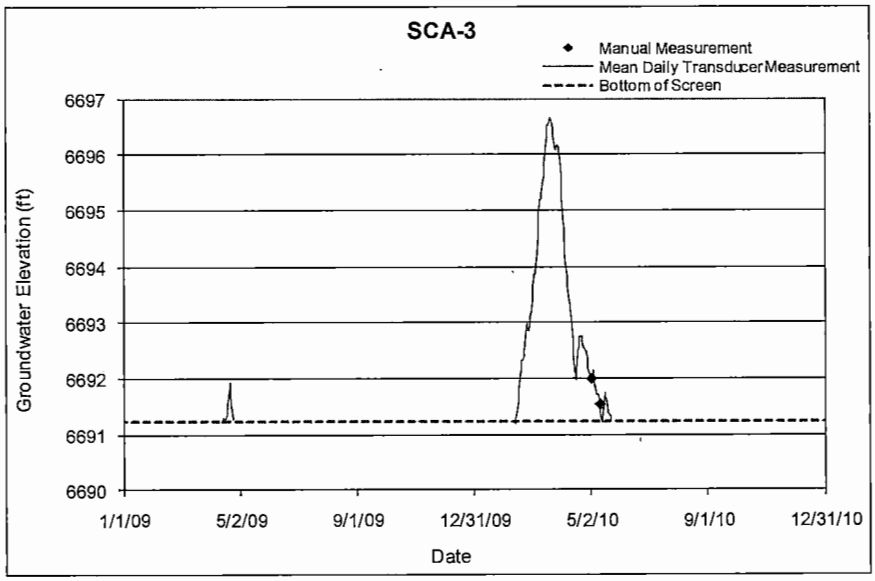
5.90 SCA-3

Location: Middle Sandia Canyon, approximately 700 ft downstream of gaging station E124.
Period of Record: October 13, 2006, through November 10, 2010.
Remarks: Water rose above the sump for the first time on December 10, 2007. Since then the well has periodically run dry.

SCA-3 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	27.6	32.0	6695.6	6691.2	4.4			32.0	6691.2	32.6	0.6	4.4	Alluvial groundwater

Note: Ground elevation is 6723.22 ft; all depths are from this elevation



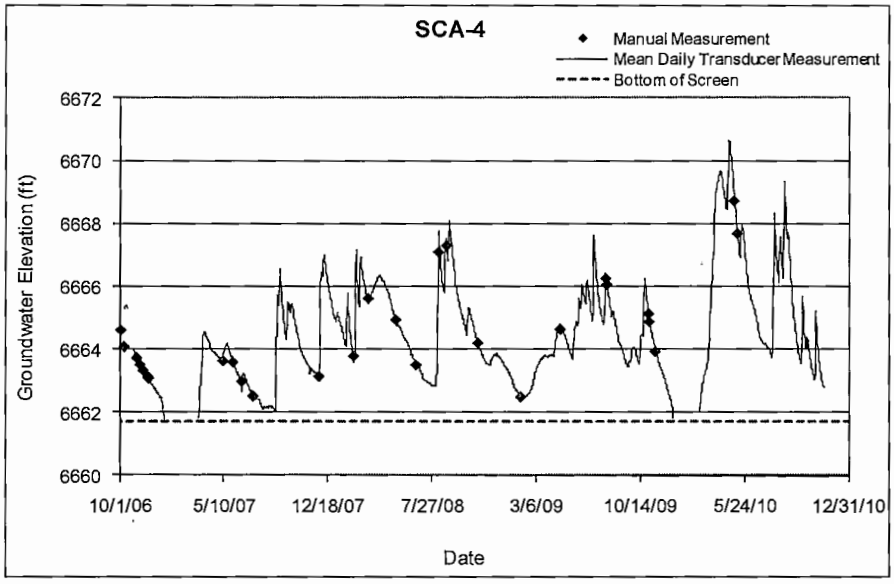


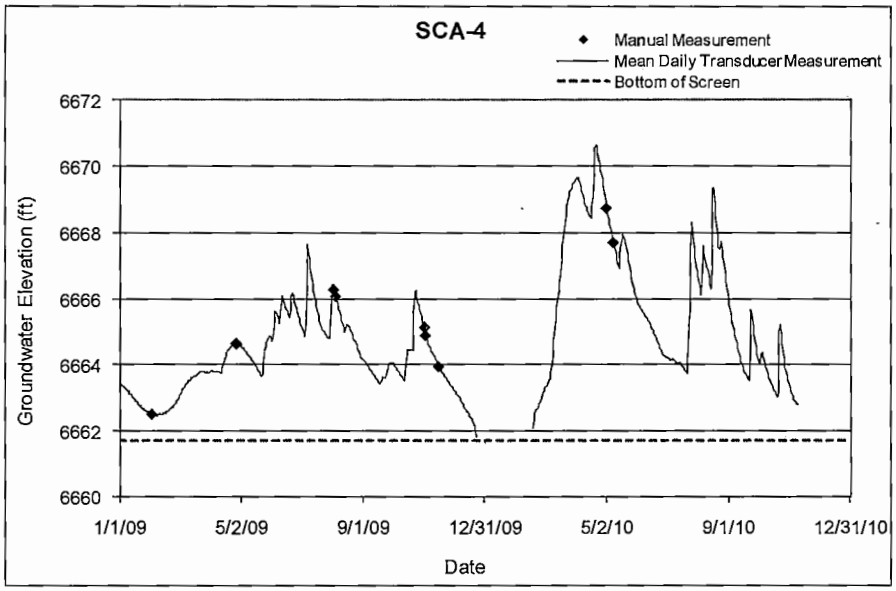
5.91 SCA-4

Location: Middle Sandia Canyon, approximately 700 ft downstream from SCA-3.
Period of Record: October 3, 2006, through November 17, 2010.
Remarks: The transducer was installed on October 3, 2006, above the top of the pump at an elevation of 6665.28 ft. The pump was removed on October 31, 2006, to allow more thorough water level monitoring.

SCA-4 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	37.0	41.5	6666.2	6661.7	4.5			41.5	6661.7	42.0	0.5	3.7	Alluvial groundwater

Note: Brass Cap Elevation: 6703.58 ft; Ground elevation: 6703.20 ft; all depths are from this elevation





5.92 SCA-5

Location: Middle Sandia Canyon, approximately 650 ft upstream from the firing range at TA-72 and about 325 ft north of R-11.

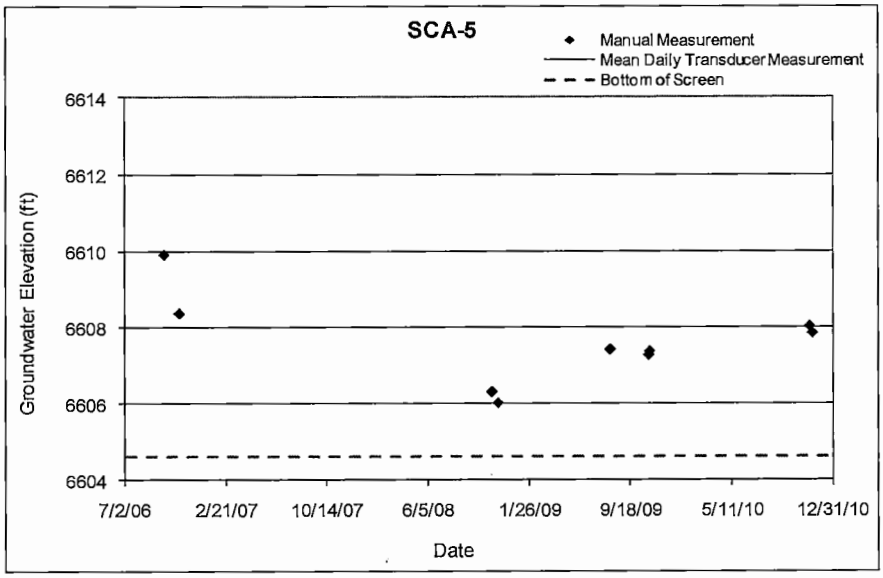
Period of Record: October 3, 2006, through November 17, 2010.

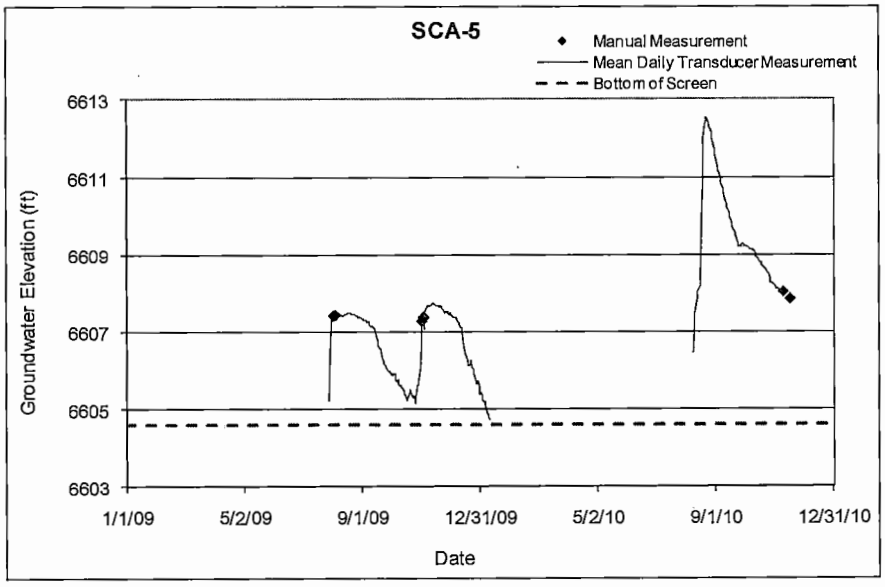
Remarks: Until spring 2008, the transducer was installed above the pump in the 2-in. casing and the transducer data did not represent water levels below 6608.1 ft. Since spring 2008, the transducer has recorded all water in the well. This well has run dry frequently since installation of the pressure transducer.

SCA-5 Construction Information

Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	55.00	64.4	6614.0	6604.6	9.4			64.4	6604.6	64.9	0.5	0.3	Alluvial groundwater

Note: Ground elevation is 6669.02 ft; all depths from this elevation





5.93 SCO-1

Location: Sandia Canyon, approximately 0.1 mi east of R-11.
Period of Record: June 7, 1997, through August 24, 2009.
Remarks: No valid data; well has been dry for every measurement event. There is no transducer installed in this well. Monitoring ceased in August 2009.

SCO-1 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	9.3	19.3	6609.4	6599.4	10.0			19.3	6599.4	19.3	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 6618.67 ft; all depths are from this elevation

SCO-1 Manual Water Levels			
Date	Comments	Date	Comments
8/14/1989	Dry	10/18/2005	Dry
6/9/1997	Dry	12/8/2005	Dry
10/13/1997	Dry	3/7/2006	Dry
3/25/1998	Dry	6/13/2006	Dry
5/29/1998	Dry	8/28/2006	Dry
7/28/1998	Dry	9/7/2006	Dry
3/3/1999	Dry	10/3/2006	Dry
6/23/1999	Dry	12/8/2006	Dry
8/30/1999	Dry	2/12/2007	Dry
11/15/1999	Dry	3/13/2007	Dry
3/26/2000	Dry	6/7/2007	Dry
5/16/2000	Dry	6/12/2007	Dry
8/30/2000	Dry	9/5/2007	Dry
10/8/2000	Dry	11/12/2007	Dry
7/2/2001	Dry	1/24/2008	Dry
8/22/2001	Dry	2/12/2008	Dry
10/18/2001	Dry	4/3/2008	Dry
1/27/2002	Dry	5/12/2008	Dry
4/19/2002	Dry	7/22/2008	Dry
8/27/2002	Dry	8/11/2008	Dry
2/19/2003	Dry	11/3/2008	Dry
5/18/2003	Dry	2/2/2009	Dry
2/28/2005	Dry	4/27/2009	Dry
6/7/2005	Dry	8/24/2009	Dry
6/14/2005	Dry		

5.94 SCO-2

Location: Sandia Canyon, approximately 300 ft west of R-12.
Period of Record: June 9, 1997, through August 24, 2009.
Remarks: No valid data; well has been dry for every measurement event. There is no transducer installed in this well. Monitoring ceased in August 2009.

SCO-2 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	9.4	19.4	6491.3	6481.3	10.0			19.4	6481.3	19.4	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 6500.67 ft; all depths are from this elevation

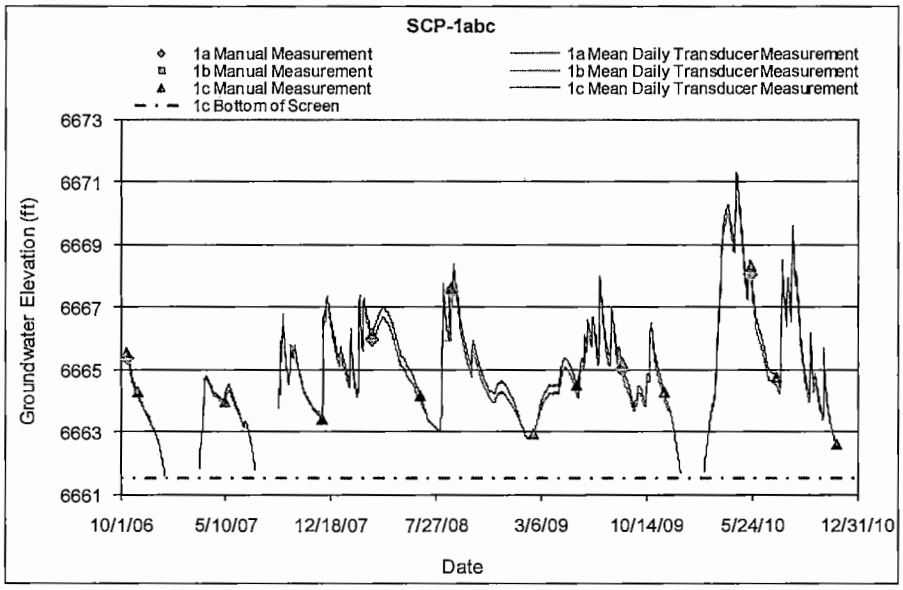
SCO-2 Manual Water Levels			
Date	Comments	Date	Comments
8/16/1989	Dry	10/18/2005	Dry
6/9/1997	Dry	12/8/2005	Dry
10/13/1997	Dry	3/7/2006	Dry
3/25/1998	Dry	6/13/2006	Dry
5/29/1998	Dry	8/28/2006	Dry
7/28/1998	Dry	9/7/2006	Dry
3/3/1999	Dry	10/3/2006	Dry
6/23/1999	Dry	12/8/2006	Dry
8/30/1999	Dry	2/12/2007	Dry
11/15/1999	Dry	3/13/2007	Dry
3/26/2000	Dry	6/7/2007	Dry
5/16/2000	Dry	6/12/2007	Dry
8/30/2000	Dry	9/5/2007	Dry
10/8/2000	Dry	11/12/2007	Dry
7/2/2001	Dry	1/24/2008	Dry
8/22/2001	Dry	2/12/2008	Dry
10/18/2001	Dry	4/3/2008	Dry
4/19/2002	Dry	5/12/2008	Dry
8/27/2002	Dry	7/22/2008	Dry
10/27/2002	Dry	8/11/2008	Dry
2/19/2003	Dry	11/3/2008	Dry
5/18/2003	Dry	2/2/2009	Dry
6/7/2005	Dry	4/27/2009	Dry
6/14/2005	Dry	8/24/2009	Dry

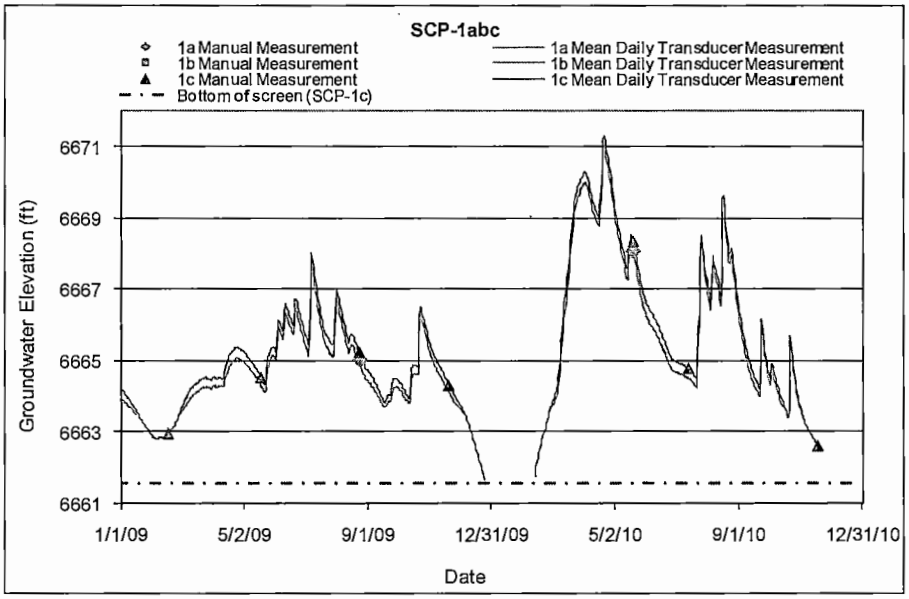
5.95 SCP-1abc

Location: Middle Sandia Canyon, approximately 5 ft west of SCA-4.
Period of Record: October 13, 2006, through November 18, 2010.
Remarks: SCP-1abc is a triple-nested piezometer.

SCP-1abc Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
a	37.80	38.3	6665.44	6664.94	0.5			38.3	6664.9	38.4	0.1	0.004	Alluvial groundwater
b	39.4	39.9	6663.84	6663.34	0.5			39.9	6663.34	40.0	0.1	0.004	Alluvial groundwater
c	41.2	41.7	6662.04	6661.54	0.5			41.7	6661.54	41.8	0.1	0.004	Alluvial groundwater

Note: Brass Cap Elevation: 6703.65 ft; Ground elevation: 6703.24 ft; all depths are from this elevation



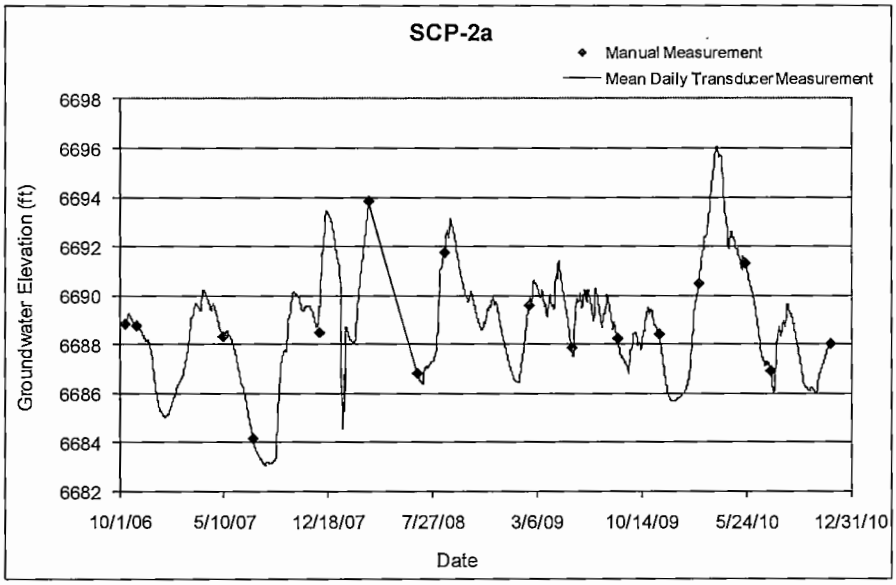


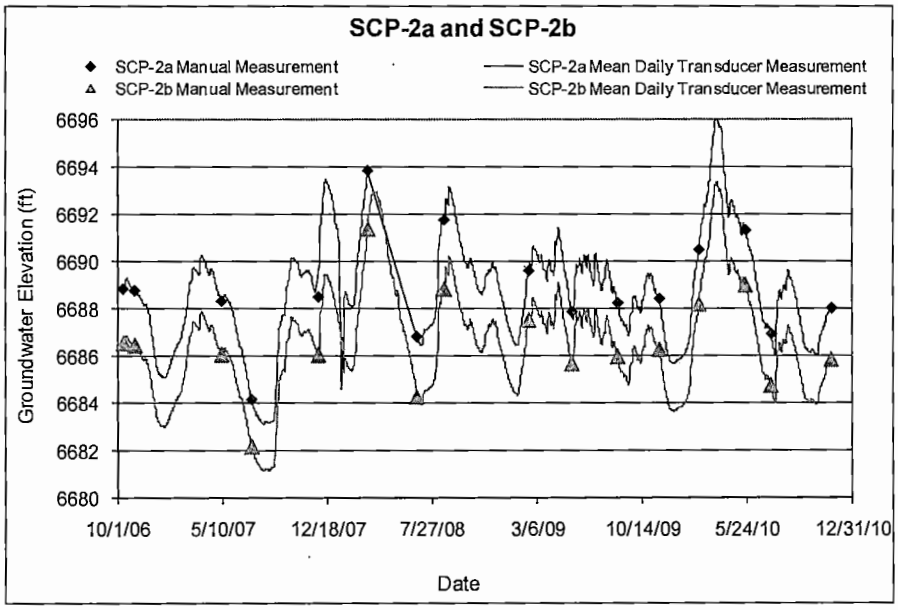
5.96 SCP-2a

Location: Middle Sandia Canyon, approximately 10 ft east of SCA-3 and 5 ft east of SCP-2b.
Period of Record: October 13, 2006, through November 18, 2010.
Remarks: None.

SCP-2a Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
2a	44.5	45.0	6678.1	6677.6	0.5			45.0	6678.0	45.1	0.1	0.02	Alluvial groundwater

Note: Brass Cap Elevation: 6722.95 ft; Ground elevation: 6722.57 ft; all depths are from this elevation



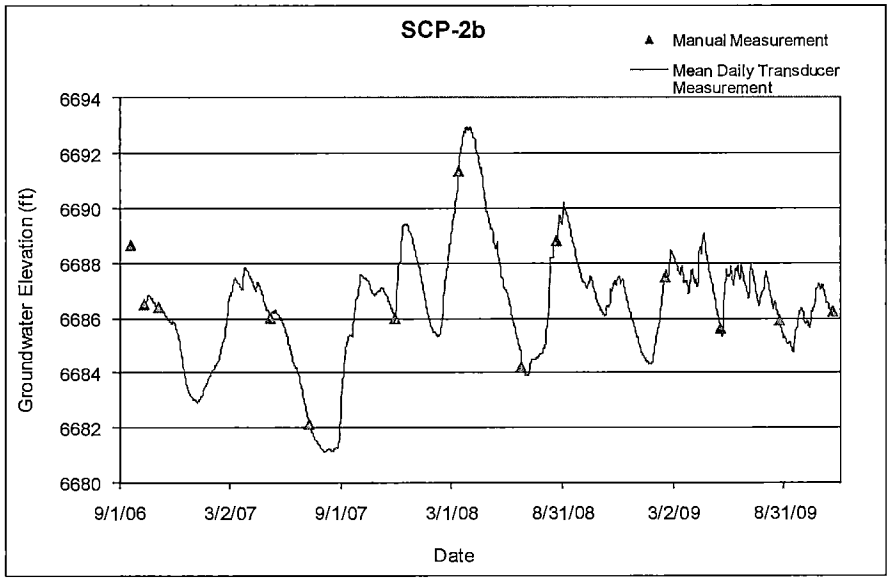


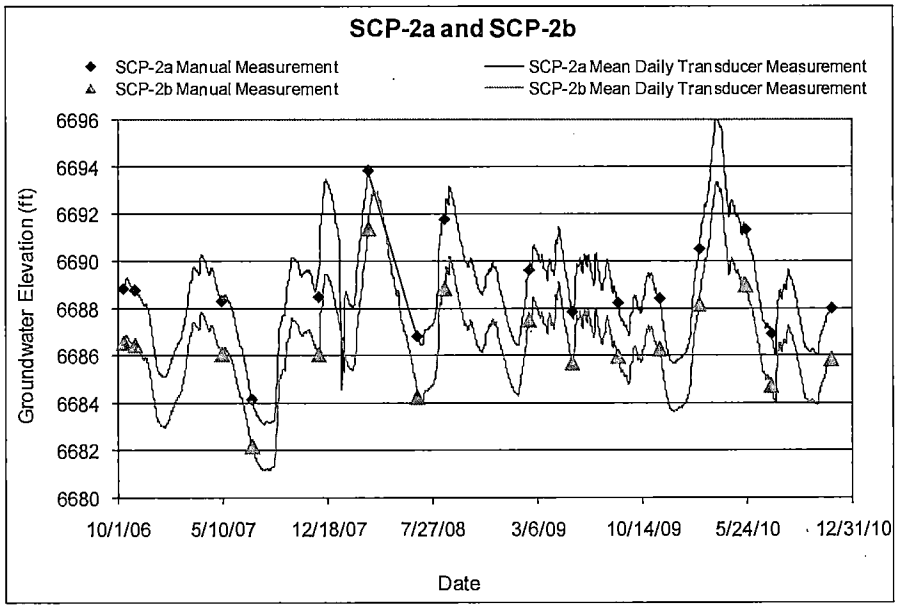
5.97 SCP-2b

Location: Middle Sandia Canyon, approximately 5 ft east of SCA-3 and 5 ft west of SCP-2a.
Period of Record: October 13, 2006, through November 18, 2010.
Remarks: None.

SCP-2b Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
2b	49.5	50.0	6673.1	6672.6	0.5			50.0	6673.1	50.1	0.1	0.02	Alluvial groundwater

Note: Brass Cap Elevation: 6723.11, Ground Elevation: 6722.57 ft; all depths are from this elevation





5.98 TMO-1

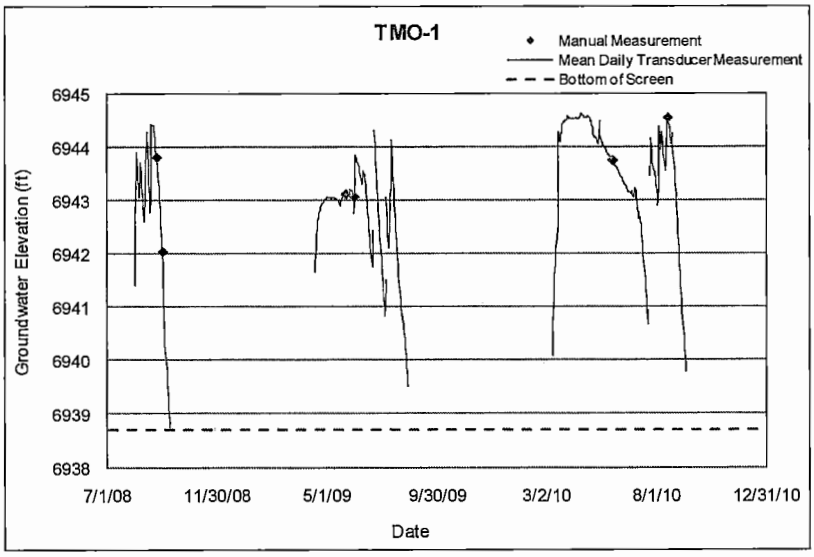
Location: In lower Two-Mile Canyon, just above the confluence with Pajarito Canyon; approximately 500 ft upstream of PCAO-5 and the flood retention dam.

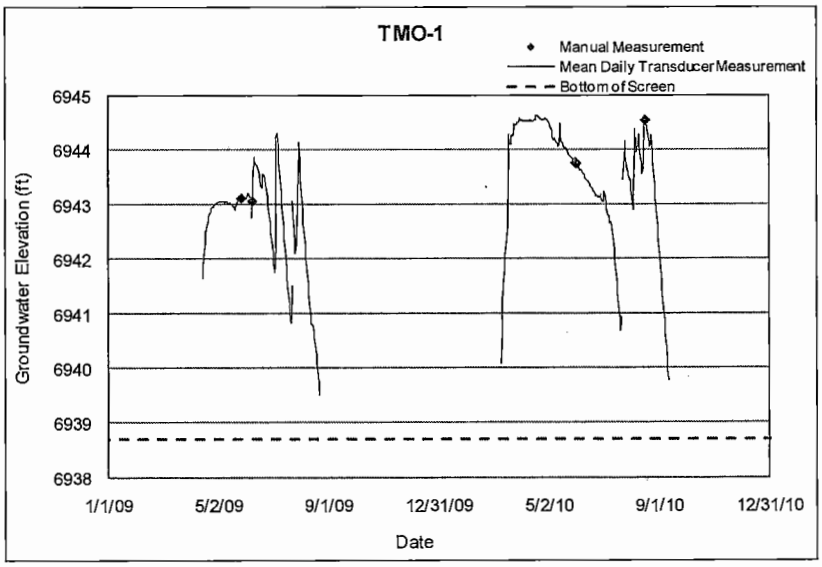
Period of Record: July 17, 2008, through October 7, 2010.

Remarks: Data from July 17, 2008, through August 9, 2008, were invalidated because transducer was hanging above level of water. The transducer was lowered to the bottom of the well on December 12, 2009.

TMO-1 Construction Information														
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comments
1	3.5	6.5	6941.7	6938.7	3.0			6.5	6938.7	6.5	0.0	0.0	Hand-augered well

Note: Ground elevation is 6945.20 ft; all depths from this elevation



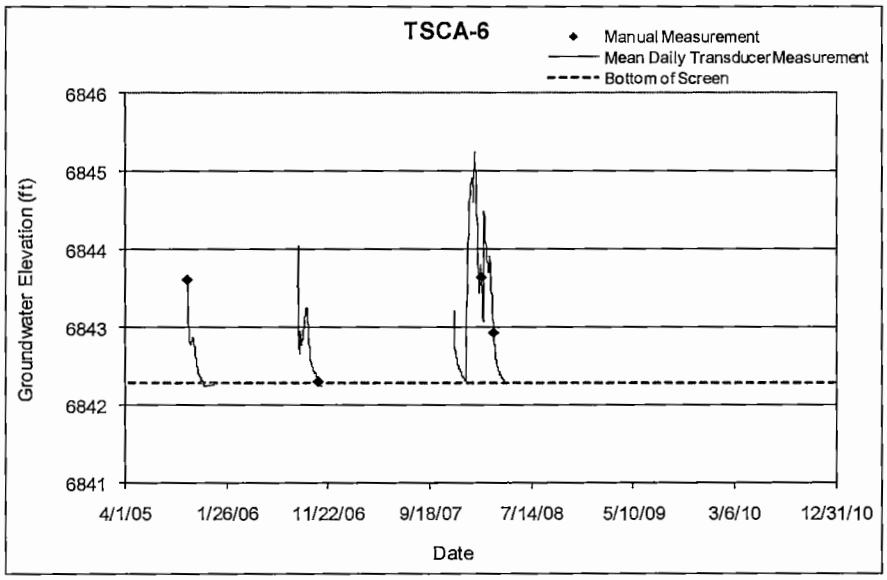


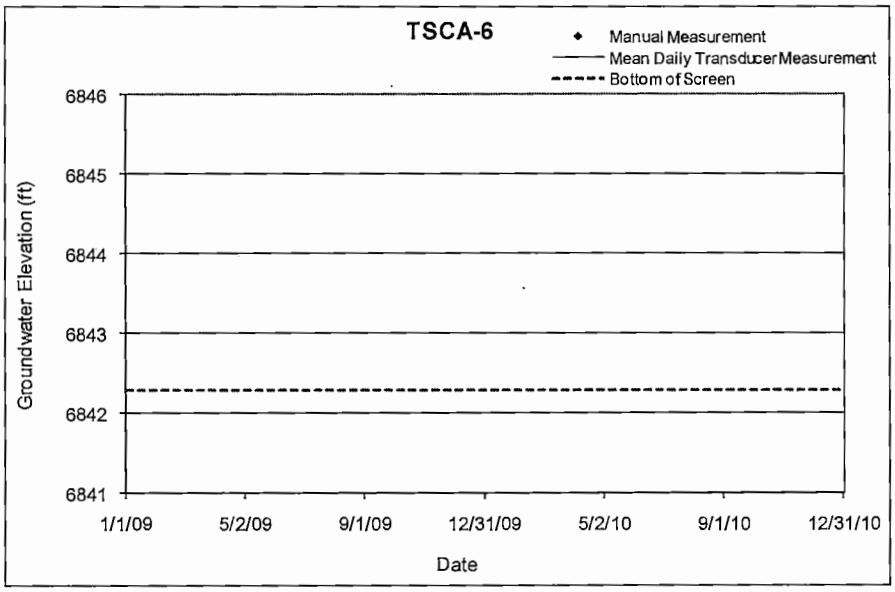
5.99 TSCA-6

Location: Ten Site Canyon, approximately 600 ft west of Mortandad Canyon confluence.
Period of Record: April 18, 2005, through December 2, 2010.
Remarks: This well tends to run dry seasonally, and has been dry since May 2008.

TSCA-6 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	16.20	20.9	6847.0	6842.3	4.7			20.9	6842.3	21.3	0.4	0.2	Alluvial groundwater

Note: Ground elevation is 6863.2 ft; all depths are from this elevation





5.100 WCO-1

Location: Water Canyon, near western border of TA-68.
Period of Record: October 31,1989, through December 20, 2009.
Remarks: This well is usually dry. There are only two records indicating water in well. This well was plugged and abandoned in December 2009. Monitoring has moved to WCO-1r.

WCO-1 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	24.4	34.4	6592.0	6582.0	10.0			34.4	6582.0	34.4	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 6616.41 ft; all depths are from this elevation

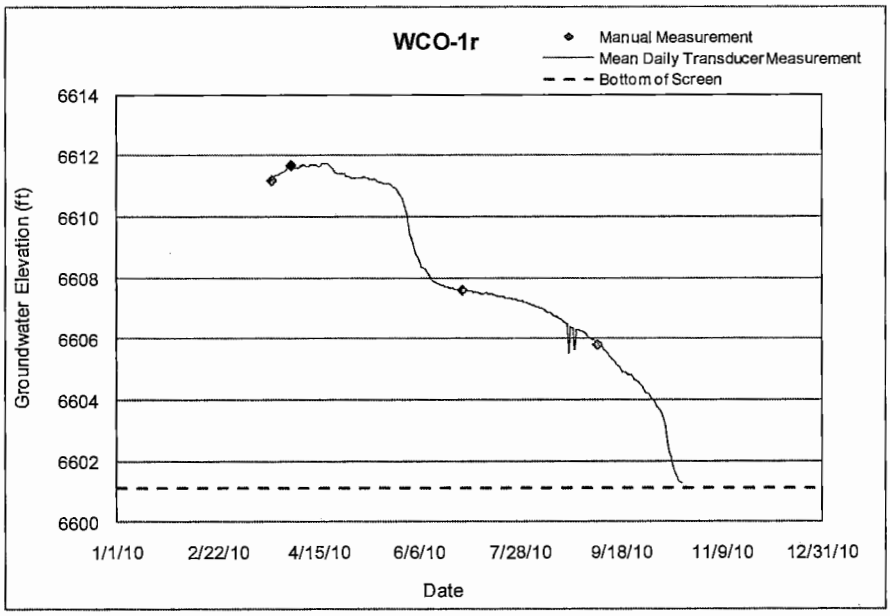
WCO-1 Manual Water Levels			
Date	Groundwater Elevation (ft)	Date	Groundwater Elevation (ft)
10/31/1989	Dry	6/19/2003	Dry
11/1/1989	Dry	9/14/2005	Dry
8/24/1990	Dry	12/22/2005	Dry
6/23/1997	6582.75	3/13/2006	Dry
10/13/1997	Dry	6/23/2006	Dry
3/25/1998	Dry	9/13/2006	Dry
5/29/1998	6582.75	12/15/2006	Dry
7/28/1998	Dry	1/24/2007	Dry
3/3/1999	Dry	3/15/2007	Dry
6/23/1999	Dry	5/24/2007	Dry
8/30/1999	Dry	6/6/2007	Dry
11/15/1999	Dry	9/5/2007	Dry
3/26/2000	Dry	10/17/2007	Dry
5/16/2000	Dry	1/16/2008	Dry
8/30/2000	Dry	4/8/2008	Dry
10/8/2000	Dry	4/25/2008	Dry
7/2/2001	Dry	7/18/2008	Dry
8/22/2001	Dry	10/7/2008	Dry
10/18/2001	Dry	2/6/2009	Dry
4/19/2002	Dry	3/23/2009	Dry
8/19/2002	Dry	7/2/2009	Dry
11/13/2002	Dry	10/7/2009	Dry
2/18/2003	Dry	12/20/2009	Dry

5.101 WCO-1r

Location: Water Canyon, near western border of TA-68, approximately 30 ft northwest of WCO-1.
Period of Record: March 22, 2010, through December 7, 2010.
Remarks: New well drilled to replace WCO-1.

WCO-1r Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	6.0	16.00	6611.1	6601.1	10.0			16.0	6601.1	16.4	0.4		Alluvial groundwater

Note: Ground elevation is 6617.12 ft; all measurements are from this elevation

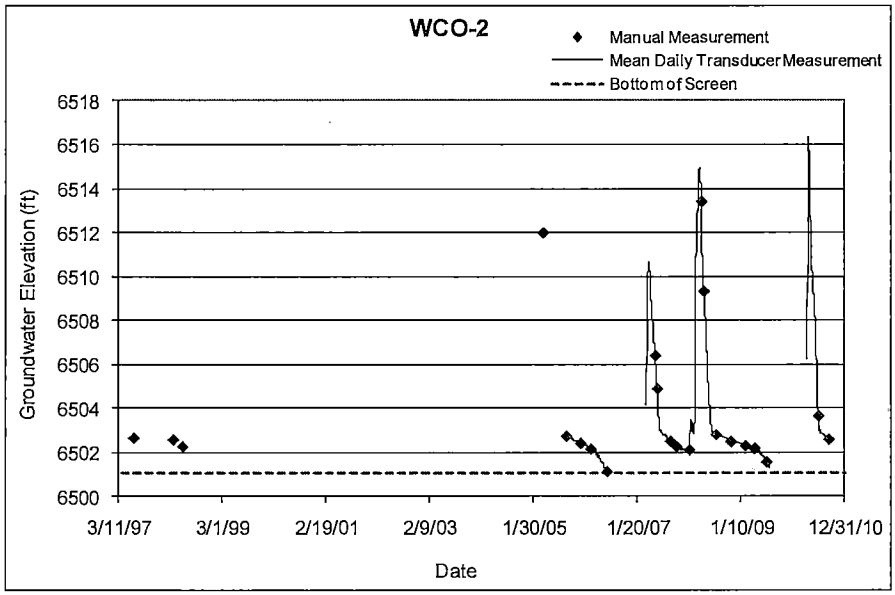


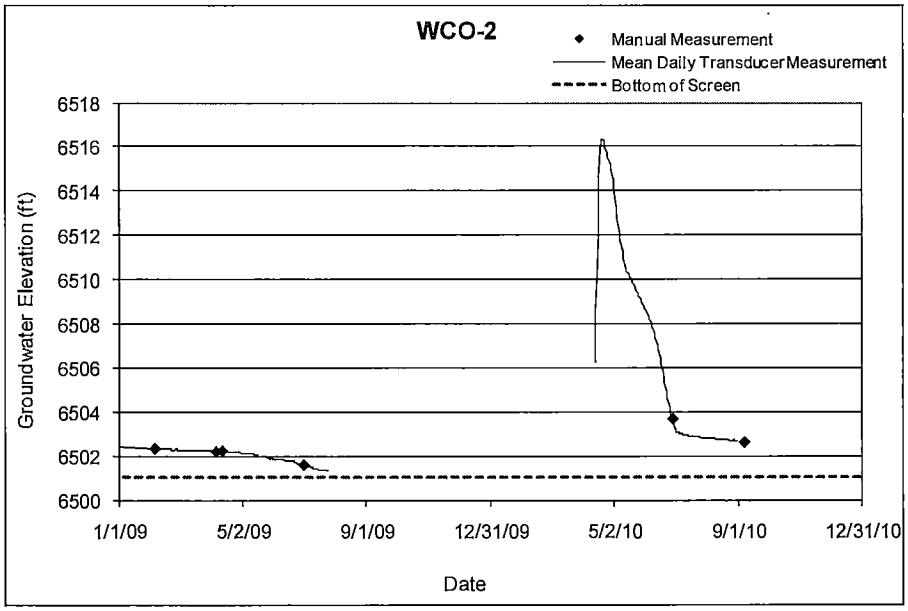
5.102 WCO-2

Location: Water Canyon, about 0.9 mi west of gate 9 on SR-4.
Period of Record: October 26, 1989, through December 10, 2010.
Remarks: The transducer malfunctioned on August 23, 2008, and was fixed February 6, 2009. The replacement transducer and/or cable malfunctioned in September 2010 and was replaced December 10, 2010, with a newer transducer and cable.

WCO-2 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	13.5	23.5	6511.1	6501.1	10.0			23.5	6501.1	23.5	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 6524.57 ft; all measurements are from this elevation





5.103 WCO-3

Location: Water Canyon, approximately 0.1 mi west of gate 9 on SR-4.
Period of Record: October 25, 1989, through December 20, 2009.
Remarks: Well is typically dry. A transducer was installed January 16, 2008, and never recorded any water in the well. This well was plugged and abandoned in December 2009. Monitoring has moved to WCO-3r.

WCO-3 Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Depth to Top of Sump (ft)	Top of Sump Elevation (ft)	Depth to Sump Bottom (ft)	Sump Length (ft)	Sump Volume (L)	Comment
1	7.4	12.4	6429.0	6424.0	5.0			12.4	6424.0	12.4	0.0	0.0	Alluvial groundwater

Note: Ground elevation is 6436.43 ft; all depths are from this elevation

WCO-3 Manual Water Levels			
Date	Water level (ft)	Date	Water level (ft)
10/25/1989	Dry	6/19/2003	Dry
8/24/1990	Dry	9/14/2004	Dry
6/23/1997	6424.6	12/22/2005	Dry
3/25/1998	Dry	3/13/2006	Dry
5/29/1998	Dry	6/23/2006	Dry
7/28/1998	Dry	9/13/2006	Dry
3/3/1999	Dry	12/15/2006	Dry
6/23/1999	Dry	1/24/2007	Dry
8/30/1999	Dry	3/15/2007	Dry
11/15/1999	Dry	5/24/2007	Dry
3/26/2000	Dry	6/6/2007	Dry
5/16/2000	Dry	9/5/2007	Dry
8/30/2000	Dry	10/17/2007	Dry
10/8/2000	Dry	1/16/2008	Dry
7/2/2001	Dry	4/8/2008	Dry
8/22/2001	Dry	7/18/2008	Dry
10/18/2001	Dry	10/7/2008	Dry
4/19/2002	Dry	2/6/2009	Dry
8/19/2002	Dry	3/23/2009	Dry
11/13/2002	Dry	7/2/2009	Dry
2/18/2003	Dry	10/7/2009	Dry
		12/20/2009	Dry

5.104 WCO-3r

Location: Water Canyon, approximately 0.1 mi west of gate 9 on SR-4 and 150 ft south of WCO-1.
Period of Record: March 22, 2010, through December 7, 2010.
Remarks: New well installed to replace WCO-3. Water level has thus far not risen above the sump.

WCO-3r Construction Information													
Zone	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elevation (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Comment
1	4.7	9.7	6432.5	6427.5	5.0			9.7	6427.5	10.1	0.4	0.2	Alluvial groundwater
Note: Ground elevation is 6437.17 ft; all measurements are from this elevation													

WCO-3r Manual Measurements		
Date	Groundwater Elevation (ft)	Comments
3/22/2010	6427.17	Water in Sump
4/1/2010	6427.28	Water in Sump
6/29/2010	6427.25	Water in Sump
10/12/2010	6427.30	Water in Sump
12/7/2010	6427.34	Water in Sump

6.0 Groundwater Level Data from Water Supply Wells

Table 6-1 lists the LAC water supply wells; all supply wells were monitored for groundwater levels in 2010 after transducers were installed at G-1A and O-4. The table provides the well name, date of completion, well depth, surveyed location coordinates, ground surface elevation, and the screen top and bottom depths for each well. See Figure 3-1 for the locations of the wells.

The LANL GWLM Project integrated the water supply wells in the monitoring project beginning in 2007 with the cooperation of LAC Utility personnel. Recently obtained groundwater level data for the supply wells are provided in the following sections. Historical groundwater level data for the supply wells were summarized by Koch and Rogers (2003) and other preceding Water Supply Reports for Los Alamos.

Table 6-1. General Information for Los Alamos County Water Supply Wells

Well Name	Date Completed	Completed Depth (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Screen Top Depth (ft)	Screen Bottom Depth (ft)
G-1A	12/15/1954	1519	1655240.9	1784353.3	6014	272	1513
G-2A	3/21/1998	2000	1651973.8	1786166.3	6138	565	1980
G-3	8/25/1999	1800	1651676.4	1786218.3	6139	441	1100
G-3A	5/9/1998	2000	1649661.5	1786585.3	6212	590	1980
G-4A	4/1/1998	2000	1647318.2	1787112.9	6299	655	1980
G-5A	5/20/1998	2000	1644877.2	1789636.0	6414	765	1980
O-1	8/1/1990	2497	1649396.3	1772232.1	6396	1017	2477
O-4	3/1/1990	2617	1637337.4	1772995.1	6627	1115	2596
PM-1	2/1/1965	2499	1647734.3	1768112.1	6520	945	2479
PM-2	7/15/1965	2300	1636697.5	1760406.4	6715	1004	2280
PM-3	11/1/1966	2552	1642590.0	1769530.0	6610	956	2532
PM-4	8/15/1981	2874	1635623.0	1764740.0	6920	1260	2854
PM-5	9/1/1982	3092	1632110.0	1767790.0	7095	1440	3072

All LAC water supply wells are powered by electric motors except for PM-4, which has a natural-gas-powered motor. The electric-powered wells are typically operated at night and on weekends when electricity rates are lower. Thus these wells usually cycle on and off daily, in contrast to PM-4, which usually runs continuously when in use, which is usually just during the summer months when water demand is highest. Thus, due to the operational characteristics of the electric-powered wells, the data displayed in the following sections for these wells are the maximum daily water level, or the "non-pumping" water level, and the minimum daily or "pumping" water level. The difference between the non-pumping and the pumping water level is the drawdown for each well. The data shown for the wells that aren't operated cyclically, which are PM-4 and O-1 (which hasn't been used in recent years), are mean daily water levels.

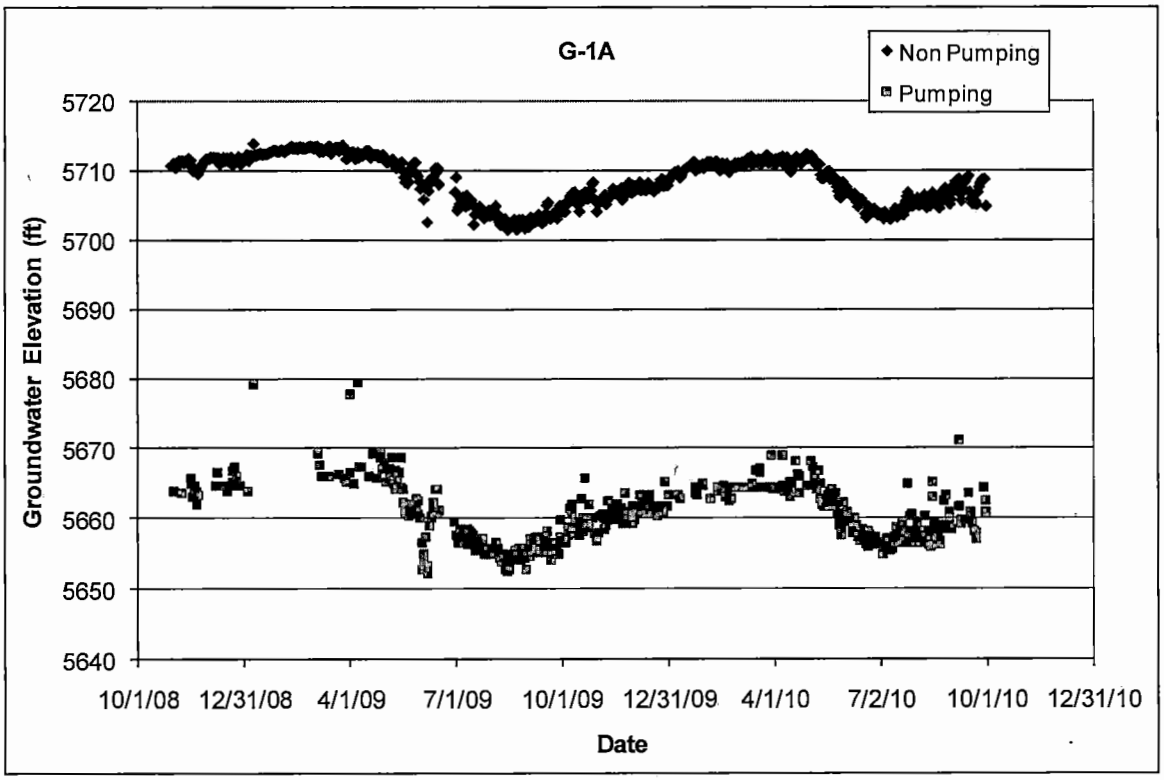
6.1 G-1A

Location: G-1A is located in Guaje Canyon and is the easternmost well in the Guaje well field.
Completion Type: Single completion in the Santa Fe Group.
Period of Record: Well completed in 1954, periodic manual measurements (Koch and Rogers 2003). Transducer installed in bubbler pressure line October 29, 2008; data through June 2010.
Remarks: G-1A was constructed without gage lines so manual measurements are not possible while the pump is installed. The transducer is connected to a bubble pressure line installed to the depth of the top of the pump. Drawdown during pumping is about 45 ft.

G-1A Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	272	1513	5742	4501	1241	496	5518	1513	4501	1519	6	93	RT	Tsf

Note: Ground Elevation: 6014.0 ft; all measurements from this elevation



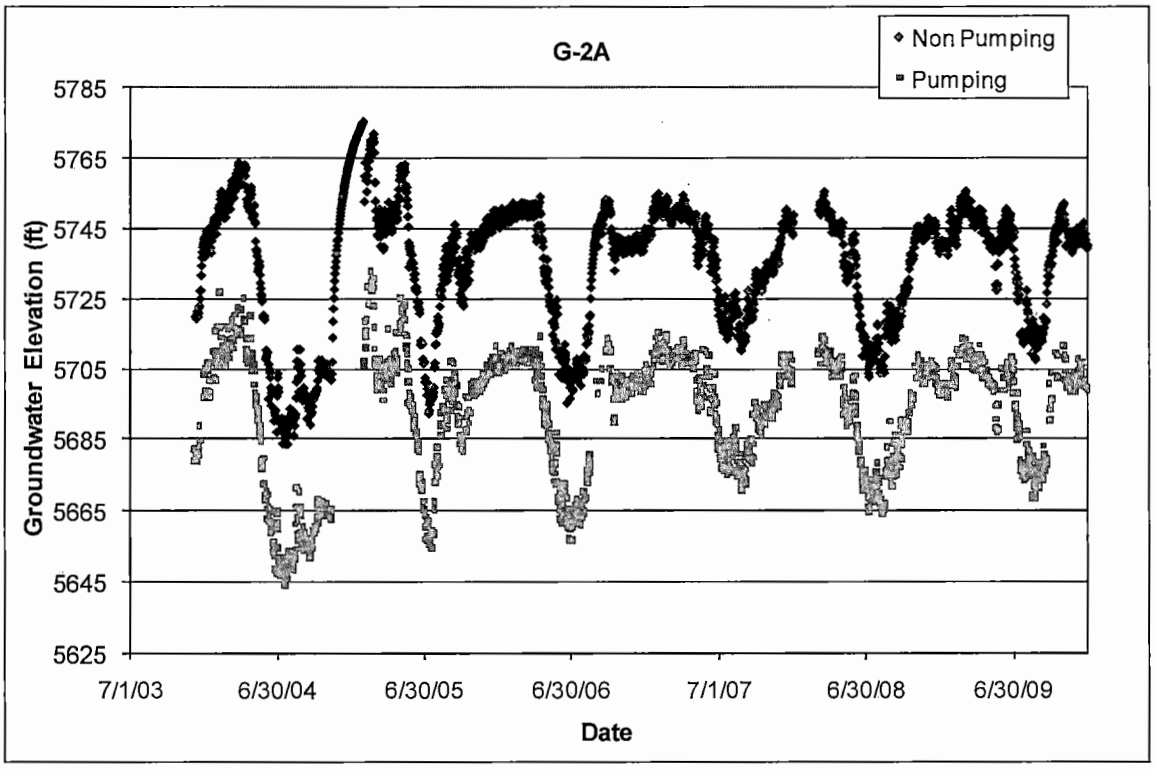
6.2 G-2A

Location: G-2A is located in Guaje Canyon about 300 ft east of monitoring well G-3.
Completion Type: Single completion in the Santa Fe Group.
Period of Record: Well completed in 1998, transducer installed December 2003; data through 2010.
Remarks: The pumping and non-pumping water levels overlap depending on pumping stress to the aquifer. The drawdown is about 40 ft.

G-2A Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	565	1980	5573	4158	1415	540	5598	1980	4158	2000	20	444.8	RT	Tsf

Note: Ground Elevation: 6138.0 ft; all depths are from this elevation



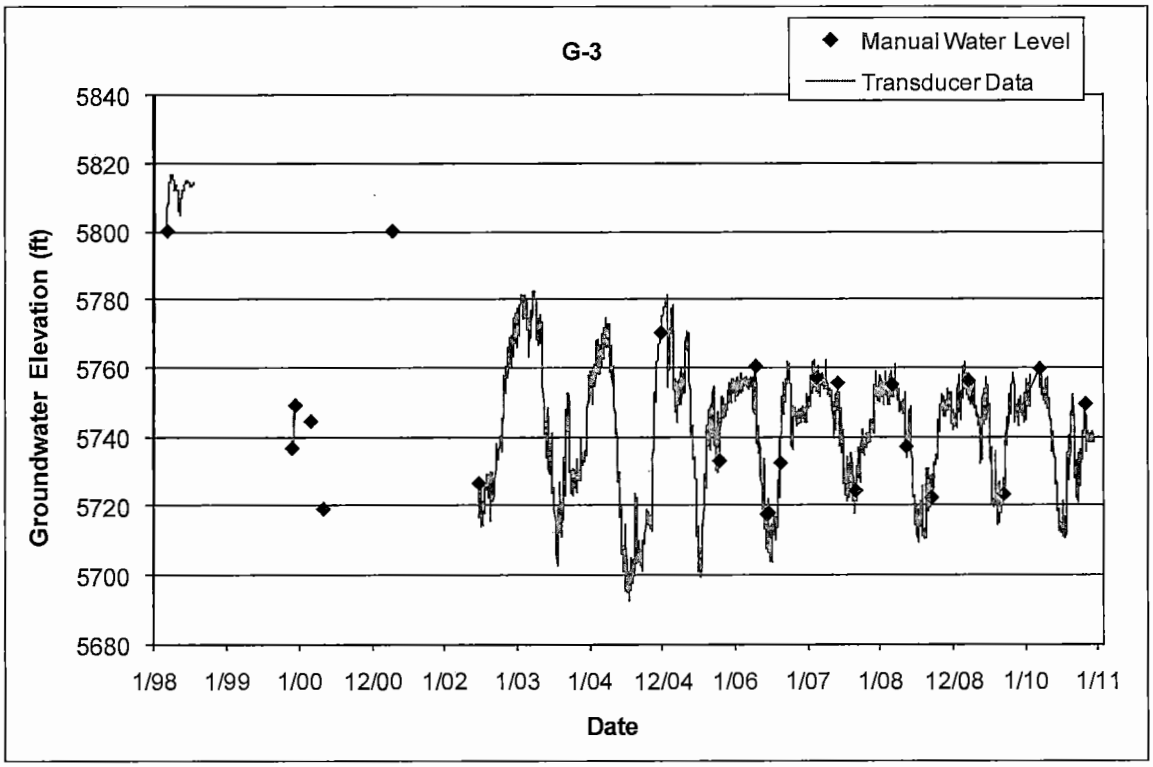
6.3 G-3

Location: G-3 is located in Guaje Canyon about 300 ft west of supply well G-2A.
Completion Type: Single completion in the Santa Fe Group.
Period of Record: Well originally completed as a supply well in July 1951; plugged back to 1103 ft and converted to a monitoring well in 1998, transducer installed June 2002; data through 2010.
Remarks: G-3 responds primarily to pumping at supply well G-2A; daily water level fluctuation is about 8 ft. The aquifer in the Guaje well field fluctuates seasonally 40 to 70 ft depending on pumping stresses.

G-3 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	441	1100	5698	5039	659	None	None	1100	5039	1103	3	66.7	RT	Tsf

Note: Ground Elevation: 6139.0 ft; all depths are from this elevation

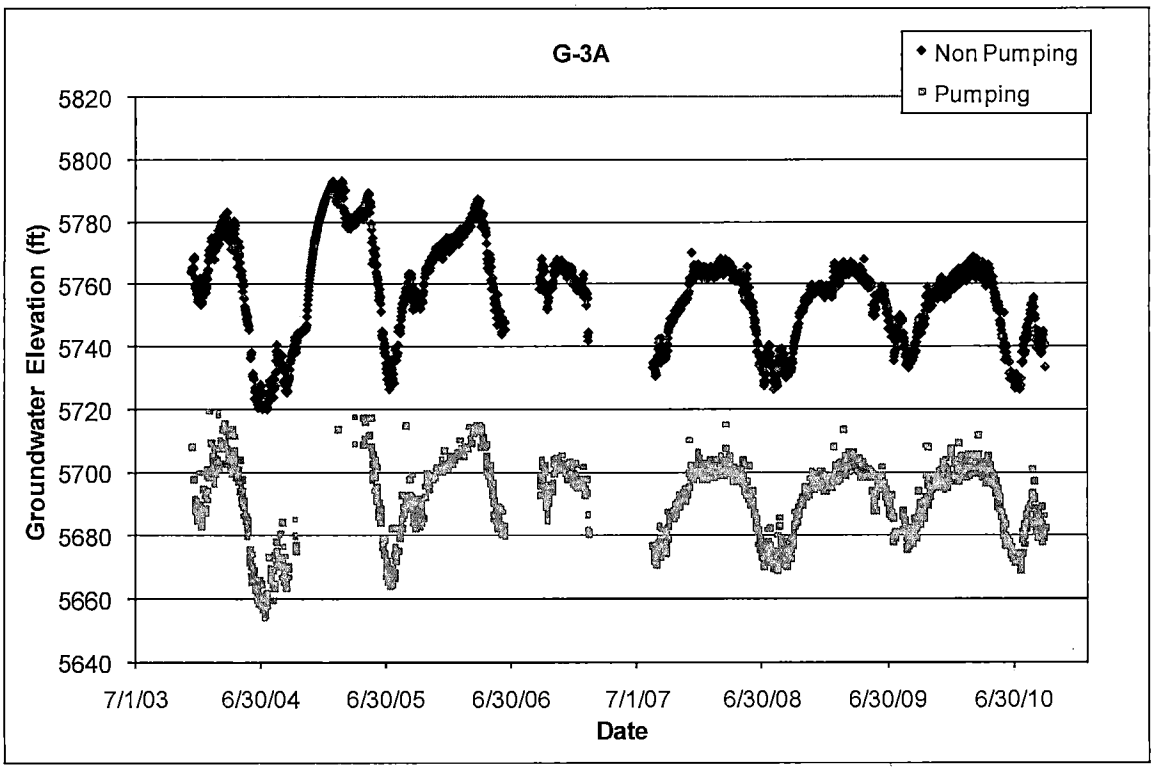


Note: mean daily water level values displayed

6.4 G-3A

Location: G-3A is located in Guaje Canyon about 1.5 mi west of monitoring well G-3.
Completion Type: Single completion in the Santa Fe Group.
Period of Record: Well completed as a supply well in May 1998; transducer installed December 2003; intermittent data through June 2010.
Remarks: Drawdown is 60 to 65 ft.

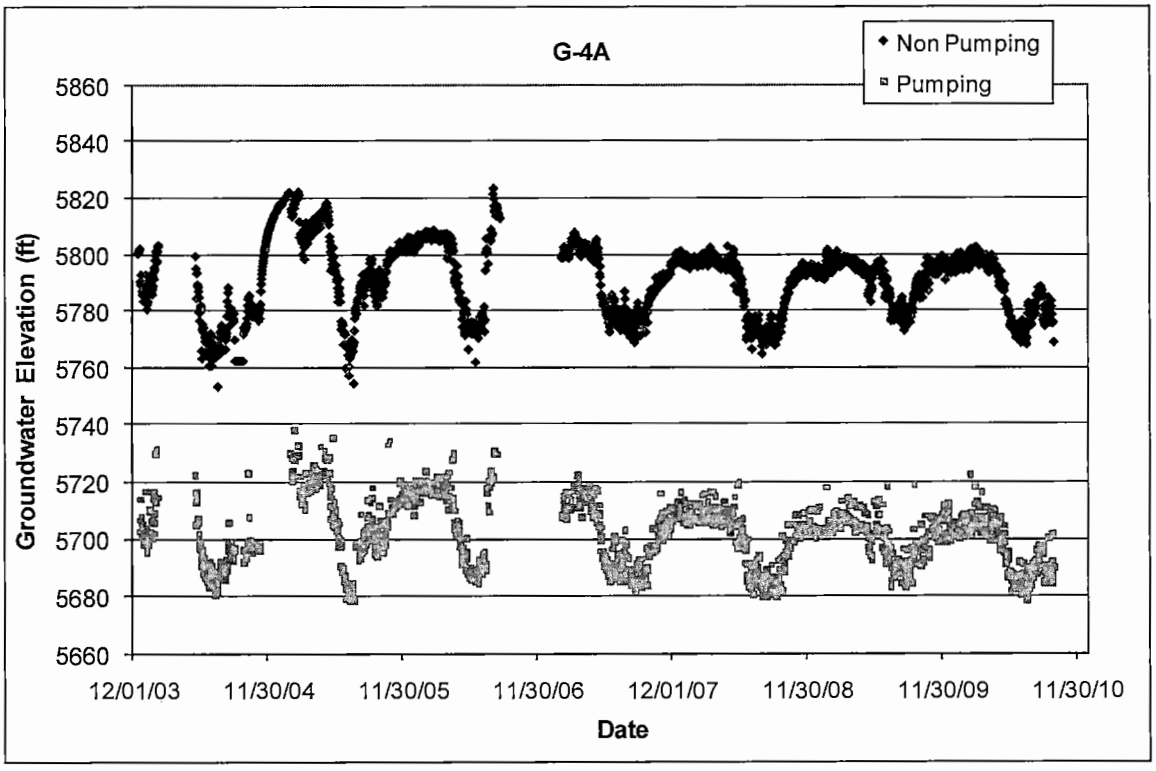
G-3A Construction Information														
Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Dept (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	590	1980	5622	4232	1390	560	5652	1980	4232	2000	20	853.7	RT	Tsf
Note: Ground Elevation: 6212.0 ft; all measurements are from this elevation														



6.5 G-4A

Location: G-4A is located in lower Rendija Canyon near the confluence with Guaje Canyon and about 0.5 mi west of supply well G-3A.
Completion Type: Single completion in the Santa Fe Group.
Period of Record: Well completed as a supply well in April 1998; transducer installed December 2003; intermittent data through 2010.
Remarks: Drawdown is 80 to 85 ft.

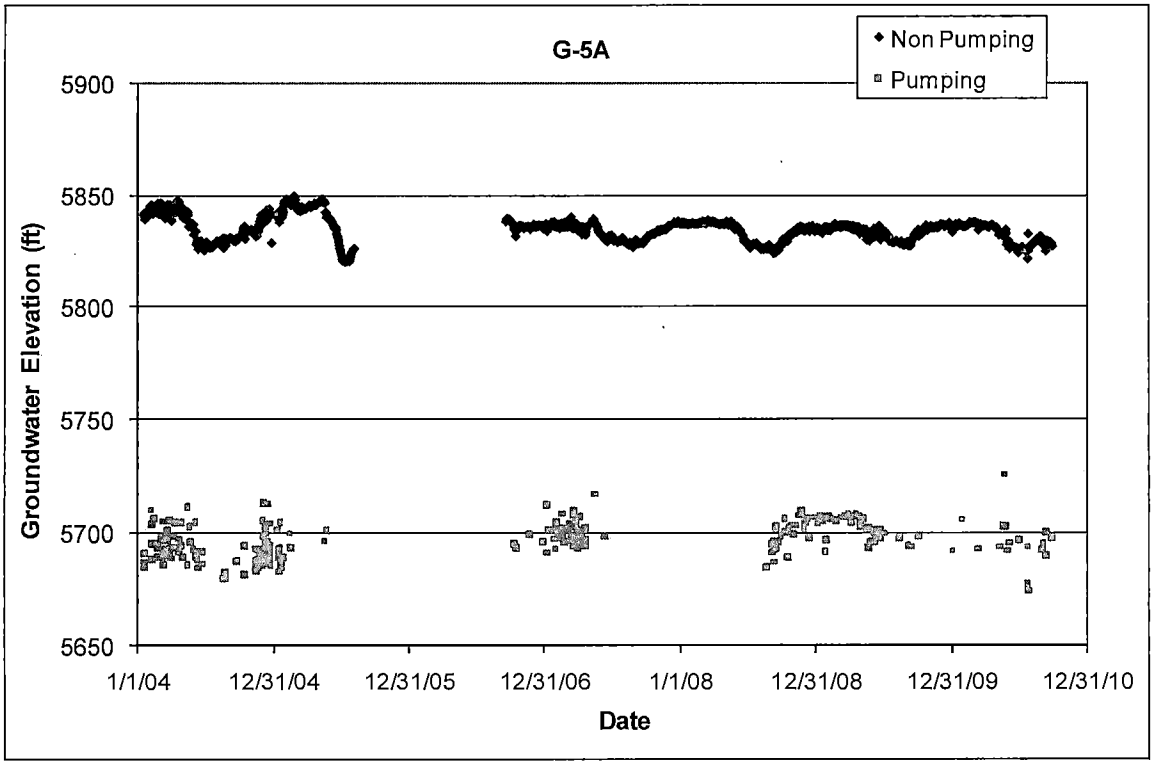
G-4A Construction Information														
Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	655	1980	5644	4319	1325	630	5669	1980	4319	2000	20.0	853.7	RT	Tsf
Note: Ground Elevation: 6299.0 ft; all measurements are from this elevation														



6.6 G-5A

Location: G-5A is located in Guaje Canyon upstream of Rendija Canyon and about 1.9 mi northwest of supply well G-4A.
Completion Type: Single completion in the Santa Fe Group.
Period of Record: Well completed as a supply well in May 1998; transducer installed January 2004; data through 2010.
Remarks: G-5A is not used on a regular basis. Drawdown is 140 to 150 ft.

G-5A Construction Information															
Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code	Comment
1	765	1980	5649	4434	1215	740	5674	1980	4434	2000	20	853.7	RT	Tsf	Supply Well
Note: Ground Elevation: 6414.0 ft; all measurements are from this elevation															



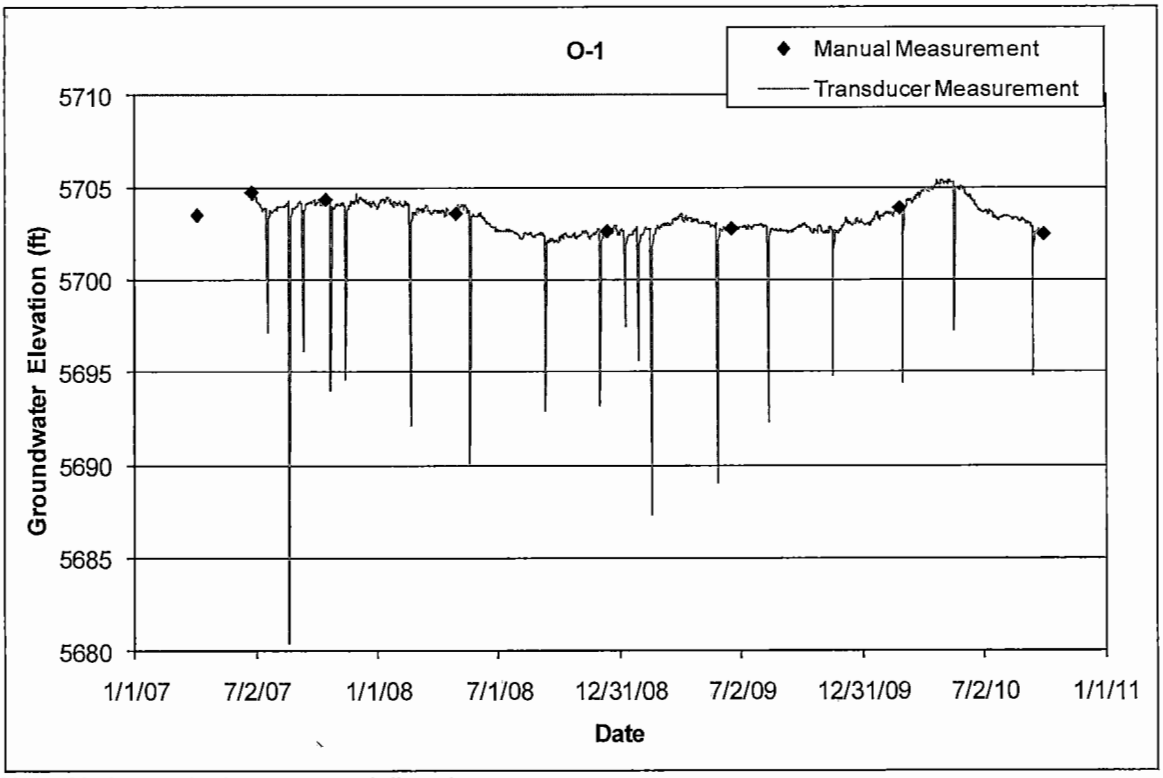
6.7 O-1

Location: O-1 is located in lower Pueblo Canyon about 0.5 mi downstream of monitoring well R-5.
Completion Type: Single completion in the Santa Fe Group.
Period of Record: Well completed as a supply well in August 1990; transducer installed June 2007; data through June 2010.
Remarks: O-1 has not been used on a regular basis except for periodic groundwater sampling. Drawdown is about 100 ft. O-1 responds to pumping of supply well PM-1.

O-1 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1017	2477	5379	3919	1460	877	5519	2477	2477	2497	20	790.8	RT	Tsf

Note: Ground Elevation: 6396 ft; all measurements are from this elevation

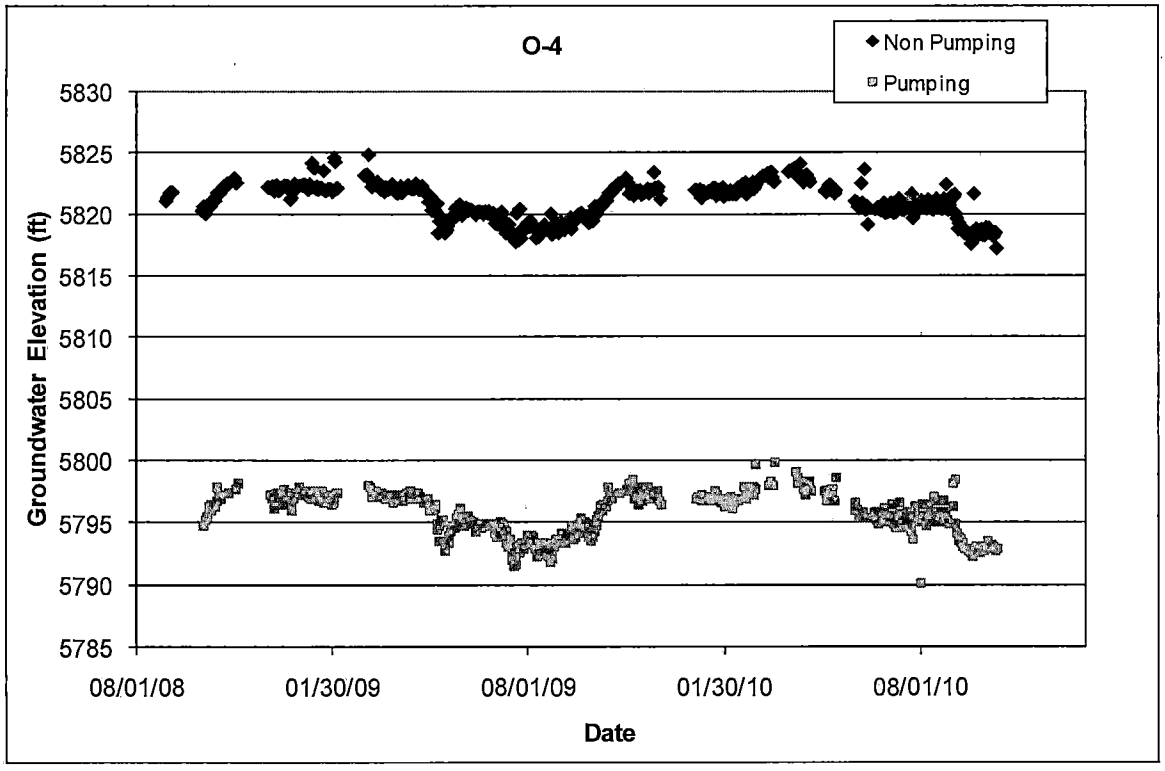


Note: Hydrograph shows mean daily values

6.8 O-4

Location: O-4 is located in Los Alamos Canyon above the confluence with DP Canyon and about 1500 ft southeast of monitoring well R-6.
Completion Type: Single completion in the Santa Fe Group.
Period of Record: Well completed as a supply well in March 1990; transducer installed August 2008; data through 2010.
Remarks: O-4 drawdown is about 25 ft.

O-4 Construction Information														
Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1115	2575	5512	4052	1460	928	5699	2575	4052	2575	0	0	RT	Tsf
Note: Ground Elevation: 6627 ft; all Measurements are from this elevation														



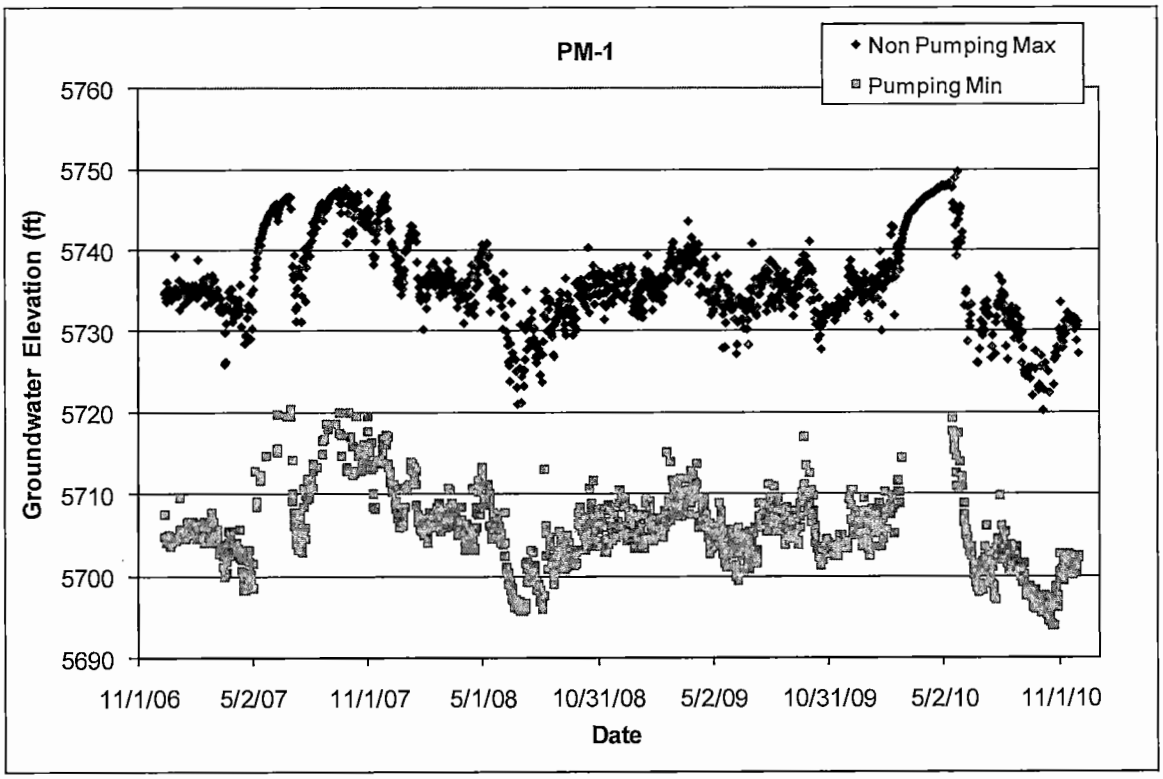
6.9 PM-1

Location: PM-1 is located in lower Sandia Canyon near the eastern Laboratory boundary and about 360 ft northeast of monitoring well R-12.
Completion Type: Single completion in the Santa Fe Group.
Period of Record: Well completed as a supply well in February 1965; transducer installed December 2006; data through 2010.
Remarks: Drawdown is about 30 ft.

PM-1 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	945	2479	5575	4041	1534	877	5643	2479	2479	2499	20.0	790.8	RT	Tsf

Note: Ground Elevation: 6520 ft; all measurements are from this elevation



6.10 PM-2

Location: PM-2 is located in Pajarito Canyon about 0.25 mi west of monitoring well R-20 and about 220 ft southwest of recently installed monitoring well R-40.

Completion Type: Single completion in the Puye Formation and Santa Fe Group.

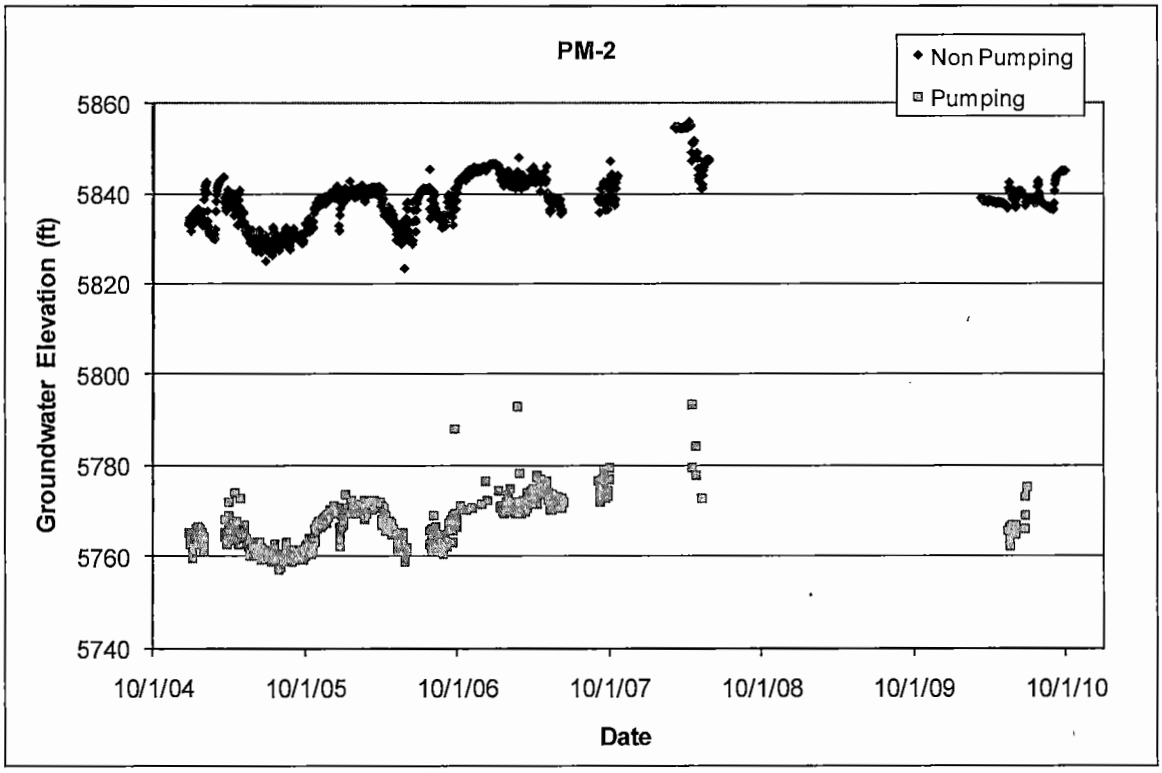
Period of Record: Well completed as a supply well in July 1965; transducer installed December 2004; data to October 23, 2007. The transducer was removed in October 2007 during pump removal and well rehabilitation. Data during April and May 2008 during pump testing. Transducer removed May 30, 2008, for well repairs, reinstalled March 8, 2010; data through 2010.

Remarks: Drawdown is about 70 ft. PM-2 responds to pumping at PM-4 (McLin 2006). PM-2 was not operated for most of 2008, 2009, and 2010 because of well maintenance and repairs.

PM-2 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Vol (L)	Hydro Zone Code	Geo Unit Code
1	1004	2280	5711	4435	1276	980	5735	2280	4435	2300	20.0	790.8	RT	Tp

Note: Ground Elevation: 6715 ft; all measurements are from this elevation



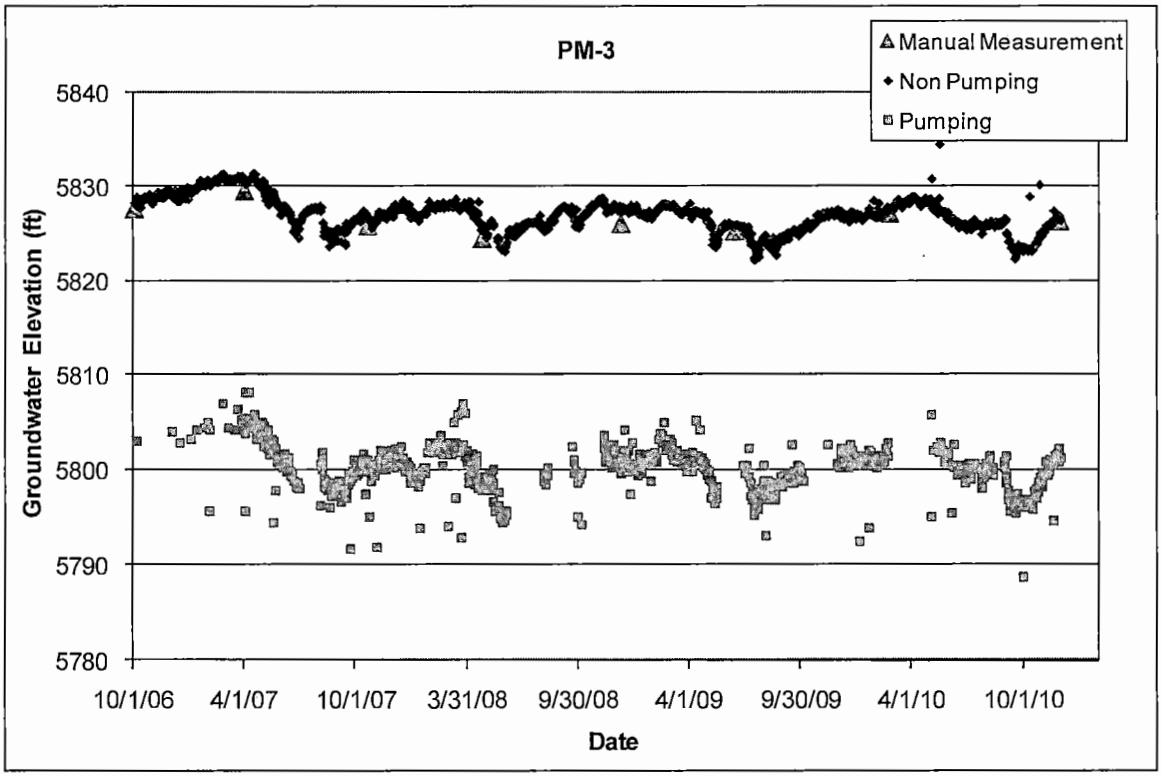
6.11 PM-3

Location: PM-3 is located in Sandia Canyon about 1 mi west of PM-1 and about 330 ft northeast of monitoring well R-35a.
Completion Type: Single completion in Santa Fe Group.
Period of Record: Well completed as a supply well in November 1966; transducer installed October 2006; data through 2010.
Remarks: Drawdown is about 27 ft. PM-3 responds to pumping at O-4.

PM-3 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	956	2532	5654	4078	1576	830	5780	2532	4078	2552	20	605.4	RT	Tsf

Note: Ground Elevation: 6610 ft; all measurements are from this elevation



6.12 PM-4

Location: PM-4 is located on Mesita del Buey about midway between supply wells PM-2 and PM-5. The nearest monitoring well is R-52 about 0.45 mi to the southeast. R-15 in Mortandad Canyon is about 0.67 mi to the north.

Completion Type: Single completion in the Puye Formation and Santa Fe Group.

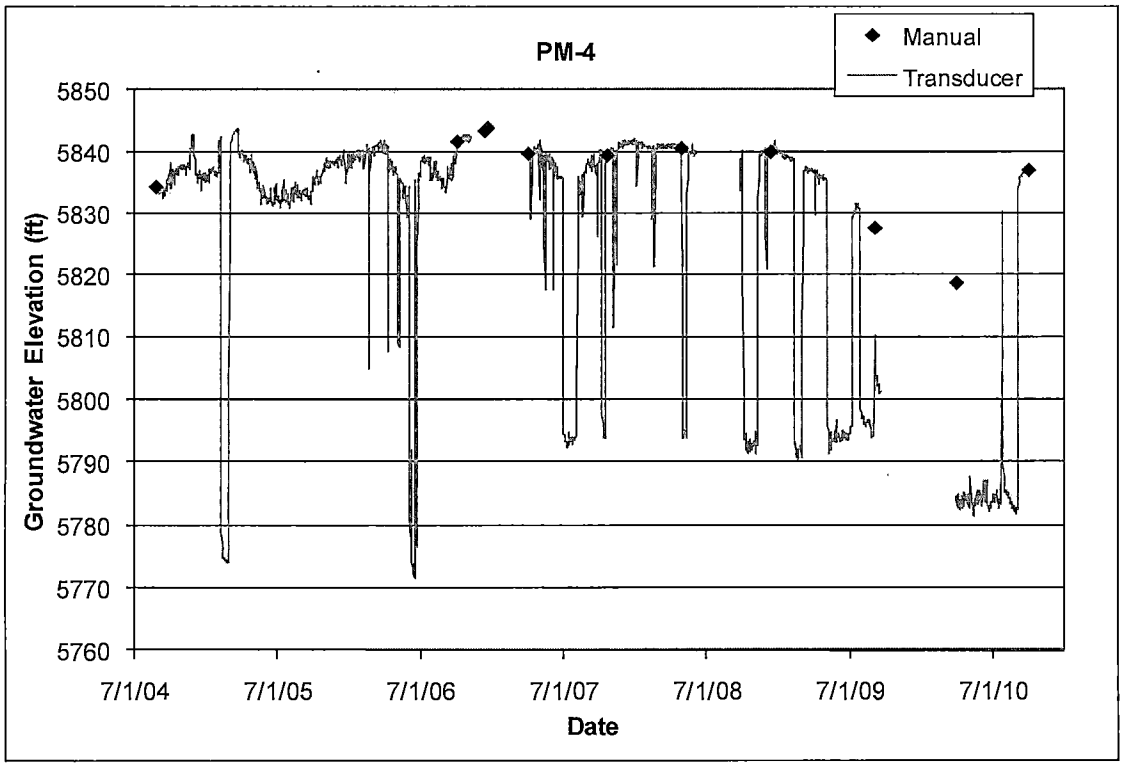
Period of Record: Well completed as a supply well in August 1981; transducer installed August 2004. The transducer failed in November 2006 and was replaced in April 2007, failed again June 2008, replaced September 2008, and failed again September 2009; replaced March 2010; data through 2010.

Remarks: Well is powered by a natural gas motor and when used is operated continuously. Drawdown in 2008 was about 48 ft and in 2010 about 54 ft. PM-4 responds to pumping at PM-2.

PM-4 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1260	2854	5660	4066	1594	1210	5710	2854	4066	2874	20	790.8	RT	Tp

Note: Ground Elevation: 6920 ft; all measurements are from this elevation



Note: mean daily water level values shown

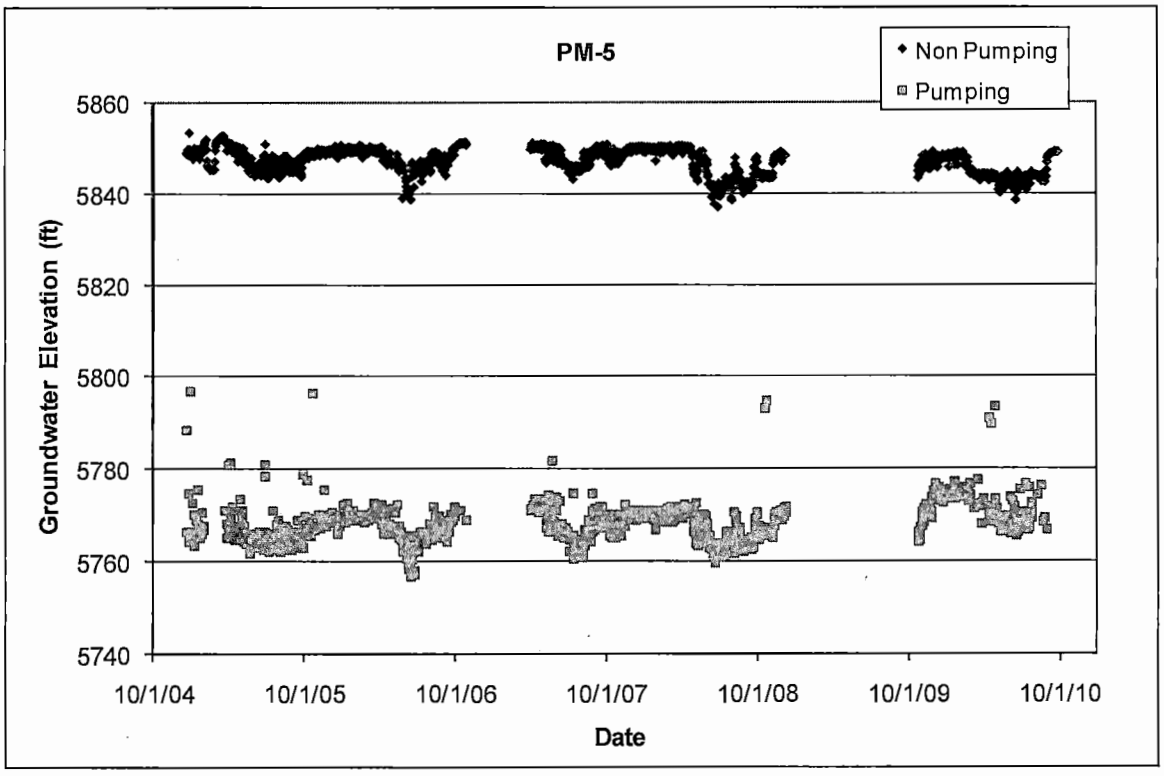
6.13 PM-5

Location: PM-5 is located on a mesa south of Ten Site and Mortandad canyons. The nearest monitoring well is R-33 in Ten Site Canyon about 1500 ft to the northeast.
Completion Type: Single completion in the Puye Formation and Santa Fe Group.
Period of Record: Well completed as a supply well in September 1982; transducer installed December 2004. The transducer failed in October 2006 and was replaced in April 2007; transducer failed again December 2008 and was replaced October 2009; data through 2010.
Remarks: PM-5 responds to pumping PM-4. Drawdown is about 80 ft.

PM-5 Construction Information

Screen	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Screen Top Elev (ft)	Screen Bottom Elev (ft)	Screen Length (ft)	Pump Intake Depth (ft)	Pump Intake Elev (ft)	Top of Sump Depth (ft)	Top of Sump Elev (ft)	Sump Bottom Depth (ft)	Sump Length (ft)	Sump Volume (L)	Hydro Zone Code	Geo Unit Code
1	1440	3072	5655	4023	1632	1384	5711	3072	3072	3092	20	790.8	RT	Tp

Note: Ground Elevation: 7095 ft; all measurements are from this elevation



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Appendix A. Geologic Unit Codes

Table A-1. Geologic Unit Codes

Geologic Unit Code	Geologic Unit Description
P	Polvadera Group
Qal	Quaternary alluvium
Qb	Bandelier Tuff, undivided
Qbo	Otowi Member of the Bandelier Tuff, undivided
Qbof	Otowi Member of the Bandelier Tuff, ash flows
Qbog	Otowi Member of the Bandelier Tuff, Guaje Pumice Bed
Qbt	Tshirege Member of the Bandelier Tuff, undivided
Qbt1	Tshirege Member of the Bandelier Tuff, Unit 1, undivided
Qbt1g	Tshirege Member of the Bandelier Tuff, Unit 1, glassy
Qbt1v	Tshirege Member of the Bandelier Tuff, Unit 1, vapor phase
Qbt2	Tshirege Member of the Bandelier Tuff, Unit 2
Qbt3	Tshirege Member of the Bandelier Tuff, Unit 3
Qbt3nw	Tshirege Member of the Bandelier Tuff, Unit 3, nonwelded
Qbt3t	Tshirege Member of the Bandelier Tuff, Unit 3, transitional
Qbt4	Tshierge Member of the Bandelier Tuff , Unit 4
Qbt5	Tshierge Member of the Bandelier Tuff , Unit 5
Qbtt	Tshierge Member of the Bandelier Tuff, Tsankawi Pumice Bed
Qct	Cerro Toledo Interval
T	Tewa Group
Tb	Tertiary Basalts
Tb1	Middle Miocene Basalts, ~12.8 - 12.9 Ma
Tb2	Late Miocene Basalts, ~8.4 - 11.4 Ma
Tb4	Cerros del Rio Basaltic Rocks, Pliocene Lavas and associated tephra of the Cerro
Tcar	Chamita Formation, axial river deposits
Tch	Chamita Formation
Tf	Puye Formation, Older fanglomerate
Tjfp	Bearhead Rhyolie and Fanglomerats
Tk	Keres Group, undivided
Tp	Puye Formation, undivided
Tpf	Puye Formation, fanglomerates
Tpp	Puye Formation, pumiceous fanglomerates
Tpt	Puye Formation, Totavi river gravels
Tsf	Santa Fe Group, undivided
Tsfb	Santa Fe Group basalt
Tsfu	Santa Fe Group, excluding Tsfuv
Tsfuv	Santa Fe Group, upper unit with volcanic detritus
Tt	Tschicoma Formation, undivided
Tt1	Tschicoma Formation, older flows
Tt2	Tschicoma Formation, younger flows

Appendix B. Mean Annual Water Level Data

Table B-1. Mean Annual Groundwater Levels at the Top of the Regional Aquifer in 2010

Well Name	Top of Regional Aquifer (ft)	No. of Data Values	Std. Dev. (ft)	Last Data Date	Well Name	Top of Regional Aquifer (ft)	No. of Data Values	Std. Dev. (ft)	Last Data Date
CDV-R-15-3	6019.1	4958	0.05	08/02/10	R-35b	5835.6	7718	0.26	11/18/10
CDV-R-37-2	6136.7	5242	0.07	08/09/10	R-36	5839.7	7719	0.20	11/18/10
G-3	5737.9	7241	13.39	12/09/10	R-37	5856.0	14054	0.69	11/29/10
R-1	5877.8	8052	0.29	12/02/10	R-38	5857.5	7743	0.16	11/19/10
R-10a	5739.7	8144	0.49	12/06/10	R-39	5753.4	10694	0.39	12/07/10
R-11	5836.2	7718	0.33	11/18/10	R-4	5829.7	7159	0.63	10/26/10
R-13	5834.7	6971	0.38	10/18/10	R-40	5864.7	7835	0.73	11/23/10
R-14	5879.1	7015	0.44	10/20/10	R-41	5699.3	10696	0.19	12/07/10
R-15	5847.5	7042	1.30	10/21/10	R-42	5838.3	8075	0.35	12/03/10
R-16r	5692.1	7738	0.18	11/19/10	R-43	5838.0	7717	0.39	11/18/10
R-17	5884.4	6007	0.31	11/23/10	R-44	5835.3	8009	0.39	12/03/10
R-18	6116.9	6829	0.24	10/12/10	R-45	5835.0	8074	0.38	12/03/10
R-19	5887.2	5940	0.14	10/26/10	R-46	5884.9	7743	0.41	11/19/10
R-2	5869.3	8193	0.23	12/08/10	R-48	6133.8	6872	1.05	10/14/10
R-20	5863.3	6848	1.28	10/29/10	R-49	5774.9	8172	1.80	12/07/10
R-21	5854.4	7741	0.62	11/19/10	R-5	5765.4	8217	0.11	12/16/10
R-22	5761.6	3403	0.18	04/13/09	R-50	5835.4	15468	2.72	12/03/10
R-23	5696.7	7208	0.17	10/28/10	R-51	5871.3	9618	0.66	11/22/10
R-24	5828.6	7161	1.66	10/26/10	R-52	5864.6	17409	0.55	12/31/10
R-25	6232.5	17995	1.72	12/16/10	R-53	5859.6	11191	0.68	12/31/10
R-26	6534.1	5359	2.33	08/13/10	R-54	5862.8	9737	0.55	12/31/10
R-27	5898.0	6826	0.23	10/12/10	R-57	5757.8	3398	0.37	12/21/10
R-28	5836.6	6971	0.39	10/18/10	R-6	5836.8	8218	0.45	12/09/10
R-29	5948.0	5405	0.29	12/09/10	R-7	5876.3	7063	0.05	12/09/10
R-3	5735.2	5466	2.21	12/08/10	R-8	5852.1	6242	0.80	12/16/10
R-30	5948.2	4853	0.19	12/09/10	R-9	5691.1	7981	0.16	11/29/10
R-31	5827.0	7426	0.13	12/07/10	Test Well DT-10	5918.2	8223	0.13	12/09/10
R-32	5851.8	7232	1.25	10/29/10	Test Well DT-5A	5957.5	8222	0.22	12/09/10
R-33	5870.6	8052	0.35	12/02/10	Test Well DT-9	5914.6	8220	0.13	12/09/10
R-34	5833.1	8145	0.30	12/06/10					

Table B-2. Mean Annual Groundwater Levels in Intermediate Wells in 2010

Well Name	Screen	Average 2010 Water Level (ft)	No. Data Points	Std. Dev. (ft)	Date Last Data
16-26644	Single	7458.0	7723	3.86	12/10/10
CdV-16-1(i)	Single	6804.3	22563	1.66	12/10/10
CdV-16-2(i)r	Single	6619.4	17641	0.45	12/31/10
CDV-37-1(i)	Single	6198.5	7318	0.21	12/07/10
LADP-3	Single	6434.7	6665	0.99	12/09/10
LAOI(A)-1.1	Single	6541.7	8223	0.30	12/09/10
LAOI-3.2	Single	6498.8	8221	0.22	12/09/10
LAOI-3.2a	Single	6441.1	6520	0.20	12/09/10
LAOI-7	Single	6241.0	8197	1.98	12/08/10
MCOI-4	Single	6315.7	8006	0.78	12/02/10
MCOI-5	Single	6139.3	8071	0.52	12/03/10
MCOI-6	Single	6157.5	8070	0.68	12/03/10
PCI-2	Single	6407.7	7815	0.20	11/22/10
POI-4	Single	6213.1	8195	0.71	12/08/10
R-12	1	6073.6	7718	0.84	11/18/10
R-12	2	6073.8	7718	0.82	11/18/10
R-19	2	6169.9	4991	0.10	10/26/10
R-23i	1	6121.7	7303	0.39	12/31/10
R-23i	2	6075.3	15077	2.38	12/31/10
R-23i	3	6071.3	13551	4.16	12/31/10
R-25	1	6780.1	17997	0.20	12/16/10
R-25	2	6742.4	17996	0.45	12/16/10
R-25	4	6344.9	17997	0.19	12/16/10
R-25b	Single	6765.6	21033	1.63	11/03/10
R-26	1	7034.4	5357	0.05	08/13/10
R-26 PZ-2	PZ-2	7467.6	7667	3.90	12/10/10
R-27i	Single	6100.9	5712	0.17	12/07/10
R-37	1	5961.6	14057	0.29	11/29/10
R-3i	Single	6201.1	8193	8.37	12/08/10
R-40	R-40i	5953.4	7836	2.76	11/23/10
R-40	1	6079.9	7837	0.11	11/23/10
R-47i	Single	6529.4	8169	0.32	12/07/10
R-5	2	6136.7	8217	0.60	12/16/10
R-6i	Single	6403.4	8218	0.17	12/09/10
R-9i	1	6242.7	6866	2.87	12/09/10
R-9i	2	6131.4	6866	0.60	12/09/10
SCI-1	Single	6370.9	7066	0.54	10/22/10
SCI-2	Single	6206.4	7717	0.33	11/18/10
TA-53i	Single	6386.8	7718	0.17	11/18/10
TW-2Ar	Single	6553.4	4056	0.17	12/08/10

Appendix C. Summary of Transient Responses

Table C-1. Summary of Transient Responses to Supply Well Pumping in LANL Monitoring Wells

Well	Screen	Seasonal Response	Guaje	O-1	O-4	PM-1	PM-2	PM-3	PM-4	PM-5	Comment
CdV-R-15-3	4	Yes	NE	NE	NE	NE	No	NE	No	No	Seasonal response not related to pumping
CdV-R-15-3	5	Yes	NE	NE	NE	NE	No	NE	No	No	Seasonal response not related to pumping
CdV-R-15-3	6	Yes	NE	NE	NE	NE	No	NE	No	Possible	Seasonal response not related to pumping
CdV-R-37-2	2	Yes	NE	NE	NE	NE	No	NE	No	No	Seasonal response not related to pumping
CdV-R-37-2	3	Yes	NE	NE	NE	NE	No	NE	No	No	Seasonal response not related to pumping
CdV-R-37-2	4	Yes	NE	NE	NE	NE	No	NE	No	No	Seasonal response not related to pumping
G-3	Single	Yes	Yes	NE	NE	NE	NE	NE	NE	NE	Guaje well field monitoring well
R-1	Single	Yes	NE	NE	Possible	NE	No	No	Possible	Yes	Primarily responds to PM-5
R-2	Single	No	No	NE	No	NE	NE	NE	NE	NE	Gradual decline of about 0.5 ft/yr
R-4	Single	Yes	Possible	No	Possible	NE	NE	Yes	NE	NE	Seasonal response but not to a specific well
R-5	3	No	No	No	No	No	NE	No	NE	NE	Gradual decline of about 0.6 ft/yr
R-5	4	Yes	No	Possible	No	Yes	NE	No	NE	NE	Seasonal response but not to a specific well
R-6	Single	Yes	No	No	Possible	NE	NE	Yes	NE	No	Seasonal response but not to a specific well
R-7	3	No	No	No	No	NE	NE	No	NE	NE	Gradual decline of about 0.5 ft/yr
R-8	1	Yes	No	NE	Possible	No	NE	Yes	NE	NE	Responds primarily to pumping at PM-3
R-8	2	Yes	No	NE	Possible	No	NE	Yes	NE	NE	Responds primarily to pumping at PM-3
R-9	Single	Yes	No	No	NE	No	NE	No	NE	NE	Gradual decline of about 0.4 ft/yr
R-10	1	ID	NE	NE	NE	Yes	NE	NE	NE	NE	Responds primarily to PM-1
R-10	2	ID	ID	ID	ID	ID	ID	ID	ID	ID	No water level data as of 01/08
R-10a	Single	No	NE	NE	NE	No	NE	No	NE	NE	No apparent response to pumping
R-11	Single	Yes	NE	NE	No	NE	Possible	No	No	Possible	Seasonal response but not to a specific well
R-12	3	No	No	No	No	No	NE	No	No	No	No apparent response to nearby well PM-1
R-13	Single	Yes	NE	NE	No	No	Possible	No	Yes	Possible	Seasonal response but not to a specific well
R-14	1	Yes	NE	NE	Possible	NE	Possible	NE	No	Yes	Responds primarily to PM-5
R-14	2	Yes	NE	NE	Possible	NE	Possible	NE	No	Yes	Responds primarily to PM-5
R-15	Single	Yes	NE	NE	Possible	NE	No	No	Yes	Yes	Responds primarily to pumping at PM-4 and PM-5
R-16	2	No	NE	NE	NE	No	No	NE	NE	NE	No apparent response to Buckman pumping
R-16	3	No	NE	NE	NE	No	No	NE	NE	NE	No apparent response to Buckman pumping
R-16	4	No	NE	NE	NE	No	No	NE	NE	NE	No apparent response to Buckman pumping
R-16r	Single	No	No	No	No	No	No	No	No	No	No apparent response to Buckman pumping
R-17	1	Yes	NE	NE	NE	NE	No	NE	No	No	Seasonal response but not to a specific well
R-17	2	Yes	NE	NE	NE	NE	Possible	NE	Possible	Yes	Responds primarily to pumping at PM-5
R-18	Single	No	NE	NE	NE	NE	No	NE	No	No	No apparent response to pumping
R-19	3	Yes	NE	NE	NE	NE	Possible	NE	No	Possible	Muted response
R-19	4	Yes	NE	NE	NE	NE	Yes	NE	Yes	Possible	Responds primarily to PM-2
R-19	5	Yes	NE	NE	NE	NE	Yes	NE	Yes	Possible	Responds primarily to PM-2
R-19	6	Yes	NE	NE	NE	NE	Yes	NE	Yes	Possible	Responds primarily to PM-2
R-19	7	Yes	NE	NE	NE	NE	Yes	NE	Yes	Possible	Responds primarily to PM-2
R-20	1	Yes	NE	NE	NE	NE	Yes	NE	Yes	NE	Highly muted response
R-20	2	Yes	NE	NE	NE	NE	Yes	NE	Yes	NE	Muted response
R-20	3	Yes	NE	NE	NE	NE	Yes	NE	Yes	NE	Responds primarily to PM-2 but also to PM-4
R-21	Single	Yes	NE	NE	NE	No	Yes	No	Possible	NE	Seasonal response but not to a specific well

NE = not evaluated; ID = insufficient Data

Table C-1. Summary of Transient Responses to Supply Well Pumping in LANL Monitoring Wells (Continued)

Well	Screen	Seasonal Response	Guaje	O-1	O-4	PM-1	PM-2	PM-3	PM-4	PM-5	Comment
R-22	1	Yes	NE	NE	NE	No	No	No	No	NE	Seasonal response but not to a specific well
R-22	2	Yes	NE	NE	NE	No	No	No	No	NE	Seasonal response but not to a specific well
R-22	3	Yes	NE	NE	NE	No	No	No	No	NE	Seasonal response but not to a specific well
R-22	4	Yes	NE	NE	NE	No	No	No	No	NE	Seasonal response but not to a specific well
R-22	5	Yes	NE	NE	NE	No	No	No	No	NE	Seasonal response but not to a specific well
R-23	Single	No	NE	NE	NE	No	No	NE	NE	NE	No apparent response to pumping
R-24	Single	Yes	Possible	No	Possible	No	NE	Yes	NE	NE	Responds primarily to pumping at PM-3
R-25	5	No	NE	NE	NE	NE	No	No	No	No	No apparent response to pumping
R-25	6	No	NE	NE	NE	NE	No	No	No	No	No apparent response to pumping
R-25	7	No	NE	NE	NE	NE	No	No	No	No	No apparent response to pumping
R-25	8	No	NE	NE	NE	NE	No	No	No	No	No apparent response to pumping
R-26	2	No	NE	NE	NE	NE	No	No	No	No	No apparent response to pumping
R-27	Single	Yes	NE	NE	NE	NE	NE	NE	NE	NE	Seasonal response but not to a specific well
R-28	Single	Yes	NE	NE	NE	NE	Possible	No	Yes	Possible	Seasonal response but not to a specific well
R-31	2	No	NE	NE	NE	No	No	No	No	NE	No apparent response to pumping
R-31	3	No	NE	NE	NE	No	No	No	No	NE	No apparent response to pumping
R-31	4	No	NE	NE	NE	No	Possible	No	No	NE	Limited data for evaluation
R-31	5	Yes	NE	NE	NE	No	Yes	No	Possible	NE	Appears to respond seasonally like PM-2
R-32	1	No	NE	NE	NE	NE	No	No	No	NE	No apparent response to pumping
R-32	2	Yes	NE	NE	NE	No	Yes	No	Yes	NE	Responds primarily to pumping at PM-2 and PM-4
R-32	3	Yes	NE	NE	NE	No	Yes	No	Yes	NE	Responds primarily to pumping at PM-2 and PM-4
R-33	1	No	NE	NE	NE	NE	NE	NE	NE	No	No apparent response to PM-5
R-33	2	Yes	NE	NE	NE	NE	NE	No	Yes	Yes	Responds primarily to pumping at PM-5
R-34	Single	Yes	NE	NE	NE	No	No	No	No	NE	Seasonal response but not to a specific well
R-35a	Single	Yes	NE	NE	Yes	NE	NE	Yes	NE	NE	Responds primarily to nearby supply well PM-3
R-35b	Single	Yes	NE	NE	NE	NE	NE	No	NE	NE	Gradual decline of about 0.6 ft/yr
R-36	Single	No	NE	NE	NE	NE	NE	NE	NE	NE	Gradual decline of about 0.5 ft/yr
R-37	2	Yes	NE	NE	ID	NE	ID	ID	Yes	ID	Responds primarily to pumping at PM-4
R-38	Single	Yes	NE	NE	ID	ID	ID	ID	Possible	ID	Sseasonal response in 2010 larger than in 2009
R-39	Single	Yes	NE	NE	ID	ID	ID	ID	Possible	ID	Sseasonal response in 2010 larger than in 2009
R-40	2	Yes	NE	NE	NE	NE	Yes	NE	Yes	NE	Responds to pumping PM-4 and PM-2
R-41	2	No	NE	NE	No	No	ID	No	No	No	Unusual fluctuations not related to pumping?
R-42	Single	Yes	NE	NE	No	NE	ID	ID	Yes	Possible	Primary response to PM-4 in 2010
R-43	1	Yes	NE	NE	ID	NE	ID	No	Yes	ID	Primary response to PM-4 in 2010
R-43	2	Yes	NE	NE	ID	NE	ID	No	Yes	ID	Primary response to PM-4 in 2010
R-44	1	Yes	NE	NE	ID	NE	ID	No	Yes	ID	Primary response to PM-4 in 2010
R-44	2	Yes	NE	NE	ID	NE	ID	No	Yes	ID	Primary response to PM-4 in 2010
R-45	1	Yes	NE	NE	ID	NE	ID	No	Yes	ID	Primary response to PM-4 in 2010
R-45	2	Yes	NE	NE	ID	NE	ID	No	Yes	ID	Primary response to PM-4 in 2010
R-46	Single	Yes	NE	NE	ID	NE	ID	ID	Yes	Yes	Primary response to PM-4 and PM-5 in 2010
R-48	Single	No	No	No	No	No	ID	No	No	No	No apparent response to pumping
R-49	1	Yes	NE	NE	NE	NE	ID	NE	Possible	Possible	Seasonal response but not to a specific well
R-49	2	Yes	NE	NE	NE	NE	ID	NE	Yes	Yes	Primary response to PM-4 and PM-5 in 2010
R-50	1	Yes	NE	NE	NE	NE	ID	ID	Yes	Possible	Primary response to PM-4 in 2010
R-50	2	Yes	NE	NE	NE	NE	ID	ID	Yes	Possible	Primary response to PM-4 in 2010
R-51	1	Yes	NE	NE	ID	NE	ID	NE	Yes	ID	Primary response to PM-4 in 2010
R-51	2	Yes	NE	NE	ID	NE	ID	NE	Yes	ID	Primary response to PM-4 in 2010
R-52	1	Yes	NE	NE	ID	NE	ID	NE	Yes	ID	Primary response to PM-4 in 2010
R-52	2	Yes	NE	NE	ID	NE	ID	NE	Yes	ID	Primary response to PM-4 in 2010
R-53	1	No	NE	NE	ID	NE	ID	NE	No	ID	No apparent response to pumping
R-53	2	Yes	NE	NE	ID	NE	ID	NE	Yes	ID	Primary response to PM-4 in 2010
R-54	1	No	NE	NE	ID	NE	No	NE	No	Possible	No apparent response to pumping
R-54	2	Yes	NE	NE	ID	NE	Yes	NE	Yes	ID	Primary response to PM-4 in 2010
R-55	1	ID	ID	ID	ID	ID	ID	ID	ID	ID	Insufficient data
R-55	2	ID	ID	ID	ID	ID	ID	ID	ID	ID	Insufficient data
R-56	1	ID	ID	ID	ID	ID	ID	ID	ID	ID	Insufficient data
R-56	2	ID	ID	ID	ID	ID	ID	ID	ID	ID	Insufficient data
R-57	1	ID	ID	ID	ID	ID	ID	ID	ID	ID	Insufficient data
R-57	2	ID	ID	ID	ID	ID	ID	ID	ID	ID	Insufficient data
R-60	1	ID	ID	ID	ID	ID	ID	ID	ID	ID	Insufficient data
TW-3	Single	Yes	No	NE	No	NE	NE	No	NE	NE	Gradual decline of about 0.8 ft/yr
NE = not evaluated; ID = insufficient Data											

Appendix D. Summary of Intermediate Groundwater Level Responses to Runoff

D.1. Intermediate Groundwater Responses in Cerros del Rio Basalt (Tb4)

Figure D-1 shows the intermediate groundwater hydrographs for wells completed in the Cerros del Rio basalt. These wells are located in lower Los Alamos Canyon, lower Pueblo Canyon, middle Mortandad Canyon, and lower Pajarito Canyon (see Figure 4-1). Note the water levels in R-12 and R-23i are lower than in the other wells (scale on the right side of the hydrograph). Perched intermediate groundwater levels in the Cerros del Rio basalt in some wells show seasonal variations that are evaluated as probable response to large runoff events in Los Alamos Canyon.

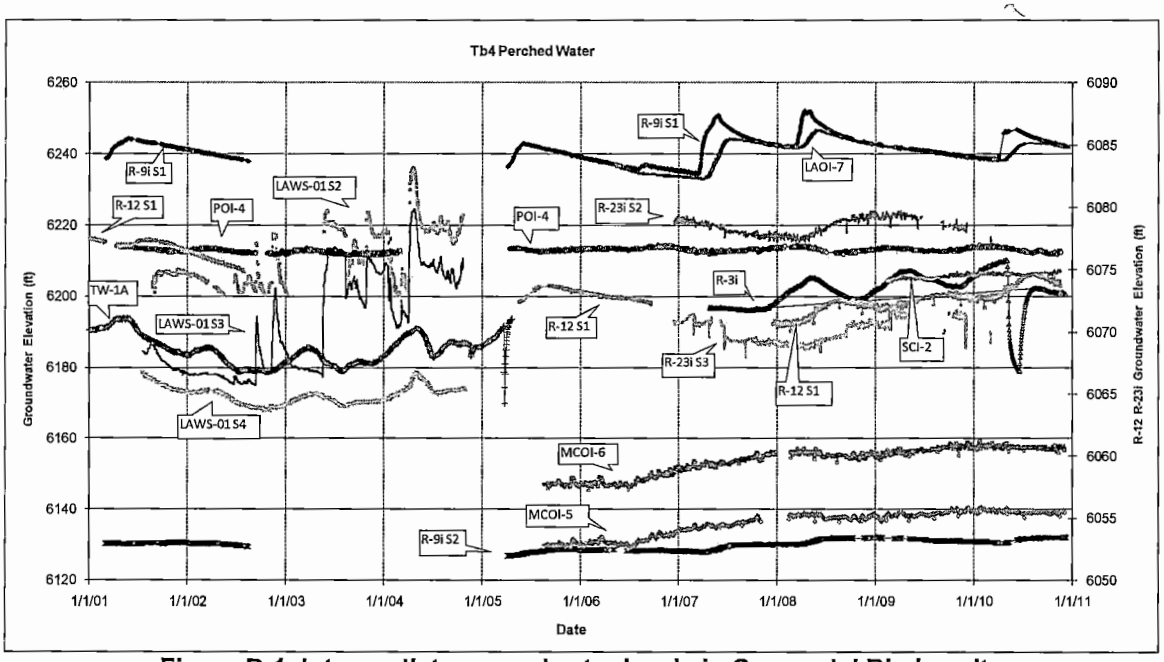

Figure D-1. Intermediate groundwater levels in Cerros del Rio basalt.

Figure D-2 shows the intermediate groundwater level in Cerros del Rio basalt in wells in lower Los Alamos Canyon and lower Pueblo Canyon and the mean daily flow at gaging station E042 in lower Los Alamos Canyon. From 2001 to 2004 screens 2 and 3 in LAWS-01 in lower Los Alamos Canyon (Stone et al. 2004) show responses to small and large runoff events. During this period LAWS-01 screen 4 and nearby well TW-1A in lower Pueblo Canyon show similar responses, generally higher water levels in the winter and lower levels in the summer. From 2006 through 2010, similar seasonal responses are observed in POI-4 and R-3i. The perched water at R-3i declined during drilling of adjacent well R-3 during the summer of 2010 and recovered when R-3 construction was completed.

Large snowmelt runoff events occurred in Los Alamos Canyon in the spring of 2001, 2005, 2007, 2008, and 2010 as observed in lower Los Alamos Canyon at stream gage E042 (Figure D-2). No significant snowmelt runoff occurred in 2002, 2003, 2006, and 2009. Concurrent with the large snowmelt runoff in lower Los Alamos Canyon, intermediate groundwater levels in wells R-9i, R-12, and LAOI-7 show groundwater level rises that appear to be related to the snowmelt runoff events.

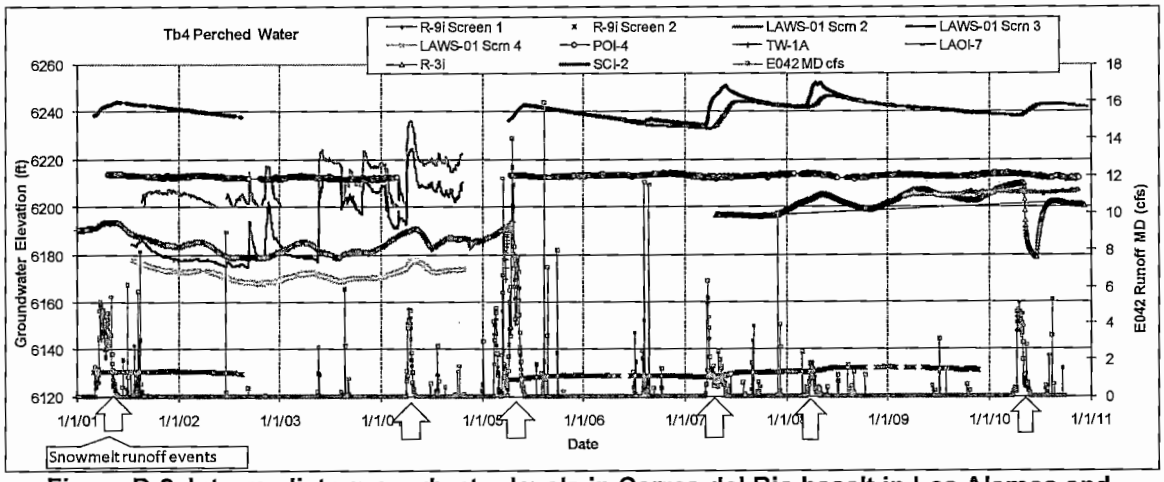

Figure D-2. Intermediate groundwater levels in Cerros del Rio basalt in Los Alamos and Pueblo canyons and mean daily flow at Gaging Station E042.

Figure D-3 shows the runoff at gage E042 from 2007 to 2010 and the water level responses in the Cerros del Rio basalt in wells R-9i screen 1, LAOI-7, and R-12 screen 1. The earliest water level response to snowmelt runoff is typically at R-9i screen 1, followed by LAOI-7 with a slightly reduced total response, and then followed possibly by a much subdued response at R-12 screen 1; again, note that the groundwater elevation at screen 1 in R-12 is about 170 ft lower than R-9i and LAOI-7. A significantly smaller and delayed response is also observed in R-9i screen 2. Additionally, two large storm runoff events in the summer of 2006 caused a rise in the groundwater level at R-9i screen 1 but little if any response at LAOI-7. With no snowmelt runoff in 2009, the groundwater levels at R-9i and LAOI-7 show a continued decline through 2009. However, the groundwater at R-12 screen 1 showed a rising trend in 2009, suggesting that the groundwater at R-12 may not be responding to the large runoff events in lower Los Alamos Canyon, or is possibly responding at a lag period greater than a few months. Additional monitoring is needed to understand the groundwater level fluctuations at R-12. The intermediate perched groundwater at all three wells again appear to have responded to snowmelt runoff in the spring of 2010.

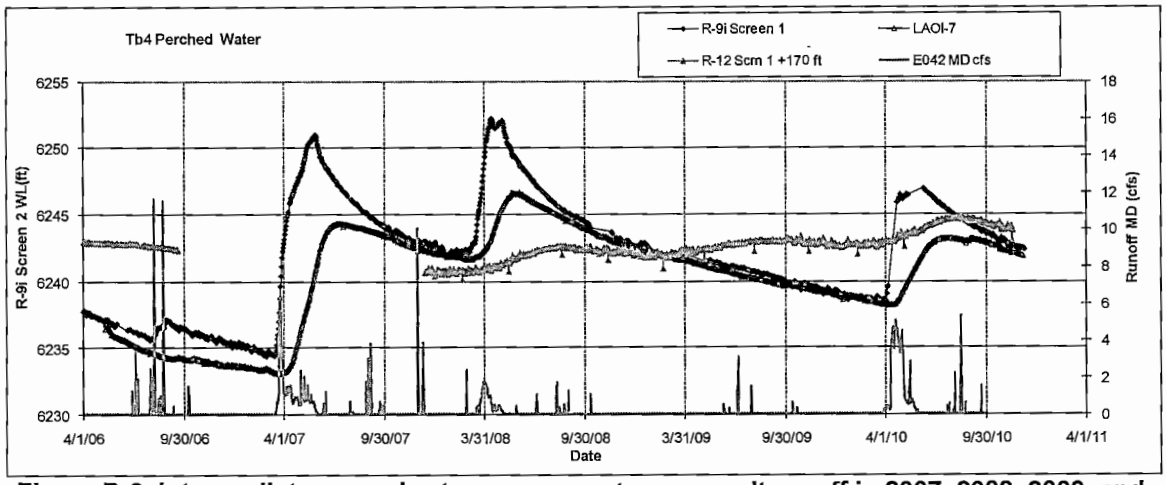

Figure D-3. Intermediate groundwater responses to snowmelt runoff in 2007, 2008, 2009, and 2010 in Cerros del Rio basalt and mean daily flow at Gaging Station E042.

Figure D-4 shows the hydrographs for intermediate perched groundwater in R-12 in lower Sandia Canyon and R-23i in lower Pajarito Canyon and the runoff at stream gages E042 in Los Alamos Canyon and E250 in lower Pajarito Canyon. As indicated above, the groundwater level fluctuations at R-12 may not be the result of snowmelt runoff infiltration below Los Alamos Canyon. The groundwater level rise in R-23i in 2008 follows a large snowmelt runoff period in the spring of 2008 and may similarly be associated with snowmelt runoff in Pajarito Canyon. Following no runoff in lower Pajarito Canyon in 2009, the water levels in R-23i showed a declining trend. The groundwater at R-23i screen 2 in 2010 do not show an obvious response to snowmelt runoff in the spring of 2010. The water levels measured at R-23i screen 3 in 2010 appear to have been compromised by possible leakage from screen 2. Additional runoff monitoring in lower Pajarito Canyon and groundwater level data from R-23i are necessary to determine if groundwater at R-23i responds to runoff events.

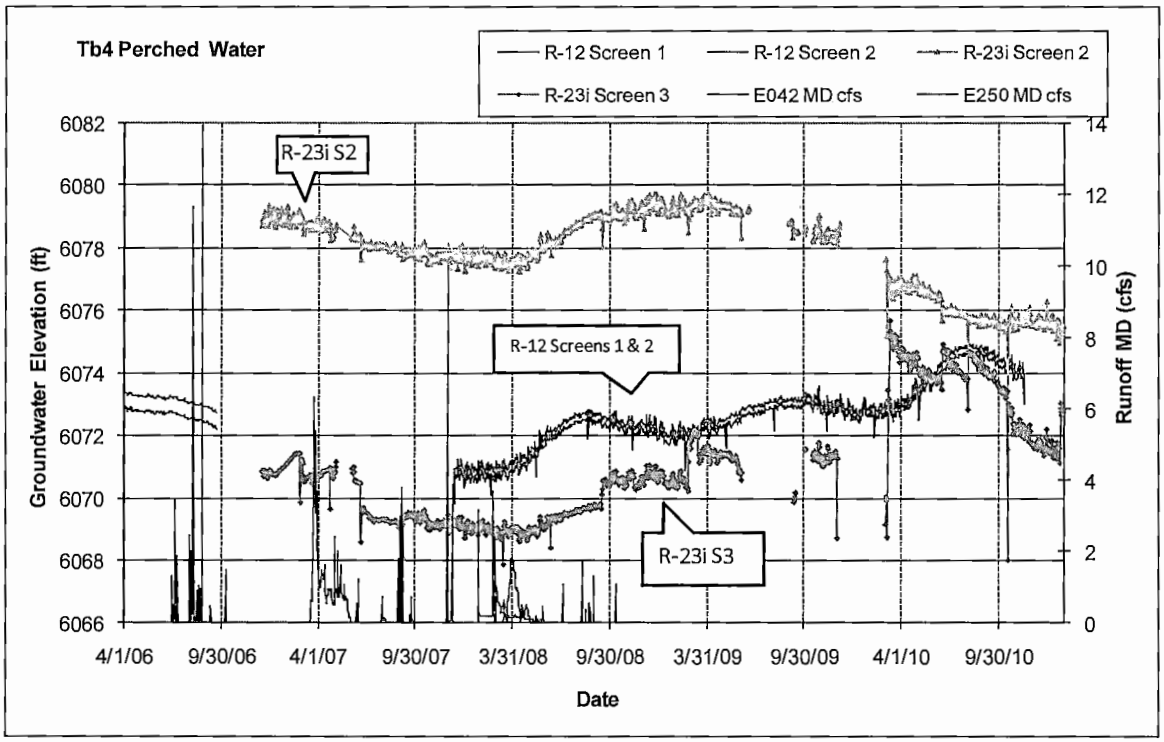

Figure D-4. Intermediate groundwater levels at R-12 and R-23i and mean daily flow at Gaging Stations E042 and E250.

Perched intermediate groundwater in the Cerros del Rio basalt beneath Mortandad Canyon in wells MCOI-5 and MCOI-6 (Figure D-1) shows a rising trend from mid 2006 to early 2008 when the water levels in both wells rose about 10 ft. A small rising trend continued at these wells in 2009 but the water levels were approximately stable in 2010. The trends in the groundwater levels in these wells do not appear to be related to specific runoff events; additional monitoring is needed to determine if the intermediate groundwater in these wells is influenced by runoff.

D.2. Intermediate Groundwater in Guaje Pumice Bed (Qbog)

Figure D-5 shows the hydrographs of perched intermediate groundwater in wells screened in the Guaje pumice bed and the mean daily runoff recorded in lower Los Alamos Canyon at stream gage E042. These wells are located in middle Los Alamos Canyon where the intermediate groundwater in the Guaje pumice bed is 100 to 300 ft below the canyon floor and is stratigraphically higher than the intermediate groundwater in the Puye Formation and Cerros del Rio basalts. The Guaje pumice bed is about 100 ft above the Cerros del Rio basalt in this area. There is no apparent correlation between trends in the groundwater levels in the Guaje pumice bed and runoff in Los Alamos Canyon.

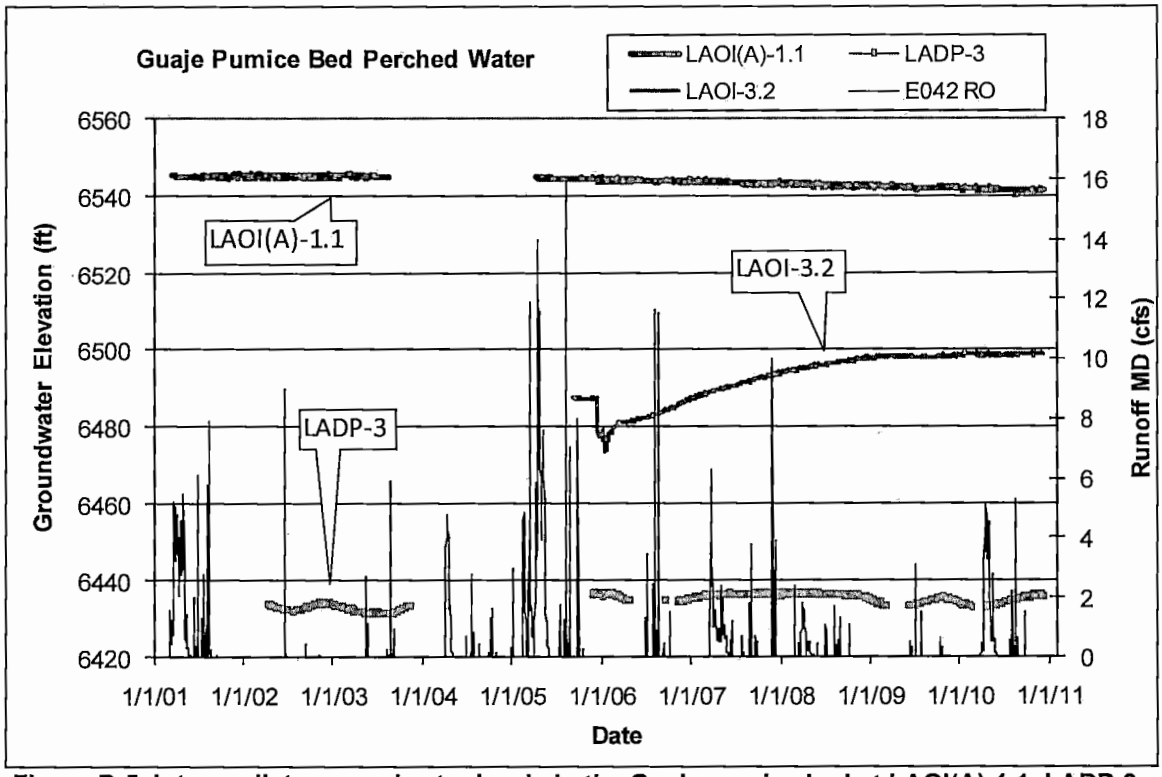

Figure D-5. Intermediate groundwater levels in the Guaje pumice bed at LAOI(A)-1.1, LADP-3, and LAOI-3.2 and mean daily flow at Gaging Station E042.

D.3. Intermediate Groundwater in the Puye Formation (Tp)

Screens in monitoring wells LAOI-3.2a, SCI-1, MCOI-4, R-5 screen 2, R-6i, R0-47i, and TA-53i monitor perched intermediate groundwater in the Puye Formation (see Section 4). There is no apparent relationship between runoff and groundwater levels in these wells.

D.4. Intermediate Groundwater at TA-16

Intermediate groundwater is monitored in the TA-16 area at wells CdV-16(i)-1, R-25 screens 1, 2, and 4, R-25b, CdV-16-2(i)r, R-26 screen 1, R-26 PZ-2, and 16-26644. Figures D-6 and D-7 show the groundwater levels from these wells and the mean daily runoff at gage E252 in upper Water Canyon. Snowmelt runoff occurred at gage E252 in 2005, 2007, and 2008, and presumably in 2010 (data not yet available), but no significant runoff occurred in 2006 and 2009. The groundwater at CdV-16-1(i) and R-25 screens 1 and 2 show an apparent response to snowmelt runoff in 2007, 2008, and 2010 ranging from a few tenths of a foot in 2007 at R-25 screen 1 up to about 5 ft at CdV-16-1(i) in 2010. The screen at R-25b is at a similar elevation as R-25 screen 1, and showed a similar response to snowmelt runoff in 2010, although a sampling event at the beginning of runoff obscured some of the response at R-25b. In 2010 the groundwater at R-25 screen 2 rose about 1.5 ft in response to snowmelt runoff, while at screen 1, the rise was about 0.8 ft (Figure D-6).

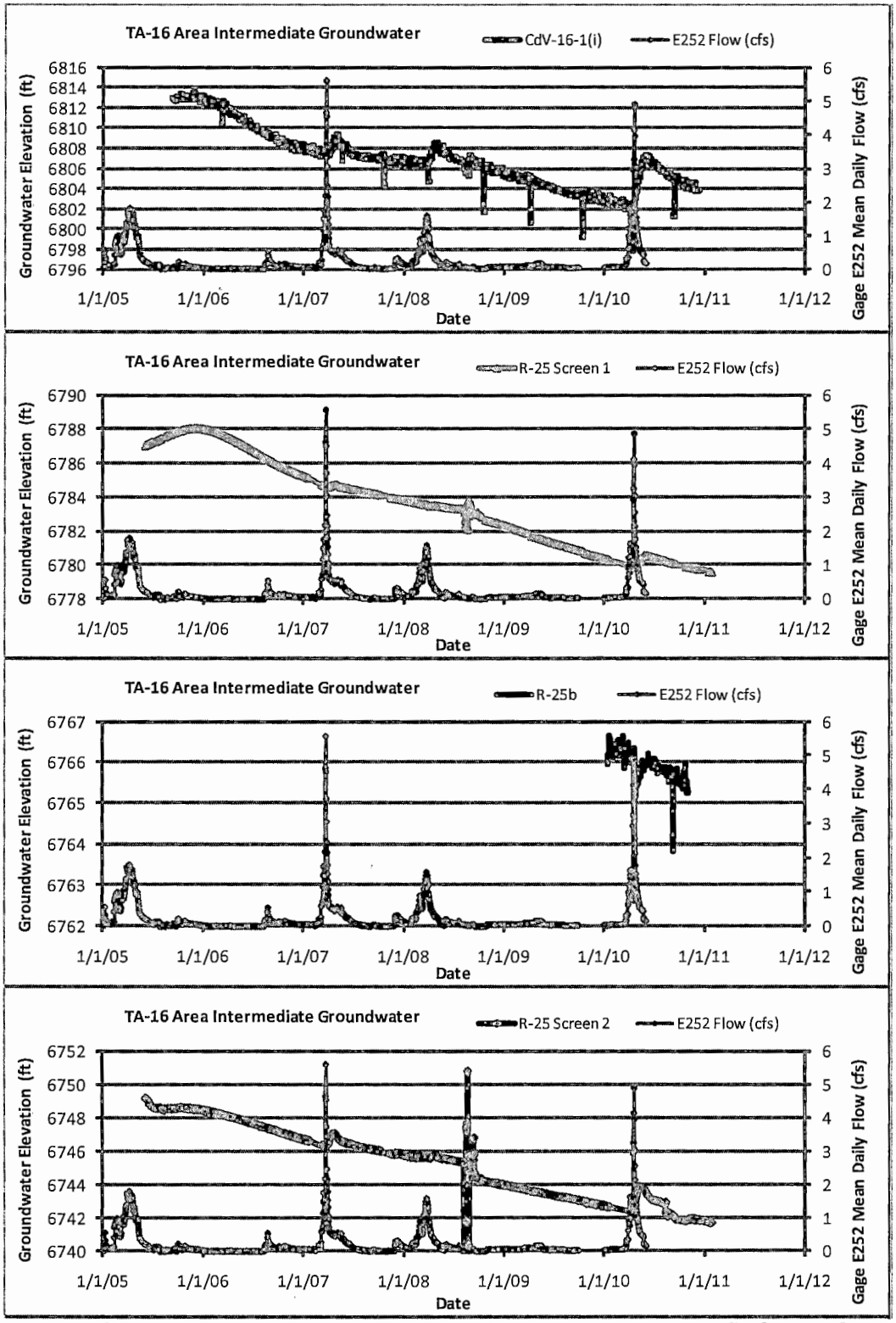

Figure D-6. Intermediate groundwater levels in TA-16 wells and mean daily flow at Gaging Station E252.

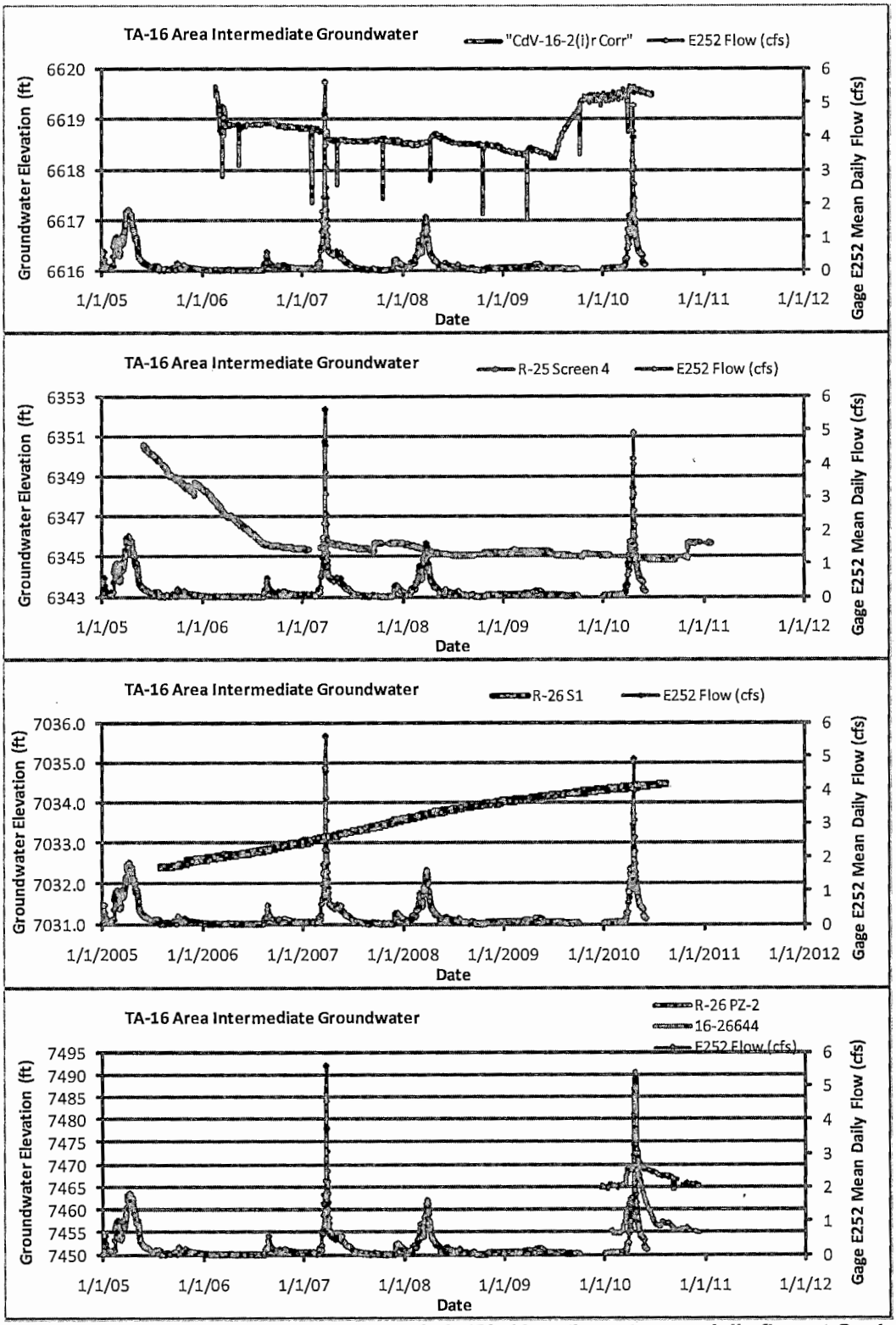

Figure D-7. Intermediate groundwater levels in TA-16 wells and mean daily flow at Gaging Station E252.

R-25 screen 4 may have shown a slight response to runoff in 2007 (Figure D-7), but there was no apparent response in 2008 and 2010, although there was an abrupt rise at screen 4 in November 2010, which may have been a delayed response to drilling nearby well CDV-16-4ip. Note that R-25 screens 1 and 2 and CdV-16-1(i) showed water level responses to drilling and installing monitoring wells R-25b and R-25c in August and September 2008 and R-25 screen 2 showed an abrupt water level decline in 2010 during drilling of CDV-16-4ip.

There was no apparent response to snowmelt runoff at CdV-16-2(i)r in 2007 and 2010 (Figure D-7), but there may have been a response in 2008. After dry well CdV-16i-2(i) was plugged and abandoned in 2009, the groundwater level at CdV-16-2(i)r showed a recovery of greater than 1 ft (see Section 3).

The perched intermediate groundwater at R-26 screen 1 in Cerro Toledo interval sediments has shown a continuing rise from 2005 to 2010, but no apparent response to snowmelt runoff. The monitoring of groundwater levels at nearby piezometer R-26 PZ-2 began in late 2009. This piezometer is screened in Unit 3 of the Bandelier Tuff and showed a total groundwater level rise of about 25 ft during snowmelt runoff in 2010 (Figure D-7). Similarly, the groundwater at monitoring well 16-26644 (also screened in Unit 3 of the Bandelier Tuff) rose about 15 ft during the spring of 2010, apparently in response to snowmelt runoff.

D.5. Summary of Runoff Impacts to Intermediate Perched Groundwater

Large snowmelt and storm runoff events in Los Alamos Canyon that extend eastward as far as the LANL boundary appear to infiltrate into subsurface units and impact groundwater levels in wells completed in the Cerros del Rio basalt. Intermediate perched groundwater in other geologic units beneath the middle part of Los Alamos Canyon and the surrounding Pajarito Plateau does not appear to be impacted by runoff events.

Similarly, intermediate perched groundwater in some wells at TA-16 appears to respond to large snowmelt runoff events. With no significant runoff events in 2009, the intermediate groundwater levels in most of the TA-16 area showed a continued decline. Reid et al. (2008) observed that the rapid infiltration to intermediate zones occurred at both the eastern and western side of the plateau in two contrasting hydrogeologic settings: runoff over fractured basalt in lower Los Alamos Canyon and possibly in lower Pajarito Canyon, and runoff crossing the Pajarito fault and associated fractured bedrock in the western part of the Pajarito Plateau. Reid et al. (2008) concluded that the key feature associated with the large runoff events and response in intermediate groundwater zones was persistent runoff and brittle bedrock near the surface that provided a conduit for infiltration.

Appendix E. Summary of Regional and Intermediate Groundwater Temperature

Table E-1. Groundwater Temperature in Regional Aquifer Wells

Regional Aquifer Temperature									
Well	Screen	T (C)	Hyro Unit	Geo Unit	Well	Screen	T (C)	Hyro Unit	Geo Unit
CDV-R-15-3	4	16.3	RT	Tpf	R-29	Single	17.3	RT	Tpf
CDV-R-15-3	5	16.7	RD	Tpf	R-3	Single	23.2	RT	Tsf
CDV-R-15-3	6	19.0	RD	Tpf	R-30	Single	19.1	RT	Tpf
CDV-R-37-2	2	20.1	RT	Tt	R-31	2	19.3	RT	Tb4
CDV-R-37-2	3	20.7	RD	Tt	R-31	3	20.4	RD	Tb4
CDV-R-37-2	4	21.8	RD	Tt	R-31	4	22.2	RD	Tpt
G-2A	Single	27.2	RT	Tsf	R-31	5	23.8	RD	Tpt
G-3	Single	24.8	RT	Tsf	R-32	1	19.7	RT	Tpt
G-3A	Single	26.6	RT	Tsf	R-33	1	21.2	RT	Tpp
O-1	Single	23.0	RT	Tsf	R-35a	Single	25.0	RD	Tsfu
PM-1	Single	26.5	RT	Tsf	R-35b	Single	23.5	RT	Tpf
PM-2	Single	20.8	RT	Tp	R-36	Single	22.9	RT	Tsfu
PM-3	Single	24.9	RT	Tsf	R-37	2	20.6	RT	Tpf
PM-4	Single	24.6	RT	Tp	R-38	Single	20.0	RT	Tpf
PM-5	Single	23.2	RT	Tp	R-39	Single	21.5	RT	Tpf
R-10	1	20.9	RD	Tsf	R-4	Single	24.5	RT	Tp
R-10a	Single	20.4	RT	Tsf	R-40	2	20.1	RT	Tpf
R-11	Single	21.3	RT	Tp	R-41	2	22.5	RT	Tpt
R-13	Single	19.8	RT	Tp	R-42	1	19.6	RT	Tsfuv
R-14	Single	22.7	RT	Tp	R-43	1	20.3	RT	Tsfu
R-16	2	20.6	RD	Tsf	R-44	1	19.2	RT	Tpf
R-16r	Single	19.8	RT	Tpt	R-45	1	19.6	RT	Tpf
R-17	1	21.4	RT	Tpf	R-46	1	23.0	RT	Tpf
R-18	Single	14.8	RT	Tpf	R-48	Single	19.9	RT	Tt
R-19	3	20.4	RT	Tpf	R-49	1	21.2	RT	Tb4
R-19	4	21.5	RD	Tpf	R-5	3	22.8	RT	Tsf
R-19	5	21.5	RD	Tpf	R-5	4	25.1	RD	Tsfb
R-19	6	25.7	RD	Tpf	R-50	1	20.0	RT	Tpf
R-19	7	26.4	RD	Tpf	R-51	1	19.8	RT	Tpf
R-2	Single	23.6	RT	Tpf	R-52	1	20.9	RT	Tpf
R-20	1	20.7	RT	Tb4	R-53	1	20.5	RT	Tpf
R-21	Single	20.4	RT	Tp	R-54	1	20.3	RT	Tpf
R-23	Single	21.6	RT	Tpt	R-57	1	22.3	RT	Tb4
R-24	Single	28.4	RT	Tsf	R-6	Single	21.9	RT	Tf
R-25	5	12.4	RT	Tpf	R-7	3	16.1	RT	Tp
R-25	6	13.7	RD	Tpf	R-8	1	20.5	RT	Tp
R-25	7	16.7	RD	Tpf	R-8	2	22.9	RD	Tp
R-25	8	20.2	RD	Tpf	R-9	Single	22.2	RT	Tsfb
R-26	2	26.7	RT	Tp	DT-10	Single	18.4	RT	Tb4
R-27	Single	17.7	RT	Tpf	DT-5A	Single	19.5	RT	Tb4
R-28	Single	24.2	RT	Tpf	DT-9	Single	20.7	RT	Tb4

Multiple completion wells equipped with Westbay® sampling systems employ transducers with temperature sensors at each screen, which appropriately measure the in-situ water temperature at each screen; these data are shown on Tables E-1 and E-2 for each screen. Multiple completion wells equipped with Baski sampling systems employ transducers that are installed above the packer. The water level for the lower screen zones is appropriately measured via a small diameter tube that extends below the packer. However, the temperature sensors in transducers that measure the lower screen water levels in the Baski-equipped wells record the water temperature of the upper screen zone and not that of the lower screen zone. Thus the temperature of the water in the lower screens is

not appropriately measured and temperature data recorded by the transducers for the lower screen zones in Baski-equipped wells are not shown in Tables E-1 and E-2.

Table E-2. Groundwater Temperature in Intermediate Groundwater Wells

Intermediate Groundwater Temperature				
Well	**Screen**	**T (C)**	**Hyro Unit**	**Geo Unit**
16-26644	Single	11.9	I	Qbt3
CdV-16-1(i)	Single	10.8	I	Qbo
CdV-16-2(i)r	Single	11.1	I	Tpf
CDV-37-1(i)	Single	12.7	I	Tpf
LADP-3	Single	9.9	I	Qbog
LAOI(A)-1.1	Single	9.6	I	Qbog
LAOI-3.2	Single	11.7	I	Qbog
LAOI-3.2a	Single	12.1	I	Tpf
LAOI-7	Single	13.8	I	Tb4
MCOI-4	Single	14.5	I	Tpf
MCOI-5	Single	16.0	I	Tb4
MCOI-6	Single	14.9	I	Tb4
PCI-2	Single	14.5	I	Tpf
POI-4	Single	11.6	I	Tb4
R-12	1	18.8	I	Tb4
R-19	2	18.0	I	Tp
R-23i	1	15.8	I	Tb4
R-25	1	11.2	I	Qbo
R-25b	Single	10.7	I	Qbo
R-26	1	15.5	I	Qct
R-26 PZ-2	PZ-2	10.7	I	Qbt3
R-27i	Single	14.7	I	Tpf
R-37	1	19.9	I	Tpf
R-3i	Single	13.7	I	Tb4
R-40	1	19.0	I	Tb4
R-47i	Single	12.5	I	Tpf
R-5	2	17.7	I	Tp
R-6i	Single	16.5	I	Tpf
R-9i	1	9.3	I	Tb4
SCI-1	Single	10.9	I	Tpf
SCI-2	Single	16.0	I	Tb4
TA-53i	Single	14.5	I	Tpf
TW-2Ar	Single	11.5	I	Tpf

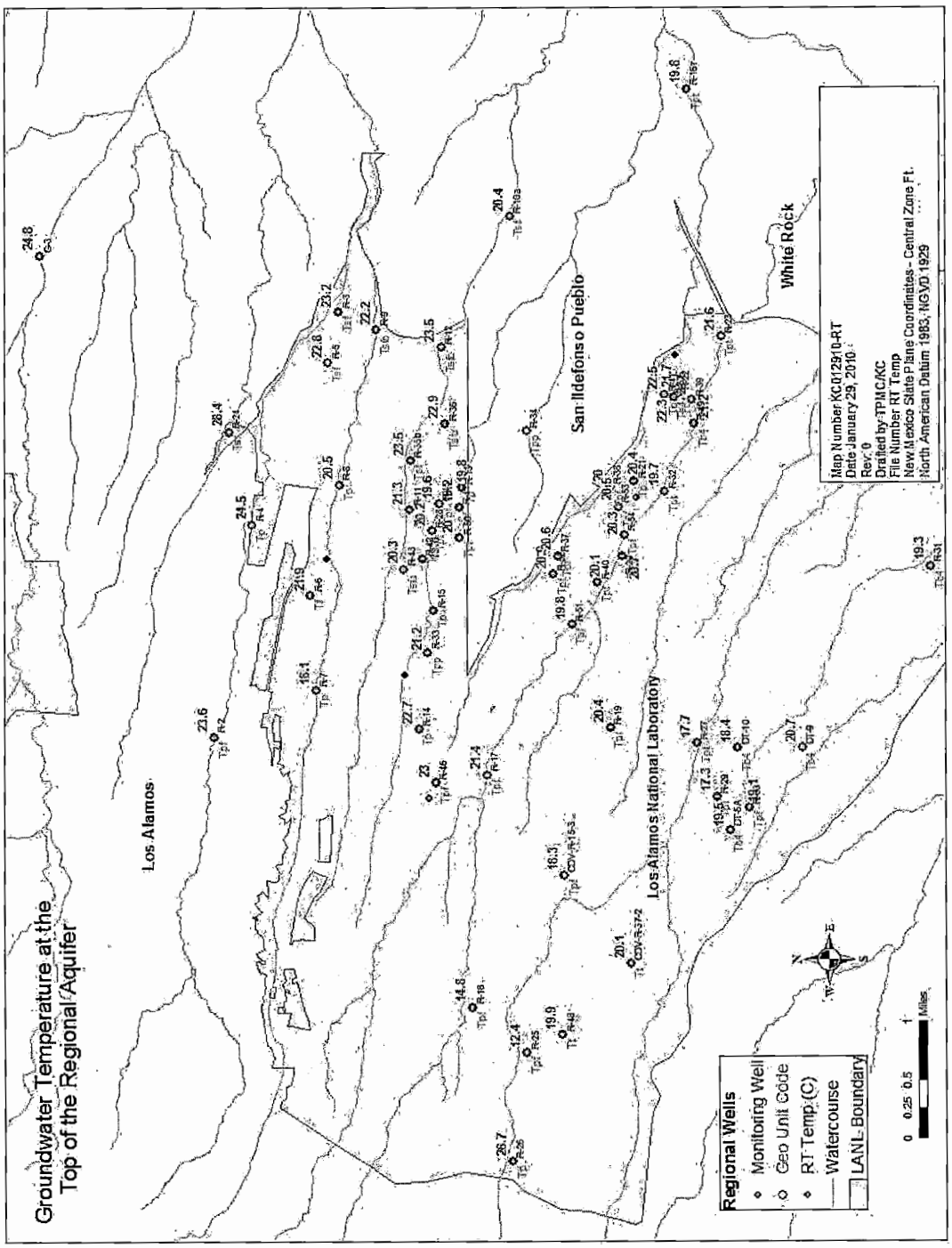

Figure E-1. Temperature of groundwater at the top of the regional aquifer.

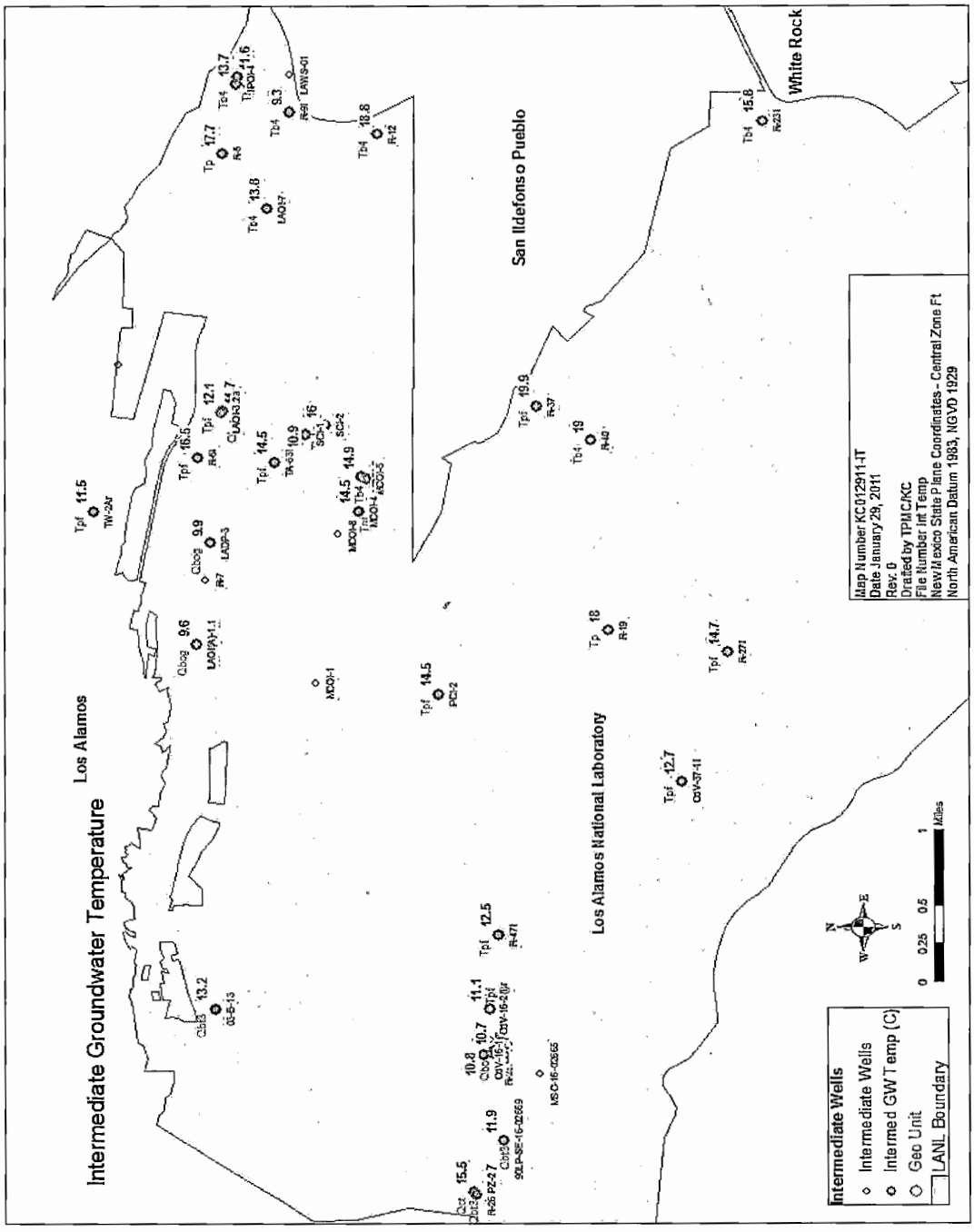

Figure E-2. Temperature of intermediate groundwater.

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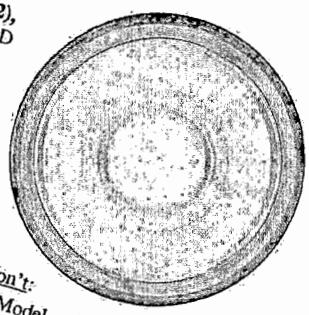
Contents:
Hydrogeologic Studies LA-14263-MS.
Hydrogeologic Site Atlas. LAUR-09-3763.
Groundwater Level Status Rpt. LA-14437-PR.

Discharge Permit Application (DP-1132),
RLWTF and TA-52 ZLD
ENV-DO-12-0005;
LAUR-12-00672
UNCLASSIFIED



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Contents Con't:
Conceptual Models of Vadose Zone Vadose Zone Journal, Vol. 4, August 2005.
NRCS Soil Survey.
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Conceptual Models of Vadose Zone Flow and Transport beneath the Pajarito Plateau, Los Alamos, New Mexico

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ABSTRACT

The Pajarito Plateau in northern New Mexico, on which the Los Alamos National Laboratory is situated, is characterized by a thick vadose zone overlying the regional aquifer of the western Espanola Basin. In this study, conceptual models of vadose zone flow and transport processes are presented and then supported through the interpretation of field data, including synthesis with numerical models. The conceptual models differentiate the rate of percolation by their location and surface hydrologic setting, including wet and dry canyons, and wet, dry, and disturbed mesas. Net infiltration beneath wet canyons is the highest, with rates on the order of a meter per year (100–1000 mm yr^{-1}). Transport to the regional aquifer beneath the wettest canyons is likely on the order of several years to several decades, depending on the thicknesses of the various hydrostratigraphic layers. Perched water is sometimes found beneath wetter canyons and is associated with near-surface alluvial systems and at intermediate depths along low-permeability interfaces such as buried soils or unfractured regions of basalt flows. Percolation through the volcanic tuffs is generally considered to be via matrix-dominated flow, whereas fracture flow may play a key role in contaminant transport through densely welded tuffs or basalt units beneath wet canyons. Infiltration beneath dry canyons and dry mesas is much slower (10 mm yr^{-1} or less), yielding transport times to the aquifer of hundreds to several thousands of years. However, long-term surface disturbances at mesa-top locations may alter infiltration rates such that at a local scale, the infiltration rates temporarily approach those of wetter canyons.

"A CONCEPTUAL MODEL is an evolving hypothesis identifying the important features, processes, and events controlling fluid flow and contaminant transport of consequence at a specific field site in the context of a recognized problem" (National Research Council, 2001). A well-defined site conceptual model is a useful tool for compiling and interpreting site data, focusing characterization work, developing the framework for numerical models, conveying information about the site to interested parties, and determining possible receptors that may be affected by disposal operations at the site. In fact, at a workshop sponsored by the National Research Council (2001), a panel of experts concluded that conceptual model development is the most important step in the overall modeling process used for site evaluation. They also pointed out that appropriate controlling processes can be identified through the development of alternative conceptual models accompanied by the evaluation of these alternatives through comparison with field observations. To best develop and test conceptual models, supporting data should be derived using a number of observational techniques and include a variety of data types.

Los Alamos National Laboratory (the Laboratory or LANL; Fig. 1) has performed research and development in nuclear weapons technologies and other national defense activities for more than 60 yr, beginning with the Manhattan Project in the 1940s. During this time, Laboratory operations have been accompanied by both disposal of and intentional or accidental releases of chemical contaminants into the environment at a variety of sites. Contaminants with possible negative impacts to groundwater include high explosives, radionuclides, chemical solvents, and metals. Today, the Laboratory is responsible for ensuring that none of its past contaminant releases pose a threat to human health now or in the future, and to carry out remediation activities to clean up contaminated sites. One of the key potential risks is groundwater contamination, possibly affecting drinking water quality in municipal or private wells. Contaminants must travel through a thick vadose zone to reach the regional aquifer. Therefore, a well-developed conceptual model describing vadose zone flow and transport beneath the Pajarito Plateau is key to assessing groundwater risk.

The conceptual models for vadose zone flow and transport for the plateau are used to characterize the hydrologic setting located between the ground surface and the regional aquifer and to help determine the fate, transport, and potential future risk of contaminants that have been released into the environment by the Laboratory. Because the Laboratory is large (>100 km^2) and covers complex terrain (Fig. 1), hydrologic conditions vary by location. For this reason, we have chosen to present the conceptual model for the plateau as multiple conceptual models that vary by location to more easily make distinctions between the varying hydrologic conditions. The ideas are based on ongoing observations of hydrologic processes that have been made since the mid 1940s (Griggs, 1964; Abrahams et al., 1961). Refinement of the conceptual models has occurred over the years and especially recently with the interpretation of data collected across the entire thickness of the vadose zone during the drilling of well-characterized regional aquifer wells (Vaniman et al., 2002; Broxton et al., 2002a; Ball et al., 2002; Longmire, 2002).

Our main purpose here is to describe the conceptual models of vadose zone flow and transport for the Pajarito Plateau and then to support these models by providing comprehensive sets of evidence from across the plateau. Toward that purpose, we briefly characterize the

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Abbreviations: ET, evapotranspiration; LANL, Los Alamos National Laboratory; MDA, material disposal area; RLWTF, radioactive liquid-waste treatment facility; TA, technical area.

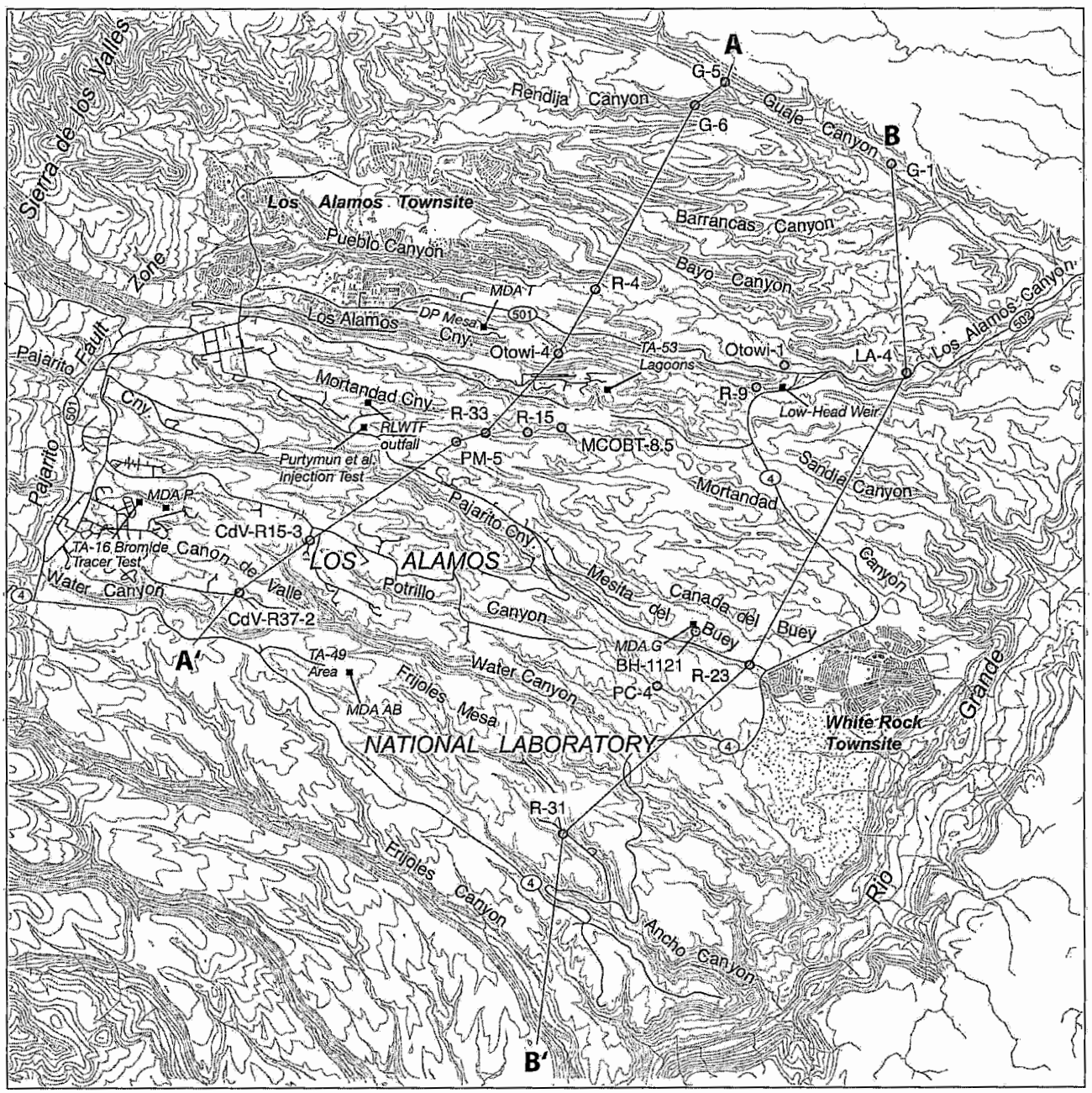

Fig. 1. Site map showing topography, Los Alamos National Laboratory boundary, and locations of cross sections, canyons, mesas, and other example sites discussed in text.

geohydrologic setting of the Pajarito Plateau, describe the hydrologic conceptual models, and then provide supporting evidence. The evidence consists of data sets, observations, and interpretation through numerical simulations. By compiling these sets of evidence into a comprehensive explanation of the processes that occur across the plateau, the credibility of the conceptual models is enhanced.

SITE DESCRIPTION

Topography and Stratigraphy

The Pajarito Plateau is a high, east-tilted tableland eroded into a series of narrow mesas separated by deep canyons. The map view in Fig. 1 and the two cross sections in Fig. 2 illustrate the topographic contrast between the mesa and canyons across the plateau. Mesa-top elevations range from approximately 2400 m on the west to about 1900 m on the east. About 1.22 and 1.61 Ma (Izett and Obradovich, 1994; Spell et al., 1990, 1996) cataclysmic eruptions from calderas in the central part of the Jemez Mountains deposited thick blankets of tuff over the area. Intense heat and hot volcanic gases welded these tuffs into hard, resistant deposits that make up the upper surface of the plateau. Streams flowing eastward across the plateau from the Jemez Mountains to the Rio Grande have cut canyons deep into the tuff, forming the striking mesas and canyons that character-

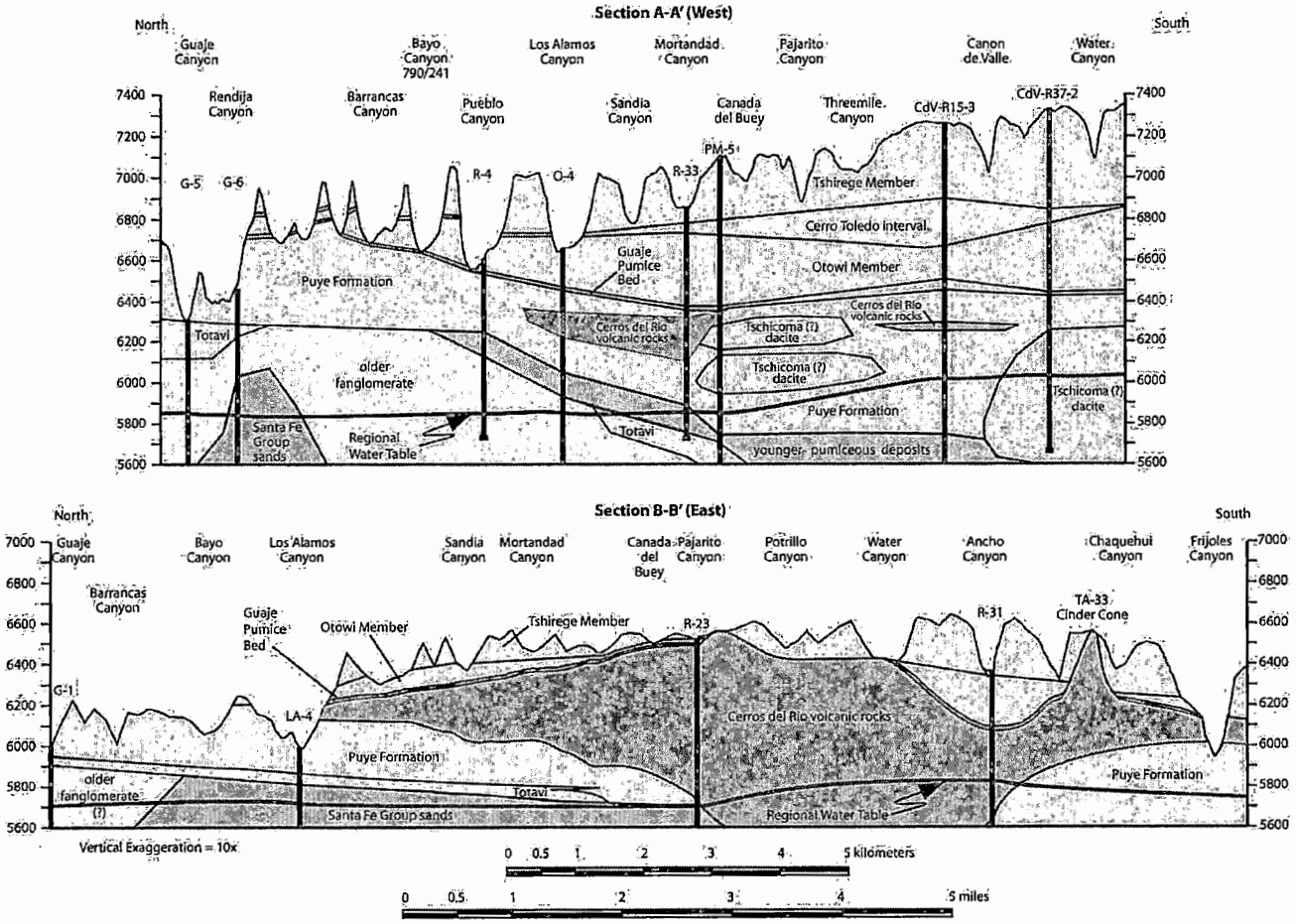

Fig. 2. Cross sections on the Pajarito Platean, (a) A–A′ on the western end, (b) B–B′ on the eastern end, as indicated in Fig. 1.

ize the landscape. The canyons tend to be deep and narrow in the western part of the plateau where streams are incised in the most strongly welded tuff units (Fig. 2a). The canyons become wider and shallower eastward, where thinner, less-welded tuffs overlie resistant basalt and coarse volcaniclastic deposits (Fig. 2b).

A comprehensive description of the regional hydrogeologic setting of the Pajarito Plateau is given in a companion paper by Broxton and Vaniman (2005). This section provides a brief overview of vadose zone stratigraphy that establishes a geologic framework for discussing conceptual models of contaminant transport. The two cross sections in Fig. 2 illustrate the lateral variations in vadose zone geology. The principal geologic units include, in descending order, the Tshirege and Otowi Members of the Bandelier Tuff, Puye Formation, and Cerros del Rio basalt. Descriptions of alluvial deposits and of other relatively minor bedrock units can be found in Broxton and Vaniman (2005).

The upper part of the vadose zone consists of an eastward-thinning wedge of Bandelier Tuff. The Bandelier Tuff is subdivided into two stratigraphic members, each consisting of a basal pumice fall overlain by a succession of rhyolitic ash-flow tuffs (Bailey et al., 1969). The Tshirege Member, which forms the surface outcrops throughout the plateau, is a compound-cooling unit consisting of alternating layers of nonwelded to moderately welded rhyolitic ash-flow tuffs. Welding within subunits of the Tshirege increases from east to west across the plateau, with some tuffs becoming densely welded near the western mountain front where they are thicker and more proximal to their source area. Within the Tshirege Member, welded tuffs are typically more highly fractured than the nonwelded tuffs that separate them. Fractures originating in welded zones, which include both cooling joints and tectonic fractures, commonly die out in overlying and underlying nonwelded tuffs. The Tshirege Member is up to 170 m thick in the south-central part of the Laboratory (Stimac et al., 2002). The Tsankawi Pumice Bed, a 0.3- to 1.2-m-thick fall deposit, marks the base of the Tshirege Member. The Otowi Member underlies the Tshirege Member and is exposed in lower canyon slopes in the northern part of the plateau. It is a multiple-flow unit made up of a relatively uniform sequence of nonwelded ash-flow tuffs. The maximum thickness of the Otowi Member is 128 m in the southwest part of the Laboratory. The Guaje Pumice Bed is a 2- to 15-m-thick stratified fall deposit at the base of the Otowi Member. The nonwelded portions of the Tshirege Member and all of the tuffs within the Otowi Member lack the pervasive cooling joints that characterize the welded portions of the Tshirege Member. Although high-

angle fractures tend to be rare in nonwelded tuffs, a few were documented by borehole videos and core samples (Broxton et al., 2002a).

The Puye Formation commonly underlies the Guaje Pumice Bed and consists of highly stratified, poorly cemented gravels and conglomerates consisting of subrounded dacitic and andesitic lava clasts in a poorly sorted, sandy to silty matrix. Debris flows, ash beds, pumiceous volcaniclastic sediments, and beds of fluvial sand and silt are interbedded with the gravels and conglomerates. Basaltic ash and lacustrine deposits are present in the upper part of the Puye Formation on the eastern side of the plateau. The formation reaches a maximum thickness of >335 m beneath the western part of the plateau but thins to 15 m in the northeast part of the plateau near the Rio Grande. Ancestral Rio Grande deposits called the Totavi Lentil are interbedded with the lower part of the Puye Formation on the east side of the plateau. These riverine deposits contain subangular dacitic detritus derived from volcanic sources to the west and rounded cobbles and boulders of quartzite, granite, and pegmatite derived from Precambrian highlands to the north and east. In some parts of the plateau, a distinctive pumice-rich rock unit beneath the Puye Formation, labeled younger pumiceous deposits in Fig. 2, overlies the Totavi Lentil. Borehole geophysical logs show that these pumiceous deposits typically have a higher porosity and lower bulk density than overlying fanglomerates. Thick deposits of older fanglomerate occur beneath the pumiceous deposits. These deposits, which are similar to but predate rocks normally assigned to the Puye Formation, are informally called older fanglomerate (Broxton and Vaniman, 2005).

Basaltic rocks of the Cerros del Rio volcanic field are intercalated with the upper part of the Puye Formation in the central and eastern part of the Pajarito Plateau. These basalts occur as numerous lava flows separated by interflow breccia, scoria, ash, and fluvial deposits. The lava flows typically contain highly brecciated tops and bottoms that provide zones of highly interconnected porosity over distances of tens to hundreds of meters. In some areas, the permeability of these zones is reduced by clays deposited in the pores of the breccias. Studies of basalts on the Columbia River Plateau found that, under saturated conditions, groundwater is most readily transmitted through the breccia zones at the tops and bottoms of basalt flows (Whiteman et al., 1994). The interiors of the flows are made up of dense, impermeable basalt. Fractures provide the primary source of permeability for the transport of liquid water and vapor in the dense flow interiors. Fracture patterns vary vertically within a flow unit with vertical columnar joints commonly occurring in the lower part of flow and irregular, complexly fanning fractures occurring in the upper part. Horizontal platy joints are also present near the base of some flow units.

Sources of Contamination

Many of the processes used to carry out the Laboratory's past and present missions use hazardous and radioactive materials. Throughout the Laboratory's history, some of these materials have been disposed of on Laboratory property or released into the environment. Since World War II, environmental legislation has evolved to become increasingly protective, and the Laboratory's operations have evolved with the legislation.

The Laboratory's Environmental Restoration Program is actively working to identify and restore contaminated sites. Original contaminant sources include, for example, septic tanks and lines, wastewater outfalls, material disposal areas (MDAs), firing ranges, and surface spills. In this paper, the focus is largely on contaminants associated with wastewater outfalls and MDAs. Wastewater from Laboratory technical areas (TAs) was historically drained through pipes and allowed to discharge into nearby canyons or mesa top lagoons. The outfalls are those areas below these effluent pipes and are a source of potential contamination for local canyons. Material disposal areas are generally mesa-top sites where waste was historically placed in near-surface pits or shafts. A variety of contaminants were disposed of in MDAs, including solid and liquid radioactive wastes, heavy metals, and organic wastes. These sites were intended to be permanent disposal facilities, and assessments are underway to determine whether any of these facilities pose long-term risks.

Climate and Near-Surface Hydrology

Arid and semiarid regions have common characteristics, such as thick vadose zones, infiltration that is often focused in topographic lows or beneath surface water bodies, and average annual potential evapotranspiration (ET) rates that far exceed precipitation rates. Under these conditions, infiltration events that propagate beneath the root zone are sporadic and occur only when the short-term infiltration rate exceeds the ET rate, such as during snowmelt or after large rainstorms. Consequently, the rates for deeper infiltration are difficult to quantify through traditional water balance studies because this component of the water balance can be orders of magnitude less than the other components (de Vries and Simmers, 2002; Scanlon et al., 2002; Sophocleous, 2002; Sanford, 2002; Flint et al., 2002). These generalities apply to the Pajarito Plateau, which has a semiarid climate and a vadose zone that ranges in thickness between approximately 100 and 400 m (Fig. 2).

Average annual precipitation across the Pajarito Plateau ranges from >0.5 m along the western boundary near the Jemez Mountains to <0.36 m to the east at the Rio Grande (Bowen, 1990). Most precipitation occurs either as winter and spring snow or as summer "monsoonal" rains. As a result, infiltration occurs episodically during spring snowmelts or the intense summer thunderstorm season and is often focused by runoff into the canyons.

Surface water flow in the canyons is generally ephemeral or intermittent, although a few canyons have short stretches with perennial surface flow. Anthropogenic discharges from water treatment outfalls can be a significant source of water in some canyons. Infiltration of

these surface sources form shallow perched alluvial groundwater systems in many of the canyons (Stone et al., 2001). These alluvial groundwaters are not sufficiently extensive for domestic use, but nevertheless, they are an important component of the subsurface hydrologic system. Because of their close association with surface waters, these shallow perched systems generally show the earliest and most pronounced impacts of laboratory contamination of all groundwaters. They also serve as lateral pathways for the down-canyon migration of contaminants and provide storage for groundwater infiltrating to deeper parts of the vadose zone.

VADOSE ZONE CONCEPTUAL MODELS OF THE PAJARITO PLATEAU

The conceptual models for vadose zone flow and transport beneath the Pajarito Plateau identify wet canyons as being hydrologically different from dry canyons and dry mesas (LANL, 1998a; Rogers et al., 1996; Neeper and Gilkeson, 1996; Turin and Rosenberg, 1996; Birdsell et al., 2000). Table 1 shows a compilation of infiltration rates estimated using a variety of interpretive techniques for locations across the plateau. These data begin to illustrate the difference in infiltration rate depending on location (i.e., mesa or canyon). In addition, Kwicklis et al. (2005) developed a map of average annual "net infiltration" in the Los Alamos area, on the basis of physical features such as elevation, vegetation, surface geology, and stream flow. They defined net infiltration as that water remaining after accounting for evapotranspiration in the shallow subsurface (i.e., the root zone). The highest net infiltration rates occur in the larger canyon systems, especially those that head in the mountains, with magnitudes of up to a few hundred millimeters per year caused by channelized runoff. In contrast, much lower net infiltration rates occur across mesas and in the smaller canyons that head on the plateau. These geographic variations in infiltration rates are key components of the site conceptual models.

In the subsections that follow, conceptual models are presented for (i) wet canyons, (ii) dry canyons, (iii) dry and disturbed mesas, and (iv) mountain-front mesas. First, however, a comparison of porous matrix flow and transport with more rapid fracture flow and transport is presented because this topic is relevant to the four location-specific conceptual models. Then, the location-specific conceptual models are given. Each conceptual model includes field observations and interpretations that support the application of these models to the Pajarito Plateau. Finally, a contrast between subsurface observations at mesa top and canyon sites is presented that further supports the distinction between canyons and mesas.

Along with each conceptual model description, field observations and/or interpretation are presented as evidence to support the model. Many of these cases are interpreted through numerical simulation using the Finite Element Heat and Mass (FEHM) code (Zyvoloski et al., 1997). This code has been used extensively to model unsaturated and saturated flow and contaminant transport in porous and fractured media (Robinson and Bussod, 2000; Robinson et al., 2005a; Keating et al., 2005). The numerical studies that follow employ the water characteristic-curve formulation of van Genuchten (1980) because that formulation was used to fit the available site data measured on core samples.

Matrix vs. Fracture Flow and Transport

Vadose zone flow through nonwelded to moderately welded units of the Bandelier Tuff is thought to occur through the porous matrix. Within densely welded tuffs and dense basalts, the vadose zone flow regime may be dominated by fracture flow. In contrast, matrix flow may occur within the more porous, brecciated zones in the basalt. The following evidence supports these hypotheses.

Matrix Flow in Nonwelded and Moderately Welded Tuffs

Across most of the plateau, the uppermost vadose zone consists of nonwelded to moderately welded Tshirege

Table 1. Estimated net infiltration rates across the Pajarito Plateau. (Negative infiltration rate implies upward flow.)

Location	Classification	Estimated net infiltration rate	Technique used for estimation	Reference
		mm yr^{-1}		
Los Alamos Canyon	wet canyon (natural with previous discharges)	213–1076	water balance study	Gray, 1997
Mortandad Canyon	wet canyon (anthropogenic recharge)	0.13, 0.25, and 1.5	analyzed vertical head gradients	Rogers et al., 1996
		transient, decreasing from 2400 to 150	depths of subsurface tritium peaks	Kwicklis et al., 2005
Cañada del Buey	dry canyon	−0.22 and 2.0	analyzed vertical head gradients	Rogers et al., 1996
Potrillo Canyon	dry canyon	0.12	analyzed vertical head gradients	Rogers et al., 1996
Mesita del Buey	dry mesa	6.9,-7.0, 0.07, −0.06, and 0.26	analyzed vertical head gradients	Rogers et al., 1996
		0.2 and 3.3	chloride mass-balance approach	Bergfeld and Newman, 2001
		1–5	moisture matching	Birdsell et al., 2000
MDA G on Mesita del Buey	disturbed dry mesa site with waste disposal	9	chloride mass-balance approach	Newman et al., 2005
Frijoles Mesa, 210-m hole near MDA AB	dry mesa	0.3–2.0	chloride mass-balance approach	Newman et al., 1997
MDA AB on Frijoles Mesa	disturbed mesa site with asphalt cover	300	water balance based on subsurface moisture	Rofer et al., 1999
MDA P	disturbed mesa site with waste disposal	95	analyzed vertical head gradients	Rogers et al., 1996
TA-53 Lagoons on Mesita de los Alamos	disturbed mesa site with liquid waste disposal	230	analyzed vertical head gradients	Rogers et al., 1996

Member ash-flow tuffs and nonwelded Otowi Member ash-flow tuffs (Fig. 2). Unsaturated flow and transport through these tuffs is assumed to occur predominantly through the porous matrix. These units have typical porosities of 40 to 50%, moderate saturated hydraulic conductivities (e.g., 10^{-4} cm s^{-1}), and water contents that are generally far below saturated conditions (2–25%) (Abrahams et al., 1961; Rogers et al., 1996; Birdsell et al., 2000; Springer, 2005). Although these tuffs are often fractured, water flow is expected to be matrix dominated unless conditions approach full saturation (Soll and Birdsell, 1998), such as beneath liquid-waste disposal pits or outfalls. In contrast, under background conditions where the fractured tuffs form the dry finger mesas on the eastern side of the plateau, air is thought to circulate freely through the fractures resulting in evaporation of pore water (Neeper, 2002; Stauffer et al., 2005).

Field observations and analyses support the matrix-flow hypothesis. Robinson et al. (2005a) modeled a vadose zone, wellbore injection test that was performed on a mesa north of Pajarito Canyon in moderately welded tuffs of the Tshirege Member (Purtymun et al., 1989) (Fig. 1). Through a numerical analysis incorporating different conceptual models of fracture flow behavior, they showed that the observed moisture distribution was consistent with a continuum model without fractures. The agreement between the numerical model and the observations was acceptable, both qualitatively and quantitatively. Dual-permeability and discrete-fracture conceptual models could also reproduce the observations, but only by muting the effect of the fractures. They estimated an equivalent infiltration rate during the injection phase of about 2.7×10^4 mm yr^{-1}, which is greater than most estimates of infiltration across the plateau (Kwicklis et al., 2005). They concluded that if matrix-dominated flow is observed at the high effective infiltration rate of this injection test, then it is even more likely to be the case under natural conditions on the plateau.

Evidence of fracture transport in a nonwelded to partially welded tuff exists beneath an historic liquid-waste disposal facility at MDA T on DP Mesa (Fig. 1). The disposal facility consisted of four adsorption beds dug 1.2 m deep into the mesa top and filled with cobbles and gravel. The beds received liquid wastes primarily between 1945 and 1950, with occasional disposals through 1967. Subsurface contaminant data from 1960, 1978, and 1996 collected beneath the adsorption beds show evidence of contaminant transport associated with fractures, while subsurface data collected in boreholes adjacent to the beds shows none (Nyhan et al., 1984; LANL, 2004b). However, the 1978 study, which targeted data collection in fractures beneath the adsorption beds, concluded that most fractures (8 of 10) did not enhance contaminant transport. The two observations of transport in fractures in that investigation occurred at similar depths (<7 m below the ground surface) to those cited in the 1960 study, even though the four investigative boreholes drilled in 1978 extended deeper (to 30 m) (Nyhan et al., 1984). Although the 1996 data show contamination in a 20-m-deep fracture, the general assumption is that fracture transport occurred while the beds actively received liquid waste and that the contaminants associated with the fractures are remnants of previous fracture flow episodes (LANL, 2004b). These data support the idea that some fractures in the nonwelded to moderately welded tuff will flow when the matrix is saturated.

Fracture Flow in Densely Welded Tuffs

In areas near the mountain front on the western edge of the plateau, the majority of tuffs making up the Tshirege Member are moderately to densely welded. These strongly welded tuffs are characterized by porosities ranging from 17 to 40%, unsaturated volumetric water contents from 3 to 12%, and low saturated hydraulic conductivities (e.g., 10^{-6} to 10^{-9} cm s^{-1}) (LANL, 2003b). These tuffs are also more fractured in the vicinity of the Pajarito fault zone along the western mountain front and can support fracture flow and transport when sufficient water is present. A bromide tracer test and high explosives contaminant distributions suggest that both fracture-dominated and matrix-dominated flow occur near the mountain front, depending on the degree of welding of the tuff (LANL, 1998b; LANL, 2003b).

Fracture Flow in Dense Basalts; Matrix Flow in Brecciated Basalts

Like the densely welded tuff units, fracture flow is hypothesized to occur through the dense, low-porosity flow interiors of the Cerros del Rio basalt. Evidence for fracture flow in basalt comes from a field experiment on the upstream side of a low-head weir located in lower Los Alamos Canyon (Fig. 1; Stone and Newell, 2002; Stone et al., 2004). The objective of the experiment was to monitor water flow and bromide tracer transport through fractured basalt under transient, unsaturated and periodically ponded conditions using three observation boreholes. Following three ponding events, the bromide tracer advanced quickly downward to a depth of several tens of meters within 10 to 14 d after the first ponding event (Stone et al., 2004). The rapid advance of bromide indicates that fracture flow and transport occur through basalts under ponded conditions. Model calibration of bromide transport yields an effective fracture porosity in the range of 10^{-2} to 10^{-3} and saturated hydraulic conductivity in the range of 10^{-2} to 10^{-3} cm s^{-1} (Stauffer and Stone, 2005; Stone et al., 2004). The data and simulations both indicate that the bromide continued to advance through the fractured system even after the ponds had drained.

Perched groundwater has been identified in a number of boreholes on the plateau (Robinson et al., 2005b; Broxton and Vaniman, 2005) and is often located beneath the larger wet canyons and within the more porous, breccia zones in basalt. An example of perched water in basalt occurs at Well R-9 in lower Los Alamos Canyon (Fig. 1), where groundwater was found from 55 to 70 m deep in the middle of the 86-m sequence of stacked lava flows (Broxton et al., 2001). The groundwater is located within a breccia zone and an underlying highly fractured basalt flow. The base of the perched zone occurs where the highly fractured basalt grades

downward into a massive flow interior with few fractures. Tritium concentrations in the perched water reveal that it is no more than a few decades old (Broxton et al., 2001).

It is apparent that groundwater flow in basalts occurs both as porous flow through breccia zones and as fracture flow where dense flow interiors are broken by interconnected fracture systems. Flow direction is likely controlled by the geometry of the interflow breccias and by fracture orientation, both of which are heterogeneous. Perched zones may be stagnant or may flow laterally. For contaminant transport calculations, water flow through the basalt is commonly purposely predicted to be via fast-flowing vertical fractures because so little is known about the true nature of flow through the basalt units (Birdsell et al., 2000).

Wet Canyons

Wet Canyon Conceptual Model

Figure 3 is a photograph of Cañon de Valle, a wet canyon on the western boundary of the plateau. Several features characterize the large, deep naturally wet canyons on the Pajarito Plateau, such as Los Alamos and Pueblo Canyons (Fig. 1 and 2). Their headwaters are in the mountains, they have large catchment areas (13–26 km^2), surface flow occurs frequently, and perched alluvial groundwaters exist beneath the canyon floors. In some cases, discharges from anthropogenic sources such as outfalls and wastewater treatment plants increase flows sufficiently that smaller dry canyons that head on the plateau act like wet canyons (e.g., Mortandad Canyon, Fig. 1 and 2). Often, deeper, intermediate perched zones are associated with wet canyons. The geometry of wet canyons promotes hydrologic conditions that yield relatively fast, unsaturated flow and transport as described in the paragraphs that follow.

Wet canyons collect large runoff volumes, either through channeling of mountain-front precipitation from large contributing areas or through wastewater discharges. This runoff, in turn, creates surface water flow along canyon bottoms, which subsequently infiltrates to form perched alluvial water bodies. Lateral flow and transport through surface water and in the alluvial systems are rapid compared with other subsurface hydrologic processes on the plateau. Rates of lateral transport are most rapid during surface flow events, which occur more frequently in the larger wet watersheds than in other areas of the plateau. Sorbing species transport slowly in alluvial waters and more commonly migrate down the canyon floor by sediment transport (LANL, 2004a; Lopes and Dionne, 1998; Solomons and Forstner, 1984; Watters et al., 1983). Since some of the wet canyons received liquid-waste discharges from outfalls, the alluvial systems then act as line sources for both water and contaminants to deeper parts of the vadose zone beneath the canyon floor. The resulting net percolation rates beneath the perched alluvial systems to the underlying unsaturated zone are expected to be among the highest across the plateau, approaching a meter per year (100–1000 mm yr^{-1}) (Gray, 1997; Kwicklis et al., 2005; Table 1).

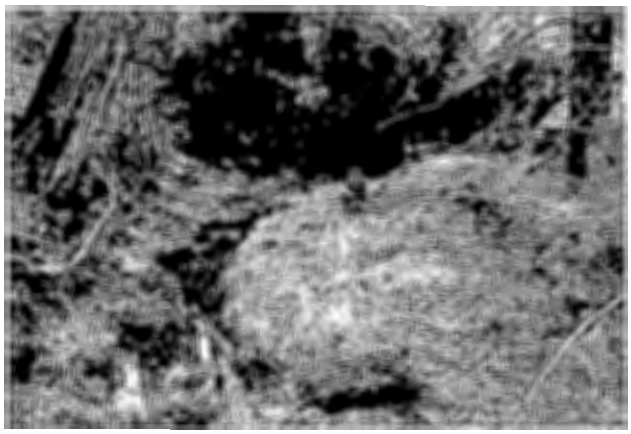

Fig. 3. Photograph of Cañon de Valle, a wet canyon on the western edge of the plateau.

From west to east, the vadose zone becomes progressively thinner and the geology becomes dominated by pre-Bandelier rock units, as can be seen by comparing Fig. 2a and 2b. This is especially true for the deep wet canyons, which are deeply incised into the underlying strata. In the eastern part of the plateau, contaminants transported laterally down canyon via surface flow or in alluvial groundwater often percolate through a geologic column consisting primarily of basalt and fanglomerate with little or no overlying tuff. Downward percolation is believed to be more rapid in the basalt than through porous tuff, as discussed in the matrix vs. fracture flow section above. Thus, especially along the eastern end of the plateau, the wet canyons have thinner vadose zones (compare, e.g., Los Alamos Canyon in Fig. 2a and 2b) and a shorter portion of the flow path that has matrix-dominated flow (compare, e.g., Pajarito Canyon in Fig. 2a and 2b) than for the less eroded areas of the plateau. These stratigraphic factors compounded by the relatively high net infiltration rates in wet canyons likely yield the fastest vadose zone travel times for contaminants from the land surface of the plateau to the regional aquifer. Transport to the regional aquifer beneath wet canyons is predicted to be on the order of decades to hundreds of years (LANL, 2003b; Nylander et al., 2003).

Wet Canyon Examples

Mortandad Canyon has the physical features of a dry canyon (Fig. 1 and 2). However, this canyon is classified as wet because it has received significant effluent discharge since the late 1950s. Since 1963, a radioactive liquid-waste treatment facility (RLWTF, Fig. 1) has released treated effluent in excess of 10^7 L yr^{-1} to Mortandad Canyon via a small side canyon (LANL, 1997). Discharge volumes and contaminant masses for the RLWTF outfall are well documented. As such, data for this canyon prove useful for conceptual model validation. Discharge volumes have declined steadily since 1982.

A perched alluvium system fills the canyon floor and varies in thickness from near zero to more than 30 m near the eastern boundary of the Laboratory (McLin

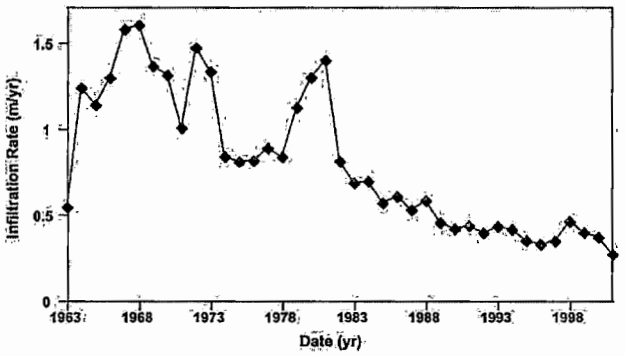

Fig. 4. Time-varying percolation rate at the alluvium–tuff interface, estimated for Mortandad Canyon near Well R-15 (Hollis et al., 2005).

et al., 1997). Purtymun (1974) observed that lateral transport of tritium and chloride was rapid through the alluvial system. He estimated lateral transport velocities between alluvial wells varying from 620 to 7300 m yr^{-1}. The alluvial wells in Mortandad Canyon cover more than a 3-km distance downstream from the RLWTF and have been monitored for nitrate and radionuclides regularly since 1963 (LANL, 1997, 2001). Nitrate and tritium concentrations at the wells are roughly within a factor of two to three of each other, indicating that these nonsorbing species are well mixed throughout the alluvial groundwater. The rapid lateral transport and mixing of nonsorbing species support the concept that the wet alluvial systems spread contaminants down canyon such that they act as a line source of water and well-mixed contaminants to the deeper vadose zone. In contrast, the concentrations of adsorbing species, such as strontium and plutonium, in the alluvial water decline by an order of magnitude or more as the water flows down canyon (LANL, 1997). This variation in concentration with distance would need to be considered when predicting transport of adsorbing species from the alluvial aquifer.

A series of one-dimensional vadose zone flow and transport simulations, using 38 columns to represent the canyon bottom, were performed to support a probabilistic risk assessment of Mortandad Canyon (Hollis et al., 2005). As an upper-boundary condition, the simulations apply a water balance to the alluvial aquifer to estimate recharge from the alluvial aquifer to the deeper vadose zone. The water balance approach assumes that the volume of water entering the canyon is a function of the discharge volume from the RLWTF, the main anthropogenic water source to the canyon, and that recharge is a function of the distance from the source. An estimate of the time-varying percolation rate at the alluvium–tuff interface in the vicinity of Well R-15 (Fig. 1) developed for the stochastic analysis is shown in Fig. 4. This particular example uses mean values for the three parameters in the study that define the distribution of infiltrating water throughout the canyon floor, with the main control being the assumed dilution of the recorded RLWTF discharge volumes (Hollis et al., 2005). The percolation estimates are indicative of rates expected in wet canyons; they range from 300 mm yr^{-1} to >1.5 m yr^{-1}.

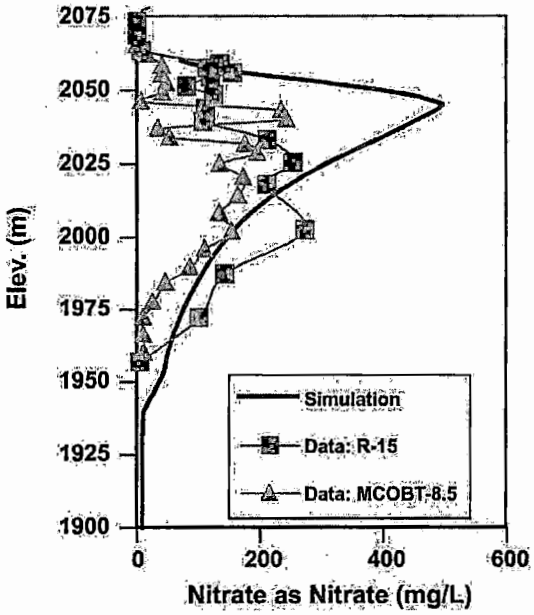

Fig. 5. Nitrate concentration profiles as a function of elevation in Wells R-15 (Longmire et al., 2001) and MCOBT-8.5 (Broxton et al., 2002b) and for a one-dimensional simulation (Hollis et al., 2005).

Nitrate concentration data collected in core from two vadose zone boreholes, R-15 and MCOBT-8.5 (Longmire et al., 2001; Broxton et al., 2002b), also confirm wet canyon behavior in Mortandad Canyon. Here nitrate has migrated to a depth of at least 100 m in the vadose zone in approximately 40 yr, as shown in Fig. 5. An example nitrate concentration profile predicted at the location of Well R-15 with the transient one-dimensional, vadose zone simulation described above agrees well with the concentration data (Fig. 5). The simulation uses the transient percolation rate shown in Fig. 4 and measured nitrate releases from the RLWTF (LANL, 1997), although one-half the nitrate mass is assumed to be degraded due to denitrification (Hollis et al., 2005). The simulation also assumes that water flow through the tuff units is matrix dominated, and flow through the basalt is fracture dominated.

Nitrate has also been observed in the regional aquifer at levels near 2 mg L^{-1} (LANL, 2003a) in Well R-15. This well is 337 m deep and extends 44 m into the regional aquifer. These nitrate levels are elevated relative to background levels in regional groundwater and are believed to be the result of Laboratory liquid-effluent discharges to Mortandad Canyon (Longmire, 2002).

Los Alamos Canyon is a large canyon that is both naturally wet and has previously received wastewater discharges. Laboratory derived contaminants (tritium, perchlorate) released in liquid effluents into this canyon and the adjacent Pueblo Canyon have reached the regional aquifer and are present in one municipal water supply well (Otowi-1) (LANL, 2004c). Well Otowi-1, located in Pueblo Canyon near the confluence with Los Alamos Canyon (Fig. 1), is in an area in which alluvium sits directly on top of basalts and the Puye formation. Further up Los Alamos and Pueblo Canyons, significant thicknesses of Bandelier Tuff are present. In contrast to

Fig. 6. Photograph of a dry canyon, lower Sandia Canyon.

Otowi-1, no contaminants have been detected in water supply well Otowi-4 (LANL, 2004c), located in a region in which more than 50 m of Bandelier Tuff is present (Fig. 1). Thus, the Otowi-4 result is consistent with a conceptual model of matrix-dominated flow and longer travel times through the nonwelded Bandelier Tuff, and the Otowi-1 observation is consistent with fracture flow through the basalt units. The numerical model of Los Alamos Canyon developed in Robinson et al. (2005c) yielded results consistent with these observations.

To summarize, these data and interpretation demonstrate several of the features included in the wet canyon conceptual model. First, lateral transport by both surface water and perched alluvial groundwater spreads nonsorbing contaminants down canyon to create a line source of contamination to the deeper vadose zone. Next, wastewater discharges can cause wet-canyon hydrologic behavior in small canyons that would otherwise likely have little net infiltration, as discussed in the upcoming section. Also, a matrix-flow model for the tuff units appears to adequately capture infiltration beneath Mortandad Canyon even though a perched system sits atop the tuff, and the transient percolation rate is estimated to have been on the order of a meter per year. In contrast, near Otowi-1, at the confluence of Los Alamos and Pueblo Canyons, little or no tuff is present, and a rapid fracture flow model through the basalts best explains the contaminant observations. Finally, the presence of anthropogenic contaminants in regional groundwater confirms that beneath wet canyons some vadose zone pathways have travel times on the order of a few decades.

Dry Canyons

Dry Canyon Conceptual Model

Figure 6 is a photograph of lower Sandia Canyon (Fig. 1), which is considered a dry canyon. In contrast to wet canyons, dry canyons head on the plateau, have smaller catchment areas (<13 km^2), experience infrequent surface flows, and have limited or no saturated alluvial systems in their floors. If anthropogenic sources are present, they are small volume sources. These hydrologic factors yield little lateral near-surface contaminant migration and slower unsaturated flow and transport from the surface to the regional aquifer. For example, because surface and alluvial waters are less common, contaminants remain near their original sources. Pathways through the vadose zone tend to be longer in the shallow dry canyons, which have thicker sections of nonwelded to moderately welded tuff than in the deeper-cut wet canyons; see, for example, Cañada del Buey in Fig. 2. Net infiltration beneath dry canyons is much slower, with rates generally believed to be less than tens of millimeters per year and commonly on the order of 1 mm yr^{-1}. Finally, transport times to the aquifer beneath dry canyons are expected to be from hundreds to several thousands of years (Nylander et al., 2003).

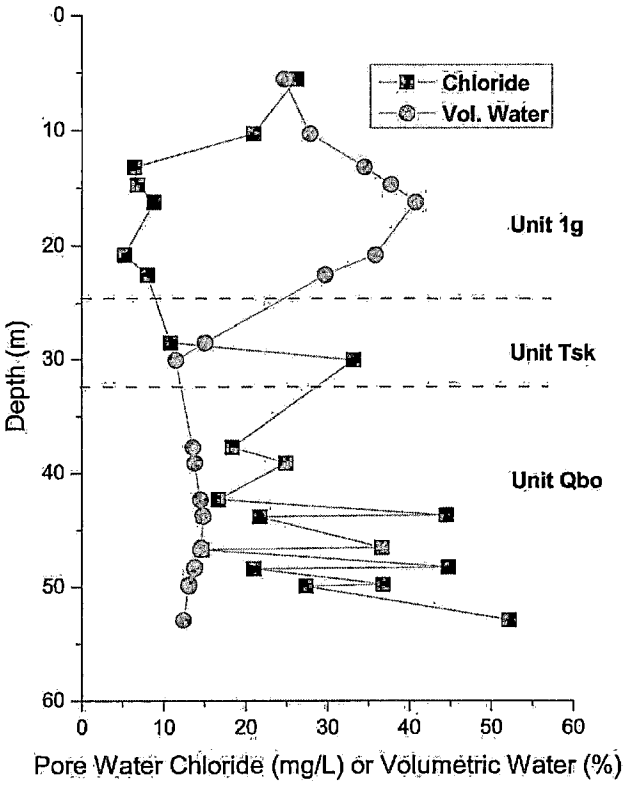

Fig. 7. Pore water chloride and volumetric water content profiles in Potrillo Canyon for Borehole PC-4 (Newman, 2002, unpublished data). Stratigraphic contacts are also shown (Qbt-1g is the Tshierege 1g unit, Tsk is the Tsankawi Pumice Bed, and Qbo is the Otowi Member of the Bandelier Tuff).

Dry Canyon Examples

Estimated net infiltration rates by Rogers et al. (1996) (Table 1) suggest fluxes of a few millimeters per year or less for two dry canyon locations, Potrillo Canyon and Cañada del Buey. Water content and chloride profiles from Potrillo Canyon Borehole PC-4 are presented in Fig. 7. The example shows that even in a "dry" canyon there can be zones of high water content (i.e., water contents are in the 40% range at about 17 m). However, the chloride mass-balance estimate of flux from this borehole is only 4.5 mm yr^{-1}, and the chloride-based vadose zone residence time exceeds 1700 yr.

Fig. 8. Photo of a dry mesa located north of Cañada del Buey, on the eastern side of the Laboratory.

Dry Mesas

Dry and Disturbed Mesa Conceptual Model

Dry finger mesas constitute most of the mesa coverage on the plateau. The hydrologic conditions on the surface and within these dry mesas lead to slow unsaturated flow and transport. Figure 8 is a photograph of a dry mesa near the eastern boundary of the laboratory. Dry mesas shed precipitation as surface runoff to the surrounding canyons such that most deep infiltration occurs episodically following snowmelt. Much of the water that does enter the soil zone is lost through evapotranspiration. In fact, potential ET was estimated to exceed precipitation at a climate station on the eastern portion of the plateau by a ratio of 6:1 (LANL, 2003c). As a result, annual net infiltration rates for dry mesas are <10 mm yr^{-1} and are more often estimated to be on the order of 1 mm yr^{-1} or less (Kwicklis et al., 2005). Since the dry mesas are generally comprised of nonwelded to moderately welded tuffs with low water content, flow is matrix dominated. Travel times for contaminants migrating through mesas to the regional aquifer are expected to be several hundred to thousands of years (Newman, 1996; Newman et al., 1997b; Birdsell et al., 2000; Nylander et al., 2003).

The topographic relief of these steep-sided mesas influences their internal hydrologic conditions as well. High solar radiation, strong winds, and fluctuations in barometric pressure cause temperature and pressure gradients between the surface of the mesa and its interior. These gradients enhance air circulation through the mesas, which is thought to enhance deep evaporation (Neeper, 2002; Neeper and Gilkeson, 1996; Newman, 1996; Newman et al., 1997b). This additional drying in the mesa-top units further slows downward water flow and transport of dissolved species. However, these same conditions enhance vapor transport of volatile species (Stauffer et al., 2005).

Anthropogenic discharges and surface disturbances from laboratory operations can drive infiltration rates higher in normally dry mesas. In some cases, multiyear disturbances of mesa sites through liquid waste disposal, asphalt covers, and/or devegetation have temporarily caused mesa infiltration rates to increase to near wet canyon levels (Table 1). Even with elevated infiltration, at most sites flow remains matrix dominated. Fracture flow has occurred beneath a long-term liquid disposal site with ponded conditions, as discussed above. However, fracture flow is thought to cease once liquid disposals stop (Soll and Birdsell, 1998). Infiltration rates are expected to return to low, near-background levels when the surface and vegetation return to native conditions.

Dry and Disturbed Mesa Examples

Two examples of vadose zone conditions from dry and disturbed mesas are discussed. The first example uses volumetric water content and chloride profiles from four boreholes (Fig. 9) from Mesita del Buey located near the eastern boundary of the laboratory (Fig. 1). In this mesa, vadose zone water contents above the level of the adjacent canyon bottoms are variable, but a large fraction of the mesa has extremely low water contents of <5% (<12% saturation). Chloride accumulation in the vadose zone is also variable, but all four boreholes have significant chloride inventories. Some samples have pore water chloride concentrations that exceed 1000 mg L^{-1}. The chloride data (Newman, 1996) and numerical modeling (Birdsell et al., 2000) indicate that downward fluxes vary with depth and across the mesa. Chloride mass-balance flux estimates range from 0.03 to 6 mm yr^{-1}, with the highest fluxes associated with the upper 6 to 9 m. However, all four boreholes have a depth interval where fluxes are <1 mm yr^{-1}. Chloride-based residence times range from 1300 to 17 000 yr (Newman, 1996). The low fluxes and long residence times suggest that there is little water movement through the mesa.

Even though the natural conditions in dry mesas result in low downward fluxes, disturbance can alter how quickly water moves through the vadose zone. Rogers et al. (1996) showed that addition of water or focusing of flow on mesa tops (e.g., waste water lagoons or storm water diversion ditches) can result in flux increases of tens to hundreds of millimeters per year (Table 1). Another example of how rapidly dry mesa conditions can shift from disturbance is provided by periodic water content monitoring of Borehole 1121 on Mesita del Buey. When the borehole was drilled, chloride and water content data reflected the native conditions in the mesa (Fig. 10). Subsequently, focused runoff from an asphalt pad resulted in transient ponding in a localized area around Borehole 1121. Periodic water content monitoring in Borehole 1121 using neutron probe revealed increasing water contents down to about 24 m in <10 yr (Fig. 10; Newell, 1996 and 2000, unpublished data). This example shows that transient ponding can affect deep portions of dry-mesa vadose zones in less than a decade.

The second dry or disturbed mesa example is from Frijoles Mesa, located at the south-central portion of the Laboratory (Fig. 1). Explosives experiments were conducted at MDA AB on Frijoles Mesa in 1960 and

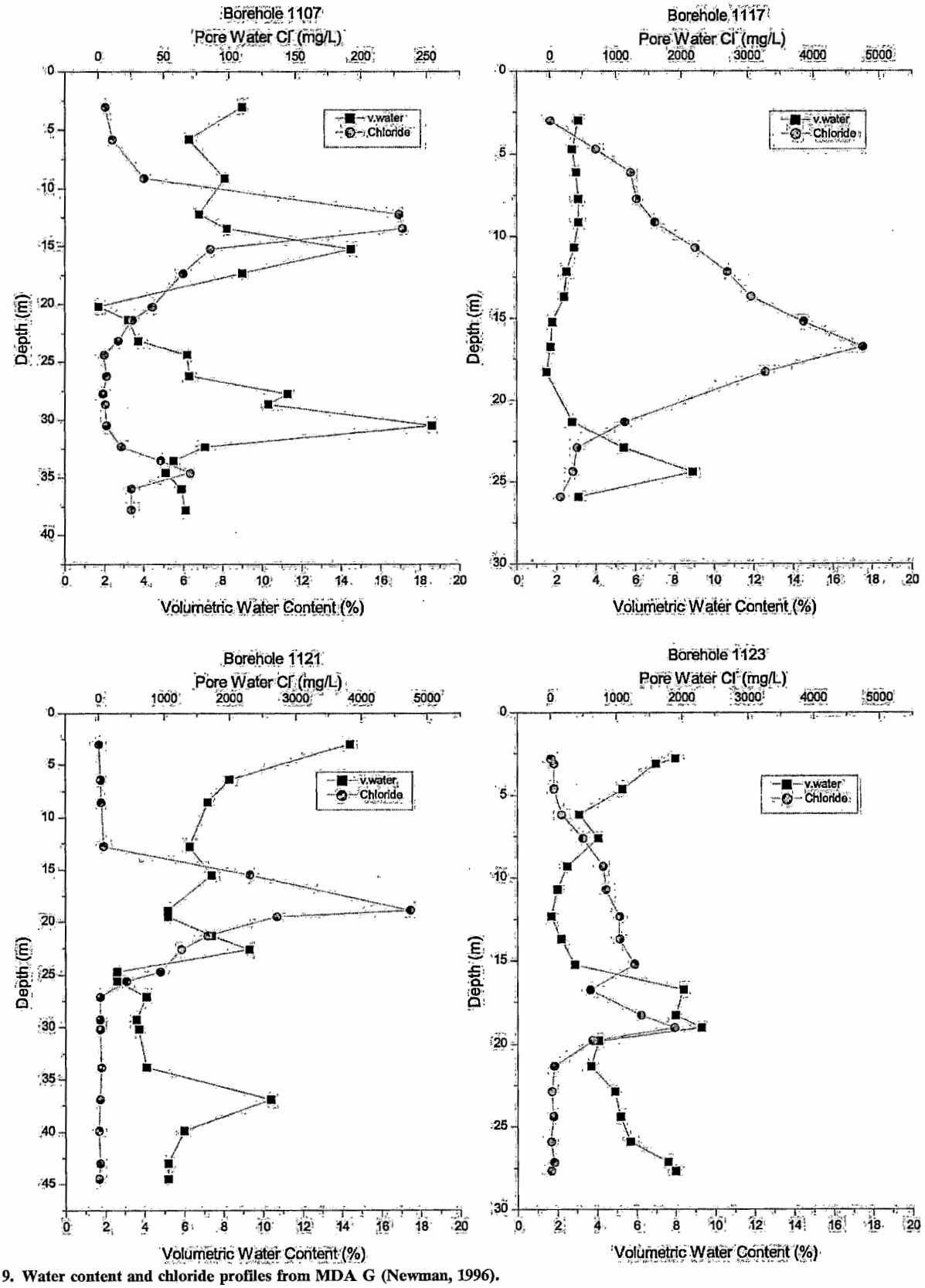

Fig. 9. Water content and chloride profiles from MDA G (Newman, 1996).

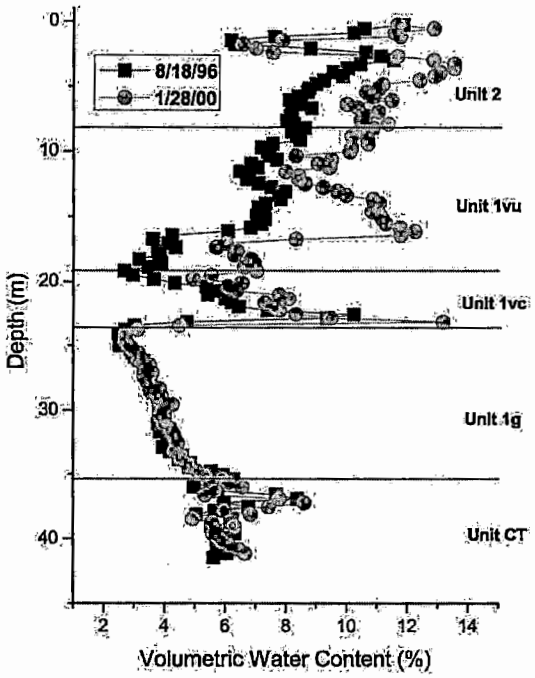

Fig. 10. Changes in volumetric water content in borehole 1121 as a result of episodic ponding (Newell, 1996 and 2000, unpublished data). Ponding occurred from focused runoff from an asphalted area.

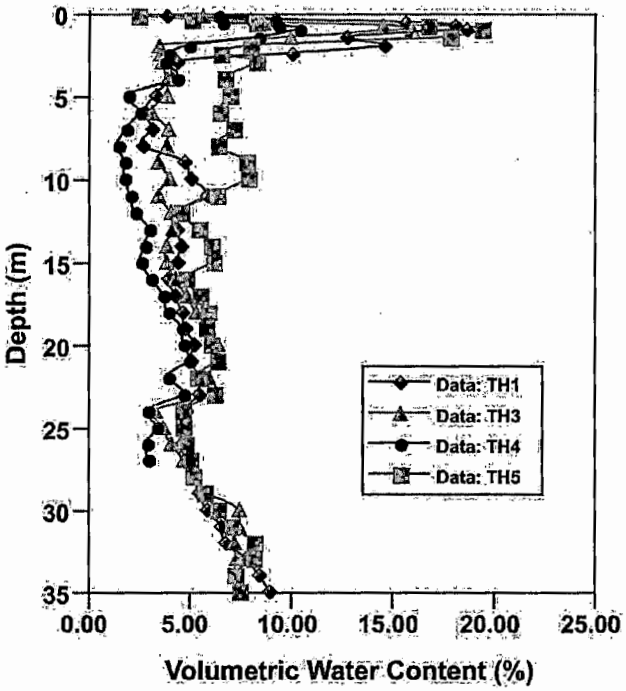

Fig. 11. Volumetric Water Content in four boreholes for background conditions at TA-49 near MDA AB (Levitt et al., 2005).

1961 at the bottom of shafts dug approximately 20 to 24 m into the Tshirege Member of the Bandelier Tuff. One area at the site was paved with asphalt in 1961 to minimize the spread of accidental surface contamination. It was later found that the elevated asphalt pad unfavorably altered the naturally dry hydrologic characteristics of the site by inhibiting evapotranspiration and by damming surface water along its edge. At several times, the asphalt was found to be in disrepair, and estimates of leakage through the cracked asphalt pad ranged from 60 to 388 mm yr^{-1} (Table 1; LANL, 1992; Rofer et al., 1999).

Background water content profiles measured in four 37-m boreholes (Fig. 11) and a 210-m borehole (Levitt et al., 2005) illustrate the site's dry background conditions. Water content of the tuff below about 3 m is <10%. Newman et al. (1997b) estimated infiltration rates in the range 0.3 to 2.0 mm yr^{-1} based on the chloride profile from the 210-m borehole at the site (Table 1). Water content profiles from beneath the asphalt were measured in two 46-m boreholes in 1994 (Fig. 12). These data clearly show elevated water contents to a depth of 18 m.

Two-dimensional numerical simulations, assuming matrix properties for the tuff units, were run to determine the asphalt's effect on the subsurface water balance and to predict the possible recovery of the site following asphalt removal (Birdsell et al., 1999). A simulated background infiltration rate of 0.1 mm yr^{-1} fits the background, water content data well and was used as an initial condition for transient simulations of the paved area. The transient simulations assumed an immediate increase in the infiltration rate in 1961, when the site was paved, to a new steady value of 60, 150, or 388 mm yr^{-1}, based on the leakage estimate cited above. Figure 12 shows the predicted water content profiles for the 60 and 150 mm yr^{-1} infiltration rate cases for a simulation time equivalent to 1994. The water content profile, based on a net infiltration rate of 60 mm yr^{-1} (a 600-

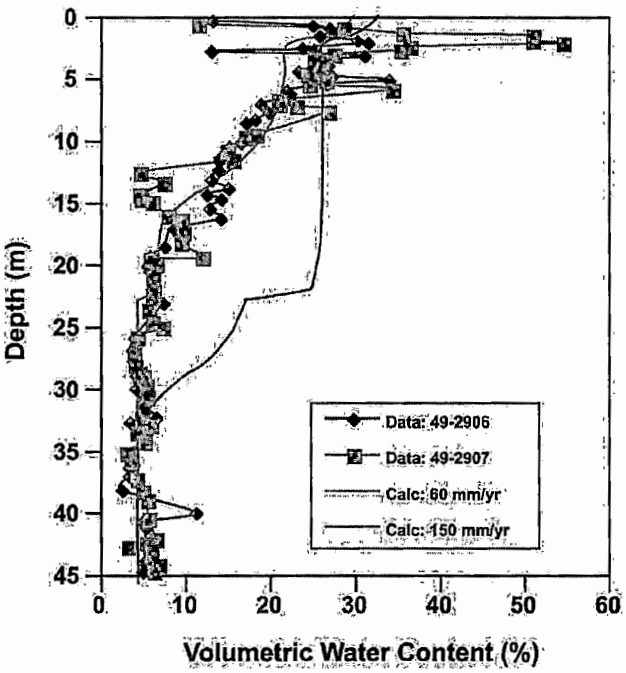

Fig. 12. Volumetric water content for disturbed conditions at TA-49, MDA AB. Data are for two boreholes beneath an asphalt area (Farley, 1994, unpublished data). Simulation results are for transient simulations with increased deep percolation during asphalt lifetime (Birdsell et al., 1999).

Fig. 13. Photograph of mountain-front mesa at TA-16.

fold increase) applied from 1961 through 1994, matches the 1994 water content data well. The simulations indicate that if the site returned to a 0.1 mm yr^{-1} infiltration rate, the soil would show detectable signs of drying in a 5-yr period. However, the water content of the uppermost tuff unit might increase slightly as the steep gradient in the top few meters, as seen in Fig. 12, relaxes downward.

To return the site to a more natural state, the asphalt was removed in 1998. The site was then regraded, capped with an ET cover, and revegetated. From 2000 through 2004, monitoring has shown slow drying in the upper 6 m of the soil layer beneath the ET cover (Levitt et al., 2005). Water contents at 12-m to 18-m depths show a slight increase in time (Levitt et al., 2005), as predicted, because of the steep water content profile that existed before removal of the asphalt is relaxing.

Data and simulations for MDA AB support several of the assumptions of the dry mesa conceptual model under both background and disturbed conditions. First, the matrix flow model adequately matches water content data at both background and enhanced infiltration conditions. Second, native conditions of this mesa are dry with predicted infiltration rates between 0.1 mm yr^{-1} (simulations) and 2.0 mm yr^{-1} (chloride). Third, the surface disturbance significantly enhanced net infiltration. Finally, the site seems to be returning to a drier condition. However, since the asphalt was in place for several decades, water accumulation in the disturbed area is significant. The simulations indicate that it may take hundreds of years for water content levels within the tuff units to return to near-background conditions.

Mountain-Front Mesas

Mountain-Front Mesa Conceptual Model

Mesas along the mountain front of the plateau are classified as being naturally wet mesas. Figure 13 shows a photograph of a mountain-front mesa area at TA-16 (Fig. 1). In contrast to the dry mesas, these mesas receive greater precipitation (e.g., 500 mm yr^{-1}) and increased runoff and infiltration. The wet, mountain-front mesas contain numerous perennial and ephemeral springs. Such springs are rare in the dry mesas of the eastern part of the plateau, except where the regional groundwater aquifer discharges along the Rio Grande. Duffy (2004) discusses the importance of mountain-front processes and conditions in semiarid landscapes and suggests that the mountain block and mountain-front areas are the dominant recharge zones in semiarid landscapes. Thus, hydrologic conditions are quite different along the wet mountain-front mesas. One other important difference is that the upper tuff units along the mountain front are often moderately to strongly welded because of the close proximity to the caldera source. Welding results in increased fracturing during cooling, and because the mountain-front mesas lie within the Pajarito Fault Zone, additional fracturing and minor faulting of the tuff units have resulted. The welded tuffs create a hydraulic condition where matrix hydraulic conductivities are low (e.g., 10^{-7} to 10^{-9} cm s^{-1}), but fracture densities are relatively high. Thus, there is a propensity for significant fracture flow. Fracturing appears to control the locations of natural springs along the mountain-front mesas. Also, fracture flow related to outfalls and wastewater lagoons is suggested by water content and contaminant distributions (LANL, 2003b).

Mountain-Front Mesa Examples

To illustrate how rapidly vadose zone flow and transport can occur in wet, mountain-front mesas, a bromide tracer test is described. This tracer experiment was conducted in a former high explosives outfall pond at TA-16. Use of the outfall had been discontinued, and ponded water conditions no longer existed at the site. In 1997, 100 kg of potassium bromide were applied to the outfall pond with 3028 L of water. The main goal of the study was to determine whether there was a connection between the mesa-top outfall pond and two high explosives–contaminated springs that flowed along the north side of the mesa. Except for the tracer solution, no additional water was added to the site. Thus, precipitation was the dominant driver for tracer transport. Borehole monitoring and drilling during the test showed that the vadose zone was largely unsaturated. Tracer was observed in the first spring after only 4 mo. These observations indicate more than 300 m of lateral transport and 33 m of vertical transport. Tracer was observed in the second spring after about 7 mo. Such rapid movement of tracer to the springs is inconsistent with fluxes that would be expected under unsaturated, matrix-type flow conditions (LANL, 1998b, 2003b). Thus, rapid movement along locally saturated fractures (possibly in combination with matrix flow) is implied. It is also worth noting that <2% of the applied tracer mass actually made it to the springs. Subsequent drilling and sampling in the application area 3 yr after the tracer was released suggests nearly all of the tracer mass was still in the top 1.2 m of the vadose zone (LANL, 2003b). This result illustrates that vadose fluxes in the mountain-front zone are not always large and that there can be a great deal

Table 2. Comparison of canyon and mesa hydrogeochemical characteristics.

	Max. Cl^-	Avg. Cl^-	Max. SO_4^{2-}	Avg. SO_4^{2-}	Max. $\delta^{18}O$	Avg. $\delta^{18}O$	Max. θ_v	Avg. θ_v
	mg L^{-1}				‰		%	
Canyons	172	30	641	78	−7	−10	52	20
Mesas	1761	398	8913	766	−1	−8	18	7
Difference	1589	368	8272	688	6	2	−33	−13

of variation in fluxes, depending on whether fracture or matrix flow (or both) occur.

Mesa–Canyon Comparison

To further demonstrate the pronounced difference between the subsurface hydrologic conditions beneath mesas and canyons, a direct comparison of data collected at a variety of mesa and canyon sites is presented in this section. A statistical examination of vadose zone water content, anion concentrations (e.g., chloride), and stable isotopes ($\delta^{18}O$ and δD) supports the hypothesis that canyons are hydrologically different from mesas. These characteristics serve as sensitive indicators for differences in recharge through the vadose zones. Cores from nine canyon and 13 mesa boreholes from relatively undisturbed locations were examined. Water content and anion and stable isotope data from the core samples were collected following Newman et al. (1997a). For each borehole, the average and maximum values of pore water chloride and sulfate concentrations, pore water $\delta^{18}O$ values, and volumetric water contents were determined. Data for each characteristic (averaged for all canyon and mesa boreholes, respectively) are shown in Table 2 along with the difference between the values. The differences between the canyons and mesas are substantial in most cases.

To test whether these differences were significant, the nonparametric Mann–Whitney U test was run using the various mesa and canyon borehole values. The nonparametric test was used primarily because of the small number of analyses available. For a p value of 0.05, the tests showed that all of the characteristics for both the maximum and average values were significantly different for the mesas and canyons. The dramatic differences between the mesa and canyon characteristics can also be seen from box and whisker plots of water content and chloride concentration shown in Fig. 14 and 15. These comparisons of mesa and canyon vadose zone characteristics support the conceptual model that there are significant differences between the mesas and the canyons in hydrologic behavior and in downward fluxes. Unfortunately, there are not enough data to test for significant differences between dry and wet canyons.

SUMMARY AND CONCLUSIONS

Field observations, data and numerical models were used in conjunction to develop and test the conceptual models of vadose zone hydrology beneath the Pajarito Plateau. Many of our findings have relevance to studies being conducted in other arid and semiarid regions and provide insights into flow and transport mechanisms, the role of hydrogeology in controlling vadose zone flow, and the influence of topographic and surface water flow conditions on infiltration and deep percolation. Therefore, understanding of the unsaturated zone hydrologic processes studied here should have a general applicability and interest that goes beyond the characterization of the Pajarito Plateau in north-central New Mexico. Our principle findings and the means for reaching these conclusions are summarized below.

Topography and Surface-Water Setting. The conceptual models distinguish differences among wet canyons, dry canyons and mesas, and mountain-front mesas. Wet canyons receive larger quantities of deep infiltration due to surface and shallow groundwater flow in alluvium. In contrast, little net infiltration occurs beneath dry canyons and mesas. Mountain-front mesas receive consid-

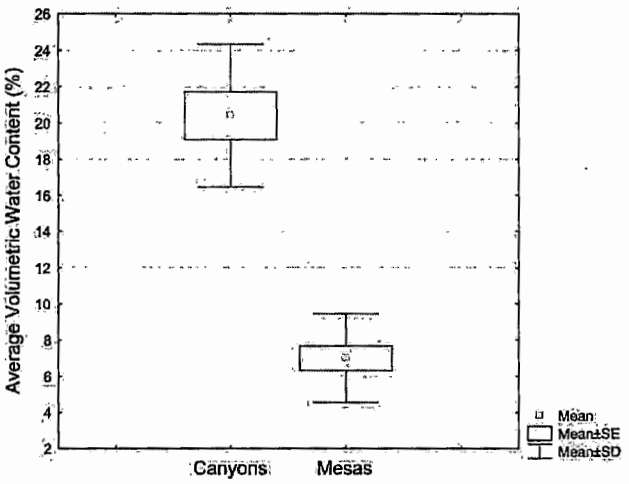

Fig. 14. Box and whisker plot comparing canyon and mesa volumetric water contents.

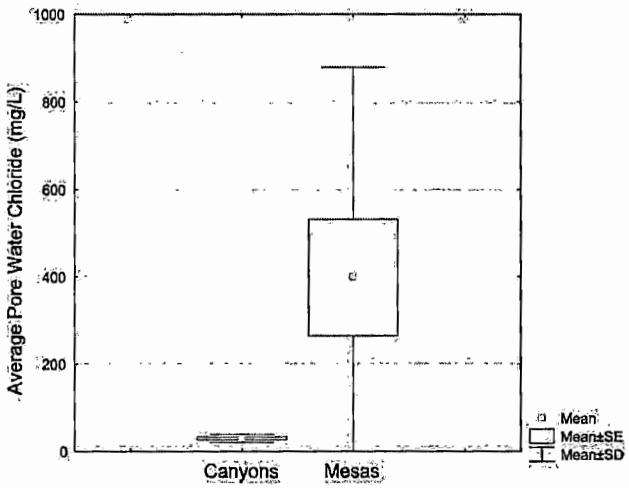

Fig. 15. Box and whisker plot comparing canyon and mesa pore water chloride concentrations.

erably more infiltration, and the particular hydrostratigraphic conditions give rise to localized perched water, and lateral flow through fractures to nearby springs. These ideas are supported by the following observations and interpretations of data from across the plateau:

- Moisture profile measurements and numerical simulation of vadose zone flow
- Major ion, stable-isotope, and contaminant concentration measurements
- Water budget studies in individual canyons (Gray, 1997; Kwicklis et al., 2005)
- Tracer tests in perched water for the mountain-front mesa case

Anthropogenic Impacts. Both canyons and mesas can be significantly changed from their natural conditions by human activities. On mesas, asphalt pavements on mesas reduce ET, and moisture builds up underneath. If the asphalt focuses runoff or subsequently cracks, localized high infiltration can take place in a location where it ordinarily would not. In canyons, effluent discharges from LANL or Los Alamos County sources can significantly increase surface and alluvial groundwater flow, which in turns typically increases the infiltration rate to the deeper vadose zone. These ideas are supported by the following observations and interpretations:

- Measurements and numerical modeling of water contents beneath and adjacent to areas paved to support LANL facilities
- Water content and contaminant transport measurements and numerical modeling of canyons impacted by LANL facilities

Flow and Transport Mechanisms. The two principle stratigraphic units of interest for vadose zone flow and transport beneath the Pajarito Plateau are the Bandelier Tuff and Cerros del Rio basalt. Water percolates through the porous and permeable matrix of most subunits of the Bandelier Tuff. Many of these units are sparsely fractured, but even for those with fractures, water quickly imbibes into the matrix. An exception is the uppermost units of the Tshirege Member, present in the western part of the Laboratory, near the mountain front, where rapid lateral transport through fractures has been observed. The basaltic rocks exhibit rapid flow and transport through fractures. These ideas are supported by the following observations and interpretations:

- Water content, major ion, and contaminant transport measurements and numerical modeling
- Field measurements at an instrumented site in basalt (Stauffer and Stone, 2005)
- Fluid injection tests in the Bandelier Tuff (Robinson et al., 2005a)

Vadose Zone Travel Times. Travel times of contaminants from wet canyons to the regional aquifer can be as short as several years to several decades. The shortest travel times occur when water infiltrates directly into fractured basalt. When significant thickness of Bandelier tuff is present, travel times on the order of decades are more common. Travel times to the water table for dry canyons or undisturbed mesas are much longer; times in excess of thousands of years are consistent with the available data. These ideas are supported by the following observations and interpretations:

- Numerical modeling of wet canyons (Robinson et al., 2005c)
- Contaminant profiles in vadose zone boreholes
- Chloride and isotope profiles in mesa-top boreholes
- Regional aquifer contaminant concentrations from groundwater surveillance activities (LANL, 2004c, 2003a)

In conclusion, the conceptual models provide a general picture of the relevant processes controlling vadose zone flow and transport at the LANL site. Preliminary assessments of a particular site on the Pajarito Plateau can be based on the results presented herein. More detailed, site-specific investigations may be required to develop in-depth understanding and models with predictive capability. In those cases, the conceptual models serve as guiding sets of principles on which site-specific data-collection programs can be based.

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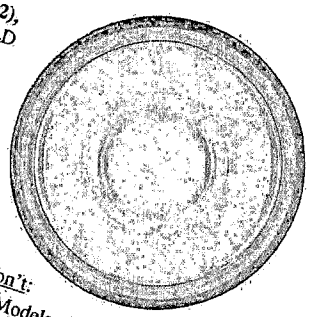
UNCLASSIFIED



Los Alamos
NATIONAL LABORATORY
Los Alamos NM 87545

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United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the United States Department of the Interior, Bureau of Land Management and Bureau of Indian Affairs; and the New Mexico Agricultural Experiment Station

Soil Survey of Sandoval County Area, New Mexico,

Parts of Los Alamos, Sandoval, and Rio Arriba Counties

How To Use This Soil Survey

General Soil Map

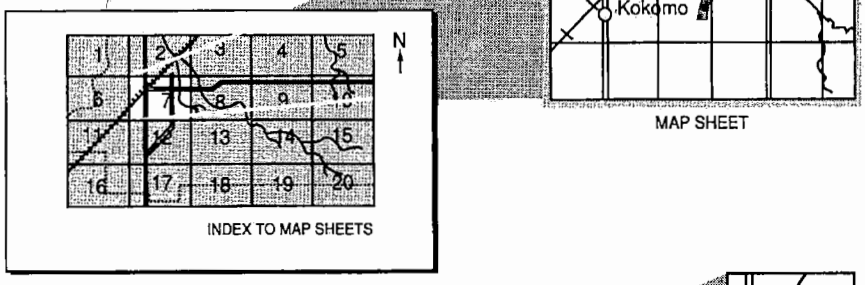
The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

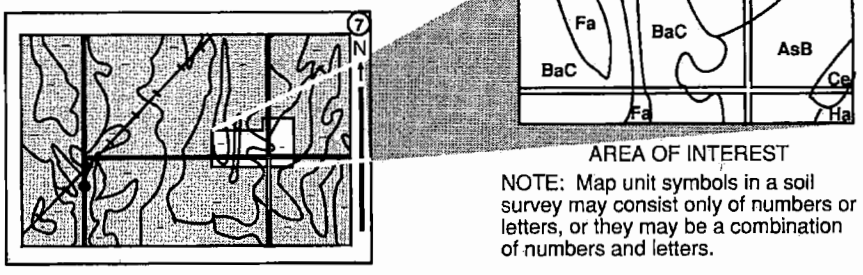
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.



Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1977-1985. Soil names and descriptions were approved in 1987. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This survey was made cooperatively by the Natural Resources Conservation Service and the United States Department of Interior, Bureau of Land Management and Bureau of Indian Affairs; and the New Mexico Agricultural Experiment Station. The survey is part of the technical assistance furnished to the San Juan, Cuba, Coronado, Ciudad, and Santa Fe-Pojoaque Soil and Water Conservation Districts.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: "Valle Grande," is the Spanish term for "great valley." Depicted here is a typical landscape of the Cosey-Jarmillo association, 2 to 20 percent slopes, in the foreground; Panlon very cobbly sandy loam, 35 to 65 percent slopes, is on the steep mountain slopes in the far background.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

Contents

Issued 2008

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Dennis Alexander
State Conservationist

Soil Survey of Sandoval County Area, New Mexico,
Parts of Los Alamos, Sandoval, and Rio Arriba Counties

By Leroy Hacker, Natural Resources Conservation Service and Christopher Banet, Bureau of Indian Affairs

Fieldwork by Leroy Hacker, Dale Swanson, Mark Seyfried, Tommie Parham, and Javier Ruiz, Natural Resources Conservation Service, and Christopher Banet and William Rigdon, Bureau of Indian Affairs

United States Department of Agriculture, Natural Resources Conservation Service
in cooperation with United States Department of the Interior, Bureau of Land Management, Bureau of Indian Affairs, and New Mexico Agricultural Experiment Station

General Nature of the Survey Area

Sandoval County Area is in north-central New Mexico. The survey area is bordered on the north by the Jicarilla Apache Area, Rio Arriba County Area, and the Santa Fe National Forest; on the east by Santa Fe County; on the south by Bernalillo County; and on the west by Cabezon Area, Cibola Area, McKinley County Area, and San Juan County, Eastern Part. It has a total of 1,550,000 acres or about 2,422 square miles, and includes parts of Sandoval and Los Alamos Counties.

Bernalillo, the county seat of Sandoval County, is on the Rio Grande in the south-central part of the survey area. Los Alamos, the county seat of Los Alamos County, is in the north-eastern corner of the survey area. Highways N.M. 550, 96, and 4, U.S. 85, Interstate 25, and the Santa Fe railway traverse the survey area.

The Rio Grande, the only perennial stream, traverses the eastern part of the survey area from north to south. The Rio Puerco and Jemez River are intermittent streams in the west and central parts of the survey area.

Elevation ranges from about 11,252 feet on Redondo Peak, the highest point in the survey area, to about 5,000 feet where the Rio Grande enters Bernalillo County.

Principal land uses in the survey area are livestock grazing, wood and timber harvesting, recreation, wildlife production, high-intensity irrigated farming, and urban development. The irrigated farming is in the Rio Grande and Jemez River Valleys. Urban development is concentrated in the Rio Rancho area.

Descriptions, names and delineations of the soils in this survey area do not fully agree with those of Bernalillo, Cabezon, San Juan, or Santa Fe Counties. This is the result of new concepts of soil classification, changes in series concepts, different needs and uses, and the time the soil survey work was performed. Map unit differences are noted in the map unit descriptions. Updated correlations are in progress for these older surveys.

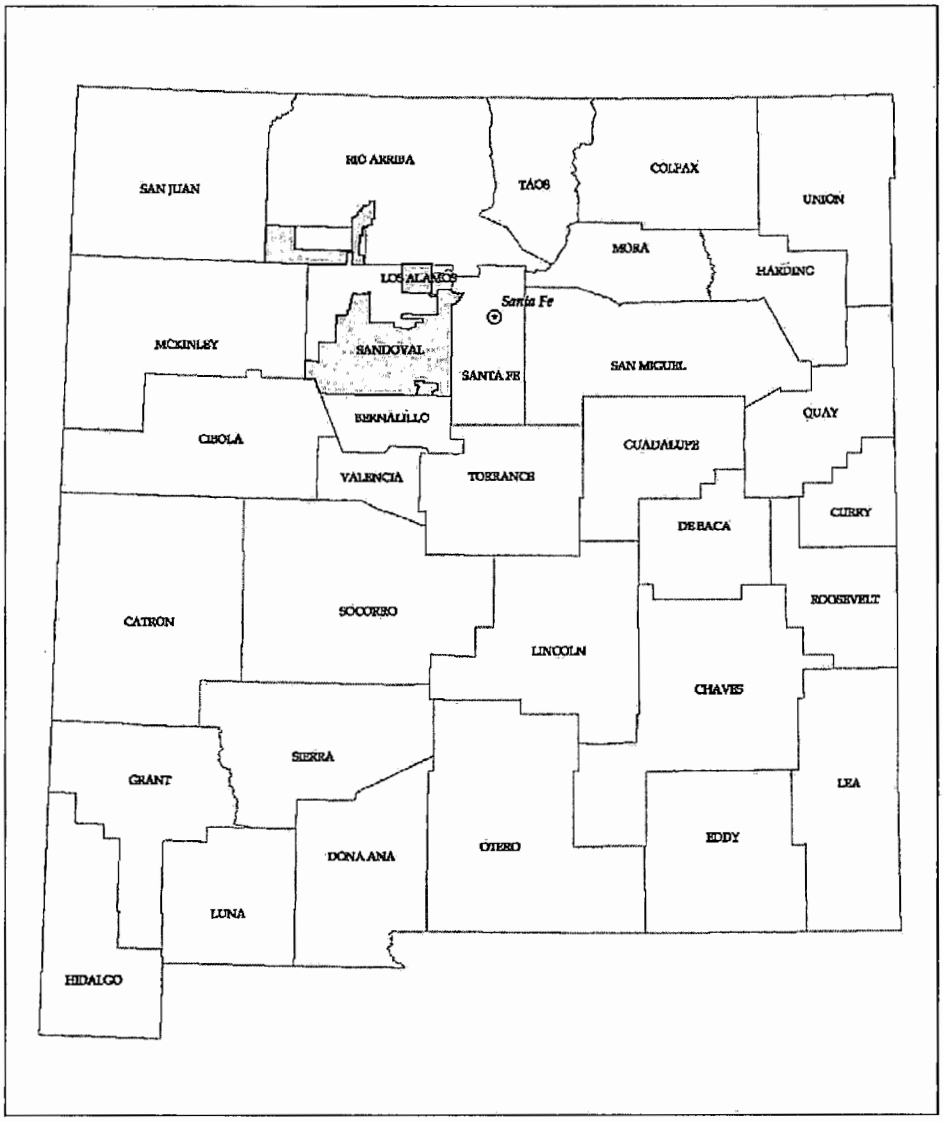


Figure 1.—Location of Sandoval County Area, New Mexico.

Agriculture

Agriculture in Sandoval and Los Alamos counties is many centuries old. Records indicate that Pueblo Indians were irrigating land and growing crops when first encountered by the Spaniards in 1540. They have continued to irrigate their lands up to the present time. Although there are a number of small and widely separated tracts of irrigated land in the valleys of the Jemez River, Rio Puerco, and their tributaries, most of the land now irrigated is in the Rio Grande Valley.

These lands along the Rio Grande are in an organized irrigation district known as the Middle Rio Grande Conservancy District. It was formed in 1925 to consolidate the many old ditch and diversion headings into major diversion dams and irrigation systems.

Water supplies generally are not as dependable for the small and scattered tracts of irrigated land that lie outside the Rio Grande Valley. Irrigation water for these lands

comes from the smaller streams originating in the mountains, and generally is available only in the spring or following periods of heavy rainfall.

The 16,000 acres of irrigated land is all within Sandoval County. Although this is a very small percentage of the total land area, it contributes much to the economy of the area. Wide varieties of crops are grown; however, many are of extremely limited acreage. Alfalfa, corn, and small grains, which are the principal crops, are grown on approximately 50 percent of the irrigated land.

Dryland farming, which was practiced to a limited extent in the western and northern parts of Sandoval County, has declined to the point that little land is now used for this purpose. Between 1920 and 1940, homesteaders settled in the more suitable parts of this area and acquired tracts of 320 to 640 acres on which they grew beans and corn successfully in some years. The low and erratic rainfall, however, made dryland farming extremely hazardous, and raising livestock gradually replaced the production of crops.

A high percentage of the land in this area is used for grazing livestock, and ranching is the principal type of agricultural enterprise. Livestock operations range from small flocks of sheep to medium-sized cow-calf-yearling operations.

Wildlife and recreation are also important land uses in this survey area. The high mountainous parts of this area, as well as adjacent foothills, provide good habitat for many species of wildlife and many opportunities for outdoor recreation such as camping, fishing, hunting, and other outdoor activities.

History of the Survey Area

The region has had continuous habitation since the Ice Age (Sandia Man Cave), and is presently the home of eight Indian pueblos.

Near Los Alamos, Bandelier National Monument is a spectacular open record of sporadic farming dating almost 3,000 years ago. In the next thousand years (nearly 2000 B.C.), a more established type of farming was taking place by people inhabiting the cave shelters of the canyon.

Further down river, the distinctive natural river crossing of the Rio Grande just north of the Sandia Mountains is the geographic crossroads of the area. North, south, east, and west traffic was centered in and around Bernalillo, which is now the County Seat of Sandoval County.

The first land to be settled by Spanish colonists in the winter of 1540 was near Bernalillo. Like the Pueblo Indians, they farmed the flat lands along the river and throughout the next century, settlers began establishing ranches there.

In the 1620s, the Spanish built mission churches in the Rio Grande pueblos. By 1680, there were 3,000 Spaniards in this region called New Spain, and ten times that many Indians. In 1680, the Indians rose up and drove the Spanish out of the valley back to Mexico, where they stayed for 15 years before returning to New Mexico.

Bernalillo was established as a village in 1695. Vineyards and orchards were planted and were an important industry in the central valley. Sheep ranching in the 18th and 19th centuries was an important occupation of the Spanish land grant families.

In 1848, General Kearney took possession of New Mexico for the United States. In 1849, Sandoval was called Santa Ana County and by 1852, another change established the county borders running across Arizona to the California line. In 1876, Santa Ana County was abolished and the area was annexed to Bernalillo County. In 1903, it was named Sandoval County for a prominent family in the area at the time. Finally on March 16, 1949, the County of Los Alamos was formed from portions of Sandoval and Santa Fe Counties.

In 1942, the Federal government purchased most of what is now Los Alamos County for use in developing the world's first atomic fission weapon. The Atomic

Energy Commission, predecessor to the Department of Energy, took control of Los Alamos Scientific Laboratory (LASL) in 1947. The area became an "open city" in 1957 when restrictive access was lifted. In 1980, the lab's name was changed to Los Alamos National Laboratory (LANL). LANL continues to be one of the outstanding research centers of the world today, and operates in cooperation with the University of California.

In 2000, the population of Sandoval County was about 89,908 and that of Los Alamos County was about 18,343.

The Geology and Geomorphology of Sandoval County

The geology and geomorphology of Sandoval County is a complex area including portions of two major physiographic divisions. A portion of the northwestern corner of the county falls within the Rocky Mountain System major division, and more specifically within the Southern Rocky Mountains physiographic province. This area is characterized by complex mountains of various types and intermountain basins. The remainder of the county is included within the Intermontane Plateaus major division. Within this division are portions of the Colorado Plateaus physiographic province, Navajo and Datil sections; and the Basin and Range physiographic province, Mexican Highland section.

The Southern Rocky Mountain physiographic province includes the Jemez and Nacimiento mountains. The Nacimiento Mountains are the surface expression of the Nacimiento uplift and fault zone. The western edge of the Nacimiento Mountains is bordered by the westerly dipping Mesozoic rocks of the San Juan Basin. The Nacimiento uplift has been slightly overthrust to the west and formed a prominent hogback between the east edge of the San Juan Basin and the west edge of the uplift. The Nacimiento Fault escarpment extends north to south from northeast of Cuba to a point west of San Ysidro. Most of this escarpment is composed of Precambrian age granite. The granite is overlain by upper Paleozoic rocks in an irregular, 3 to 6 mile wide band along its eastern edge. These are in turn overlain by the younger deposits of volcanic flows and pyroclastics that form the broad based cone surrounding the Jemez volcanic center. The cone extends south to the Jemez Pueblo, and to the west bank of the Rio Grande.

The Jemez Mountains are the dominant physical feature in this area. These mountains were created through volcanic activity. The remnant volcanic caldera is one of the largest caldera features on the earth. Several resurgent domes have risen in the interior of the caldera with the largest cone rising to an elevation of 11,252 feet above sea level. Within the Jemez Mountains, large volumes of volcanic tuff and pumice are found. These materials represent two large eruptions that shaped the form of these mountains. Huge amounts of volcanic gases and ash representing 50 cubic miles of rock materials were ejected from the destroyed composite volcano. Ash clouds drifted as far north and east as Iowa. The welded ash known as the Bandelier Tuff was deposited by these eruptions. Geothermal springs are well represented in these mountains. The source of the hot water is shallow, hot rocks bearing evidence to the areas volcanic past.

The Colorado Plateau physiographic province covers the northwest portion of the county. This area is represented by the southeastern portion of the San Juan Basin. Tertiary aged rocks of the San Jose Formation and the Nacimiento Formation are found at the ground surface. These units consist of sandstone, siltstone, and claystone. Some of the clays have high shrink-swell potential. Some Cretaceous aged marine sandstones and shale are also found on the flanks of the San Juan Basin. Some of the marine deposited shale are quite thick and contribute to water quality issues due to the large amounts of salts found in these units.

The Navajo Section of the Colorado Plateau physiographic province is found in the southwest corner of the survey area. It is characterized by a young plateau with minor relief. The plateau is formed from Cretaceous aged marine sandstone and shale. The landforms represented include mesas and canyons with eroded shale plains. Exposures of underlying Triassic and Jurassic aged rocks are scattered across the area but generally concentrated on the western flanks of the Nacimiento Mountains. These exposures in some cases are the result of erosion of the overlying, relatively soft Cretaceous rocks, but more commonly due to the movement of deep seated faults. Volcanic necks and lava flows are found in the westernmost portion of this area. These Tertiary aged rocks and flows are scattered through the Rio Puerco valley. The western extent of these flows form Mesa Chivato. Cabezon Peak is the largest and best known volcanic neck in the region. Its prominent profile is due to the erosion of softer Cretaceous aged rocks that surround the more erosive resistant volcanic materials.

The Navajo Section is drained by the Rio Puerco. The river is deeply incised within the highly erosive silty to sandy soils. Some of the extent of the erosion was caused by relocation of the channel south of Cuba by the highway department. The relocation of the channel caused a shortening and steepening of the channel geomorphology. The result of these changes caused the river to downcut in excess of 20 feet in some areas. The remainder of the watershed was forced to adjust to the newly created base level. The result of this adjustment was large-scale erosion and the movement of extreme amounts of sediment down the Rio Puerco and into the Rio Grande.

The Basin and Range physiographic province located within Sandoval County is found in the southeast corner of the county. The Mexican Highland section is characterized by isolated mountain ranges separated by aggraded desert plains. From the southern and southeastern boundary of the Jemez volcanic deposits, the land surface is covered with the poorly indurated rocks of the Tertiary aged Santa Fe Group. These basin fill deposits are associated with materials moving from surrounding mountains and highlands and filling the down-dropped basins that formed the ancestral Rio Grande River corridor. The extreme southeastern corner of the survey includes the northern end of the Sandia Mountains. The Sandia Mountains are the uplifted portion of a massive fault block that exposes Precambrian aged granite to the west, and is capped with easterly dipping Pennsylvanian aged limestone and sandstone. Geologic hazards, including radon gas and collapsible soils, are associated with alluvial fans and channels draping off the flanks of the Sandia Mountains. The mode of deposition of much of the alluvial fans makes them favorable to the development of collapsible soils.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous

areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Mapping Unit Composition

Soils in this survey area were mapped at two levels of detail. The detail of mapping in an area was selected based on the area's anticipated long term use.

At the most detailed level, mapping units are narrowly defined. Soil boundaries are plotted and verified at closely spaced intervals. Agricultural areas along the Rio Grande Valley were mapped at this level of detail.

Most of the survey area is used as rangeland, and mapping was performed at a less detailed level. The mapping units in this area are broadly defined. Soil boundaries were plotted and verified at widely spaced intervals. In general, these mapping units are less homogeneous and contain more minor soil components areas than the more detailed mapping units. These units are designed primarily for planning the management of large tracts of land as rangeland. They provide general information for development, but the information should be used with caution. Onsite investigation is essential to provide the detail needed for planning intensive land uses.

Climate

Prepared by the Natural Resources Conservation Service National Water and Climate Center, Portland, Oregon.

Climate tables are created from climate stations Cuba, Jemez Springs, Torreon Navajo Mission, and Wolf Canyon, New Mexico.

Thunderstorm days, relative humidity, percent sunshine, and wind information are estimated from First Order station in Albuquerque, New Mexico.

Table 1 gives data on temperature and precipitation for the survey area as recorded at these four climate stations in the period 1971 to 2000. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, average temperatures are 27.2, 34.9, 30.9 and 24.0 degrees F at Cuba, Jemez Springs, Torreon, and Wolf Canyon, respectively. Average daily minimum temperatures are 10.5, 21.5, 17.4, and 9.3 degrees, respectively. The lowest temperatures on record were -40 degrees at Cuba on February 1, 1951; and -18 degrees at Jemez Springs, -33 degrees at Torreon, and –36 degrees at Wolf Canyon, all on January 6, 1971.

In summer, average temperatures are 64.5, 70.1, 70.0, and 56.7 degrees, respectively, at Cuba, Jemez Springs, Torreon, and Wolf Canyon. Average daily maximum temperatures are 83.1, 86.8, 87.0, and 73.9 degrees, respectively. The highest temperatures ever recorded were 102 degrees at Cuba on July 3, 1953; 101 degrees at Jemez Springs on July 28, 1995; 107 degrees at Torreon on August 9, 1962; and 90 degrees at Wolf Canyon on July 11, 1958.

Growing degree days are shown in Table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Average annual total precipitation is variable across this soil survey area. In general, lower elevations, mostly in the south and west, receive between 8 and 12 inches of annual precipitation, while to the north amounts increase with elevation, and are generally between 11 and 18 inches. Elevations above 7,000 feet receive up to 30 inches or more, depending on slope and other factors. Average annual precipitation at these four stations is 12.57 inches at Cuba, 17.63 inches at Jemez Springs, 10.80 inches at Torreon, and 24.28 inches at Wolf Canyon (at 8,220 feet in elevation). Generally, about half of the annual precipitation falls between June and September at elevations below 7,500 feet, but in the higher mountainous elevations a greater percentage of precipitation falls as snow during the winter. The heaviest 1-day precipitation amounts during the periods of record were 2.25 inches at Cuba on October 31, 1998; 2.78 inches at Jemez Springs on October 16, 1960; 1.89 inches at

Torreon on August 15, 1994; and 3.35 inches at Wolf Canyon on July 25, 1962. Thunderstorms occur on about 40 days each year (with slightly more at the higher elevations), and most occur between May and September, with more than 22 in July and August.

Average seasonal snowfall over the area also is quite dependent on elevation and location relative to the mountains. Average annual snowfall is 27.6, 32.5, 20.5, and 128.1 inches, respectively, at Cuba, Jemez Springs, Torreon, and Wolf Canyon. The greatest snow depths at any one time during the periods of record were 22 inches at Cuba, recorded on December 20, 1967; 20 inches at Jemez Springs, on January 16, 1987; 16 inches at Torreon on March 22, 2000; and 46 inches at Wolf Canyon on February 2, 1979. On average, about 15 to 25 days per year have at least 1 inch of snow on the ground at lower elevations, while at higher elevations up to 90 days or more are snow-covered. For these four stations, number of days ranges from 18 at Cuba and Torreon, to 25 at Jemez Springs, and 96 days at Wolf Canyon. The heaviest 1-day snowfalls on record were 13.5 inches at Cuba, recorded on March 4, 1964; 19.8 inches at Jemez Springs on January 16, 1987; 14.0 inches at Torreon on March 21, 2000; and 26.0 at Wolf Canyon on January 16, 1987.

The average relative humidity in mid-afternoon is about 40 percent in the winter and between 15 and 20 percent in the summer. Humidity is higher at night, and the average at dawn is about 70 percent in the winter and 45 percent in the summer. The sun shines about 75 to 80 percent of the time in summer and around 65 to 70 percent in winter. The prevailing wind is from the northwest in the winter and early spring and from the south and southeast the remainder of the year. Average wind speed is highest, around 12 miles per hour, in April.

General Soil Map Unit Descriptions

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

Dry soils on plateaus and flood plains

This group consists of two map units and makes up about 9 percent of the survey area. The slopes range from 0 to 15 percent, but included areas range to 40 percent. The present vegetation consists of grass and shrubs. Elevation is 5,000 to 6,000 feet. The average annual precipitation is 8 to 10 inches; the average annual air temperature is 53 to 55 degrees F., and the average frost-free period is 140 to 160 days.

The soils in this group formed in alluvium and eolian material derived from sediment of mixed sources.

The soils in this group are used for irrigated farming, urban development, and wildlife habitat.

1. Gilco-Trail-Peralta

Very deep soils on the flood plain of the Rio Grande River

This map unit is in the east-central part of the survey area along the Rio Grande River. The slopes range from 0 to 4 percent. The native vegetation on this unit consists mainly of grasses and shrubs. Elevation is 5,000 to 6,000 feet. The average annual precipitation is 8 to 10 inches; the average annual air temperature is 53 to 55 degrees F., and the average frost-free period is 140 to 160 days.

This unit makes up about 3 percent of the survey area. It is about 34 percent Gilco and similar soils, 26 percent Trail and similar soils, and 15 percent Peralta soils. The remaining 25 percent is comprised of components of minor extent.

Gilco soils are on the flood plain of the Rio Grande River. These soils are very deep, moderately well drained, and moderately permeable. They formed in stream alluvium. The surface layer is brown loam about 4 inches thick. The underlying material is light yellowish brown stratified silt loam, loam, and fine sandy loam to a depth of 60 inches or more.

Trail soils are on the flood plain of the Rio Grande. These soils are very deep, moderately well drained, and moderately rapidly permeable. They formed in eolian material and stream alluvium. The surface layer is light yellowish brown fine sandy loam about 9 inches thick. The upper 27 inches of the underlying material is very pale brown loamy sand. The lower part is very pale brown sandy loam to a depth of 60 inches or more.

Peralta soils are on the flood plain of the Rio Grande. These soils are very deep, somewhat poorly drained, and moderately permeable. They formed in stream alluvium. The surface layer is brown loam about l0 inches thick. The underlying layer is stratified brown, light yellowish brown, pale brown, and yellowish brown very fine sandy loam, fine sandy loam, loamy sand, and loamy fine sand, with thin lenses of silt loam, and clay loam to a depth of 60 inches or more.

Other soils and miscellaneous areas in this unit are Jocity and Sparham soils and Riverwash along the Rio Grande channel.

This unit is used mainly for irrigated crops. It is also used for wildlife habitat, urban development, and livestock grazing. The hazard of soil blowing and seepage are the main limitations for most uses.

This unit supports a diversity of wildlife habitats, including riparian trees, river, and wetland; irrigated croplands, orchards, and rural residential.

Characteristic wildlife includes raccoon, striped skunk, cottontail rabbit, pocket gopher, mourning dove, pheasant, swallow, bullsnake, and woodhouse toad. The aquatic and wetland habitats support beaver, muskrat, and bullfrogs. This unit is an important migratory corridor for sandhill cranes, snow geese, and ducks.

2. Sheppard-Grieta

Very deep soils on dunes and ridges

This map unit is in the south-central part of the survey area. The slopes range from 1 to 15 percent. The vegetation on this unit consists mainly of grasses and shrubs. Elevation is 5,000 to 6,000 feet. The average annual precipitation is 8 to 10 inches; the average annual air temperature is 53 to 55 degrees F., and the average frost-free period is 140 to 160 days.

This unit makes up about 6 percent of the survey area. It is about 45 percent Sheppard soils and 43 percent Grieta soils. The remaining 12 percent is comprised of components of minor extent.

Sheppard soils are on dunes. These soils are very deep, somewhat excessively drained, and rapidly permeable. They formed in eolian sands. The surface layer is light brown loamy fine sand about 3 inches thick. The upper 24 inches of the underlying material is strong brown loamy fine sand. The lower part is pink loamy fine sand to a depth of 60 inches or more.

Grieta soils are on ridges. These soils are very deep, well drained, and moderately permeable. They formed in eolian material and fan alluvium. The surface layer is brown loamy fine sand about 7 inches thick. The subsoil is yellowish brown and pale brown sandy clay loam about 14 inches thick. The substratum is light yellowish brown, white, and very pale brown coarse sandy loam to a depth of 60 inches or more.

Other soils in this unit are Cascajo, Embudo, and Tijeras soils.

This unit is used mainly for urban development. It is also used for wildlife habitat and livestock grazing. A hazard of soil blowing due to the sandy surface layers is the main limitation to most uses. Vegetative cover aids in the control of soil blowing.

This unit furnishes a desert grassland wildlife habitat which has been heavily impacted by human activities. While the vegetative base is in fair or good condition, the habitat has been degraded.

Characteristic wildlife includes coyote, badger, kit fox, scaled quail, horned lark, western kingbird, collared lizard, and prairie rattlesnake.

Moist soils on valley floors, valley sides, plateaus, cuestas, and mesas

This group consists of 11 map units. It makes up about 82 percent of the survey area. The slopes range from 0 to 60 percent but may climb to 70 percent. The present vegetation consists of grass and trees. Elevation is dominantly 5,500 to 6,500 feet, but ranges from 5,000 to 7,500 feet. The average annual precipitation is 10 to 16 inches; the average annual air temperature is 48 to 54 degrees F., and the average frost-free period is 110 to 140 days.

The soils formed in alluvium, colluvium, and eolian materials derived from volcanic rocks, gypsum, limestone, sandstone, and shale.

This group is used for livestock grazing, fuel wood, and wildlife habitat.

3. Harvey-Cascajo-Ildefonso

Very deep soils on mesas, hills, and fan terraces

This map unit is in the eastern part of the survey area. The slopes range from 1 to 45 percent. The vegetation on this unit consists mainly of grasses and shrubs. Elevation is 6,300 to 6,500 feet. The average annual precipitation is 10 to 13 inches; the average annual air temperature is 52 to 54 degrees F.; and the average frost-free period is 120 to 140 days.

This unit makes up about 9 percent of the survey area. It is about 30 percent Harvey and similar soils, 23 percent Cascajo and similar soils, and 22 percent Ildefonso and similar soils. The remaining 25 percent is comprised of components of minor extent.

Harvey soils are on mesas. These soils are very deep, well drained, and moderately permeable. They formed in eolian material and fan alluvium. The surface layer is pinkish gray loam about 4 inches thick. The subsoil is pinkish gray loam about 6 inches thick. The upper 31 inches of the substratum is pinkish gray and pink clay loam. The lower part is reddish yellow sandy clay loam to a depth of 60 inches or more.

Cascajo soils are on hills. These soils are very deep, excessively drained, and rapidly permeable. They formed in fan alluvium. The surface layer is pale brown and very pale brown very gravelly sandy loam about 5 inches thick. The upper 6 inches of the underlying material is very pale brown very gravelly sandy loam. The next 19 inches is pale and light brown very gravelly loamy sand. The lower part is light brown extremely cobbly loamy sand to a depth of 60 inches or more.

Ildefonso soils are on fan terraces. These soils are very deep, well drained, and moderately rapidly permeable. They formed in colluvium and fan alluvium. The surface layer is brown cobbly loam about 2 inches thick. The subsoil is brown and pale brown very gravelly loam about 11 inches thick. The upper 27 inches of the substratum is very pale brown very cobbly sandy loam. The lower part is very pale brown extremely cobbly sand to a depth of 60 inches or more.

Other soils and miscellaneous areas in this unit are Skyvillage, Pastura, and Placitas soils, and Riverwash.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat and urban development. Slope and droughtiness are the main limitations to most uses. Overgrazing is an important concern of management because it increases the risk of water erosion, and promotes an increase of undesirable plants.

This unit contains both desert grassland and juniper grassland wildlife habitats. There is little habitat diversity other than shrub thickets in the drainage ways.

Characteristic wildlife includes coyote, kit fox, blacktailed jackrabbit, kangaroo rat, spotted ground squirrel, horned lark, burrowing owl, scaled quail, striped whiptail lizard, bullsnake, and western rattlesnake.

4.Pinavetes-Clovis-Zia
Very deep soils on dunes, plains, alluvial fans, and stream terraces

This map unit is in the central part of the survey area. The slopes range from 1 to 35 percent. The vegetation on this unit consists mainly of grasses and shrubs with scattered trees. Elevation is 5,100 to 7,200 feet. The average annual precipitation is 10 to 13 inches. The average annual air temperature is 52 to 54 degrees F.; the average frost-free period is 120 to 140 days.

This unit makes up about 9 percent of the survey area. It is about 32 percent Pinavetes soils, 25 percent Clovis soils, and similar soils, and 23 percent Zia soils. The remaining 20 percent is comprised of components of minor extent.

Pinavetes soils are on dunes. These soils are very deep, excessively drained, and rapidly permeable. They formed in eolian sands derived dominantly from sandstone. The surface layer is light yellowish brown loamy sand about 10 inches thick. The underlying material is light yellowish brown sand to a depth of 60 inches or more.

Clovis soils are on plains. These soils are very deep, well drained, and moderately permeable. They formed in eolian material and slope alluvium. The surface layer is pale brown fine sandy loam about 3 inches thick. The subsoil is brown sandy clay loam about 19 inches thick. The substratum is light brown and reddish yellow sandy clay loam to a depth of 60 inches or more.

Zia soils are on alluvial fans and stream terraces. These soils are very deep, well drained, and moderately rapidly permeable. They formed in eolian material and fan and stream alluvium. The surface layer is pale brown sandy loam about 5 inches thick. The upper 9 inches of the underlying material is pale brown sandy loam. The lower part is light gray, very pale brown, and light yellowish brown sandy loam and sandy clay loam to a depth of 60 inches or more.

Other soils and miscellaneous areas in this unit are Sandoval and Skyvillage soils, Rock outcrop, and Riverwash.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat and urban development. Soil blowing is the main limitation for most uses. Overgrazing is an important concern of management because it increases the risk of soil blowing and promotes an increase in undesirable plants.

This unit consists of desert shrub, and desert grassland wildlife habitat is interspersed by thin shrub thickets along drainageways. Habitats have been rated as fair for pronghorn and poor for mule deer.

Characteristic wildlife include coyote, kit fox, pronghorn antelope, blacktailed jackrabbit, spotted ground squirrel, horned lark, prairie falcon, meadowlark, horned lizard, bullsnake, and prairie rattlesnake.

5. Sparank
Very deep soils on alluvial fans

This map unit is in the west-central part of the survey area. The slopes range from 0 to 3 percent. The vegetation on this unit consists mainly of grasses and shrubs. Elevation is 5,500 to 6,400 feet. The average annual precipitation is 10 to 13 inches; the average annual air temperature is 52 to 54 degrees F., and the average frost-free period is 120 to l40 days.

This unit makes up about 3 percent of the survey area. It is about 82 percent Sparank and similar soils. The remaining 18 percent is comprised of components of minor extent.

Sparank soils are on alluvial fans. These soils are very deep, well drained, and very slowly permeable. They formed in stream alluvium. The surface layer is brown clay loam about 2 inches thick. The upper 22 inches of the underlying material is brown silty clay. The lower part is pale brown and dark grayish brown silty clay and silty clay loam to a depth of 60 inches or more.

Other soils and miscellaneous areas in this unit are Orlie, Pinavetes, and Zia soils, and Riverwash.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat, irrigated crops, and urban development. A hazard of flooding, slow permeability, and gullying are the main limitations for most uses. Overgrazing is an important concern of management because it increased the risk of flooding and gullying and promotes an increase in undesirable plants.

This unit consists of valley and bottomland grasslands wildlife habitats which are mostly in poor vegetative condition. Diversity of vegetation is provided by seasonal streamflow, wetlands, salt flats, and scattered thickets of trees or shrubs.

Characteristic wildlife includes blacktailed jackrabbit, pocket gopher, prairie dog, scaled quail, sandpiper, woodhouse toad, and garter snake.

6. Rock outcrop-Frijoles-Hackroy

Rock outcrop and deep to shallow soils on narrow mesas and plateaus formed from tuff and pumice

This map unit is in the northeastern part of the survey area. The slopes range from 1 to 8 percent. The vegetation consists mainly of pinyon and juniper. Elevation is 6,000 to 7,500 feet. The average annual precipitation is 13 to 16 inches; the average annual air temperature is 48 to 52 degrees F.; and the average frost-free period is 110 to 130 days.

This unit makes up about 3 percent of the survey area. It is about 52 percent Rock outcrop, 14 percent Frijoles soils, and 14 percent Hackroy soils. The remaining 20 percent is comprised of components of minor extent.

Rock outcrop is found on the edges and sides of mesas.

Frijoles soils are on mesas. These soils are deep, well drained, and moderately permeable. They formed in eolian material and alluvium. The surface layer is brown very fine sandy loam about 3 inches thick. The subsoil is brown very gravelly clay loam about 10 inches thick. The upper 7 inches of the substratum is pinkish gray extremely gravelly sandy loam. The lower part is pinkish white pumice pebbles to a depth of 60 inches or more.

Hackroy soils are on plateaus. These soils are very shallow or shallow, well drained, and slowly permeable. They formed in residuum. The surface layer is brown sandy loam about 3 inches thick. The subsoil is reddish brown clay about 10 inches thick. Tuff is at a depth of 13 inches.

Other soils in this unit are Hagerman, Nyjack, Penistaja, and Totavi.

This unit is used mainly for wildlife habitat. It is also used for urban development. Depth to tuff and pumice are the main limitations for most uses.

This unit contains a complex of wildlife habitat types. The valley is a combination of juniper grassland and shrub-forb grassland. Upslope there are valuable browse plants such as oak, sumac, saltbush, and sagebrush. There are pinyon-juniper woodlands on mesa tops and northern slopes. Stringers of ponderosa pine follow drainages and eastern slopes at higher elevations.

Characteristic wildlife includes mountain cottontail, coyote, woodrat, valley pocket gopher, scrub jay, raven, fence lizard, and western diamondback rattlesnake. The band-tailed pigeon uses this unit when foraging for oak acorns and pinyon nuts. The prominent rock outcrops furnish habitat for the ringtail, bats, and several hawks.

7. Bamac-Espiritu-Cochiti

Very deep soils on fan remnants, mountain slopes, and fan terraces

This map unit is in the east-central part of the survey area. The slopes range from 1 to 50 percent. The vegetation on this unit consists mainly of pinyon and juniper with an understory of grasses and shrubs. Elevation is 5,400 to 6,500 feet. The average

annual precipitation is 13 to 16 inches; the average annual air temperature is 48 to 52 degrees F.; and the average frost-free period is 110 to 130 days.

This unit makes up about 5 percent of the survey area. It is about 38 percent Bamac, 30 percent Espiritu and similar soils, and 13 percent Cochiti and similar soils. The remaining 19 percent is comprised of components of minor extent.

Bamac soils are on fan remnants. These soils are very deep, excessively drained, and very rapidly permeable. They formed in slope and fan alluvium. The surface layer is light yellowish brown very gravelly loamy sand about 4 inches thick. The upper 6 inches of the underlying material is light yellowish brown loamy sand. The lower part is very pale brown, pale brown, and pink very gravelly loamy coarse sand to a depth of 60 inches or more.

Espiritu soils are on mountain slopes. These soils are very deep, well drained, and moderately permeable. They formed in slope alluvium and colluvium. The surface layer is brown very gravelly fine sandy loam about 6 inches thick. The subsoil is brown and light brown very gravelly sandy clay loam about 16 inches thick. The substratum is stratified pale brown, strong brown, and reddish yellow very cobbly sandy clay loam, fine sandy loam, and very gravelly sandy loam to a depth of 60 inches or more.

Cochiti soils are on fan terraces. These soils are very deep, well drained, and slowly permeable. They formed in gravelly alluvium. The surface layer is dark yellowish brown gravelly loam about 7 inches thick. The upper 13 inches of the subsoil is reddish brown gravelly clay loam and very gravelly clay. The lower 9 inches is light reddish brown very gravelly clay loam. The substratum is light reddish brown very gravelly sandy loam to a depth of 60 inches or more.

Other soils and miscellaneous areas in this unit are Elpedro, Flugle, and Montecito soils, and Rock outcrop.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat and fuel wood production. A hazard of droughtiness, slope, and sandy surface layer are the main limitations for most uses. Overgrazing is an important concern of management because it increases the risk of water erosion and promotes an increase in undesirable plants.

This unit provides pinyon-juniper wildlife habitat which furnishes winter range for elk and mule deer.

Characteristic wildlife includes coyote, gray fox, rock squirrel, pinyon jay, plain titmouse, redtail hawk, short horned lizard, and blacktailed rattlesnake.

8. Silver-Ildefonso-Clovis

Very deep soils on mesas, fan terraces, and plains

This map unit is in the central part of the survey area. The slopes range from 1 to 15 percent. The vegetation on this unit consists mainly of grasses and shrubs. Elevation is 5,600 to 7,300 feet. The average annual precipitation is 10 to 13 inches; the average annual air temperature is 52 to 54 degrees F.; and the average frost-free period is 120 to 140 days.

This unit makes up about 8 percent of the survey area. It is about 43 percent Silver and similar soils, 20 percent Ildefonso and similar soils, and 19 percent Clovis and similar soils. The remaining 18 percent is comprised of components of minor extent.

Silver soils are on mesas. These soils are very deep, well drained, and slowly permeable. They formed in eolian material and slope alluvium. The surface layer is pale brown loam about 4 inches thick. The upper 16 inches of the subsoil is light brown and brown silty clay loam. The lower 19 inches is brown clay loam. The substratum is brown clay loam to a depth of 60 inches or more.

Ildefonso soils are on fan terraces. These soils are very deep, well drained, and moderately rapidly permeable. They formed in fan alluvium and colluvium derived from basalt. The surface layer is brown cobbly loam about 2 inches thick. The subsoil

is brown and pale brown very gravelly loam about 11 inches thick. The substratum is very pale brown very cobbly sandy loam and extremely cobbly sand to a depth of 60 inches or more.

Clovis soils are on plains. These soils are very deep, well drained, and moderately permeable. They formed in eolian material and slope alluvium. The surface layer is pale brown fine sandy loam about 3 inches thick. The subsoil is brown sandy clay loam about 19 inches thick. The substratum is light brown and reddish yellow sandy clay loam to a depth of 60 inches or more.

Other soils and miscellaneous areas in this unit are Sandoval, Orejas, and Prieta soils, and Rock outcrop.

This unit is used for livestock grazing. It is also used for wildlife habitat. Overgrazing is an important concern of management because of the increase in undesirable plants.

This unit consists of a mesa grassland wildlife habitat.

Characteristic wildlife includes coyote, blacktailed jackrabbit, ground squirrel, least chipmunk, prairie falcon, golden eagle, and bullsnake.

9. Royosa-Fragua

Very deep soils on dunes and fan remnants

This map unit is in the central part of the survey area. The slopes range from 1 to 8 percent. The vegetation on this unit consists mainly of pinyon and juniper with a grass understory. Elevation is 5,600 to 6,200 feet. The average annual precipitation is 13 to 16 inches; the average annual air temperature is 48 to 52 degrees F. and the average frost-free period is 110 to 130 days.

This unit makes up about 6 percent of the survey area. It is about 60 percent Royosa and similar soils and 35 percent Fragua and similar soils. The remaining 5 percent is comprised of components of minor extent.

Royosa soils are on dunes. These soils are very deep, somewhat excessively drained, and very rapidly permeable. They formed in eolian sands. The surface layer is very pale brown sand about 5 inches thick. The underlying material is brown and brownish yellow sand and loamy sand to a depth of 60 inches or more.

Fragua soils are on fan remnants. These soils are very deep, well drained, and moderately rapidly permeable. They formed in fan alluvium and eolian material derived from sandstone. The surface layer is brown loamy sand about 3 inches thick. The subsoil is brown sandy loam about 21 inches thick. The substratum is brown sandy loam to a depth of 60 inches or more.

Other soils and miscellaneous areas in this unit are San Mateo soils and Rock outcrop.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat and fuel wood production. A hazard of droughtiness, soil blowing, and a sandy surface layer are the main limitations for most uses. Overgrazing is an important concern of management because it increases the risk of soil blowing and promotes an increase in undesirable plants.

This unit provides juniper grassland and pinyon-juniper woodland wildlife habitats. Habitat condition is low and provides poor winter range for elk and mule deer.

10. Blancot-Badland-Councelor

Very deep soils and Badland on valley sides and stream terraces

This map unit is in the northwestern part of the survey area. The slopes range from 1 to 8 percent. The vegetation on this unit consists mainly of grasses and shrubs with widely scattered trees. Elevation is 6,600 to 7,000 feet. The average annual precipitation is 10 to 13 inches; the average annual air temperature is 48 to 52 degrees F.; and the average frost-free period is 120 to 140 days.

This unit makes up about 5 percent of the survey area. It is about 31 percent Blancot and similar soils, 25 percent Badland, and 20 percent Councelor soils. The remaining 24 percent is comprised of components of minor extent.

Blancot soils are on valley sides. These soils are very deep, well drained, and moderately slowly permeable. They formed in fan alluvium. The surface layer is pale brown fine sandy loam about 2 inches thick. The subsoil is grayish brown and yellowish brown clay loam about 21 inches thick. The substratum is pale brown and light brownish gray sandy loam with thin strata of silty clay loam to a depth of 60 inches or more.

Badland areas are on ridges and side slopes. They are derived from shale.

Councelor soils are on stream terraces. These soils are very deep, well drained, and moderately rapidly permeable. They formed in eolian material and stream alluvium. The surface layer is pale brown fine sandy loam about 2 inches thick. The upper 35 inches of the underlying material is pale brown fine sandy loam. The next 3 inches is pale brown clay loam. The lower part is pale brown sandy loam to a depth of 60 inches or more.

Other soils in this unit are Doakum, Mespun, Tsosie, and Lybrook soils.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat. A hazard of soil blowing, gullying, and water erosion are the main limitations for most uses. Overgrazing is an important concern of management because it increases the risk of soil blowing and gullying and promotes an increase of undesirable plants.

This unit provides a grassland wildlife habitat of low rating.

Characteristic wildlife includes coyote, prairie dog, pocket gopher, blacktailed jackrabbit, burrowing owl, horned lark, meadowlark, horned lizard, and western toad.

11. Sandoval-Querencia-Zia

Shallow and very deep soils on ridges, alluvial fans, and stream terraces

This map unit is in the west-central part of the survey area. The slopes range from 1 to 30 percent. The vegetation on this unit consists mainly of grasses and shrubs. Elevation is 5,100 to 7,000 feet. The average annual precipitation is 10 to 13 inches; the average annual air temperature is 52 to 54 degrees F.; and the average frost-free period is 120 to 140 days.

This unit makes up about 20 percent of the survey area. It is about 31 percent Sandoval and similar soils, 27 percent Querencia and similar soils, and 17 percent Zia and similar soils. The remaining 25 percent is comprised of components of minor extent.

Sandoval soils are on ridges. These soils are shallow, well drained, and moderately slowly permeable. They formed in slope alluvium. The surface layer is light yellowish brown fine sandy loam about 2 inches thick. The upper 4 inches of the underlying material is light gray clay loam. The lower part is light brownish gray clay loam to a depth of 15 inches. Shale is at a depth of 15 inches.

Querencia soils are on alluvial fans. These soils are very deep, well drained, and moderately permeable. They formed in fan alluvium and colluvium. The surface layer is light brownish gray sandy clay loam about 4 inches thick. The upper 8 inches of the subsoil is light yellowish brown clay loam. The lower 12 inches is pale yellow loam. The substratum is pale yellow loam to a depth of 60 inches or more.

Zia soils are on stream terraces and alluvial fan. These soils are very deep, well drained, and moderately rapidly permeable. They formed in eolian material and fan and stream alluvium. The surface layer is pale brown sandy loam about 5 inches thick. The underlying material is pale brown, light gray, very pale brown, and light yellowish brown sandy loam and sandy clay loam to a depth of 60 inches or more.

Other soils and miscellaneous areas in this unit are Saido, Camino, Winona, San Mateo, and Sparank soils, and Rock outcrop.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat. The hazard of soil blowing and water erosion are the main limitations for most uses. Overgrazing is an important concern of management because it increases the hazard of soil blowing and water erosion and promotes an increase of undesirable plants.

This unit furnishes a grassland wildlife habitat with shrubs located in drainages and on eroded areas. There is a herd of pronghorn antelope located east of Cabezon Peak. Overall pronghorn antelope habitat has been rated as low. An important migration route for elk and mule deer lies between Sierra Nacimiento and La Ventana Mesa.

Characteristic wildlife includes pronghorn antelope, blacktailed jackrabbit, coyote, kangaroo rat, prairie dog, horned lark, raven, ferruginous hawk, and golden eagle.

12. Menefee-Vessilla-Orlie

Shallow and very deep soils on hillslopes, mesas, and cuestas

This map unit is in the western and northwestern parts of the survey area. The slopes range from 2 to 60 percent. The vegetation consists mainly of pinyon and juniper. Elevation is 6,500 to 8,000 feet. The average annual precipitation is 13 to 16 inches; the average annual air temperature is 48 to 52 degrees F.; and the frost-free period is 110 to 130 days.

This unit makes up about 12 percent of the survey area. It is about 26 percent Menefee and similar soils, 25 percent Vessilla and similar soils, and 25 percent Orlie and similar soils. The remaining 24 percent is comprised of components of minor extent.

Menefee soils are on hillslopes. These soils are shallow, well drained, and slowly permeable. They formed in colluvium and residuum. The surface layer is light yellowish brown clay loam about 5 inches thick. The underlying material is light olive brown and light brownish gray clay loam to a depth of 17 inches. Shale is at a depth of 17 inches.

Vessilla soils are on structural benches and mesas. These soils are shallow or very shallow, well drained, and moderately rapidly permeable. They formed in eolian material, slope alluvium and residuum. The surface layer is light yellowish brown gravelly fine sandy loam about 2 inches thick. The underlying material is light brown gravelly fine sandy loam about 9 inches thick. Sandstone is at a depth of 11 inches.

Orlie soils are on cuestas. These soils are very deep, well drained, and moderately slowly permeable. They formed in fan alluvium and eolian material. The surface layer is pale brown loam about 2 inches thick. The subsoil is brown clay loam about 20 inches thick. The substratum is pale brown and brown silty clay loam and clay loam to a depth of 60 inches or more.

Other soils and miscellaneous areas in this unit are Sparham, Teco, and Wauquie soils, Rock outcrop, and Badland.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat and fuel wood production. Shallow soil depth, water erosion hazard and slope are the main limitations for most uses. Overgrazing is an important concern of management because it increases the risk of water erosion and gullying and promotes an increase in undesirable plants.

This unit occurs as widely scattered wildlife habitats dominated by pinyon-juniper woodland, but also including rocky areas. Shrubs may be an important habitat component. Sources of water may be scarce in dry years.

Characteristic wildlife includes mule deer, bobcat, porcupine, mountain cottontail, woodrat, scrub jay, junco, Cooper's hawk, brown towhee, and blacktailed rattlesnake.

13. Doakum-Betonnie

Very deep soils on hills

This map unit is in the northwestern part of the survey area. The slopes range from 0 to 8 percent. The vegetation consists mainly of grasses and shrubs with scattered trees. Elevation is 6,600 to 7,000 feet. The average annual precipitation is 10 to 13 inches; the average annual air temperature is 48 to 52 degrees F.; the average frost-free period is 110 to 130 days.

This unit makes up about 2 percent of the survey area. It is about 55 percent Doakum soils, and 35 percent Betonnie soils. The remaining 10 percent is components of minor extent.

Doakum soils are on hills. These soils are very deep, well drained and moderately permeable. They formed in eolian material and slope alluvium. The surface layer is light yellowish brown fine sandy loam about 5 inches thick. The subsoil is brown clay loam and sandy clay loam about 19 inches thick. The substratum to a depth of 60 inches or more is very pale brown loam and clay loam.

Betonnie soils are on hills. These soils are very deep, well drained, and moderately rapidly permeable. They formed in eolian material and slope alluvium. The surface layer is light yellowish brown fine sandy loam about 2 inches thick. The subsoil is brown fine sandy loam and sandy loam about 16 inches thick. The substratum to a depth of 60 inches or more is yellowish brown and pale brown sandy loam.

Other soils in this unit are Blancot, Eslendo, and Mespun soils.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat. Overgrazing is an important concern of management because it increases the risk of soil blowing and gullying and promotes an increase of undesirable plants.

This unit of desert shrub and desert grassland wildlife habitat is interspersed by thin shrub thickets along drainageways. Habitats have been rated as fair for pronghorn antelope and poor for mule deer.

Characteristic wildlife include coyote, kit fox, pronghorn antelope, blacktailed jackrabbit, spotted ground squirrel, horned lark, prairie falcon, meadowlark, horned lizard, bullsnake, and prairie rattlesnake.

Moist, cold soils on mountain slopes and mountain valleys

This group consists of 2 units. It makes up about 9 percent of the survey area. The slopes range from 1 to 80 percent. The present vegetation consists of mountain grasses and trees. Elevation is 8,000 to 11,000 feet, but included areas range only to 7,500 feet. The average annual precipitation is 20 to 30 inches; the average annual air temperature is 38 to 45 degrees F.; and the average frost-free period is 45 to 90 days.

The soils formed in alluvium and colluvium derived dominantly from tuff and rhyolite.

This group is used for livestock grazing, timber production, and wildlife habitat.

14. Cosey-Jarmillo-Tranquilar

Very deep soils on mountain slopes and stream terraces

This map unit is in the northern part of the survey area. The slopes range from 1 to 20 percent. The vegetation on this unit consists mainly of grasses and shrubs. Elevation is 8,000 to 9,200 feet. The average annual precipitation is 20 to 25 inches; the average annual air temperature is 42 to 45 degrees F.; and the average frost-free period is 60 to 90 days.

This unit makes up about 2 percent of the survey area. It is about 30 percent Cosey and similar soils, 24 percent Jarmillo and similar soils, and 21 percent Tranquilar soils. The remaining 25 percent is components of minor extent.

Cosey soils are on mountain slopes. These soils are very deep, well drained and moderately slowly permeable. They formed in slope alluvium and colluvium. The

surface layer is dark grayish brown and grayish brown silt loam about 15 inches thick. The upper 13 inches of the subsoil is very pale brown gravelly loam. The lower subsoil to 60 inches or more is very pale brown very gravelly sandy clay loam over light brown extremely cobbly clay loam.

Jarmillo soils are on stream terraces. These soils are very deep, well drained, and moderately permeable. They formed in lacustrine sediments, alluvium and colluvium. The surface layer is dark grayish brown loam about 13 inches thick. The subsoil is grayish brown, light brownish gray, very pale brown, light yellowish brown and white loam, fine sandy loam, clay loam, and very fine sandy loam to a depth of 60 inches or more.

Tranquilar soils are on stream terraces. These soils are very deep, somewhat poorly drained, and very slowly permeable. They formed in clayey lacustrine deposits. The surface layer is dark grayish brown silty clay loam about 8 inches thick. The subsurface layer is gray and light gray silty clay loam about 5 inches thick. The upper 21 inches of the subsoil is very dark grayish brown and dark grayish brown clay. The lower subsoil to a depth of 60 inches or more is light yellowish brown and light gray clay.

Other soils in this unit are Cajete, Jarola, and Vastine soils.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat. Short growing period and somewhat poor drainage are the main limitations to use.

This unit consists of a mountain meadow wildlife habitat. There are permanent streams which support trout. This is an important late winter range for elk. Characteristic wildlife includes northern pocket gopher, least chipmunk, meadow mole, garter snake, leopard frog, and tiger salamander.

15. Redondo-Palon-Calaveras
Very deep soils on mountain slopes

This map unit is in the northern part of the survey area. The slopes range from 5 to 80 percent. The vegetation on this unit consists mainly of trees. Elevation is 8,500 to 11,000 feet. The average annual precipitation is 25 to 30 inches; the average annual air temperature is 38 to 42 degrees F.; and the average frost-free period is 45 to 60 days.

This unit makes up about 7 percent of the survey area. It is about 33 percent Redondo and similar soils, 23 percent Palon and similar soils, and 22 percent Calaveras and similar soils. The remaining 22 percent is comprised of components of minor extent.

Redondo soils are on mountain slopes. These soils are very deep, well drained, and moderately rapidly permeable. They formed in colluvium. The surface layer is grayish brown coarse sandy loam about 2 inches thick. The subsurface layer is light brownish gray and light gray coarse sandy loam about 13 inches thick. The upper 7 inches of the subsoil is pink coarse sandy loam. The lower subsoil is light gray and light brown gravelly coarse sandy loam, very gravelly coarse sandy loam, extremely gravelly coarse sandy loam, and extremely cobbly coarse sandy loam to a depth of 60 inches or more.

Palon soils are on mountain slopes. They formed in colluvium and slope alluvium. These soils are very deep, well drained, and moderately rapidly permeable. The surface layer is dark gray and light brownish gray very cobbly sandy loam and extremely cobbly sandy loam about 8 inches thick. The subsurface layer is light gray extremely cobbly sandy loam about 22 inches thick. The subsoil is pink very cobbly sandy loam with light brown sandy clay loam lamellae to a depth of 60 inches or more.

Calaveras soils are on mountain slopes. These soils are very deep, well drained, and moderately permeable. They formed in colluvium. The surface layer is grayish brown and pale brown silt loam about 11 inches thick. The upper 19 inches of the

subsoil is pale brown gravelly silt loam and very cobbly loam. The lower part is light brown extremely cobbly coarse sandy loam and extremely cobbly loamy sand to a depth of 60 inches or more.

Other soils and miscellaneous areas in this unit are Cypher, Osha, Sedmar, Tocal, and Totavi soils, Rubble land, and Rock outcrop.

This unit is used mainly for timber production. It is also used for wildlife habitat. The slopes are the main limitation for most uses.

This unit furnishes montane conifer forest wildlife habitats. The endangered Jemez Mountain Salamander is found within drainages containing volcanic talus.

Characteristic wildlife includes elk, mule deer, black bear, tassel eared and red squirrel, sapsucker, hairy woodpecker, and Clark's nutcracker.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown

on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Sparham clay loam is a phase of the Sparham series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Flugle-Waumac complex, 1 to 8 percent slopes is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Orlie-Sparham association, 0 to 5 percent slopes is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Riverwash is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The *Glossary* defines many of the terms used in describing the soils or miscellaneous areas.

1—Silver-Clovis loams, 1 to 7 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,600 to 7,300 feet (1,707 to 2,225 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Silver and similar soils: 55 percent
Clovis and similar soils: 35 percent
Minor components: 10 percent

Component Descriptions

Silver soils
Landscape: Uplands
Landform: Mesas, plateaus, hills, fan remnants
Position on landform: Toeslopes
Position on landform: Side slope
Parent material: Eolian deposits over slope alluvium derived from sandstone and shale
Slope: 1 to 7 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 11.7 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low

Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, spike muhly, needlegrass, winterfat
Land capability subclass (irrigated): 4e
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 4 inches; loam
Bt1—4 to 8 inches; silty clay loam
Bt2—8 to 20 inches; silty clay loam
Bt3—20 to 39 inches; clay loam
C—39 to 60 inches; clay loam

Clovis soils
Landscape: Uplands
Landform: Fan remnants, plains
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian deposits over slope alluvium derived from sandstone and shale
Slope: 1 to 7 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.6 inches (high)
Shrink-swell potential: About 3.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, bottlebrush squirreltail
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 3 inches; loam
Bt—3 to 20 inches; clay loam
Bk1—20 to 40 inches; sandy clay loam
Bk2—40 to 60 inches; fine sandy loam

Minor Components
Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Prieta and similar soils
Composition: About 5 percent
Slope: 1 to 7 percent

Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Malpais

2—Clovis-Prieta-Silver association, 3 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,600 to 7,300 feet (1,707 to 2,225 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Clovis and similar soils: 35 percent
Prieta and similar soils: 35 percent
Silver and similar soils: 20 percent
Minor components: 10 percent

Component Descriptions

Clovis soils
Landscape: Uplands
Landform: Fan remnants, plains
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian deposits over slope alluvium derived from sandstone and shale
Slope: 3 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.6 inches (high)
Shrink-swell potential: About 2.6 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, bottlebrush squirreltail
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 3 inches; loam
Bt—3 to 24 inches; clay loam
Bk—24 to 60 inches; fine sandy loam

Prieta soils
Landscape: Plains
Landform: Mesas, lava flows
Position on landform: Footslopes

Position on landform: Side slope
Parent material: Eolian deposits over slope alluvium derived from basalt
Slope: 3 to 15 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 1.8 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 14 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Malpais
Potential native vegetation: blue grama, alkali sacaton, hairy grama, little bluestem, sideoats grama, black grama, spike muhly, wolftail
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; very stony loam
Bt1—3 to 10 inches; very stony clay loam
Bt2—10 to 14 inches; very stony clay loam
Bk—14 to 19 inches; very stony clay loam
R—19 to 60 inches; bedrock

Silver soils
Landscape: Plains
Landform: Fan remnants, hills, mesas, plateaus
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Eolian deposits over slope alluvium derived from sandstone and shale
Slope: 3 to 8 percent
Aspect: East to west
Shape (down/across): Concave/linear
Surface fragments: About 2 percent subrounded cobbles, about 2 percent subrounded gravel
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 11.6 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, spike muhly, bottlebrush squirreltail, needlegrass, winterfat
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 8 inches; loam
Bt—8 to 30 inches; silty clay loam
C—30 to 60 inches; silty clay loam

Minor Components
Rock outcrop
Composition: About 10 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

3—Montecito-Orejas complex, 1 to 7 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,800 to 7,600 feet (2,073 to 2,316 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Montecito and similar soils: 60 percent
Orejas and similar soils: 30 percent
Minor components: 10 percent

Component Descriptions

Montecito soils
Landscape: Uplands
Landform: Plains, mesas, hills
Position on landform: Summits
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium derived from sandstone and shale
Slope: 1 to 7 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 11.6 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: twoneedle pinyon, oneseed juniper
Other plants: blue grama, bottlebrush squirreltail, muttongrass
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 3 inches; fine sandy loam
Bt—3 to 18 inches; clay loam
2Bk—18 to 60 inches; clay loam

Orejas soils
Landscape: Uplands
Landform: Plateaus, mesas
Position on landform: Summits
Position on landform: Side slope
Parent material: Eolian deposits over colluvium and/or slope alluvium derived from sandstone and shale
Slope: 1 to 7 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 30 percent subrounded cobbles
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 1.9 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: twoneedle pinyon, oneseed juniper
Other plants: big sagebrush, blue grama, sideoats grama, oneseed juniper, twoneedle pinyon
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 2 inches; cobbly loam
Bt1—2 to 5 inches; very cobbly clay loam
Bt2—5 to 14 inches; very cobbly clay loam
Bt3—14 to 17 inches; very cobbly clay loam
C—17 to 19 inches; very gravelly clay loam
R—19 to 60 inches; bedrock

Minor Components
Rock outcrop
Composition: About 10 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

4—Montecito complex, 3 to 30 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 7,000 feet (1,829 to 2,134 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)

Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Montecito and similar soils: 45 percent
Montecito, bouldery and similar soils: 35 percent
Minor components: 20 percent

Component Descriptions

Montecito soils
Landscape: Uplands
Landform: Hills, mesas, plains
Position on landform: Summits
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium derived from sandstone and shale
Slope: 3 to 30 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 10.5 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: twoneedle pinyon, oneseed juniper
Other plants: blue grama, bottlebrush squirreltail, muttongrass
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 3 inches; fine sandy loam
Bt—3 to 22 inches; clay loam
2Bk—22 to 60 inches; loam

Montecito, bouldery soils
Landscape: Uplands
Landform: Hills, mesas, plains
Position on landform: Summits
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium derived from sandstone and shale
Slope: 3 to 30 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.3 inches (high)
Shrink-swell potential: About 3.7 percent (moderate)
Runoff class: Medium

Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: twoneedle pinyon, oneseed juniper
Other plants: big sagebrush, Gambel oak, blue grama, bottlebrush squirreltail, broom snakeweed, muttongrass, pingue rubberweed, sideoats grama
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 5 inches; extremely bouldery loam
Bt—5 to 28 inches; clay loam
2Bk1—28 to 45 inches; loam
2Bk2—45 to 60 inches; sandy loam

Minor Components

Rock outcrop
Composition: About 10 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Vessilla and similar soils
Composition: About 5 percent
Slope: 3 to 30 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

Sandoval and similar soils
Composition: About 5 percent
Slope: 3 to 30 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

10—Trail silty clay loam, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Trail and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Trail soils
Landscape: Valleys
Landform: Channels, valley floor remnants, flood plains, alluvial fans
Position on landform: Toeslopes
Position on landform: Base slope, rise
Parent material: Eolian deposits over stream alluvium derived from sandstone
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Concave, linear/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 4.9 inches (low)
Shrink-swell potential: About 1.6 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Very low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation: alkali sacaton, giant sacaton, fourwing saltbush
Land capability subclass (irrigated): 4e
Land capability subclass (nonirrigated): 7s

Typical Profile:
Ap—0 to 6 inches; silty clay loam
C1—6 to 30 inches; stratified loamy sand to sandy loam
C2—30 to 45 inches; sand
C3—45 to 60 inches; loamy fine sand

Minor Components
Aga and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

11—Trail fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)

Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Trail and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Trail soils
Landscape: Valleys
Landform: Alluvial fans, channels, flood plains, valley floor remnants
Position on landform: Toeslopes
Position on landform: Rise, tread
Parent material: Eolian deposits over stream alluvium derived from sandstone
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Linear, concave/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 5.9 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Occasional
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Very low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation: alkali sacaton, giant sacaton, fourwing saltbush
Land capability subclass (irrigated): 4e
Land capability subclass (nonirrigated): 7s

Typical Profile:
Ap—0 to 9 inches; fine sandy loam
C1—9 to 36 inches; stratified loamy sand to sandy loam
C2—36 to 60 inches; sandy loam

Minor Components
Aga and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Riverwash
Composition: About 3 percent
Landscape: Valleys
Landform: Streams, channels
Slope: 0 to 3 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Peralta and similar soils
Composition: About 2 percent
Slope: 1 to 3 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Occasional
Ecological site: Bottomland

13—Sandoval-Querencia association, 2 to 7 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,800 to 6,400 feet (1,768 to 1,951 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Sandoval and similar soils: 65 percent
Querencia and similar soils: 20 percent
Minor components: 15 percent

Component Descriptions

Sandoval soils
Landscape: Uplands
Landform: Hills, ridges
Position on landform: Summits
Position on landform: Nose slope
Parent material: Slope alluvium derived from shale
Slope: 2 to 7 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 2.9 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: About 5 percent
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Shallow

Potential native vegetation: sideoats grama, New Mexico Feathergrass, cane bluestem, little bluestem, galleta
Land capability subclass (nonirrigated): 7s

Typical Profile:
A1—0 to 2 inches; fine sandy loam
A2—2 to 6 inches; clay loam
C1—6 to 10 inches; clay loam
C2—10 to 15 inches; clay loam
Cr—15 to 60 inches; bedrock

Querencia soils
Landscape: Uplands
Landform: Valley sides, stream terraces, alluvial fans
Position on landform: Footslopes
Position on landform: Rise
Parent material: Fan alluvium over colluvium derived from sandstone and shale
Slope: 2 to 7 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 10.2 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, spike muhly, bottlebrush squirreltail, fourwing saltbush, needlegrass, winterfat
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 4 inches; sandy clay loam
Bw—4 to 12 inches; clay loam
Bw—12 to 24 inches; loam
Bk—24 to 60 inches; loam

Minor Components
Camino and similar soils
Composition: About 5 percent
Slope: 1 to 6 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Clayey

Badland
Composition: About 5 percent
Slope: 5 to 75 percent
Depth to restrictive feature: 0 inches to bedrock (paralithic)

San Mateo and similar soils
Composition: About 3 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

Skyvillage and similar soils
Composition: About 2 percent
Slope: 8 to 25 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

15—Camino-Sandoval complex, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,900 to 6,200 feet (1,798 to 1,890 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Camino and similar soils: 40 percent
Sandoval and similar soils: 35 percent
Minor components: 25 percent

Component Descriptions

Camino soils
Landscape: Uplands
Landform: Valley sides, plateaus
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Fan alluvium over residuum weathered from shale
Slope: 1 to 6 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Deep
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 7.8 inches (moderate)
Shrink-swell potential: About 7.5 percent (high)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Clayey
Potential native vegetation: alkali sacaton, giant sacaton, western wheatgrass, galleta, blue grama, fourwing saltbush
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 2 inches; silty clay loam
Bw1—2 to 5 inches; clay
Bw2—5 to 20 inches; clay
Bk—20 to 51 inches; clay
Cr—51 to 60 inches; bedrock

Sandoval soils
Landscape: Uplands
Landform: Ridges, hills
Position on landform: Summits
Position on landform: Nose slope
Parent material: Slope alluvium derived from shale
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 3.3 inches (low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: About 10 percent
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 13 (moderately sodic)
Ecological site: Shallow
Potential native vegetation: sideoats grama, New Mexico Feathergrass, cane bluestem, little bluestem, galleta
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 2 inches; fine sandy loam
C—2 to 17 inches; clay loam
Cr—17 to 60 inches; bedrock

Minor Components
Querencia and similar soils
Composition: About 10 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: Loamy

Badland
Composition: About 10 percent
Slope: 5 to 75 percent
Depth to restrictive feature: 0 inches to bedrock (paralithic)

Sparank and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Occasional
Ecological site: Clayey Bottomland

16—Rock outcrop-Prieta complex, 3 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,600 to 7,200 feet (1,707 to 2,195 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Rock outcrop: 50 percent
Prieta and similar soils: 30 percent
Minor components: 20 percent

Component Descriptions

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Ridges, volcanic cones
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Prieta soils
Landscape: Uplands
Landform: Lava flows, mesas
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Eolian deposits over slope alluvium derived from basalt
Slope: 3 to 15 percent
Aspect: East to west
Shape (down/across): Convex/linear
Surface fragments: About 20 percent subrounded stones
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 2.1 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 8 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Malpais
Potential native vegetation: blue grama, alkali sacaton, hairy grama, sideoats grama, black grama, little bluestem, spike muhly, wolftail
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 5 inches; stony silt loam
Bt—5 to 15 inches; very stony clay loam
Bk—15 to 19 inches; very stony clay loam
R—19 to 60 inches; bedrock

Minor Components
Clovis and similar soils
Composition: About 10 percent
Slope: 1 to 4 percent
Drainage class: Well drained
Ecological site: Loamy

Silver and similar soils
Composition: About 5 percent
Slope: 1 to 7 percent
Drainage class: Well drained
Ecological site: Loamy

Prieta and similar soils
Composition: About 5 percent
Slope: 1 to 2 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Malpais

17—Vessilla-Menefee-Rock outcrop complex, 3 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,800 to 7,500 feet (2,073 to 2,286 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Vessilla and similar soils: 35 percent
Menefee and similar soils: 25 percent
Rock outcrop: 20 percent
Minor components: 20 percent

Component Descriptions

Vessilla soils
Landscape: Uplands
Landform: Ridges, breaks, hills, mesas
Position on landform: Shoulders
Position on landform: Nose slope
Parent material: Eolian deposits over slope alluvium derived from sandstone
Slope: 3 to 15 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very shallow and shallow

Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 1.3 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Indian ricegrass, blue grama, mountain big sagebrush, oak, galleta, sideoats grama
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 5 inches; sandy loam
C—5 to 11 inches; sandy loam
R—11 to 60 inches; bedrock

Menefee soils
Landscape: Uplands
Landform: Hillslopes, mesas, mountainsides
Position on landform: Shoulders
Position on landform: Nose slope
Parent material: Colluvium over residuum weathered from shale
Slope: 3 to 15 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 2.0 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, Rocky Mountain juniper, twoneedle pinyon
Other plants: blue grama, galleta, Gambel oak, big sagebrush, sideoats grama
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; clay loam
C—3 to 10 inches; clay loam
2Cr—10 to 60 inches; bedrock

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Breaks, escarpments, ledges
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Orlie and similar soils
Composition: About 10 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Sparham and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Clayey

18—Sparham clay, 0 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,500 to 7,500 feet (1,981 to 2,286 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Sparham and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Sparham soils
Landscape: Valleys
Landform: Flood plains, valley sides, alluvial fans
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Fan alluvium derived from sandstone and shale
Slope: 0 to 3 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 11.8 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Flooding hazard: Occasional
Runoff class: Low
Calcium carbonate maximum: About 10 percent

Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Clayey
Potential native vegetation: western wheatgrass, alkali sacaton, bottlebrush squirreltail, prairie junegrass
Land capability subclass (irrigated): 3s
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 7 inches; clay
C1—7 to 20 inches; clay loam
C2—20 to 29 inches; clay loam
C3—29 to 47 inches; silty clay loam
C4—47 to 53 inches; clay loam
C5—53 to 60 inches; clay loam

Minor Components
Riverwash
Composition: About 5 percent
Landscape: Valleys
Landform: Streams, channels
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Menefee and similar soils
Composition: About 5 percent
Slope: 5 to 35 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

Vessilla and similar soils
Composition: About 5 percent
Slope: 5 to 30 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

20—Gilco clay loam, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Gilco and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Gilco soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Concave/linear
Surface fragments: About 12 percent subrounded gravel
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 10.2 inches (high)
Shrink-swell potential: About 1.6 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 7c

Typical Profile:
Ap—0 to 6 inches; clay loam
C—6 to 60 inches; stratified fine sandy loam to loam

Minor Components
Peralta and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

Sparham and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Occasional
Ecological site: Bottomland

Aga and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

21—Rock outcrop-Hackroy complex, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 7,200 feet (1,829 to 2,195 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Rock outcrop: 60 percent
Hackroy and similar soils: 25 percent
Minor components: 15 percent

Component Descriptions

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Ledges, escarpments, benches
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Hackroy soils
Landscape: Uplands
Landform: Mesas, plateaus
Position on landform: Summits
Position on landform: Nose slope
Parent material: Residuum weathered from tuff
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 1.7 inches (very low)
Shrink-swell potential: About 7.5 percent (high)
Runoff class: Very high
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon

Other plants: blue grama, Indian ricegrass, needle and thread, skunkbush sumac
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; sandy loam
Bt—3 to 12 inches; clay
2R—12 to 60 inches; bedrock

Minor Components
Frijoles and similar soils
Composition: About 10 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Nyjack and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

22—Aga silty clay loam, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Aga and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Aga soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 6.8 inches (moderate)
Shrink-swell potential: About 1.7 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 42 to 60 inches
Runoff class: Low

Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 2s
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 8 inches; silty clay loam
C1—8 to 24 inches; loam
2C2—24 to 60 inches; sand

Minor Components
Gilco and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Trail and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Somewhat excessively drained
Flooding hazard: Rare
Ecological site: Bottomland

23—Hickman clay loam, 1 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,500 to 7,500 feet (1,981 to 2,286 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Hickman and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Hickman soils
Landscape: Valleys
Landform: Flood plains, valley floors
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep

Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 10.9 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Flooding hazard: Rare
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Swale
Potential native vegetation: western wheatgrass, alkali sacaton, big sagebrush, bottlebrush squirreltail
Land capability subclass (irrigated): 3e
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 4 inches; clay loam
C1—4 to 12 inches; sandy clay loam
C2—12 to 49 inches; clay loam
C3—49 to 60 inches; sandy clay loam

Minor Components
Royosa and similar soils
Composition: About 8 percent
Slope: 1 to 8 percent
Drainage class: Somewhat excessively drained
Ecological site: Deep Sand

Sparham and similar soils
Composition: About 7 percent
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Clayey Bottomland

24—Orlie-Sparham association, 0 to 5 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 7,000 to 7,500 feet (2,134 to 2,286 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Orlie and similar soils: 45 percent
Sparham and similar soils: 35 percent
Minor components: 20 percent

Component Descriptions

Orlie soils
Landscape: Valleys
Landform: Valley sides, mesas, cuestas, hills
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium derived from sandstone and shale
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 10.0 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Loamy
Potential native vegetation: western wheatgrass, big sagebrush, galleta, Indian ricegrass, needle and thread, fourwing saltbush
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 2 inches; fine sandy loam
Bt—2 to 25 inches; clay loam
C—25 to 60 inches; stratified sandy clay loam to clay loam

Sparham soils
Landscape: Valleys
Landform: Alluvial fans, valley sides, flood plains
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Stream alluvium derived from sandstone and shale
Slope: 0 to 2 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 9.4 inches (high)
Shrink-swell potential: About 7.5 percent (high)
Flooding hazard: Occasional
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Clayey

Potential native vegetation: western wheatgrass, alkali sacaton, bottlebrush squirreltail, prairie junegrass
Land capability subclass (irrigated): 3s
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 3 inches; clay
C—3 to 60 inches; silty clay

Minor Components
Menefee and similar soils
Composition: About 10 percent
Slope: 5 to 35 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

Riverwash
Composition: About 5 percent
Landscape: Valleys
Landform: Streams, channels
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Sedmar and similar soils
Composition: About 5 percent
Slope: 1 to 15 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

25—Gilco loam, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Gilco and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Gilco soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes

Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 8.4 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 7e

Typical Profile:
Ap—0 to 4 inches; loam
C1—4 to 34 inches; stratified silt loam to loam to fine sandy loam
C2—34 to 60 inches; stratified fine sandy loam to loam

Minor Components
Aga and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Sparham and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Occasional
Ecological site: Bottomland

26—Orlie loam, 0 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,200 to 6,800 feet (1,890 to 2,073 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Orlie and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Orlie soils
Landscape: Valleys
Landform: Cuestas, mesas, valley sides, hills
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium derived from sandstone and shale
Slope: 0 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 11.8 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Loamy
Potential native vegetation: western wheatgrass, big sagebrush, galleta, Indian ricegrass, needle and thread, fourwing saltbush
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 2 inches; loam
Bt1—2 to 13 inches; clay loam
Bt2—13 to 22 inches; clay loam
C1—22 to 36 inches; silty clay loam
C2—36 to 50 inches; clay loam
C3—50 to 60 inches; silty clay loam

Minor Components
Menefee and similar soils
Composition: About 8 percent
Slope: 5 to 35 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

Vessilla and similar soils
Composition: About 7 percent
Slope: 1 to 3 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

27—Aga loam, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Aga and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Aga soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 5.0 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 42 to 60 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 2s
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 10 inches; loam
C1—10 to 23 inches; loam
2C2—23 to 43 inches; sand
2C3—43 to 60 inches; sand

Minor Components
Gilco and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Trail and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

29—Trail loamy sand, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Trail and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Trail soils
Landscape: Valleys
Landform: Alluvial fans, channels, flood plains, valley floor remnants

Figure 2.—Typical landscape of Trail loamy sand, 0 to 1 percent slopes, and Riverwash, along the Jemez River.

Position on landform: Toeslopes
Position on landform: Rise, base slope
Parent material: Eolian deposits derived from sandstone over stream alluvium derived from igneous and sedimentary rock
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Linear, concave/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 4.1 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Very low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, black grama, dropseed, sand sagebrush
Land capability subclass (irrigated): 4s
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 6 inches; loamy sand
C—6 to 60 inches; stratified loamy sand to sandy loam

Minor Components

Aga and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Peralta and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

31—Riverwash

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 54 to 56 degrees F. (12.2 to 13.3 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Riverwash: 90 percent
Minor components: 10 percent

Component Descriptions

Riverwash
Description: Riverwash consists of unstable sand and silt that is reworked by water and wind so frequently, that it supports little or no vegetation.
Landscape: Valleys
Landform: Streams
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 0 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 2.9 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Frequent
Runoff class: Very low
Calcium carbonate maximum: About 1 percent
Gypsum maximum: About 1 percent
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 1 (slightly sodic)
Land capability subclass (nonirrigated): 8w

Minor Components
Torrifluvents and similar soils
Composition: About 10 percent
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Concave/linear
Drainage class: Moderately well drained
Flooding hazard: Rare

33—Pits

Map Unit Setting

Major Land Resource Area: 36

Map Unit Composition

Pits: 100 percent

Component Descriptions

Pits
Description: Pits consist of quarries and gravel and borrow pits.
Slope: 0 to 4 percent
Aspect: East to west
Runoff class: Low
Land capability subclass (nonirrigated): 8s

34—Ildefonso-Witt association, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,200 to 5,700 feet (1,585 to 1,737 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Ildefonso and similar soils: 55 percent
Witt and similar soils: 30 percent
Minor components: 15 percent

Component Descriptions

Ildefonso soils
Landscape: Uplands
Landform: Hills, fan remnants, mesas
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Fan alluvium over colluvium derived from igneous and sedimentary rock
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 25 percent subrounded gravel
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 5.0 inches (low)
Shrink-swell potential: About 2.2 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Limy

Potential native vegetation: thickspike wheatgrass, western wheatgrass, New Mexico Feathergrass, blue grama, hairy grama, winterfat
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; cobbly loam
Bk—3 to 17 inches; cobbly loam
C—17 to 60 inches; stratified very cobbly sandy loam to very cobbly loam

Witt soils
Landscape: Uplands
Landform: Mesas, fan remnants, bajadas
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone over fan alluvium derived from basalt
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 10.0 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, spike muhly, fourwing saltbush, galleta
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 3 inches; very fine sandy loam
Bt—3 to 27 inches; loam
Bk—27 to 60 inches; loam

Minor Components
Rock outcrop
Composition: About 10 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Prieta and similar soils
Composition: About 5 percent
Slope: 3 to 15 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Malpais

41—Dune land

Map Unit Setting

Major Land Resource Area: 36

Map Unit Composition

Dune land: 100 percent

Component Descriptions

Dune land
Description: Dune land consists of areas of loose, windblown, generally sandy material, mostly bare of vegetation. There characteristic shape is low mounds, ridges, or hills. They are capable of movement from place to place.
Landscape: Dune fields
Landform: Shrub-coppice dunes
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone
Slope: 0 to 20 percent
Aspect: East to west
Shape (down/across): Convex/convex
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 2.4 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 1 percent
Gypsum maximum: About 1 percent
Salinity maximum: About 1 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 1 (slightly sodic)
Land capability subclass (nonirrigated): 8e

47—Cascajo very gravelly sandy loam, 12 to 30 percent slopes

Map Unit Setting

Major Land Resource Area: 70
Elevation: 5,300 to 6,100 feet (1,615 to 1,859 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Cascajo and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Cascajo soils
Landscape: Uplands
Landform: Ridges, knolls, hills
Position on landform: Backslopes
Position on landform: Side slope

Parent material: Fan alluvium derived from sandstone
Slope: 12 to 30 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 59 percent subrounded gravel
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 2.2 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Gravelly
Potential native vegetation: blue grama, New Mexico Feathergrass, sideoats grama, twoneedle pinyon, black grama, oneseed juniper
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 2 inches; very gravelly sandy loam
Bw—2 to 5 inches; very gravelly sandy loam
Bk1—5 to 11 inches; very gravelly sandy loam
Bk2—11 to 23 inches; very gravelly loamy sand
C1—23 to 30 inches; very gravelly loamy sand
C2—30 to 60 inches; extremely cobbly loamy sand

Minor Components

La Fonda and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Harvey and similar soils
Composition: About 5 percent
Slope: 5 to 10 percent
Drainage class: Well drained
Ecological site: Limy

Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

51—Sparham clay loam, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Sparham and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Sparham soils
Landscape: Valleys
Landform: Alluvial fans, valley sides, flood plains
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Stream alluvium derived from sandstone and shale
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 11.0 inches (high)
Shrink-swell potential: About 5.4 percent (moderate)
Flooding hazard: Occasional
Seasonal high water table depth: About 4 to 10 inches
Runoff class: High
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Clayey Bottomland
Potential native vegetation: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 3e
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 6 inches; clay loam
C1—6 to 20 inches; clay loam
C2—20 to 36 inches; clay
C3—36 to 60 inches; clay loam

Minor Components
Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Clayey Bottomland

Gilco, sandy substrata and similar soils
Composition: About 5 percent
Slope: 1 to 4 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Clayey Bottomland

Riverwash
Composition: About 5 percent
Landscape: Valleys
Landform: Streams, channels
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 1 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

52—Totavi loamy sand, 0 to 5 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 7,000 to 7,500 feet (2,134 to 2,286 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Totavi and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Totavi soils
Landscape: Valleys
Landform: Closed depressions, valley floors, stream terraces
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from tuff
Slope: 0 to 5 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 4.1 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Runoff class: Very low
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa-Juniperus deppeana/Quercus gambelii
Potential native vegetation:
Common trees: oneseed juniper, Utah juniper, ponderosa pine
Other plants: needle and thread, western wheatgrass, Gambel oak, oneseed juniper, skunkbush sumac
Land capability subclass (nonirrigated): 4s

Typical Profile:
A—0 to 15 inches; loamy sand
C1—15 to 19 inches; loamy sand
C2—19 to 60 inches; loamy sand

Minor Components
Riverwash
Composition: About 5 percent
Landscape: Valleys
Landform: Streams, channels
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Hackroy and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Depth to restrictive feature: 8 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Nyjack and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

53—Witt-Harvey association, 1 to 7 percent slopes

Map Unit Setting

Major Land Resource Area: 70
Elevation: 5,600 to 6,700 feet (1,707 to 2,042 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Witt and similar soils: 55 percent
Harvey and similar soils: 30 percent
Minor components: 15 percent

Component Descriptions

Witt soils
Landscape: Uplands
Landform: Bajadas, fan remnants, mesas
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Eolian deposits and alluvium derived from igneous and sedimentary rock

Slope: 1 to 7 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 11.7 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, galleta, sideoats grama, black grama, fourwing saltbush, obtuse panicgrass, plains lovegrass, sand dropseed, threeawn
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 3 inches; loam
BA—3 to 6 inches; silt loam
Bt1—6 to 11 inches; silty clay loam
Bt2—11 to 18 inches; silty clay loam
Btk—18 to 25 inches; silty clay loam
Bk1—25 to 39 inches; silt loam
Bk2—39 to 53 inches; silt loam
C—53 to 60 inches; silt loam

Harvey soils
Landscape: Uplands
Landform: Bajadas, plateaus, mesas
Position on landform: Shoulders
Position on landform: Nose slope
Parent material: Eolian deposits derived from sandstone over fan alluvium derived from basalt
Slope: 1 to 7 percent
Aspect: East to west
Shape (down/across): Convex/linear
Surface fragments: About 5 percent subrounded gravel
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.5 inches (high)
Shrink-swell potential: About 3.6 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Limy
Potential native vegetation: black grama, sideoats grama, blue grama, needlegrass, winterfat, Bigelow sagebrush, fourwing saltbush, western wheatgrass
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 10 inches; loam
Bw—10 to 28 inches; clay loam
Bk—28 to 42 inches; sandy clay loam
C—42 to 60 inches; sandy loam

Minor Components
Ildefonso and similar soils
Composition: About 10 percent
Slope: 10 to 35 percent
Drainage class: Well drained
Ecological site: Limy

La Fonda and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

54—Harvey-Cascajo association, 5 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 70
Elevation: 5,300 to 6,500 feet (1,615 to 1,981 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Harvey and similar soils: 45 percent
Cascajo and similar soils: 40 percent
Minor components: 15 percent

Component Descriptions

Harvey soils
Landscape: Uplands
Landform: Bajadas, mesas, plateaus
Position on landform: Shoulders
Position on landform: Nose slope
Parent material: Eolian deposits and alluvium derived from igneous and sedimentary rock
Slope: 5 to 15 percent
Aspect: East to west
Shape (down/across): Convex/linear
Surface fragments: About 10 percent subrounded gravel
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.3 inches (high)
Shrink-swell potential: About 4.1 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None

Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Limy
Potential native vegetation: black grama, sideoats grama, blue grama, needlegrass, winterfat, Bigelow sagebrush, fourwing saltbush, western wheatgrass
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 2 inches; fine sandy loam
Bw—2 to 11 inches; fine sandy loam
Bk—11 to 23 inches; clay loam
C—23 to 60 inches; sandy clay loam

Cascajo soils
Landscape: Uplands
Landform: Hills, knolls, ridges
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Fan alluvium derived from sandstone
Slope: 5 to 15 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 10 percent subrounded gravel
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 1.5 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 20 percent
Gypsum maximum: About 1 percent
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Gravelly
Potential native vegetation: New Mexico Feathergrass, black grama, blue grama, hairy grama, sideoats grama, plains lovegrass, winterfat, wolftail
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; very gravelly sandy loam
AB—3 to 9 inches; very gravelly sandy loam
Bk—9 to 28 inches; very gravelly sand
C—28 to 60 inches; very gravelly sand

Minor Components
La Fonda and similar soils
Composition: About 10 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Witt and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: Loamy

55—La Fonda loam, 1 to 5 percent slopes

Map Unit Setting

Major Land Resource Area: 70
Elevation: 6,000 to 6,500 feet (1,829 to 1,981 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

La Fonda and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

La Fonda soils
Landscape: Plains
Landform: Fan remnants, fan piedmonts
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Fan alluvium derived from igneous and sedimentary rock
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 10.0 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, galleta, sideoats grama, black grama, fourwing saltbush, obtuse panicgrass, plains lovegrass, sand dropseed, threeawn
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 4 inches; loam
Bw—4 to 26 inches; loam
Bk—26 to 60 inches; loam

Minor Components
Harvey and similar soils
Composition: About 5 percent
Slope: 5 to 10 percent
Drainage class: Well drained
Ecological site: Limy

Witt and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: Loamy

Ildefonso and similar soils
Composition: About 5 percent
Slope: 15 to 35 percent
Drainage class: Well drained
Ecological site: Breaks

56—Ildefonso cobbly loam, 15 to 35 percent slopes

Map Unit Setting

Major Land Resource Area: 70
Elevation: 5,500 to 6,500 feet (1,676 to 1,981 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Ildefonso and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Ildefonso soils
Landscape: Plains
Landform: Mesas, fan remnants, hills
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium and colluvium derived from sandstone
Slope: 15 to 35 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 30 percent subangular gravel
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 5.6 inches (low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)

Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Breaks
Potential native vegetation: black grama, blue grama, little bluestem, mountain muhly, sideoats grama, New Mexico Feathergrass, twoneedle pinyon, wolftail
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 3 inches; cobbly loam
Bw—3 to 9 inches; cobbly loam
Bk—9 to 15 inches; very gravelly loam
C—15 to 60 inches; very cobbly loam

Minor Components
La Fonda and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Harvey and similar soils
Composition: About 5 percent
Slope: 5 to 10 percent
Drainage class: Well drained
Ecological site: Limy

Rock outcrop
Composition: About 3 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Witt and similar soils
Composition: About 2 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: Loamy

57—Badland

Map Unit Setting

Major Land Resource Area: 37

Map Unit Composition

Badland: 90 percent
Minor components: 10 percent

Component Descriptions

Badland
Description: Badland consists of areas of exposed raw shale that is essentially denuded of vegetation. These areas are highly dissected.
Landscape: Hills
Landform: Escarpments, ledges, rockfalls
Position on landform: Summits
Position on landform: Nose slope

Slope: 5 to 75 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth to restrictive feature: 0 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Runoff class: Very high
Land capability subclass (nonirrigated): 8

Minor Components
Eslendo and similar soils
Composition: About 5 percent
Slope: 5 to 30 percent
Depth to restrictive feature: 4 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

Doakum and similar soils
Composition: About 5 percent
Slope: 0 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

58—Deama-Elpedro association, 5 to 30 percent slopes

Map Unit Setting

Major Land Resource Area: 70
Elevation: 6,000 to 7,000 feet (1,829 to 2,134 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Deama and similar soils: 45 percent
Elpedro and similar soils: 35 percent
Minor components: 20 percent

Component Descriptions

Deama soils
Landscape: Hills
Landform: Mesas, ridges, plateaus
Position on landform: Shoulders
Position on landform: Nose slope
Parent material: Colluvium derived from limestone
Slope: 15 to 30 percent
Aspect: East to west
Shape (down/across): Convex/linear
Surface fragments: About 10 percent subrounded cobbles, about 10 percent subangular channers, about 20 percent subrounded stones
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 1.4 inches (very low)

Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 60 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: black grama, Bigelow sagebrush, little bluestem, sideoats grama
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 7 inches; very stony silt loam
Bk—7 to 14 inches; very cobbly silt loam
2R—14 to 60 inches; bedrock

Elpedro soils
Landscape: Hills
Landform: Benches, mesas, fan piedmonts, valley sides
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Eolian deposits over colluvium derived from limestone
Slope: 5 to 12 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 11.2 inches (high)
Shrink-swell potential: About 3.7 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: juniper, twoneedle pinyon
Other plants: blue grama, galleta, bottlebrush squirreltail, oak, western wheatgrass
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 5 inches; loam
Bt1—5 to 12 inches; silty clay loam
Bt2—12 to 19 inches; silty clay loam
Bt3—19 to 25 inches; silty clay loam
Btk1—25 to 36 inches; silty clay loam
Btk2—36 to 45 inches; silt loam
Btk3—45 to 60 inches; loam

Minor Components
La Fonda and similar soils
Composition: About 10 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Rock outcrop
Composition: About 10 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

59—Harvey-Ildefonso-La Fonda association, 3 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 70
Elevation: 6,200 to 6,800 feet (1,890 to 2,073 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Harvey and similar soils: 35 percent
Ildefonso and similar soils: 35 percent
La Fonda and similar soils: 15 percent
Minor components: 15 percent

Component Descriptions

Harvey soils
Landscape: Uplands
Landform: Bajadas, mesas, plateaus
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone over fan alluvium and colluvium derived from igneous and sedimentary rock
Slope: 3 to 9 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 10.6 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Limy
Potential native vegetation: black grama, sideoats grama, blue grama, winterfat, Bigelow sagebrush, fourwing saltbush, needlegrass, western wheatgrass
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 4 inches; loam
Bw—4 to 10 inches; loam
Bk1—10 to 18 inches; clay loam
Bk2—18 to 41 inches; clay loam
C—41 to 60 inches; sandy clay loam

Ildefonso soils
Landscape: Uplands
Landform: Fan remnants, mesas, hills
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Fan alluvium and/or colluvium derived from igneous and sedimentary rock
Slope: 7 to 15 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 5 percent subrounded gravel, about 10 percent subrounded cobbles
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 3.0 inches (low)
Shrink-swell potential: About 2.0 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Breaks
Potential native vegetation: black grama, blue grama, little bluestem, mountain muhly, sideoats grama, New Mexico Feathergrass, twoneedle pinyon, wolftail
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 2 inches; cobbly loam
Bw1—2 to 8 inches; very gravelly loam
Bw2—8 to 13 inches; very gravelly loam
Bk1—13 to 32 inches; very cobbly sandy loam
Bk2—32 to 40 inches; very cobbly sandy loam
C—40 to 60 inches; extremely cobbly sand

La Fonda soils
Landscape: Uplands
Landform: Fan remnants, fan piedmonts
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Fan alluvium derived from igneous and sedimentary rock
Slope: 3 to 7 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)

Available water capacity: About 10.3 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, galleta, sideoats grama, black grama, fourwing saltbush, obtuse panicgrass, plains lovegrass, sand dropseed, threeawn
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 3 inches; loam
Bw1—3 to 7 inches; loam
Bw2—7 to 14 inches; clay loam
Bw3—14 to 26 inches; loam
Bk1—26 to 42 inches; loam
Bk2—42 to 60 inches; loam

Minor Components
Ildefonso and similar soils
Composition: About 10 percent
Slope: 15 to 35 percent
Drainage class: Well drained
Ecological site: Breaks

Witt and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: Loamy

63—Placitas gravelly loam, 8 to 40 percent slopes

Map Unit Setting

Major Land Resource Area: 70
Elevation: 5,700 to 6,300 feet (1,737 to 1,920 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Placitas and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Placitas soils
Landscape: Uplands
Landform: Fan remnants
Position on landform: Toeslopes
Position on landform: Tread

Parent material: Fan alluvium derived from conglomerate
Slope: 8 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Moderately deep
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 1.8 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: High
Calcium carbonate maximum: About 25 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Gravelly
Potential native vegetation: blue grama, New Mexico Feathergrass, sideoats grama, twoneedle pinyon, black grama, oneseed juniper
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 5 inches; gravelly loam
Bw—5 to 10 inches; very gravelly sandy loam
Bk—10 to 27 inches; very gravelly sandy loam
R—27 to 60 inches; bedrock

Minor Components
Skyvillage and similar soils
Composition: About 8 percent
Slope: 5 to 40 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

Zia and similar soils
Composition: About 7 percent
Slope: 5 to 20 percent
Drainage class: Well drained
Ecological site: Sandy

64—Skyvillage-Ildefonso association, 8 to 40 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,800 to 6,400 feet (1,768 to 1,951 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Skyvillage and similar soils: 40 percent
Ildefonso and similar soils: 35 percent
Minor components: 25 percent

Component Descriptions

Skyvillage soils
Landscape: Uplands
Landform: Ridges, structural benches, mesas, hills, breaks, cuestas
Position on landform: Shoulders
Position on landform: Head slope, side slope, nose slope
Parent material: Slope alluvium derived from sandstone
Slope: 8 to 25 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 2.4 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Shallow Sandstone
Potential native vegetation: sideoats grama, blue grama, little bluestem, Indian ricegrass, galleta
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 4 inches; fine sandy loam
C1—4 to 11 inches; fine sandy loam
C2—11 to 18 inches; sandy loam
2R—18 to 60 inches; bedrock

Ildefonso soils
Landscape: Uplands
Landform: Fan remnants, mesas
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Fan alluvium and/or colluvium derived from igneous and sedimentary rock
Slope: 8 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 2 percent subrounded stones, about 8 percent subrounded cobbles, about 32 percent subrounded gravel
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 3.6 inches (low)
Shrink-swell potential: About 1.5 percent (low)

Runoff class: Medium
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Breaks
Potential native vegetation: black grama, blue grama, little bluestem, mountain muhly, plains lovegrass, sideoats grama, New Mexico Feathergrass
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 3 inches; gravelly sandy loam
Bw—3 to 14 inches; very gravelly sandy loam
Bk—14 to 60 inches; very gravelly sandy loam

Minor Components
Riverwash
Composition: About 10 percent
Landscape: Valleys
Landform: Streams, channels
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Deama and similar soils
Composition: About 10 percent
Slope: 15 to 30 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

65—Ildefonso-Harvey association, 10 to 35 percent slopes

Map Unit Setting

Major Land Resource Area: 70
Elevation: 5,000 to 5,700 feet (1,524 to 1,737 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Ildefonso and similar soils: 50 percent
Harvey and similar soils: 30 percent
Minor components: 20 percent

Component Descriptions

Ildefonso soils
Landscape: Hills
Landform: Mesas, fan remnants
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Fan alluvium over colluvium derived from igneous and sedimentary rock
Slope: 10 to 35 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 2 percent subrounded stones, about 13 percent subrounded cobbles, about 43 percent subrounded gravel
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 3.5 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Breaks
Potential native vegetation: black grama, blue grama, little bluestem, mountain muhly, plains lovegrass, sideoats grama, New Mexico Feathergrass
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 6 inches; very gravelly sandy loam
Bw—6 to 38 inches; very gravelly sandy loam
Bk—38 to 60 inches; very gravelly sandy loam

Harvey soils
Landscape: Uplands
Landform: Bajadas, mesas, plateaus
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Eolian deposits over slope alluvium derived from igneous and sedimentary rock
Slope: 10 to 15 percent
Aspect: East to west
Shape (down/across): Convex/linear
Surface fragments: About 5 percent subrounded gravel
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 8.9 inches (moderate)
Shrink-swell potential: About 3.2 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: Limy
Potential native vegetation: black grama, sideoats grama, blue grama, needlegrass, winterfat, Bigelow sagebrush, fourwing saltbush, western wheatgrass
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 4 inches; loam
Bk1—4 to 23 inches; loam
Bk2—23 to 36 inches; loam
C—36 to 60 inches; sandy loam

Minor Components
La Fonda and similar soils
Composition: About 10 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Riverwash
Composition: About 5 percent
Landscape: Valleys
Landform: Channels, streams
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Placitas and similar soils
Composition: About 5 percent
Slope: 8 to 40 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Gravelly

66—Zia sandy loam, 3 to 6 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,100 to 5,700 feet (1,554 to 1,737 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Zia and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Zia soils
Landscape: Valleys
Landform: Alluvial fans

Position on landform: Toeslopes
Position on landform: Rise
Parent material: Eolian deposits over fan alluvium derived from sandstone
Slope: 3 to 6 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 7.1 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: blue grama, western wheatgrass, Indian ricegrass, black grama, oneseed juniper
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 4 inches; sandy loam
C—4 to 60 inches; sandy loam

Minor Components
Riverwash
Composition: About 5 percent
Landscape: Valleys
Landform: Channels, streams
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

San Mateo and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

Cascajo and similar soils
Composition: About 5 percent
Slope: 12 to 30 percent
Drainage class: Excessively drained
Ecological site: Hills

67—Sandoval-Poley complex, 3 to 30 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 7,000 feet (1,829 to 2,134 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Sandoval and similar soils: 40 percent
Poley and similar soils: 35 percent
Minor components: 25 percent

Component Descriptions

Sandoval soils
Landscape: Hills
Landform: Ridges
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Slope alluvium derived from shale
Slope: 3 to 30 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 2.1 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: About 10 percent
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Shallow
Potential native vegetation: sideoats grama, New Mexico Feathergrass, cane bluestem, little bluestem, galleta
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 2 inches; loam
C—2 to 11 inches; clay loam
Cr—11 to 60 inches; bedrock

Poley soils
Landscape: Hills
Landform: Fan remnants
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Colluvium derived from sandstone and shale

Slope: 3 to 30 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 8.8 inches (moderate)
Shrink-swell potential: About 3.5 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: About 1 percent
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Foothills
Potential native vegetation: blue grama, black grama, sideoats grama, oneseed juniper, New Mexico Feathergrass, sacahuista
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 3 inches; very cobbly loam
Bt1—3 to 12 inches; clay loam
Bt2—12 to 17 inches; clay loam
Btk—17 to 21 inches; clay loam
Bk1—21 to 40 inches; clay loam
Bk2—40 to 60 inches; very gravelly sandy loam

Minor Components

Camino and similar soils
Composition: About 10 percent
Slope: 1 to 6 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Clayey

Skyvillage and similar soils
Composition: About 5 percent
Slope: 8 to 25 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

Montecito and similar soils
Composition: About 5 percent
Slope: 3 to 30 percent
Drainage class: Well drained
Ecological site: pinyon-juniper forest

San Mateo and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

68—Penistaja-Querencia complex, 2 to 7 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,700 to 6,400 feet (1,737 to 1,951 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Penistaja and similar soils: 45 percent
Querencia and similar soils: 35 percent
Minor components: 20 percent

Component Descriptions

Penistaja soils
Landscape: Uplands
Landform: Mesas, alluvial fans, bajadas, plateaus, cuestas, hills
Position on landform: Footslopes
Position on landform: Head slope, side slope, nose slope, rise
Parent material: Eolian deposits over slope alluvium derived from sandstone and shale
Slope: 2 to 7 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.3 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: sand dropseed, spike muhly, winterfat, galleta, sand bluestem, black grama, blue grama
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 2 inches; loamy fine sand
Bt—2 to 15 inches; sandy clay loam
Btk—15 to 27 inches; sandy clay loam
Bk—27 to 38 inches; clay loam
C—38 to 60 inches; sandy clay loam

Querencia soils
Landscape: Uplands
Landform: Stream terraces, valley sides, alluvial fans
Position on landform: Footslopes
Position on landform: Rise
Parent material: Fan alluvium over colluvium derived from sandstone and shale

Slope: 2 to 7 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 8.6 inches (moderate)
Shrink-swell potential: About 3.5 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, spike muhly, bottlebrush squirreltail, fourwing saltbush, needlegrass, winterfat
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 2 inches; fine sandy loam
Bw—2 to 40 inches; sandy clay loam
Bk—40 to 60 inches; fine sandy loam

Minor Components
Camino and similar soils
Composition: About 10 percent
Slope: 1 to 6 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Clayey

San Mateo and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

Sandoval and similar soils
Composition: About 5 percent
Slope: 3 to 30 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

71—Palon cobbly sandy loam, 15 to 35 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,500 to 9,500 feet (2,591 to 2,896 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Palon and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Palon soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Slope alluvium over colluvium derived from rhyolite
Slope: 15 to 35 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 2.8 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: white fir, ponderosa pine, Douglas-fir
Other plants: prairie junegrass, quaking aspen, silverweed cinquefoil, Arizona fescue, mountain muhly, nodding brome
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 6 inches; cobbly sandy loam
E—6 to 27 inches; very cobbly sandy loam
Bt—27 to 60 inches; extremely cobbly sandy loam

Minor Components
Jarmillo and similar soils
Composition: About 8 percent
Slope: 2 to 20 percent
Drainage class: Well drained
Ecological site: Mountain Loam

Rock outcrop
Composition: About 7 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

72—Palon very cobbly sandy loam, 35 to 65 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,600 to 9,300 feet (2,621 to 2,835 meters)

Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Palon and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Palon soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Slope alluvium over colluvium derived from rhyolite
Slope: 35 to 65 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 3.2 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: white fir, ponderosa pine, Douglas-fir
Other plants: prairie junegrass, quaking aspen, silverweed cinquefoil, Arizona fescue, mountain muhly, nodding brome
Land capability subclass (nonirrigated): 7c

Typical Profile:
Oi—0 to 2 inches; slightly decomposed plant material
A1—2 to 4 inches; very cobbly sandy loam
A2—4 to 10 inches; extremely cobbly sandy loam
E—10 to 32 inches; extremely cobbly sandy loam
Bt1—32 to 53 inches; very cobbly sandy loam
Bt2—53 to 60 inches; very cobbly sandy loam

Minor Components
Palon, bouldery and similar soils
Composition: About 5 percent
Slope: 15 to 35 percent
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

Rubble land
Composition: About 5 percent
Slope: 35 to 60 percent
Drainage class: Excessively drained

Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

74—Origo-Pavo association, 5 to 35 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,600 to 10,000 feet (2,621 to 3,048 meters)
Mean annual precipitation: 25 to 30 inches (635 to 762 millimeters)
Mean annual air temperature: 38 to 42 degrees F. (3.3 to 5.6 degrees C.)
Frost-free period: 45 to 60 days

Map Unit Composition

Origo and similar soils: 50 percent
Pavo and similar soils: 25 percent
Minor components: 25 percent

Component Descriptions

Origo soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Slope alluvium over colluvium derived from rhyolite
Slope: 15 to 35 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 2.0 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: white fir, Douglas-fir, limber pine, quaking aspen
Other plants: common juniper, nodding brome, prairie junegrass, unknown, ponderosa pine
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 7 inches; very cobbly sandy loam
E—7 to 28 inches; extremely cobbly sandy loam
Bt—28 to 60 inches; extremely cobbly sandy loam

Pavo soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Colluvium derived from tuff
Slope: 5 to 20 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 7.6 inches (moderate)
Shrink-swell potential: About 1.8 percent (low)
Runoff class: Low
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Mountain Loam
Potential native vegetation: Arizona fescue, bluegrass, western wheatgrass, muhly, needlegrass, bottlebrush squirreltail
Land capability subclass (nonirrigated): 7c

Typical Profile:
A1—0 to 9 inches; loam
A2—9 to 12 inches; sandy loam
E—12 to 25 inches; sandy loam
E/Bt1—25 to 35 inches; sandy loam
E/Bt2—35 to 45 inches; fine sandy loam
2Bt1—45 to 50 inches; gravelly clay loam
3Bt2—50 to 60 inches; sandy loam

Minor Components
Cajete and similar soils
Composition: About 10 percent
Slope: 0 to 8 percent
Drainage class: Well drained
Ecological site: Mountain Grassland

Rock outcrop
Composition: About 10 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Rubble land
Composition: About 5 percent
Slope: 35 to 60 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)
Drainage class: Excessively drained

75—Origo very cobbly sandy loam, 35 to 65 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,600 to 10,000 feet (2,621 to 3,048 meters)
Mean annual precipitation: 25 to 30 inches (635 to 762 millimeters)
Mean annual air temperature: 38 to 42 degrees F. (3.3 to 5.6 degrees C.)
Frost-free period: 45 to 60 days

Map Unit Composition

Origo and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Origo soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Slope alluvium over colluvium derived from rhyolite
Slope: 35 to 65 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 3.8 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: Engelmann spruce, white fir, Douglas-fir
Other plants: common juniper, nodding brome, prairie junegrass, limber pine, ponderosa pine, quaking aspen
Land capability subclass (nonirrigated): 7e

Typical Profile:
Oi—0 to 1 inch; slightly decomposed plant material
A1—1 inch to 6 inches; very cobbly sandy loam
A2—6 to 12 inches; very cobbly sandy loam
E—12 to 32 inches; very cobbly sandy loam
Bt1—32 to 56 inches; very cobbly sandy loam
Bt2—56 to 60 inches; very cobbly loamy sand

Minor Components
Pavo and similar soils
Composition: About 5 percent
Slope: 5 to 20 percent
Drainage class: Well drained
Ecological site: Mountain Loam

Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Rubble land
Composition: About 5 percent
Slope: 35 to 60 percent
Drainage class: Excessively drained

82—Calaveras loam, 15 to 35 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,500 to 9,000 feet (2,591 to 2,743 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Calaveras and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Calaveras soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Colluvium derived from tuff
Slope: 15 to 35 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 3.4 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: High
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: white fir, limber pine, Douglas-fir, ponderosa pine
Other plants: common juniper, nodding brome, prairie junegrass, quaking aspen
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 2 inches; loam
AE—2 to 6 inches; sandy loam
2Bt—6 to 40 inches; very cobbly sandy loam
3Bt—40 to 60 inches; extremely cobbly coarse sandy loam

Minor Components
Redondo and similar soils
Composition: About 5 percent
Slope: 35 to 80 percent
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

Cajete and similar soils
Composition: About 5 percent
Slope: 0 to 8 percent
Drainage class: Well drained
Ecological site: Mountain Grassland

Cosey and similar soils
Composition: About 5 percent
Slope: 2 to 20 percent
Drainage class: Well drained
Ecological site: Mountain Loam

83—Calaveras-Rubble land association, 35 to 60 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,500 to 9,000 feet (2,591 to 2,743 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Calaveras and similar soils: 60 percent
Rubble land: 20 percent
Minor components: 20 percent

Component Descriptions

Calaveras soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank

Parent material: Colluvium derived from tuff
Slope: 35 to 60 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 3.5 inches (low)
Shrink-swell potential: About 1.6 percent (low)
Runoff class: High
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: white fir, limber pine, Douglas-fir, ponderosa pine
Other plants: common juniper, nodding brome, prairie junegrass, quaking aspen
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 6 inches; loam
AE—6 to 12 inches; sandy loam
2Bt—12 to 24 inches; very cobbly sandy loam
3Bt—24 to 60 inches; extremely cobbly coarse sandy loam

Rubble land
Description: Rubble land consists of areas with 90 percent or more of the surface covered with cobbles, stones, and boulders.
Landscape: Mountains
Landform: Ledges, escarpments
Position on landform: Shoulders
Position on landform: Mountainflank
Slope: 35 to 60 percent
Aspect: East to west
Shape (down/across): Linear/linear
Drainage class: Excessively drained
Available water capacity: About 0.6 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 0 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Land capability subclass (nonirrigated): 8s

Minor Components
Redondo and similar soils
Composition: About 10 percent
Slope: 15 to 35 percent
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

Rock outcrop
Composition: About 10 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

85—Redondo coarse sandy loam, 15 to 35 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,700 to 10,000 feet (2,652 to 3,048 meters)
Mean annual precipitation: 25 to 30 inches (635 to 762 millimeters)
Mean annual air temperature: 38 to 42 degrees F. (3.3 to 5.6 degrees C.)
Frost-free period: 45 to 60 days

Map Unit Composition

Redondo and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Redondo soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Colluvium derived from tuff
Slope: 15 to 35 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 4.2 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: Engelmann spruce
Other plants: Arizona fescue, corkbark fir, sedge, Fendler meadowrue, common juniper, kinnikinnick, prairie junegrass, silverweed cinquefoil
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 2 inches; coarse sandy loam
E1—2 to 7 inches; coarse sandy loam
E2—7 to 15 inches; coarse sandy loam
BE—15 to 22 inches; coarse sandy loam
Bt1—22 to 29 inches; gravelly coarse sandy loam
Bt2—29 to 38 inches; very gravelly coarse sandy loam
Bt3—38 to 54 inches; extremely gravelly coarse sandy loam
Bt4—54 to 60 inches; extremely cobbly coarse sandy loam

Minor Components
Ess and similar soils
Composition: About 10 percent
Slope: 5 to 45 percent
Drainage class: Well drained
Ecological site: Subalpine Grassland

Rubble land
Composition: About 5 percent
Slope: 35 to 80 percent
Drainage class: Excessively drained

86—Redondo cobbly coarse sandy loam, 35 to 80 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,700 to 11,000 feet (2,652 to 3,353 meters)
Mean annual precipitation: 25 to 30 inches (635 to 762 millimeters)
Mean annual air temperature: 38 to 42 degrees F. (3.3 to 5.6 degrees C.)
Frost-free period: 45 to 60 days

Map Unit Composition

Redondo and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Redondo soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Colluvium derived from tuff
Slope: 35 to 80 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 2.4 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: Engelmann spruce
Other plants: Arizona fescue, Fendler meadowrue, Rocky Mountain maple, corkbark fir, kinnikinnick, limber pine, quaking aspen
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 8 inches; cobbly coarse sandy loam
E—8 to 13 inches; very cobbly coarse sandy loam
BE—13 to 34 inches; extremely cobbly coarse sandy loam
Bt—34 to 60 inches; extremely cobbly coarse sandy loam

Minor Components
Ess and similar soils
Composition: About 8 percent
Slope: 5 to 45 percent
Drainage class: Well drained
Ecological site: Subalpine Grassland

Rubble land
Composition: About 7 percent
Slope: 35 to 80 percent
Drainage class: Excessively drained

87—Redondo-Rubble land association, 35 to 80 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 9,000 to 10,500 feet (2,743 to 3,200 meters)
Mean annual precipitation: 25 to 30 inches (635 to 762 millimeters)
Mean annual air temperature: 38 to 42 degrees F. (3.3 to 5.6 degrees C.)
Frost-free period: 45 to 60 days

Map Unit Composition

Redondo and similar soils: 50 percent
Rubble land: 25 percent
Minor components: 25 percent

Component Descriptions

Redondo soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Colluvium derived from tuff
Slope: 35 to 80 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 3.4 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: Engelmann spruce
Other plants: Arizona fescue, Fendler meadowrue, Rocky Mountain maple, corkbark fir, kinnikinnick, limber pine, quaking aspen
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 6 inches; cobbly loam
E—6 to 13 inches; very cobbly coarse sandy loam
Bt—13 to 60 inches; very cobbly coarse sandy loam

Rubble land
Description: Rubble land consists of areas with 90 percent or more of the surface covered with cobbles, stones, and boulders.
Landscape: Mountains
Landform: Talus slopes
Position on landform: Backslopes
Position on landform: Mountainflank, upper third
Slope: 35 to 80 percent
Aspect: East to west
Shape (down/across): Concave/linear
Drainage class: Excessively drained
Available water capacity: About 0.6 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 0 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Land capability subclass (nonirrigated): 8s

Minor Components
Ess and similar soils
Composition: About 25 percent
Landform: Mountains
Slope: 5 to 45 percent
Drainage class: Well drained
Ecological site: Subalpine Grassland

88—Totavi-Jemez-Rock outcrop association, 0 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 7,800 to 8,800 feet (2,377 to 2,682 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Totavi and similar soils: 45 percent
Jemez and similar soils: 30 percent
Rock outcrop: 15 percent
Minor components: 10 percent

Component Descriptions

Totavi soils
Landscape: Plains
Landform: Stream terraces, valley floors, closed depressions
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Fan alluvium derived from tuff
Slope: 0 to 5 percent
Aspect: East to west
Shape (down/across): Concave/concave
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 4.7 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Runoff class: Very low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa-Juniperus deppeana/Quercus gambelii
Potential native vegetation:
Common trees: oneseed juniper, ponderosa pine
Other plants: needle and thread, skunkbush sumac, western wheatgrass, Gambel oak
Land capability subclass (nonirrigated): 6s

Typical Profile:
A—0 to 12 inches; sandy loam
C—12 to 60 inches; loamy sand

Jemez soils
Landscape: Hills
Landform: Plateaus
Position on landform: Shoulders
Position on landform: Nose slope
Parent material: Slope alluvium derived from tuff
Slope: 5 to 15 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Moderately deep
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 4.6 inches (low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High

Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: white fir, ponderosa pine, Douglas-fir
Other plants: needle and thread, skunkbush sumac, western wheatgrass, Gambel oak
Land capability subclass (nonirrigated): 7c

Typical Profile:
A1—0 to 6 inches; loam
A2—6 to 13 inches; loam
BA—13 to 19 inches; clay loam
Bt—19 to 27 inches; sandy clay loam
R—27 to 60 inches; bedrock

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landscape: Hills
Landform: Breaks, escarpments
Position on landform: Summits
Position on landform: Nose slope
Aspect: East to west
Shape (down/across): Convex/linear
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Cajete and similar soils
Composition: About 10 percent
Slope: 8 to 30 percent
Drainage class: Well drained
Ecological site: Mountain Grassland

91—Zia sandy loam, 1 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,500 to 5,700 feet (1,676 to 1,737 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Zia and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Zia soils
Landscape: Valleys
Landform: Stream terraces
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Eolian deposits over stream alluvium derived from sandstone
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 7.3 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: blue grama, western wheatgrass, Indian ricegrass, black grama, oneseed juniper
Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 16 inches; sandy loam
C1—16 to 22 inches; loamy sand
C2—22 to 35 inches; sandy loam
C3—35 to 60 inches; fine sandy loam

Minor Components
El Rancho and similar soils
Composition: About 10 percent
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Loamy

Galisteo and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Well drained
Ecological site: Salt Flats

92—Galisteo silty clay loam, moderately saline, sodic, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,500 to 5,700 feet (1,676 to 1,737 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)

Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Galisteo, moderately saline, sodic and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Galisteo, moderately saline, sodic soils
Landscape: Valleys
Landform: Stream terraces, alluvial fans
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Stream alluvium derived from sandstone and shale
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 9.4 inches (high)
Shrink-swell potential: About 7.1 percent (high)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Salty Bottomland
Potential native vegetation: alkali sacaton, western wheatgrass, bottlebrush squirreltail, galleta, fourwing saltbush, greasewood
Land capability subclass (irrigated): 4s
Land capability subclass (nonirrigated): 6c

Typical Profile:
Ap—0 to 12 inches; silty clay loam
C—12 to 60 inches; clay

Minor Components
El Rancho and similar soils
Composition: About 10 percent
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Loamy

Zia and similar soils
Composition: About 5 percent
Slope: 5 to 20 percent
Drainage class: Well drained
Ecological site: Sandy

93—Zia loamy sand, 1 to 4 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,100 to 5,500 feet (1,554 to 1,676 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Zia and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Zia soils
Landscape: Valleys
Landform: Stream terraces
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Eolian deposits over stream alluvium derived from sandstone
Slope: 1 to 4 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 6.7 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: blue grama, western wheatgrass, Indian ricegrass, black grama, oneseed juniper
Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 8 inches; loamy sand
C—8 to 60 inches; sandy loam

Minor Components
Gilco and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Pinavetes and similar soils
Composition: About 5 percent
Slope: 5 to 15 percent
Drainage class: Excessively drained
Ecological site: Deep Sand

95—El Rancho loam, 0 to 2 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,300 to 5,500 feet (1,615 to 1,676 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

El Rancho and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

El Rancho soils
Landscape: Valleys
Landform: Stream terraces
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from sandstone and shale
Slope: 0 to 2 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 8.3 inches (moderate)
Shrink-swell potential: About 3.4 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, spike muhly, western wheatgrass, bottlebrush squirreltail, fourwing saltbush, winterfat
Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 6c

Typical Profile:
Ap—0 to 5 inches; loam
C1—5 to 20 inches; sandy clay loam
C2—20 to 38 inches; sandy clay loam
2C3—38 to 60 inches; sandy loam

Minor Components
Galisteo and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Well drained
Ecological site: Salt Flats

Zia and similar soils
Composition: About 5 percent
Slope: 1 to 4 percent
Drainage class: Well drained
Ecological site: Sandy

97—El Rancho clay loam, 0 to 2 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,300 to 5,500 feet (1,615 to 1,676 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

El Rancho and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

El Rancho soils
Landscape: Valleys
Landform: Stream terraces
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from sandstone and shale
Slope: 0 to 2 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.3 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, spike muhly, western wheatgrass, bottlebrush squirreltail, fourwing saltbush, winterfat
Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 6c

Typical Profile:
Ap—0 to 8 inches; clay loam
C—8 to 60 inches; sandy clay loam

Minor Components
Jocity and similar soils
Composition: About 8 percent
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Zia and similar soils
Composition: About 7 percent
Slope: 1 to 4 percent
Drainage class: Well drained
Ecological site: Sandy

100—Orejas-Rock outcrop complex, 15 to 40 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 7,000 to 7,500 feet (2,134 to 2,286 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Orejas and similar soils: 40 percent
Rock outcrop: 40 percent
Minor components: 20 percent

Component Descriptions

Orejas soils
Landscape: Uplands
Landform: Plateaus, mesas
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian material, alluvium and colluvium derived from basalt
Slope: 15 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 1.8 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)

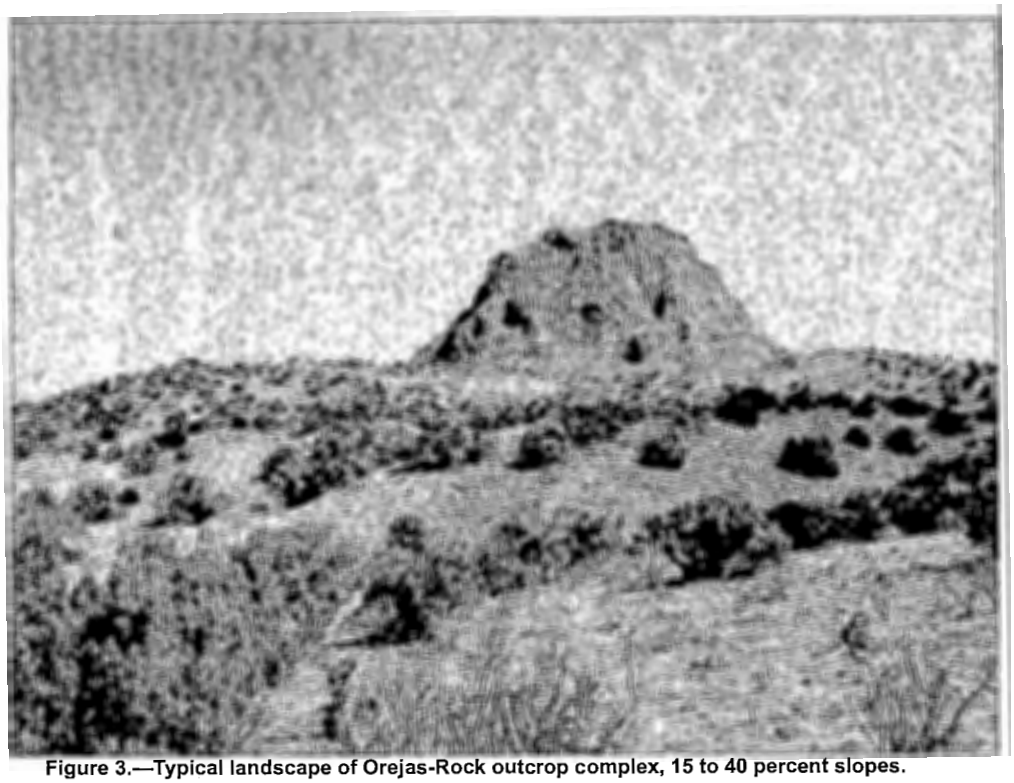


Figure 3.—Typical landscape of Orejas-Rock outcrop complex, 15 to 40 percent slopes.

Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: twoneedle pinyon, oneseed juniper
Other plants: blue grama, sideoats grama, big sagebrush
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 5 inches; very stony loam
Bt—5 to 15 inches; very cobbly clay loam
C—15 to 19 inches; very cobbly clay loam
R—19 to 60 inches; bedrock

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landscape: Uplands
Landform: Breaks, escarpments
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Montecito and similar soils
Composition: About 10 percent
Slope: 3 to 30 percent

Drainage class: Well drained
Ecological site: pinyon-juniper forest

San Mateo and similar soils
Composition: About 10 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

101—Blancot-Lybrook association, 0 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 37
Elevation: 6,600 to 7,000 feet (2,012 to 2,134 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Blancot and similar soils: 55 percent
Lybrook and similar soils: 25 percent
Minor components: 20 percent

Component Descriptions

Blancot soils
Landscape: Uplands
Landform: Ridges, valley sides
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Fan alluvium derived from sandstone and shale
Slope: 2 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.5 inches (high)
Shrink-swell potential: About 3.0 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: Indian ricegrass, blue grama, galleta, big sagebrush, sand dropseed, western wheatgrass
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 2 inches; fine sandy loam
Bt1—2 to 5 inches; clay loam
Bt2—5 to 14 inches; clay loam
Btk—14 to 23 inches; clay loam
C1—23 to 40 inches; sandy loam
C2—40 to 49 inches; silty clay loam
C3—49 to 60 inches; sandy loam

Lybrook soils
Landscape: Valleys
Landform: Stream terraces, valley floors
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from sandstone and shale
Slope: 0 to 2 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 10.6 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 25 mmhos/cm (strongly saline)
Sodium adsorption ratio maximum: About 50 (strongly sodic)
Ecological site: Salt Flats
Potential native vegetation: alkali sacaton, fourwing saltbush, galleta, greasewood, shadscale saltbush, big sagebrush, inland saltgrass, western wheatgrass
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 1 inch; clay loam
C1—1 inch to 5 inches; silty clay loam
C2—5 to 21 inches; clay loam
C3—21 to 30 inches; silty clay loam
C4—30 to 60 inches; clay loam

Minor Components
Betonnie and similar soils
Composition: About 10 percent
Slope: 5 to 8 percent
Drainage class: Well drained
Ecological site: Sandy

Councelor and similar soils
Composition: About 10 percent
Slope: 1 to 3 percent
Drainage class: Well drained
Ecological site: Sandy

102—Sparham clay loam, 1 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,500 to 7,500 feet (1,981 to 2,286 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Sparham and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Sparham soils
Landscape: Valleys
Landform: Valley sides, alluvial fans, flood plains
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Stream alluvium derived from shale
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 11.8 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Flooding hazard: Occasional
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Bottomland
Potential native vegetation: western wheatgrass, alkali sacaton, bottlebrush squirreltail, prairie junegrass
Land capability subclass (irrigated): 3s
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 7 inches; clay loam
C1—7 to 29 inches; clay loam
C2—29 to 60 inches; silty clay loam

Minor Components
Hickman and similar soils
Composition: About 5 percent
Slope: 1 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

Pinitos and similar soils
Composition: About 5 percent
Slope: 2 to 10 percent
Drainage class: Well drained
Ecological site: Loamy

Royosa and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Somewhat excessively drained
Ecological site: Deep Sand

104—Cochiti-Montecito association, 1 to 30 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,500 to 7,000 feet (1,981 to 2,134 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Cochiti and similar soils: 50 percent
Montecito and similar soils: 30 percent
Minor components: 20 percent

Component Descriptions

Cochiti soils
Landscape: Uplands
Landform: Fan remnants
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Fan alluvium derived from igneous and sedimentary rock
Slope: 3 to 30 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 15 percent subrounded gravel
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 4.8 inches (low)
Shrink-swell potential: About 4.1 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Juniperus monosperma-Pinus edulis/Fallugia paradoxa-Chrysothamnus nauseosus/Bouteloua hirsuta-Bouteloua gracilis

Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: blue grama, sideoats grama, bottlebrush squirreltail
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 7 inches; gravelly loam
Bt1—7 to 12 inches; gravelly clay loam
Bt2—12 to 20 inches; very gravelly clay
Bt3—20 to 29 inches; very gravelly clay loam
C—29 to 60 inches; very gravelly sandy loam

Montecito soils
Landscape: Uplands
Landform: Hills, mesas, plains
Position on landform: Toeslopes
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium derived from sandstone and shale
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 8.1 inches (moderate)
Shrink-swell potential: About 2.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: twoneedle pinyon, oneseed juniper
Other plants: blue grama, bottlebrush squirreltail, muttongrass
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 3 inches; loam
Bt1—3 to 9 inches; clay loam
Bt2—9 to 15 inches; clay loam
Bt3—15 to 22 inches; clay loam
2Bk1—22 to 37 inches; sandy loam
2Bk2—37 to 60 inches; gravelly sandy loam

Minor Components
Cajete and similar soils
Composition: About 10 percent
Slope: 0 to 8 percent
Drainage class: Well drained
Ecological site: Loamy

Waumac and similar soils
Composition: About 10 percent
Slope: 1 to 7 percent
Drainage class: Well drained
Ecological site: Sandy

105—Badland-Menefee complex, 15 to 35 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,500 to 7,600 feet (1,981 to 2,316 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Badland: 50 percent
Menefee and similar soils: 30 percent
Minor components: 20 percent

Component Descriptions

Badland
Landform: Escarpments
Slope: 15 to 35 percent
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Runoff class: Very high
Land capability subclass (nonirrigated): 8

Menefee soils
Landscape: Hills
Landform: Mesas, mountainsides, hillslopes
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Colluvium over residuum weathered from shale
Slope: 15 to 35 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 1.9 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 5 percent
Gypsum maximum: About 1 percent
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, Rocky Mountain juniper, twoneedle pinyon
Other plants: blue grama, galleta, sideoats grama, Gambel oak, big sagebrush
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 4 inches; loam
C—4 to 10 inches; clay loam
2Cr—10 to 60 inches; bedrock

Minor Components
Pinitos and similar soils
Composition: About 10 percent
Slope: 2 to 10 percent
Drainage class: Well drained
Ecological site: Loamy

Sparham and similar soils
Composition: About 10 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Occasional
Ecological site: Clayey

106—Stumble association, 1 to 40 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,600 feet (1,524 to 1,707 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Stumble and similar soils: 50 percent
Stumble, sandy and similar soils: 30 percent
Minor components: 20 percent

Component Descriptions

Stumble soils
Landscape: Valleys
Landform: Fan aprons, inset fans, alluvial fans, fan remnants
Position on landform: Footslopes
Position on landform: Side slope, rise
Parent material: Eolian deposits derived from sandstone
Slope: 10 to 40 percent
Aspect: East to west
Shape (down/across): Linear, convex/linear
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)

Available water capacity: About 2.6 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Gravelly Sand
Potential native vegetation: black grama, bush muhly
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 4 inches; very gravelly fine sandy loam
Bw—4 to 10 inches; gravelly fine sandy loam
C1—10 to 24 inches; loamy sand
C2—24 to 60 inches; gravelly coarse sand

Stumble, sandy soils
Landscape: Valleys
Landform: Alluvial fans, fan remnants, fan aprons, inset fans
Position on landform: Footslopes
Position on landform: Rise, side slope
Parent material: Eolian deposits derived from sandstone
Slope: 1 to 10 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 2.0 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Deep Sand
Potential native vegetation: black grama, Indian ricegrass, dropseed, bush muhly, sand sagebrush
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 4 inches; gravelly loamy sand
Bw—4 to 18 inches; loamy sand
C—18 to 60 inches; gravelly coarse sand

Minor Components
Embudo and similar soils
Composition: About 10 percent
Slope: 1 to 15 percent
Drainage class: Well drained
Ecological site: Sandy

Grieta and similar soils
Composition: About 10 percent
Slope: 1 to 4 percent
Drainage class: Well drained
Ecological site: Loamy

108—Embudo gravelly sandy loam, 1 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,600 feet (1,524 to 1,707 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.7 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Embudo and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Embudo soils
Landscape: Valleys
Landform: Fan remnants
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Fan alluvium derived from granite
Slope: 1 to 15 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 5.5 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: black grama, dropseed, Indian ricegrass, sand sagebrush
Land capability subclass (nonirrigated): 7c

Typical Profile:
AB—0 to 6 inches; gravelly sandy loam
Bk1—6 to 30 inches; sandy loam
2Bk2—30 to 60 inches; loamy sand

Minor Components

Cascajo and similar soils
Composition: About 5 percent
Slope: 12 to 30 percent
Drainage class: Excessively drained
Ecological site: Hills

Riverwash
Composition: About 5 percent
Landscape: Valleys
Landform: Streams, channels
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Sheppard and similar soils
Composition: About 3 percent
Slope: 10 to 40 percent
Drainage class: Somewhat excessively drained
Ecological site: Deep Sand

Tijeras and similar soils
Composition: About 2 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Sandy

109—Embudo-Tijeras association, 1 to 9 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,100 to 5,600 feet (1,554 to 1,707 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Embudo and similar soils: 50 percent
Tijeras and similar soils: 35 percent
Minor components: 15 percent

Component Descriptions

Embudo soils
Landscape: Valleys
Landform: Fan remnants
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Fan alluvium derived from granite

Slope: 3 to 9 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 3.8 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: black grama, dropseed, Indian ricegrass, sand sagebrush
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 4 inches; gravelly sandy loam
Bw—4 to 12 inches; gravelly fine sandy loam
Bk1—12 to 30 inches; gravelly coarse sandy loam
2Bk2—30 to 60 inches; gravelly loamy coarse sand

Tijeras soils
Landscape: Valleys
Landform: Fan remnants
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Fan alluvium derived from granite
Slope: 1 to 6 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 4.6 inches (low)
Shrink-swell potential: About 2.4 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: black grama, dropseed, Indian ricegrass, sand sagebrush
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 4 inches; gravelly fine sandy loam
Bt—4 to 10 inches; sandy clay loam
Btk—10 to 20 inches; sandy clay loam
Bk1—20 to 26 inches; gravelly sandy loam
Bk2—26 to 60 inches; very gravelly coarse sandy loam

Minor Components
Grieta and similar soils
Composition: About 10 percent
Slope: 2 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Sheppard and similar soils
Composition: About 5 percent
Slope: 3 to 8 percent
Drainage class: Somewhat excessively drained
Ecological site: Deep Sand

110—Rock outcrop-Saido complex, 5 to 40 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,300 to 6,000 feet (1,615 to 1,829 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Rock outcrop: 45 percent
Saido and similar soils: 40 percent
Minor components: 15 percent

Component Descriptions

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Escarpments, breaks
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Saido soils
Landscape: Hills
Landform: Mesas, cuestas, knolls, fans
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Slope alluvium derived from gypsum
Slope: 5 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 10.8 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 10 percent
Gypsum maximum: About 80 percent

Salinity maximum: About 8 mmhos/cm (slightly saline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Gyp Upland
Potential native vegetation: alkali sacaton, black grama, bush muhly, gyp dropseed, blue grama, coldenia, fourwing saltbush, galleta, gypsum grama
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 5 inches; silt loam
By1—5 to 9 inches; silt loam
By2—9 to 15 inches; silt loam
By3—15 to 25 inches; silt loam
C—25 to 60 inches; loam

Minor Components
Riverwash
Composition: About 5 percent
Landscape: Valleys
Landform: Streams, channels
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Penistaja and similar soils
Composition: About 5 percent
Slope: 2 to 7 percent
Drainage class: Well drained
Ecological site: Loamy

Hagerman and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Loamy

111—Rock outcrop-Zia complex, 8 to 25 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,400 to 6,400 feet (1,646 to 1,951 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Rock outcrop: 50 percent
Zia and similar soils: 35 percent
Minor components: 15 percent

Figure 4.—Typical landscape of Rock outcrop-Zia complex, 8 to 25 percent slopes.

Component Descriptions

Rock outcrop

Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Escarpments, breaks
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Zia soils

Landscape: Valleys
Landform: Alluvial fans
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Eolian deposits over fan alluvium derived from sandstone
Slope: 8 to 25 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 8.2 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None

Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Foothills
Potential native vegetation: blue grama, hairy grama, black grama, sideoats grama, galleta, oneseed juniper, sacahuista
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 5 inches; sandy loam
C—5 to 60 inches; fine sandy loam

Minor Components
Penistaja and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Hagerman and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Loamy

San Mateo and similar soils
Composition: About 3 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

Skyvillage and similar soils
Composition: About 2 percent
Slope: 3 to 20 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

112—Tijeras gravelly fine sandy loam, 1 to 5 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,100 to 5,600 feet (1,554 to 1,707 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Tijeras and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Tijeras soils
Landscape: Uplands
Landform: Fan remnants
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Fan alluvium derived from granite
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 6.5 inches (moderate)
Shrink-swell potential: About 2.1 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: black grama, dropseed, Indian ricegrass, sand sagebrush
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 3 inches; gravelly fine sandy loam
Bt—3 to 14 inches; sandy clay loam
Bk—14 to 60 inches; gravelly sandy loam

Minor Components
Embudo and similar soils
Composition: About 15 percent
Landform: Fan remnants
Slope: 1 to 15 percent
Drainage class: Well drained
Ecological site: Sandy

114—Zia-San Mateo association, 0 to 9 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,500 to 6,200 feet (1,676 to 1,890 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Zia and similar soils: 40 percent
San Mateo and similar soils: 40 percent
Minor components: 20 percent

Component Descriptions

Zia soils
Landscape: Valleys
Landform: Alluvial fans
Position on landform: Footslopes
Position on landform: Rise
Parent material: Eolian deposits over fan alluvium derived from sandstone
Slope: 1 to 9 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 8.3 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: blue grama, spike muhly, western wheatgrass, bottlebrush squirreltail, fourwing saltbush, oneseed juniper, winterfat
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 3 inches; fine sandy loam
C—3 to 60 inches; fine sandy loam

San Mateo soils
Landscape: Valleys
Landform: Alluvial fans, valley sides, flood plains
Position on landform: Footslopes
Position on landform: Rise
Parent material: Stream alluvium derived from sandstone and shale
Slope: 0 to 3 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.2 inches (high)
Shrink-swell potential: About 4.3 percent (moderate)
Flooding hazard: Rare
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 30 mmhos/cm (strongly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Swale
Potential native vegetation: galleta, big sagebrush, blue grama, bottlebrush squirreltail, other half shrubs, western wheatgrass
Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 7 inches; sandy loam
C—7 to 60 inches; stratified sandy loam to loam to clay loam to silty clay loam

Minor Components
Sparank and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Well drained
Flooding hazard: Occasional
Ecological site: Clayey Bottomland

Querencia and similar soils
Composition: About 10 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: Loamy

120—Pinavetes loamy sand, 3 to 5 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,300 to 6,000 feet (1,615 to 1,829 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Pinavetes and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Pinavetes soils
Landscape: Dune fields
Landform: Dunes, valley sides
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone
Slope: 3 to 5 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 2.9 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)

Figure 5.—Typical landscape of Pinavetes loamy sand, 3 to 5 percent slopes.

Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, blue grama, sand sagebrush
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 10 inches; loamy sand
C1—10 to 35 inches; sand
C2—35 to 60 inches; sand

Minor Components
San Mateo and similar soils
Composition: About 10 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

Zia and similar soils
Composition: About 5 percent
Slope: 1 to 3 percent
Drainage class: Well drained
Ecological site: Sandy

124—Rock outcrop

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,300 to 6,000 feet (1,615 to 1,829 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)

Map Unit Composition

Rock outcrop: 90 percent
Minor components: 10 percent

Component Descriptions

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Mesas, escarpments
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Vessilla and similar soils
Composition: About 10 percent
Slope: 5 to 40 percent
Depth to restrictive feature: 5 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

129—Menefee clay loam, 5 to 35 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,800 to 7,800 feet (2,073 to 2,377 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Menefee and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Menefee soils
Landscape: Hills
Landform: Mountainsides, hillslopes, mesas
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Colluvium over residuum weathered from shale
Slope: 5 to 35 percent
Aspect: East to west
Shape (down/across): Convex/linear

Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 3.4 inches (low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 5 percent
Gypsum maximum: About 1 percent
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: Rocky Mountain juniper, oneseed juniper, twoneedle pinyon
Other plants: blue grama, Gambel oak, galleta, big sagebrush, sideoats grama
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 5 inches; clay loam
C1—5 to 10 inches; clay loam
C2—10 to 17 inches; clay loam
2Cr—17 to 60 inches; bedrock

Minor Components
Pinitos and similar soils
Composition: About 5 percent
Slope: 2 to 10 percent
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Cochiti and similar soils
Composition: About 5 percent
Slope: 3 to 30 percent
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Badland
Composition: About 5 percent
Slope: 5 to 75 percent
Depth to restrictive feature: 0 inches to bedrock (paralithic)

130—Pinavetes-Galisteo, moderately saline, sodic, association, 0 to 5 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,500 to 6,000 feet (1,676 to 1,829 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Pinavetes and similar soils: 45 percent
Galisteo, moderately saline, sodic and similar soils: 40 percent
Minor components: 15 percent

Component Descriptions

Pinavetes soils
Landscape: Valleys
Landform: Dunes, valley sides
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone
Slope: 0 to 5 percent
Aspect: East to west
Shape (down/across): Convex/convex
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 4.1 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, blue grama, sand sagebrush
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 2 inches; loamy sand
C—2 to 60 inches; loamy sand

Galisteo, moderately saline, sodic soils
Landscape: Valleys
Landform: Alluvial fans, stream terraces
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Stream alluvium derived from sandstone and shale
Slope: 0 to 2 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 9.0 inches (moderate)
Shrink-swell potential: About 7.5 percent (high)
Flooding hazard: Rare
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Salty Bottomland

Potential native vegetation: alkali sacaton, western wheatgrass, bottlebrush squirreltail, galleta, fourwing saltbush, greasewood
Land capability subclass (nonirrigated): 6c

Typical Profile:
Ap—0 to 2 inches; clay loam
C—2 to 60 inches; clay

Minor Components
Riverwash
Composition: About 5 percent
Landscape: Valleys
Landform: Streams, channels
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

El Rancho and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Loamy

San Mateo and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

142—Grieta fine sandy loam, 1 to 4 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Grieta and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Grieta soils
Landscape: Uplands
Landform: Plateaus, fan remnants, ridges, mesas
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium derived from sandstone

Slope: 1 to 4 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 5 percent fine subrounded gravel
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 7.9 inches (moderate)
Shrink-swell potential: About 3.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Loamy
Potential native vegetation: black grama, dropseed, Indian ricegrass, sand sagebrush
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 3 inches; fine sandy loam
Bt1—3 to 11 inches; fine sandy loam
Bt2—11 to 34 inches; sandy clay loam
Bk1—34 to 48 inches; sandy clay loam
Bk2—48 to 60 inches; loamy sand

Minor Components
Sheppard and similar soils
Composition: About 15 percent
Slope: 3 to 8 percent
Drainage class: Somewhat excessively drained
Ecological site: Deep Sand

143—Clovis fine sandy loam, 1 to 4 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 6,600 feet (1,829 to 2,012 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Clovis and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Clovis soils
Landscape: Uplands
Landform: Fan remnants, plains, mesas
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian deposits over slope alluvium derived from sandstone and shale

Slope: 1 to 4 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 8.8 inches (moderate)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 25 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 1 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, bottlebrush squirreltail
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 3 inches; fine sandy loam
Bt1—3 to 7 inches; sandy clay loam
Bt2—7 to 12 inches; sandy clay loam
Bt3—12 to 22 inches; sandy clay loam
Bk1—22 to 34 inches; sandy clay loam
Bk2—34 to 60 inches; sandy clay loam

Minor Components
Harvey and similar soils
Composition: About 5 percent
Slope: 5 to 10 percent
Drainage class: Well drained
Ecological site: Limy

Zia and similar soils
Composition: About 5 percent
Slope: 3 to 6 percent
Drainage class: Well drained
Ecological site: Sandy

Pinavetes and similar soils
Composition: About 5 percent
Slope: 3 to 5 percent
Drainage class: Excessively drained
Ecological site: Deep Sand

145—Grieta-Sheppard loamy fine sands, 2 to 9 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,200 to 6,000 feet (1,585 to 1,829 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Grieta and similar soils: 55 percent
Sheppard and similar soils: 40 percent
Minor components: 5 percent

Component Descriptions

Grieta soils
Landscape: Uplands
Landform: Fan remnants, ridges, plateaus, mesas
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium derived from sandstone
Slope: 2 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 6.5 inches (moderate)
Shrink-swell potential: About 2.2 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, bottlebrush squirreltail
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 7 inches; loamy fine sand
Bt1—7 to 14 inches; sandy clay loam
Bt2—14 to 21 inches; sandy clay loam
Bk1—21 to 38 inches; coarse sandy loam
Bk2—38 to 50 inches; coarse sandy loam
Bk3—50 to 60 inches; coarse sandy loam

Sheppard soils
Landscape: Uplands
Landform: Alluvial fans, benches, dunes, structural benches, terraces
Position on landform: Shoulders
Position on landform: Rise, side slope
Parent material: Eolian deposits derived from sandstone
Slope: 3 to 9 percent
Aspect: East to west
Shape (down/across): Linear, convex/linear
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 5.3 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None

Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, black grama, sand dropseed, sand sagebrush, spike dropseed
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 5 inches; loamy fine sand
C—5 to 27 inches; loamy fine sand
C—27 to 60 inches; loamy fine sand

Minor Components
Cascajo and similar soils
Composition: About 3 percent
Slope: 12 to 30 percent
Drainage class: Excessively drained
Ecological site: Hills

Riverwash
Composition: About 2 percent
Landscape: Valleys
Landform: Streams, channels
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

146—Sedmar loamy sand, 1 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 7,000 to 8,000 feet (2,134 to 2,438 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Sedmar and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Sedmar soils
Landscape: Uplands
Landform: Ridges, cuestas
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Slope alluvium over residuum weathered from sandstone
Slope: 1 to 15 percent
Aspect: East to west
Shape (down/across): Linear/linear

Depth class: Very shallow and shallow
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 1.8 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii
Potential native vegetation:
Common trees: ponderosa pine, Gambel oak
Other plants: prairie junegrass, Rocky Mountain juniper, Utah juniper, true mountain mahogany
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 3 inches; loamy sand
C1—3 to 13 inches; sandy loam
C2—13 to 18 inches; loamy sand
2R—18 to 60 inches; bedrock

Minor Components
Menefee and similar soils
Composition: About 8 percent
Slope: 15 to 35 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Ponderosa Pine Forest

Rock outcrop
Composition: About 7 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

150—Doakum-Betonnie fine sandy loams, 0 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 37
Elevation: 6,600 to 7,000 feet (2,012 to 2,134 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Doakum and similar soils: 55 percent
Betonnie and similar soils: 35 percent
Minor components: 10 percent

Component Descriptions

Doakum soils
Landscape: Uplands
Landform: Mesas, plateaus, hills, cuestas, bajadas
Position on landform: Footslopes
Position on landform: Head slope, side slope, nose slope
Parent material: Eolian deposits over slope alluvium derived from sandstone and shale
Slope: 0 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 10.0 inches (high)
Shrink-swell potential: About 4.4 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 8 mmhos/cm (slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: Indian ricegrass, blue grama, galleta, big sagebrush, bottlebrush squirreltail, sand dropseed, western wheatgrass
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 5 inches; fine sandy loam
Bt1—5 to 11 inches; clay loam
Bt2—11 to 17 inches; sandy clay loam
Bk1—17 to 24 inches; sandy clay loam
Bk2—24 to 31 inches; clay loam
Bk3—31 to 44 inches; loam
C—44 to 60 inches; loam

Betonnie soils
Landscape: Uplands
Landform: Cuestas, mesas, plateaus, hills, valley sides, fan remnants
Position on landform: Footslopes
Position on landform: Head slope, side slope, nose slope
Parent material: Eolian deposits over slope alluvium derived from sandstone
Slope: 5 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 7.3 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)

Ecological site: Sandy
Potential native vegetation: Indian ricegrass, dropseed, needle and thread, winterfat, alkali sacaton, fourwing saltbush, mormon tea, sand sagebrush, sandhill muhly
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 2 inches; fine sandy loam
BA—2 to 4 inches; fine sandy loam
Bt—4 to 12 inches; fine sandy loam
BC—12 to 18 inches; sandy loam
C1—18 to 34 inches; sandy loam
C2—34 to 60 inches; sandy loam

Minor Components
Blancot and similar soils
Composition: About 5 percent
Slope: 3 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Eslendo and similar soils
Composition: About 3 percent
Slope: 5 to 30 percent
Depth to restrictive feature: 4 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

Mespun and similar soils
Composition: About 2 percent
Slope: 5 to 30 percent
Drainage class: Excessively drained
Ecological site: Sandy

162—Hackroy-Nyjack association, 1 to 5 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 7,200 feet (1,829 to 2,195 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Hackroy and similar soils: 45 percent
Nyjack and similar soils: 40 percent
Minor components: 15 percent

Component Descriptions

Hackroy soils
Landscape: Uplands
Landform: Mesas, plateaus
Position on landform: Shoulders
Position on landform: Side slope

Parent material: Residuum weathered from tuff
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 1.9 inches (very low)
Shrink-swell potential: About 7.5 percent (high)
Runoff class: High
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Indian ricegrass, blue grama, needle and thread, skunkbush sumac
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; sandy loam
Bt—3 to 13 inches; clay
2R—13 to 60 inches; bedrock

Nyjack soils
Landscape: Uplands
Landform: Plateaus, mesas
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian deposits over slope alluvium derived from tuff
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Moderately deep
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 6.1 inches (moderate)
Shrink-swell potential: About 3.2 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa-Juniperus deppeana/Quercus gambelii
Potential native vegetation:
Common trees: oneseed juniper, ponderosa pine, twoneedle pinyon
Other plants: blue grama, little bluestem, wavyleaf oak, western wheatgrass
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 3 inches; loam
Bt1—3 to 13 inches; clay loam
Bt2—13 to 24 inches; clay loam
2C—24 to 39 inches; gravelly sandy loam
2Cr—39 to 60 inches; bedrock

Minor Components
Frijoles and similar soils
Composition: About 10 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

163—Jemez loam, 1 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 7,000 to 7,500 feet (2,134 to 2,286 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Jemez and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Jemez soils
Landscape: Uplands
Landform: Plateaus, hills
Position on landform: Summits
Position on landform: Side slope
Parent material: Slope alluvium derived from tuff
Slope: 1 to 15 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Moderately deep
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 7.0 inches (moderate)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: white fir, ponderosa pine, Douglas-fir
Other plants: needle and thread, skunkbush sumac, western wheatgrass, Gambel oak
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 3 inches; loam
BA—3 to 24 inches; clay loam
Bt—24 to 39 inches; sandy clay loam
R—39 to 60 inches; bedrock

Minor Components
Carjo and similar soils
Composition: About 5 percent
Slope: 1 to 9 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Pinus ponderosa/Quercus gambelii

Alanos and similar soils
Composition: About 5 percent
Slope: 5 to 40 percent
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

Mirand and similar soils
Composition: About 3 percent
Slope: 5 to 30 percent
Drainage class: Well drained
Ecological site: Pinus ponderosa/Quercus gambelii

Rock outcrop
Composition: About 2 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

170—San Mateo loam, 0 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,800 to 6,800 feet (1,768 to 2,073 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

San Mateo and similar soils: 85 percent
Minor components: 15 percent

Figure 6.—Typical landscape of San Mateo loam, 0 to 3 percent slopes. This area is prone to flooding.

Component Descriptions

San Mateo soils
Landscape: Valleys
Landform: Alluvial fans, valley sides, flood plains
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Stream alluvium derived from sandstone and shale
Slope: 0 to 3 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 10.7 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Flooding hazard: Rare
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 8 mmhos/cm (slightly saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Swale
Potential native vegetation: galleta, big sagebrush, blue grama, bottlebrush squirreltail, other half shrubs, western wheatgrass

Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 2 inches; loam
C1—2 to 10 inches; clay loam
C2—10 to 23 inches; clay loam
C3—23 to 32 inches; clay loam
C4—32 to 54 inches; clay loam
C5—54 to 60 inches; clay loam

Minor Components
Camino and similar soils
Composition: About 5 percent
Slope: 1 to 6 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Clayey

Querencia and similar soils
Composition: About 3 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: Loamy

Sandoval and similar soils
Composition: About 3 percent
Slope: 3 to 30 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

Skyvillage and similar soils
Composition: About 2 percent
Slope: 3 to 20 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

Sparank and similar soils
Composition: About 2 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Occasional
Ecological site: Clayey Bottomland

180—Councelor-Eslendo-Mespun complex, 5 to 30 percent slopes

Map Unit Setting

Major Land Resource Area: 37
Elevation: 6,600 to 7,000 feet (2,012 to 2,134 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)

Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Councelor and similar soils: 40 percent
Eslendo and similar soils: 30 percent
Mespun and similar soils: 25 percent
Minor components: 5 percent

Component Descriptions

Councelor soils
Landscape: Uplands
Landform: Stream terraces, fan remnants, valley floors, valley sides
Position on landform: Toeslopes
Position on landform: Side slope
Parent material: Eolian deposits over stream alluvium derived from sandstone and shale
Slope: 5 to 30 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 8.1 inches (moderate)
Shrink-swell potential: About 1.7 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: Indian ricegrass, blue grama, dropseed, New Mexico Feathergrass, big sagebrush, galleta, mormon tea, needle and thread, winterfat
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 2 inches; fine sandy loam
C1—2 to 7 inches; fine sandy loam
C2—7 to 37 inches; fine sandy loam
C3—37 to 40 inches; clay loam
C4—40 to 60 inches; sandy loam

Eslendo soils
Landscape: Uplands
Landform: Ridges
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Residuum weathered from shale
Slope: 5 to 30 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 4 to 20 inches to bedrock (paralithic)
Drainage class: Well drained

Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 2.0 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Shallow
Potential native vegetation: Indian ricegrass, galleta, blue grama, big sagebrush, mormon tea, threeawn
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 3 inches; clay loam
C—3 to 10 inches; clay loam
Cr—10 to 60 inches; bedrock

Mespun soils
Landscape: Uplands
Landform: Dunes
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone
Slope: 5 to 30 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 4.8 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, blue grama, sand dropseed, sand sagebrush, spike dropseed
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 6 inches; loamy fine sand
C—6 to 60 inches; loamy sand

Minor Components
Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

183—Sheppard loamy fine sand, 8 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,200 to 5,700 feet (1,585 to 1,737 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Sheppard and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Sheppard soils
Landscape: Uplands
Landform: Structural benches, stream terraces, alluvial fans, benches, dunes
Position on landform: Shoulders
Position on landform: Rise, side slope
Parent material: Eolian deposits derived from sandstone
Slope: 8 to 15 percent
Aspect: East to west
Shape (down/across): Linear, convex/linear, convex
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 5.3 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, black grama, sand dropseed, sand sagebrush, spike dropseed
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 4 inches; loamy fine sand
C1—4 to 45 inches; loamy fine sand
C2—45 to 60 inches; loamy fine sand

Minor Components
Cascajo and similar soils
Composition: About 7 percent
Slope: 1 to 9 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Hills

Sheppard and similar soils
Composition: About 7 percent
Slope: 3 to 8 percent
Drainage class: Somewhat excessively drained
Ecological site: Deep Sand

Riverwash
Composition: About 1 percent
Landscape: Valleys
Landform: Channels, streams
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

185—Frijoles very fine sandy loam, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 7,000 feet (1,829 to 2,134 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Frijoles and similar soils: 90 percent
Minor components: 10 percent

Component Descriptions

Frijoles soils
Landscape: Uplands
Landform: Mesas
Position on landform: Summits
Position on landform: Side slope
Parent material: Eolian deposits over alluvium derived from pumice
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Depth to restrictive feature: 15 to 30 inches to abrupt textural change
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 2.1 inches (very low)
Shrink-swell potential: About 2.0 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Arizona fescue, blue grama
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 3 inches; very fine sandy loam
Bt1—3 to 8 inches; very gravelly clay loam
Bt2—8 to 13 inches; very gravelly clay loam
2C1—13 to 20 inches; extremely gravelly sandy loam
3C2—20 to 60 inches; fragmental material

Minor Components
Nyjack and similar soils
Composition: About 10 percent
Slope: 1 to 5 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

190—Zia-Skyvillage-Rock outcrop complex, 5 to 40 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,800 to 6,400 feet (1,768 to 1,951 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Zia and similar soils: 35 percent
Skyvillage and similar soils: 25 percent
Rock outcrop: 15 percent
Minor components: 25 percent

Component Descriptions

Zia soils
Landscape: Uplands
Landform: Alluvial fans
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Eolian deposits over fan alluvium derived from sandstone
Slope: 5 to 20 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 7.1 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low

Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Sandy
Potential native vegetation: blue grama, hairy grama, black grama, sideoats grama, galleta, oneseed juniper, sacahuista
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 5 inches; sandy loam
C1—5 to 28 inches; sandy loam
C2—28 to 60 inches; sandy loam

Skyvillage soils
Landscape: Uplands
Landform: Breaks, cuestas, hills, mesas, ridges, structural benches
Position on landform: Backslopes
Position on landform: Side slope, nose slope, head slope
Parent material: Slope alluvium derived from sandstone
Slope: 5 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 2.3 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Shallow Sandstone
Potential native vegetation: sideoats grama, blue grama, little bluestem, Indian ricegrass, galleta
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 2 inches; fine sandy loam
C1—2 to 11 inches; fine sandy loam
C2—11 to 16 inches; fine sandy loam
2R—16 to 60 inches; bedrock

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Breaks, escarpments
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components

Penistaja and similar soils
Composition: About 10 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Badland
Composition: About 10 percent
Slope: 5 to 75 percent
Depth to restrictive feature: 0 inches to bedrock (paralithic)

Sandoval and similar soils
Composition: About 5 percent
Slope: 3 to 30 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

191—Sheppard loamy fine sand, 3 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,200 to 5,700 feet (1,585 to 1,737 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Sheppard and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Sheppard soils

Landscape: Uplands
Landform: Alluvial fans, stream terraces, dunes, benches, structural benches
Position on landform: Shoulders
Position on landform: Side slope, rise
Parent material: Eolian deposits derived from sandstone
Slope: 3 to 8 percent
Aspect: East to west
Shape (down/across): Convex, linear/convex, linear
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 5.3 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, black grama, sand dropseed, sand sagebrush, spike dropseed
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; loamy fine sand
C1—3 to 27 inches; loamy fine sand
C2—27 to 60 inches; loamy fine sand

Minor Components
Grieta and similar soils
Composition: About 12 percent
Slope: 1 to 4 percent
Drainage class: Well drained
Ecological site: Loamy

Riverwash
Composition: About 3 percent
Landscape: Valleys
Landform: Channels, streams
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

200—Sedillo very cobbly sandy loam, 5 to 25 percent slopes, stony

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,400 to 6,100 feet (1,646 to 1,859 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Sedillo and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Sedillo soils
Landscape: Uplands
Landform: Fan remnants, stream terraces, bajadas
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Fan alluvium derived from igneous and sedimentary rock
Slope: 5 to 25 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep

Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 2.3 inches (very low)
Shrink-swell potential: About 2.0 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 30 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Gravelly
Potential native vegetation: blue grama, big sagebrush, black grama, hairy grama, needlegrass, New Mexico Feathergrass, oneseed juniper, sideoats grama, western wheatgrass, winterfat
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 4 inches; very cobbly sandy loam
Bt—4 to 13 inches; very gravelly sandy clay loam
Bk—13 to 60 inches; extremely gravelly coarse sandy loam

Minor Components

Pastura and similar soils
Composition: About 5 percent
Slope: 1 to 4 percent
Depth to restrictive feature: 7 to 20 inches to petrocalcic
Drainage class: Well drained
Ecological site: Limy

Clovis and similar soils
Composition: About 5 percent
Slope: 1 to 4 percent
Drainage class: Well drained
Ecological site: Loamy

Riverwash
Composition: About 3 percent
Landscape: Valleys
Landform: Channels, streams
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Sedillo and similar soils
Composition: About 2 percent
Slope: 5 to 25 percent
Drainage class: Well drained
Ecological site: Foothills

201—Rock outcrop-Sedgran association, 25 to 55 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,800 to 8,000 feet (1,768 to 2,438 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Rock outcrop: 55 percent
Sedgran and similar soils: 35 percent
Minor components: 10 percent

Component Descriptions

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Escarpments, ridges
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Sedgran soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank, lower third
Parent material: Colluvium derived from granite
Slope: 25 to 55 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 0.4 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Hills
Potential native vegetation: black grama, sideoats grama, New Mexico Feathergrass, little bluestem, New Mexico muhly, blue grama, mountain mahogany, needle and thread, oneseed juniper, skunkbush sumac, wavyleaf oak
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 4 inches; extremely gravelly loamy coarse sand
C—4 to 13 inches; very gravelly loamy coarse sand
2R—13 to 60 inches; bedrock

Minor Components
Sedillo and similar soils
Composition: About 9 percent
Slope: 5 to 25 percent
Drainage class: Well drained
Ecological site: Foothills

Riverwash
Composition: About 1 percent
Landscape: Valleys
Landform: Channels, streams
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

206—Pinitos loam, 1 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 7,000 to 7,600 feet (2,134 to 2,316 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Pinitos and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Pinitos soils
Landscape: Uplands
Landform: Hills, mesas, cuestas, fan remnants
Position on landform: Shoulders
Position on landform: Side slope, side slope
Parent material: Fan alluvium derived from sandstone and shale
Slope: 1 to 15 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 11.7 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 12 percent

Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Indian ricegrass, blue grama, New Mexico Feathergrass, bottlebrush squirreltail, mountain big sagebrush, western wheatgrass
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 4 inches; loam
Bt1—4 to 10 inches; clay loam
Bt2—10 to 27 inches; clay loam
Btk—27 to 39 inches; clay loam
C—39 to 60 inches; clay loam

Minor Components
Sparham and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Occasional
Ecological site: Clayey

Hickman and similar soils
Composition: About 5 percent
Slope: 1 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

Menefee and similar soils
Composition: About 5 percent
Slope: 5 to 35 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

207—Penistaja-Zia complex, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,400 to 6,100 feet (1,646 to 1,859 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Penistaja and similar soils: 60 percent
Zia and similar soils: 25 percent
Minor components: 15 percent

Component Descriptions

Penistaja soils
Landscape: Uplands
Landform: Plateaus, alluvial fans, bajadas, cuestas, hills, mesas
Position on landform: Footslopes
Position on landform: Head slope, rise, side slope, nose slope
Parent material: Eolian deposits over alluvium derived from sandstone and shale
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 8.6 inches (moderate)
Shrink-swell potential: About 2.9 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, spike muhly, western wheatgrass, bottlebrush squirreltail, galleta, winterfat
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 3 inches; very fine sandy loam
Btk—3 to 29 inches; sandy clay loam
C—29 to 60 inches; fine sandy loam

Zia soils
Landscape: Uplands
Landform: Plateaus
Position on landform: Toeslopes
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium derived from sandstone
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 8.3 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, spike muhly, western wheatgrass, bottlebrush squirreltail, fourwing saltbush, oneseed juniper, winterfat
Land capability subclass (irrigated): 3e
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 5 inches; fine sandy loam
C—5 to 60 inches; fine sandy loam

Minor Components
Clovis and similar soils
Composition: About 10 percent
Slope: 3 to 8 percent
Drainage class: Well drained
Ecological site: Loamy

Pinavetes and similar soils
Composition: About 5 percent
Slope: 5 to 15 percent
Drainage class: Excessively drained
Ecological site: Deep Sand

208—Sedillo very gravelly fine sandy loam, 25 to 55 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,100 to 6,500 feet (1,554 to 1,981 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Sedillo and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Sedillo soils
Landscape: Uplands
Landform: Bajadas, fan remnants, stream terraces
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Fan alluvium derived from igneous and sedimentary rock
Slope: 25 to 55 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 3.6 inches (low)
Shrink-swell potential: About 1.7 percent (low)
Runoff class: High
Calcium carbonate maximum: About 25 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)

Ecological site: Gravelly
Potential native vegetation: blue grama, big sagebrush, black grama, hairy grama, needlegrass, New Mexico Feathergrass, oneseed juniper, sideoats grama, western wheatgrass, winterfat
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 2 inches; very gravelly fine sandy loam
Bt—2 to 8 inches; very gravelly sandy clay loam
Bk1—8 to 12 inches; very gravelly sandy loam
Bk2—12 to 60 inches; extremely gravelly sandy loam

Minor Components
Ildefonso and similar soils
Composition: About 5 percent
Slope: 15 to 35 percent
Drainage class: Well drained
Ecological site: Limy

Pinavetes and similar soils
Composition: About 5 percent
Slope: 5 to 15 percent
Drainage class: Excessively drained
Ecological site: Deep Sand

Rock outcrop
Composition: About 3 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Zia and similar soils
Composition: About 2 percent
Slope: 3 to 6 percent
Drainage class: Well drained
Ecological site: Sandy

210—Ildefonso very stony loam, 25 to 70 percent slopes, rubbly

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,000 to 5,800 feet (1,524 to 1,768 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Ildefonso and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Ildefonso soils
Landscape: Uplands
Landform: Fan remnants, hills, mesas

Position on landform: Backslopes, side slopes
Parent material: Fan alluvium over colluvium derived from sandstone and shale
Slope: 25 to 70 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 4.7 inches (low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Limy
Potential native vegetation: blue grama, New Mexico Feathergrass, sideoats grama, twoneedle pinyon
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 3 inches; very stony loam
Bw—3 to 9 inches; very stony loam
Bk—9 to 60 inches; very stony loam

Minor Components
Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Rubble land
Composition: About 5 percent
Slope: 35 to 60 percent
Drainage class: Excessively drained

Prieta and similar soils
Composition: About 5 percent
Slope: 3 to 15 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Malpais

211—Zia-Clovis association, 2 to 10 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,500 to 6,400 feet (1,676 to 1,951 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Zia and similar soils: 45 percent
Clovis and similar soils: 30 percent
Minor components: 25 percent

Component Descriptions

Zia soils
Landscape: Uplands
Landform: Plateaus
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone over fan alluvium derived from sandstone, eolian deposits and alluvium derived from sandstone and shale
Slope: 2 to 10 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 7.5 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: blue grama, western wheatgrass, Indian ricegrass, black grama, oneseed juniper
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 5 inches; sandy loam
Bw—5 to 14 inches; sandy loam
C1—14 to 33 inches; sandy loam
C2—33 to 46 inches; sandy clay loam
C3—46 to 60 inches; sandy loam

Clovis soils
Landscape: Uplands
Landform: Fan remnants, plains
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone over fan alluvium derived from sandstone and shale, eolian deposits and alluvium derived from sandstone and shale
Slope: 2 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 8.8 inches (moderate)
Shrink-swell potential: About 4.4 percent (moderate)

Runoff class: Medium
Calcium carbonate maximum: About 25 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, bottlebrush squirreltail
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 5 inches; fine sandy loam
B—5 to 60 inches; sandy clay loam

Minor Components
Penistaja and similar soils
Composition: About 15 percent
Slope: 2 to 7 percent
Drainage class: Well drained
Ecological site: Loamy

Pinavetes and similar soils
Composition: About 10 percent
Slope: 5 to 15 percent
Drainage class: Excessively drained
Ecological site: Deep Sand

213—Pinavetes-Rock outcrop complex, 15 to 35 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,600 to 6,100 feet (1,707 to 1,859 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Pinavetes and similar soils: 55 percent
Rock outcrop: 30 percent
Minor components: 15 percent

Component Descriptions

Pinavetes soils
Landscape: Uplands
Landform: Valley sides, dunes
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone
Slope: 15 to 35 percent
Aspect: East to west
Shape (down/across): Convex/convex
Depth class: Very deep
Drainage class: Excessively drained

Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 2.9 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, blue grama, western wheatgrass, galleta, oneseed juniper, sand sagebrush, twoneedle pinyon
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 7 inches; sand
C—7 to 60 inches; stratified sand to loamy sand

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Escarpments, breaks
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Skyvillage and similar soils
Composition: About 10 percent
Slope: 8 to 25 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

Zia and similar soils
Composition: About 5 percent
Slope: 3 to 6 percent
Drainage class: Well drained
Ecological site: Sandy

215—Ess-Rock outcrop complex, 5 to 45 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 9,000 to 11,000 feet (2,743 to 3,353 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Ess and similar soils: 60 percent
Rock outcrop: 30 percent
Minor components: 10 percent

Component Descriptions

Ess soils
Landscape: Mountains
Landform: Mountain slopes, hills
Position on landform: Backslopes
Position on landform: Mountainflank, side slope
Parent material: Colluvium derived from rhyolite
Slope: 5 to 45 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 4.6 inches (low)
Shrink-swell potential: About 2.3 percent (low)
Runoff class: High
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 0 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Subalpine Grassland
Potential native vegetation: Arizona fescue, sedge, bottlebrush squirreltail, mountain muhly, muttongrass, prairie junegrass, western wheatgrass
Land capability subclass (nonirrigated): 7c

Typical Profile:
A1—0 to 7 inches; very cobbly sandy loam
A2—7 to 15 inches; very cobbly sandy loam
Bt—15 to 29 inches; very cobbly sandy clay loam
C—29 to 60 inches; very cobbly loam

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Mountains
Position on landform: Mountainflank, mountaintop
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Calaveras and similar soils
Composition: About 10 percent
Landform: Mountain slopes
Position on landform: Mountainflank
Slope: 35 to 60 percent
Aspect: East to west
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

217—Witt loam, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,200 to 6,000 feet (1,585 to 1,829 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Witt and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Witt soils
Landscape: Uplands
Landform: Mesas, fan remnants, bajadas
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone over fan alluvium derived from basalt, eolian deposits and alluvium derived from sandstone and shale
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 10.0 inches (high)
Shrink-swell potential: About 1.8 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, spike muhly, fourwing saltbush, galleta
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 2 inches; loam
Bt—2 to 9 inches; loam
Bk—9 to 60 inches; stratified very fine sandy loam to loam

Minor Components
Penistaja and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Harvey and similar soils
Composition: About 5 percent
Slope: 5 to 10 percent
Drainage class: Well drained
Ecological site: Limy

Ildefonso and similar soils
Composition: About 5 percent
Slope: 15 to 35 percent
Drainage class: Well drained
Ecological site: Limy

218—Ildefonso very cobbly loam, 1 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,200 to 5,800 feet (1,585 to 1,768 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Ildefonso and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Ildefonso soils
Landscape: Uplands
Landform: Hills, fan remnants, mesas
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Fan alluvium over colluvium derived from sandstone and shale
Slope: 1 to 15 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 3.8 inches (low)
Shrink-swell potential: About 1.7 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Limy
Potential native vegetation: thickspike wheatgrass, western wheatgrass, New Mexico Feathergrass, blue grama, hairy grama, winterfat
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 4 inches; very cobbly loam
B—4 to 8 inches; very cobbly loam
B—8 to 60 inches; very cobbly sandy loam

Minor Components
Pastura and similar soils
Composition: About 5 percent
Slope: 1 to 4 percent
Depth to restrictive feature: 7 to 20 inches to petrocalcic
Drainage class: Well drained
Ecological site: Limy

Prieta and similar soils
Composition: About 5 percent
Slope: 3 to 15 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Malpais

Rock outcrop
Composition: About 3 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Witt and similar soils
Composition: About 2 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: Loamy

220—Rock outcrop-Vessilla-Menefee complex, 30 to 40 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,100 to 7,200 feet (1,859 to 2,195 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Rock outcrop: 40 percent
Vessilla and similar soils: 30 percent
Menefee and similar soils: 20 percent
Minor components: 10 percent

Component Descriptions

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.

Landform: Escarpments, breaks
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Vessilla soils
Landscape: Uplands
Landform: Mesas, hills, breaks, ridges
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium over residuum weathered from sandstone
Slope: 30 to 40 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 1.2 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Indian ricegrass, blue grama, mountain big sagebrush, oak, galleta, sideoats grama
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 2 inches; sandy loam
C—2 to 10 inches; sandy loam
R—10 to 60 inches; bedrock

Menefee soils
Landscape: Uplands
Landform: Mountainsides, mesas, hillslopes
Position on landform: Shoulders
Position on landform: Nose slope
Parent material: Colluvium over residuum weathered from shale
Slope: 30 to 40 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 2.0 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high

Calcium carbonate maximum: About 5 percent
Gypsum maximum: About 1 percent
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, Rocky Mountain juniper, twoneedle pinyon
Other plants: blue grama, galleta, Gambel oak, big sagebrush, sideoats grama
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 2 inches; clay loam
C—2 to 10 inches; clay loam
2Cr—10 to 60 inches; bedrock

Minor Components
Badland
Composition: About 5 percent
Slope: 5 to 75 percent
Depth to restrictive feature: 0 inches to bedrock (paralithic)

Rubble land
Composition: About 5 percent
Slope: 35 to 60 percent
Drainage class: Excessively drained

226—Galisteo loam, moderately saline, sodic, 1 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,700 to 6,200 feet (1,737 to 1,890 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Galisteo, moderately saline, sodic and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Galisteo, moderately saline, sodic soils
Landscape: Valleys
Landform: Alluvial fans, stream terraces
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Stream alluvium derived from sandstone and shale
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained

Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 11.5 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 20 (moderately sodic)
Ecological site: Salty Bottomland
Potential native vegetation: alkali sacaton, western wheatgrass, galleta, fourwing saltbush, greasewood
Land capability subclass (nonirrigated): 6c

Typical Profile:
Ap—0 to 10 inches; loam
C—10 to 60 inches; silty clay loam

Minor Components
Zia and similar soils
Composition: About 5 percent
Slope: 1 to 3 percent
Drainage class: Well drained
Ecological site: Sandy

El Rancho and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Loamy

Ildefonso and similar soils
Composition: About 5 percent
Slope: 1 to 15 percent
Drainage class: Well drained
Ecological site: Limy

227—Hagerman-Bond association, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,700 to 6,000 feet (1,737 to 1,829 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Hagerman and similar soils: 65 percent
Bond and similar soils: 20 percent
Minor components: 15 percent

Component Descriptions

Hagerman soils
Landscape: Uplands
Landform: Mesas, hills, ridges
Position on landform: Shoulders
Position on landform: Crest
Parent material: Eolian deposits over slope alluvium derived from sandstone
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 5 percent subangular channers
Depth class: Moderately deep
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 6.5 inches (moderate)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, spike muhly, fourwing saltbush, galleta, sand dropseed
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 4 inches; fine sandy loam
Bt—4 to 34 inches; clay loam
2R—34 to 60 inches; bedrock

Bond soils
Landscape: Uplands
Landform: Ridges, cuestas, mesas, hills
Position on landform: Summits
Position on landform: Crest
Parent material: Eolian deposits over slope alluvium derived from sandstone
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 1.5 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: Shallow Sandstone
Potential native vegetation: sideoats grama, blue grama, little bluestem, Indian ricegrass, galleta
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 4 inches; loamy fine sand
Bt—4 to 12 inches; sandy clay loam
R—12 to 60 inches; bedrock

Minor Components
Penistaja and similar soils
Composition: About 10 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

228—Winona very channery fine sandy loam, 8 to 25 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,900 to 6,300 feet (1,798 to 1,920 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Winona and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Winona soils
Landscape: Uplands
Landform: Plateaus, hills
Position on landform: Shoulders
Position on landform: Nose slope, head slope, nose slope, side slope
Parent material: Residuum weathered from travertine
Slope: 8 to 25 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 5 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 1.1 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 50 percent

Gypsum maximum: None
Salinity maximum: About 8 mmhos/cm (slightly saline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Shallow Sandstone
Potential native vegetation: sideoats grama, blue grama, little bluestem, needlegrass, juniper, muhly, winterfat
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 2 inches; very channery fine sandy loam
Bk—2 to 13 inches; very channery loam
R—13 to 60 inches; bedrock

Minor Components
Rock outcrop
Composition: About 15 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

230—Skyvillage-Sandoval-Rock outcrop complex, 3 to 20 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,800 to 6,400 feet (1,768 to 1,951 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Skyvillage and similar soils: 35 percent
Sandoval and similar soils: 25 percent
Rock outcrop: 20 percent
Minor components: 20 percent

Component Descriptions

Skyvillage soils
Landscape: Uplands
Landform: Structural benches, cuestas, ridges, breaks, mesas, hills
Position on landform: Shoulders
Position on landform: Side slope, nose slope, head slope
Parent material: Slope alluvium derived from sandstone
Slope: 3 to 20 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 1.3 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: High
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None

Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Shallow Sandstone
Potential native vegetation: sideoats grama, blue grama, little bluestem, Indian ricegrass, galleta
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 6 inches; sandy loam
C—6 to 11 inches; sandy loam
2R—11 to 60 inches; bedrock

Sandoval soils
Landscape: Uplands
Landform: Hills, ridges
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Slope alluvium derived from shale
Slope: 3 to 20 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 2.0 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 10 percent
Gypsum maximum: About 10 percent
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Shallow
Potential native vegetation: sideoats grama, New Mexico Feathergrass, cane bluestem, little bluestem, galleta
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 2 inches; clay loam
C—2 to 10 inches; clay loam
Cr—10 to 60 inches; bedrock

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Escarpments, breaks
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Penistaja and similar soils
Composition: About 10 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

Querencia and similar soils
Composition: About 10 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: Loamy

231—Querencia loam, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,200 to 6,900 feet (1,890 to 2,103 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Querencia and similar soils: 85 percent
Minor components: 15 percent

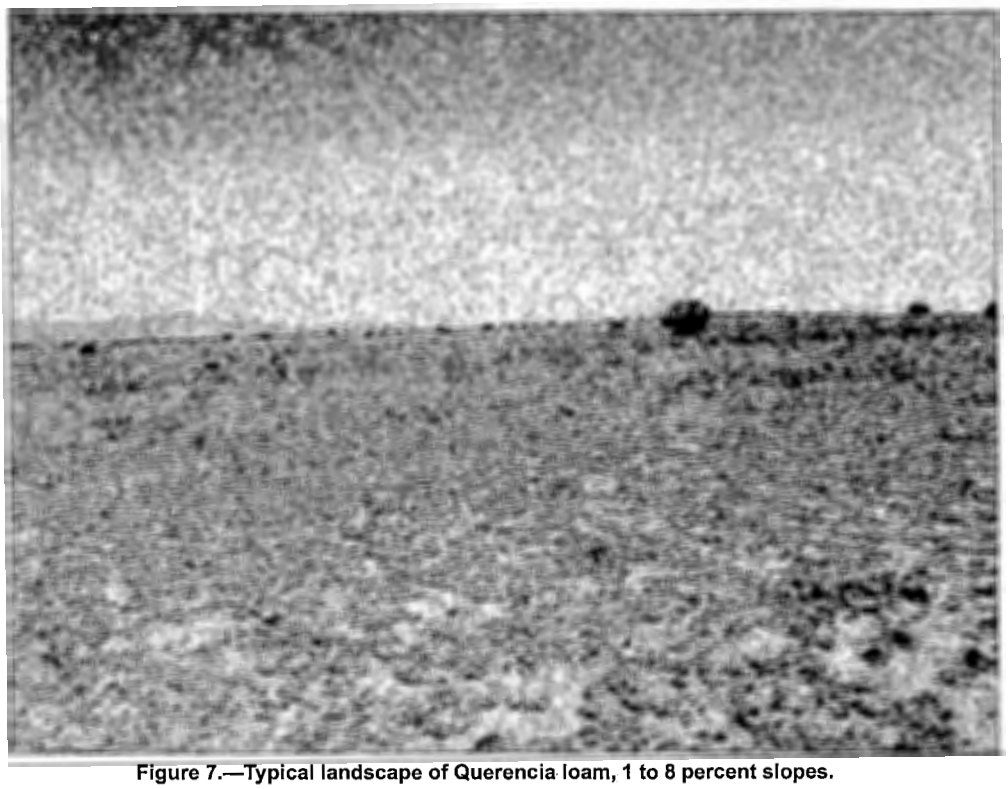


Figure 7.—Typical landscape of Querencia loam, 1 to 8 percent slopes.

Component Descriptions

Querencia soils
Landscape: Valleys
Landform: Valley sides, stream terraces, alluvial fans
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Fan alluvium over colluvium derived from sandstone and shale
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 10.0 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, spike muhly, bottlebrush squirreltail, fourwing saltbush, needlegrass, winterfat
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 3 inches; loam
Bw—3 to 21 inches; loam
Bk—21 to 60 inches; loam

Minor Components
Sandoval and similar soils
Composition: About 5 percent
Slope: 3 to 20 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

Sparank and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Well drained
Flooding hazard: Occasional
Ecological site: Clayey Bottomland

San Mateo and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

234—Querencia-Zia complex, 2 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,800 to 6,900 feet (1,768 to 2,103 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Querencia and similar soils: 60 percent
Zia and similar soils: 20 percent
Minor components: 20 percent

Component Descriptions

Querencia soils
Landscape: Valleys
Landform: Stream terraces, valley sides, alluvial fans
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Fan alluvium over colluvium derived from sandstone and shale
Slope: 2 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 9.3 inches (high)
Shrink-swell potential: About 2.7 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, spike muhly, bottlebrush squirreltail, fourwing saltbush, needlegrass, winterfat
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 3 inches; fine sandy loam
Bw—3 to 25 inches; loam
Bk—25 to 60 inches; stratified loam to fine sandy loam

Zia soils
Landscape: Valleys
Landform: Alluvial fans
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Eolian deposits over fan alluvium derived from sandstone
Slope: 2 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear

Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 7.1 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: blue grama, western wheatgrass, Indian ricegrass, black grama, oneseed juniper
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 11 inches; sandy loam
C—11 to 60 inches; sandy loam

Minor Components
Penistaja and similar soils
Composition: About 10 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Loamy

San Mateo and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

Sandoval and similar soils
Composition: About 5 percent
Slope: 3 to 20 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

235—Sandoval fine sandy loam, 3 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,800 to 6,400 feet (1,768 to 1,951 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Sandoval and similar soils: 85 percent
Minor components: 15 percent

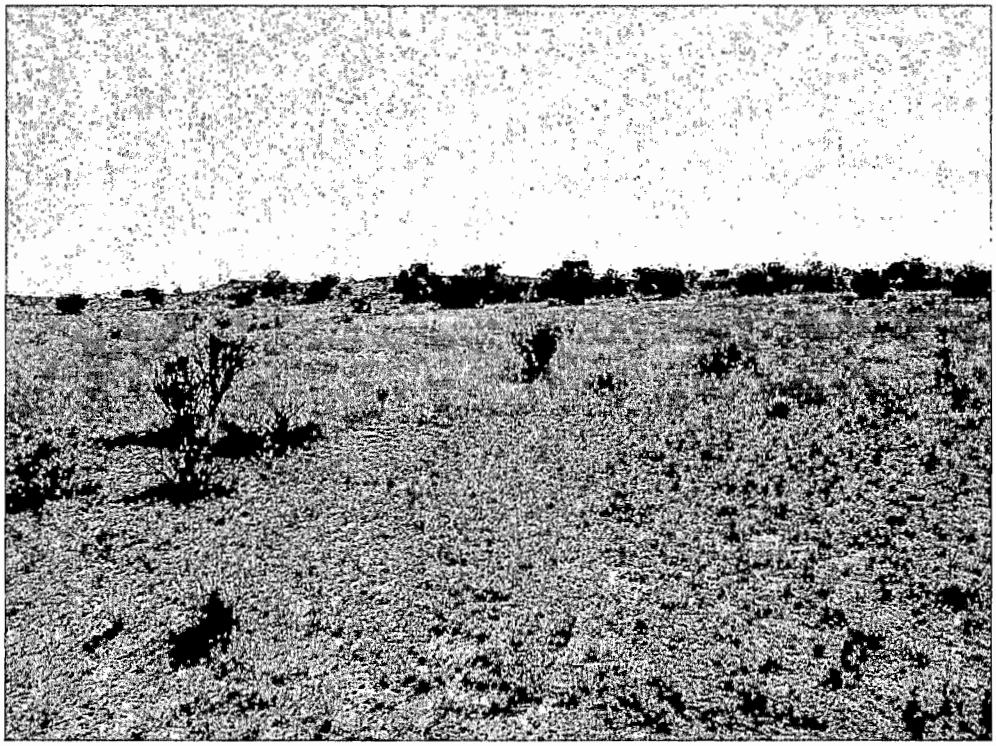


Figure 8.—Typical landscape of Sandoval fine sandy loam, 3 to 15 percent slopes.

Component Descriptions

Sandoval soils
Landscape: Uplands
Landform: Hills, ridges
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Slope alluvium derived from shale
Slope: 3 to 15 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 3.7 inches (low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: About 10 percent
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 13 (moderately sodic)
Ecological site: Shallow
Potential native vegetation: sideoats grama, New Mexico Feathergrass, cane bluestem, little bluestem, galleta
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 2 inches; fine sandy loam
C1—2 to 16 inches; clay loam
C2—16 to 19 inches; clay loam
Cr—19 to 60 inches; bedrock

Minor Components
Querencia and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: Loamy

San Mateo and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

Badland
Composition: About 5 percent
Slope: 5 to 75 percent
Depth to restrictive feature: 0 inches to bedrock (paralithic)

236—Sparank clay loam, moderately saline, sodic, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,800 to 6,400 feet (1,768 to 1,951 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Sparank, moderately saline, sodic and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Sparank, moderately saline, sodic soils
Landscape: Valleys
Landform: Stream terraces, alluvial fans, valley sides, valley floors, flood plains
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Stream alluvium derived from sandstone and shale
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 10.2 inches (high)

Shrink-swell potential: About 6.6 percent (high)
Flooding hazard: Occasional
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Salty Bottomland
Potential native vegetation: alkali sacaton, western wheatgrass, galleta, fourwing saltbush, greasewood
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 2 inches; clay loam
C1—2 to 10 inches; silty clay
C2—10 to 24 inches; silty clay
C3—24 to 40 inches; silty clay loam
C4—40 to 44 inches; silty clay
C5—44 to 60 inches; silty clay

Minor Components
Camino and similar soils
Composition: About 10 percent
Slope: 1 to 6 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Clayey

San Mateo and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

237—Sparank silty clay loam, 0 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,500 to 6,400 feet (1,676 to 1,951 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Sparank and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Sparank soils
Landscape: Valleys
Landform: Valley sides, valley floors, alluvial fans, flood plains, stream terraces
Position on landform: Toeslopes

Position on landform: Rise
Parent material: Stream alluvium derived from sandstone and shale
Slope: 0 to 3 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 11.8 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Flooding hazard: Occasional
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 10 (slightly sodic)
Ecological site: Clayey Bottomland
Potential native vegetation: western wheatgrass, alkali sacaton, blue grama, fourwing saltbush, galleta, obtuse panicgrass
Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 4 inches; silty clay loam
C—4 to 60 inches; silty clay loam

Minor Components
Camino and similar soils
Composition: About 10 percent
Slope: 1 to 6 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Clayey

San Mateo and similar soils
Composition: About 5 percent
Slope: 0 to 3 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Swale

240—Penistaja-Hagerman association, 1 to 5 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 6,400 feet (1,829 to 1,951 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Penistaja and similar soils: 45 percent
Hagerman and similar soils: 35 percent
Minor components: 20 percent

Component Descriptions

Penistaja soils
Landscape: Uplands
Landform: Plateaus, mesas, hills, cuestas, alluvial fans, bajadas
Position on landform: Footslopes
Position on landform: Rise, side slope, nose slope, head slope
Parent material: Eolian material and slope alluvium derived from sandstone and shale
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.3 inches (high)
Shrink-swell potential: About 2.8 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, spike muhly, western wheatgrass, bottlebrush squirreltail, galleta, winterfat
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 5 inches; fine sandy loam
Bt—5 to 14 inches; clay loam
Btk—14 to 29 inches; sandy clay loam
C—29 to 60 inches; stratified sandy clay loam to fine sandy loam to loam

Hagerman soils
Landscape: Uplands
Landform: Mesas, hills, ridges
Position on landform: Shoulders
Position on landform: Crest
Parent material: Eolian material and slope alluvium derived from sandstone and shale
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Moderately deep
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 4.7 inches (low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None

Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Loamy
Potential native vegetation: blue grama, western wheatgrass, spike muhly, fourwing saltbush, galleta, sand dropseed
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 2 inches; fine sandy loam
Bt—2 to 9 inches; clay loam
Btk—9 to 24 inches; clay loam
2R—24 to 60 inches; bedrock

Minor Components
Skyvillage and similar soils
Composition: About 10 percent
Slope: 8 to 25 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

Rock outcrop
Composition: About 10 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

250—Pinavetes loamy fine sand, 5 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,200 to 5,700 feet (1,585 to 1,737 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Pinavetes and similar soils: 90 percent
Minor components: 10 percent

Component Descriptions

Pinavetes soils
Landscape: Uplands
Landform: Dunes, valley sides
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone
Slope: 5 to 15 percent
Aspect: East to west
Shape (down/across): Convex/convex
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 4.2 inches (low)
Shrink-swell potential: About 1.5 percent (low)

Runoff class: Low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, blue grama, sand sagebrush
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 4 inches; loamy fine sand
C—4 to 60 inches; loamy sand

Minor Components
Zia and similar soils
Composition: About 10 percent
Slope: 8 to 25 percent
Drainage class: Well drained
Ecological site: Sandy

262—Pastura loam, 1 to 4 percent slopes

Map Unit Setting

Major Land Resource Area: 70
Elevation: 5,400 to 5,800 feet (1,646 to 1,768 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Pastura and similar soils: 90 percent
Minor components: 10 percent

Component Descriptions

Pastura soils
Landscape: Uplands
Landform: Cuestas, mesas
Position on landform: Shoulders
Position on landform: Tread
Parent material: Eolian materials and alluvium derived from sandstone and shale
Slope: 1 to 4 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 5 to 20 inches to petrocalcic
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 1.9 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: About 1 percent
Salinity maximum: About 2 mmhos/cm (nonsaline)

Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Shallow Limy Savannah
Potential native vegetation: black grama, blue grama, sideoats grama, needle and thread, winterfat, dropseed, galleta, juniper, muttongrass, bastardsage, Menodora
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; loam
Bw—3 to 10 inches; gravelly loam
Bk—10 to 14 inches; gravelly loam
Bkm—14 to 60 inches; cemented material

Minor Components
Ildefonso and similar soils
Composition: About 5 percent
Slope: 1 to 15 percent
Drainage class: Well drained
Ecological site: Limy

Harvey and similar soils
Composition: About 5 percent
Slope: 10 to 15 percent
Drainage class: Well drained
Ecological site: Limy

270—Blancot-Councelor-Tsosie association, 0 to 5 percent slopes

Map Unit Setting

Major Land Resource Area: 37
Elevation: 6,600 to 7,000 feet (2,012 to 2,134 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Blancot and similar soils: 40 percent
Councelor and similar soils: 30 percent
Tsosie and similar soils: 25 percent
Minor components: 5 percent

Component Descriptions

Blancot soils
Landscape: Uplands
Landform: Ridges, valley sides
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Fan alluvium derived from sandstone and shale
Slope: 3 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained

Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 8.1 inches (moderate)
Shrink-swell potential: About 2.4 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 13 (moderately sodic)
Ecological site: Loamy
Potential native vegetation: Indian ricegrass, blue grama, galleta, big sagebrush, bottlebrush squirreltail, sand dropseed, western wheatgrass
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 2 inches; fine sandy loam
Bt1—2 to 12 inches; sandy clay loam
B2—12 to 21 inches; clay loam
C—21 to 60 inches; sandy loam

Councelor soils
Landscape: Uplands
Landform: Fan remnants, valley sides, valley floors, stream terraces
Position on landform: Footslopes
Position on landform: Tread
Parent material: Eolian deposits over stream alluvium derived from sandstone and shale
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 7.1 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: Indian ricegrass, blue grama, dropseed, New Mexico Feathergrass, big sagebrush, galleta, mormon tea, needle and thread, winterfat
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 2 inches; fine sandy loam
C—2 to 60 inches; sandy loam

Tsosie soils
Landscape: Uplands
Landform: Alluvial fans, stream terraces
Position on landform: Footslopes
Position on landform: Tread, rise
Parent material: Stream alluvium derived from sandstone and shale

Slope: 0 to 3 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.7 inches (high)
Shrink-swell potential: About 3.2 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 8 mmhos/cm (slightly saline)
Sodium adsorption ratio maximum: About 10 (slightly sodic)
Ecological site: Salt Flats
Potential native vegetation: alkali sacaton, fourwing saltbush, galleta, greasewood, shadscale saltbush, big sagebrush, inland saltgrass, western wheatgrass
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 2 inches; clay loam
C1—2 to 10 inches; loam
C2—10 to 20 inches; clay loam
C3—20 to 26 inches; clay loam
C4—26 to 36 inches; clay loam
C5—36 to 44 inches; sandy loam
C6—44 to 55 inches; sandy loam
C7—55 to 60 inches; sandy loam

Minor Components
Badland
Composition: About 5 percent
Slope: 5 to 75 percent
Depth to restrictive feature: 0 inches to bedrock (paralithic)

281—Carjo loam, 1 to 9 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 7,000 to 8,000 feet (2,134 to 2,438 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Carjo and similar soils: 90 percent
Minor components: 10 percent

Component Descriptions

Carjo soils
Landscape: Uplands
Landform: Ridges, hills, mesas
Position on landform: Shoulders
Position on landform: Side slope

Parent material: Residuum weathered from tuff
Slope: 1 to 9 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Moderately deep
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 4.2 inches (low)
Shrink-swell potential: About 4.9 percent (moderate)
Runoff class: High
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii
Potential native vegetation:
Common trees: ponderosa pine
Other plants: Arizona fescue, blue grama, big bluestem, little bluestem, twoneedle pinyon, wavyleaf oak
Land capability subclass (nonirrigated): 5c

Typical Profile:
A—0 to 4 inches; loam
BA—4 to 12 inches; clay loam
Bt—12 to 20 inches; clay
C—20 to 25 inches; very fine sandy loam
2R—25 to 60 inches; bedrock

Minor Components

Frijoles and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: ponderosa forest

Nyjack and similar soils
Composition: About 3 percent
Slope: 1 to 5 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: ponderosa forest

Tocal and similar soils
Composition: About 2 percent
Slope: 3 to 8 percent
Depth to restrictive feature: 8 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

282—Tocal very fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 7,000 to 8,000 feet (2,134 to 2,438 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Tocal and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Tocal soils
Landscape: Mountains
Landform: Plateaus
Position on landform: Shoulders
Position on landform: Mountaintop
Parent material: Eolian deposits derived from sandstone over residuum weathered from tuff
Slope: 3 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 2.5 inches (very low)
Shrink-swell potential: About 5.1 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 1 percent
Gypsum maximum: About 1 percent
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: ponderosa pine, white fir, Douglas-fir
Other plants: bottlebrush squirreltail, Gambel oak, little bluestem, mountain muhly, true mountain mahogany
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 5 inches; very fine sandy loam
Bt1—5 to 8 inches; clay loam
Bt2—8 to 11 inches; clay
2Bt3—11 to 14 inches; silt loam
2Cr—14 to 60 inches; bedrock

Minor Components

Alanos and similar soils
Composition: About 10 percent
Slope: 20 to 40 percent
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

Mirand and similar soils
Composition: About 5 percent
Slope: 5 to 30 percent
Drainage class: Well drained
Ecological site: Pinus ponderosa/Quercus gambelii

283—Mirand-Alanos complex, 5 to 40 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,500 to 9,500 feet (2,591 to 2,896 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Mirand and similar soils: 45 percent
Alanos and similar soils: 30 percent
Minor components: 25 percent

Component Descriptions

Mirand soils

Landscape: Mountains
Landform: Canyons, mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Colluvium derived from volcanic rock
Slope: 5 to 30 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .001 to .06 in./hr. (very slow)
Available water capacity: About 10.8 inches (high)
Shrink-swell potential: About 5.6 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii
Potential native vegetation:
Common trees: ponderosa pine
Other plants: Arizona fescue, mountain muhly, muttongrass, California brome, Gambel oak, prairie junegrass
Land capability subclass (nonirrigated): 7c

Typical Profile:
Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 6 inches; loam
Bt1—6 to 11 inches; clay loam
Bt2—11 to 17 inches; gravelly clay loam
Bt3—17 to 27 inches; clay loam
Bt4—27 to 47 inches; clay
2Bt5—47 to 60 inches; clay loam

Alanos soils
Landscape: Mountains
Landform: Mountain slopes, hillsides
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Slope alluvium over colluvium derived from volcanic rock
Slope: 5 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 4.7 inches (low)
Shrink-swell potential: About 6.1 percent (high)
Runoff class: High
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: ponderosa pine, Douglas-fir
Other plants: Arizona fescue, blue grama, California brome, pine dropseed, Gambel oak, lupine
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 6 inches; cobbly loam
E—6 to 9 inches; cobbly loam
Bt1—9 to 30 inches; extremely gravelly clay loam
Bt2—30 to 60 inches; very gravelly clay

Minor Components
Calaveras and similar soils
Composition: About 10 percent
Slope: 35 to 60 percent
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

Palon and similar soils
Composition: About 5 percent
Slope: 35 to 65 percent
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

Pavo and similar soils
Composition: About 5 percent
Slope: 5 to 20 percent
Drainage class: Well drained
Ecological site: Mountain Loam

Rubble land
Composition: About 5 percent
Slope: 35 to 60 percent
Drainage class: Excessively drained

290—Alanos-Rock outcrop complex, 20 to 40 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 7,800 to 8,500 feet (2,377 to 2,591 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Alanos and similar soils: 50 percent
Rock outcrop: 30 percent
Minor components: 20 percent

Component Descriptions

Alanos soils
Landscape: Mountains
Landform: Hillsides, mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Slope alluvium over colluvium derived from tuff
Slope: 20 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 4.3 inches (low)
Shrink-swell potential: About 6.7 percent (high)
Runoff class: Very high
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: ponderosa pine, Douglas-fir
Other plants: Arizona fescue, California brome, blue grama, pine dropseed, Gambel oak, lupine
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 4 inches; loam
E—4 to 9 inches; loam
BE—9 to 18 inches; very gravelly loam
Bt1—18 to 26 inches; extremely gravelly clay
Bt2—26 to 60 inches; extremely gravelly clay

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Ridges
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Alanos and similar soils
Composition: About 10 percent
Slope: 5 to 40 percent
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

Tocal and similar soils
Composition: About 5 percent
Slope: 3 to 8 percent
Depth to restrictive feature: 8 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

Carjo and similar soils
Composition: About 5 percent
Slope: 1 to 9 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Pinus ponderosa/Quercus gambelii

300—Waumac-Bamac association, 1 to 7 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,400 to 6,200 feet (1,646 to 1,890 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Waumac and similar soils: 50 percent
Bamac and similar soils: 35 percent
Minor components: 15 percent

Component Descriptions

Waumac soils
Landscape: Valleys
Landform: Valley floors
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Fan alluvium derived from igneous and sedimentary rock
Slope: 1 to 7 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 6.9 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very low
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: blue grama, western wheatgrass, Indian ricegrass, black grama, oneseed juniper, twoneedle pinyon
Land capability subclass (nonirrigated): 6s

Typical Profile:
A—0 to 3 inches; loamy sand
C1—3 to 31 inches; fine sandy loam
C2—31 to 60 inches; gravelly fine sandy loam

Bamac soils
Landscape: Valleys
Landform: Fan remnants, fan remnants, ridges, hills
Position on landform: Footslopes
Position on landform: Side slope, head slope
Parent material: Slope alluvium derived from igneous and sedimentary rock
Slope: 1 to 7 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 1.9 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Foothills
Potential native vegetation: blue grama, western wheatgrass, Indian ricegrass, black grama
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 6 inches; gravelly loamy sand
C—6 to 60 inches; stratified very gravelly coarse sand to very gravelly loamy sand

Minor Components
Riverwash
Composition: About 10 percent
Landscape: Valleys
Landform: Streams, channels
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Royosa and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Somewhat excessively drained
Ecological site: Deep Sand

301—Vastine-Jarola silt loams, 0 to 5 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,400 to 8,600 feet (2,560 to 2,621 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Vastine and similar soils: 45 percent
Jarola and similar soils: 40 percent
Minor components: 15 percent

Component Descriptions

Vastine soils
Landscape: Valleys
Landform: Stream terraces, flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 0 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Poorly drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 5.3 inches (low)
Shrink-swell potential: About 2.6 percent (low)
Flooding hazard: Rare

Seasonal high water table depth: About 12 to 36 inches
Runoff class: High
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Mountain Loam
Potential native vegetation: tufted hairgrass, bluegrass, sedge, Canada wildrye, Rocky Mountain iris, bluejoint, clover, shrubby cinquefoil, western wheatgrass
Land capability subclass (nonirrigated): 7c

Typical Profile:
A1—0 to 4 inches; silt loam
A2—4 to 11 inches; loam
Bw—11 to 24 inches; loam
2C—24 to 60 inches; very gravelly loamy sand

Jarola soils
Landscape: Mountains
Landform: Stream terraces
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous rock
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Poorly drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 7.7 inches (moderate)
Shrink-swell potential: About 3.6 percent (moderate)
Flooding hazard: Rare
Seasonal high water table depth: About 12 to 36 inches
Runoff class: High
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Mountain Meadow
Potential native vegetation: tufted hairgrass, bluegrass, sedge, Canada wildrye, Rocky Mountain iris, clover, reedgrass, shrubby cinquefoil, western wheatgrass
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 9 inches; silt loam
E—9 to 11 inches; silt loam
Bt1—11 to 17 inches; silty clay loam
Bt2—17 to 21 inches; clay loam
2C1—21 to 42 inches; gravelly sandy clay loam
2C2—42 to 60 inches; very gravelly sandy loam

Minor Components
Organic soils and similar soils
Composition: About 10 percent
Landscape: Mountains
Landform: Marshes
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Aspect: East to west
Shape (down/across): Concave/concave
Drainage class: Poorly drained
Flooding hazard: Frequent

Tranquilar and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Somewhat poorly drained
Ecological site: Mountain Grassland

302—Tranquilar-Jarmillo complex, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,500 to 8,800 feet (2,591 to 2,682 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Tranquilar and similar soils: 50 percent
Jarmillo and similar soils: 30 percent
Minor components: 20 percent

Component Descriptions

Tranquilar soils
Landscape: Mountains
Landform: Valley floors, stream terraces
Position on landform: Toeslopes
Position on landform: Side slope
Parent material: Lacustrine deposits derived from igneous rock
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 9.5 inches (high)
Shrink-swell potential: About 7.0 percent (high)
Seasonal high water table depth: About 18 to 48 inches
Runoff class: Very high
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)

Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Mountain Grassland
Potential native vegetation: western wheatgrass, prairie junegrass, spike muhly, Rocky Mountain iris, sedge, shrubby cinquefoil
Land capability subclass (nonirrigated): 7c

Typical Profile:
A1—0 to 4 inches; silty clay loam
A2—4 to 8 inches; silty clay loam
E1—8 to 11 inches; silty clay loam
E2—11 to 13 inches; silty clay loam
Bt1—13 to 20 inches; clay
Bt2—20 to 34 inches; clay
Bt3—34 to 42 inches; clay
Bt4—42 to 50 inches; clay
Bt5—50 to 60 inches; clay

Jarmillo soils
Landscape: Mountains
Landform: Stream terraces
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium over colluvium over lacustrine deposits derived from igneous rock
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 10.1 inches (high)
Shrink-swell potential: About 2.1 percent (low)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Mountain Loam
Potential native vegetation: Arizona fescue, bluegrass, western wheatgrass, muhly, needlegrass, bottlebrush squirreltail
Land capability subclass (nonirrigated): 7c

Typical Profile:
A1—0 to 4 inches; loam
A2—4 to 13 inches; loam
AB—13 to 20 inches; loam
Bw1—20 to 26 inches; loam
Bw2—26 to 36 inches; loam
Bw3—36 to 41 inches; fine sandy loam
2Bw4—41 to 51 inches; clay loam
3C—51 to 60 inches; very fine sandy loam

Minor Components

Vastine and similar soils
Composition: About 5 percent
Landscape: Mountains
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Drainage class: Poorly drained
Flooding hazard: Rare
Ecological site: Mountain Loam

Jarola and similar soils
Composition: About 5 percent
Landscape: Valleys
Landform: Stream terraces
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Concave/linear
Drainage class: Poorly drained
Flooding hazard: Rare
Ecological site: Mountain Meadow

Cosey and similar soils
Composition: About 5 percent
Slope: 2 to 20 percent
Drainage class: Well drained
Ecological site: Mountain Loam

Tranquilar, stony silt loam and similar soils
Composition: About 5 percent
Slope: 5 to 8 percent
Drainage class: Somewhat poorly drained
Ecological site: Mountain Grassland

304—Cosey-Jarmillo association, 2 to 20 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,600 to 8,800 feet (2,621 to 2,682 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Cosey and similar soils: 45 percent
Jarmillo and similar soils: 40 percent
Minor components: 15 percent

Component Descriptions

Cosey soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Slope alluvium over colluvium derived from rhyolite
Slope: 2 to 20 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 6.5 inches (moderate)
Shrink-swell potential: About 3.8 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Mountain Loam
Potential native vegetation: Arizona fescue, bluegrass, western wheatgrass, needlegrass, bottlebrush squirreltail, mountain muhly
Land capability subclass (nonirrigated): 7c

Typical Profile:
A1—0 to 9 inches; silt loam
A2—9 to 15 inches; silt loam
BA—15 to 28 inches; gravelly loam
Bt1—28 to 34 inches; very gravelly sandy clay loam
Bt2—34 to 60 inches; extremely cobbly clay loam

Jarmillo soils
Landscape: Mountains
Landform: Stream terraces
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Alluvial, colluvial, and lacustrine deposits derived from igneous rock
Slope: 2 to 20 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 8.4 inches (moderate)
Shrink-swell potential: About 2.2 percent (low)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: Mountain Loam
Potential native vegetation: Arizona fescue, bluegrass, western wheatgrass, muhly, needlegrass, bottlebrush squirreltail
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 17 inches; silt loam
Bw—17 to 33 inches; sandy loam
Cw—33 to 60 inches; sandy loam

Minor Components
Jarola and similar soils
Composition: About 10 percent
Landscape: Valleys
Landform: Stream terraces
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Concave/linear
Drainage class: Poorly drained
Flooding hazard: Rare
Ecological site: Mountain Meadow

Vastine and similar soils
Composition: About 5 percent
Landscape: Mountains
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Drainage class: Poorly drained
Flooding hazard: Rare
Ecological site: Mountain Loam

307—Flugle-Waumac complex, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,600 to 6,100 feet (1,707 to 1,859 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Flugle and similar soils: 60 percent
Waumac and similar soils: 25 percent
Minor components: 15 percent

Figure 9.—Typical landscape of Flugle-Waumac complex, 1 to 8 percent slopes.

Component Descriptions

Flugle soils
Landscape: Uplands
Landform: Cuestas, hills, valley sides, fan remnants, ridges
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium derived from sandstone and shale
Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 8.5 inches (moderate)
Shrink-swell potential: About 2.3 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Savannah
Potential native vegetation: blue grama, twoneedle pinyon, western wheatgrass, Indian ricegrass, juniper, needlegrass, other half shrubs
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 3 inches; loam
Bt—3 to 7 inches; sandy clay loam
Btk1—7 to 12 inches; sandy clay loam
Btk2—12 to 19 inches; sandy clay loam
Bk—19 to 60 inches; fine sandy loam

Waumac soils
Landscape: Uplands
Landform: Valley floors
Position on landform: Toeslopes
Position on landform: Side slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 7.5 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: blue grama, western wheatgrass, Indian ricegrass, black grama, oneseed juniper, twoneedle pinyon
Land capability subclass (nonirrigated): 6s

Typical Profile:
A—0 to 3 inches; loamy sand
C—3 to 60 inches; stratified fine sandy loam to sandy loam

Minor Components
Fragua and similar soils
Composition: About 10 percent
Slope: 1 to 15 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Foothills

Royosa and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Somewhat excessively drained
Ecological site: Deep Sand

308—Cajete gravelly loam, 0 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,000 to 8,500 feet (2,438 to 2,591 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Cajete and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Cajete soils
Landscape: Mountains
Landform: Mountain slopes, stream terraces, hills
Position on landform: Footslopes
Position on landform: Mountainbase
Parent material: Residuum weathered from pumice
Slope: 0 to 8 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 3.7 inches (low)
Shrink-swell potential: About 2.1 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Mountain Grassland
Potential native vegetation: Arizona fescue, needlegrass, Kentucky bluegrass, bluegrass, western wheatgrass, Thurber fescue, pine dropseed
Land capability subclass (nonirrigated): 7c

Typical Profile:
A1—0 to 7 inches; gravelly loam
A2—7 to 15 inches; gravelly loam
Bw—15 to 33 inches; very gravelly sandy loam
C1—33 to 45 inches; very gravelly sand
C2—45 to 49 inches; extremely gravelly sand
C3—49 to 60 inches; very gravelly sand

Minor Components
Calaveras and similar soils
Composition: About 10 percent
Slope: 15 to 35 percent
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

Jarmillo and similar soils
Composition: About 5 percent
Slope: 2 to 20 percent
Drainage class: Well drained
Ecological site: Mountain Loam

311—Cosey-Tranquilar-Calaveras association, 5 to 20 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,600 to 9,200 feet (2,621 to 2,804 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Cosey and similar soils: 35 percent
Tranquilar and similar soils: 30 percent
Calaveras and similar soils: 25 percent
Minor components: 10 percent

Component Descriptions

Cosey soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Toeslopes
Position on landform: Mountainbase
Parent material: Slope alluvium over colluvium derived from rhyolite
Slope: 5 to 20 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 5.7 inches (low)
Shrink-swell potential: About 3.9 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Mountain Loam
Potential native vegetation: Arizona fescue, bluegrass, western wheatgrass, needlegrass, bottlebrush squirreltail, mountain muhly
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 13 inches; silt loam
BA—13 to 24 inches; gravelly loam
Bt—24 to 60 inches; extremely cobbly clay loam

Tranquilar soils
Landscape: Mountains
Landform: Stream terraces, valley floors
Position on landform: Toeslopes
Position on landform: Mountainbase
Parent material: Lacustrine deposits derived from igneous rock
Slope: 5 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 9.9 inches (high)
Shrink-swell potential: About 6.6 percent (high)
Seasonal high water table depth: About 18 to 48 inches
Runoff class: Very high
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Mountain Grassland
Potential native vegetation: western wheatgrass, prairie junegrass, spike muhly, Rocky Mountain iris, sedge, shrubby cinquefoil
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 14 inches; silt loam
E—14 to 20 inches; silt loam
Bt1—20 to 42 inches; clay
Bt2—42 to 60 inches; clay

Calaveras soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Footslopes
Position on landform: Mountainbase
Parent material: Colluvium derived from tuff
Slope: 5 to 20 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 4.9 inches (low)
Shrink-swell potential: About 2.2 percent (low)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia
Potential native vegetation:
Common trees: limber pine, ponderosa pine, white fir, Douglas-fir
Other plants: common juniper, nodding brome, prairie junegrass, unknown, quaking aspen
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 4 inches; silt loam
E—4 to 11 inches; silt loam
Bw—11 to 17 inches; gravelly silt loam
2Bt1—17 to 30 inches; very cobbly loam
2B2—30 to 39 inches; extremely cobbly coarse sandy loam
3Bt3—39 to 60 inches; extremely cobbly loamy sand

Minor Components
Jarmillo and similar soils
Composition: About 5 percent
Slope: 2 to 20 percent
Drainage class: Well drained
Ecological site: Mountain Loam

Cosey and similar soils
Composition: About 5 percent
Slope: 2 to 20 percent
Drainage class: Well drained
Ecological site: Mountain Loam

312—Royosa sand, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,900 to 6,200 feet (1,798 to 1,890 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Royosa and similar soils: 90 percent
Minor components: 10 percent

Component Descriptions

Royosa soils
Landscape: Dune fields
Landform: Dunes
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Convex/convex
Depth class: Very deep
Drainage class: Somewhat excessively drained

Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 3.6 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 3 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, blue grama, dropseed, needle and thread, bottlebrush squirreltail, oneseed juniper
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 5 inches; sand
C1—5 to 16 inches; sand
C2—16 to 60 inches; loamy sand

Minor Components
Waumac and similar soils
Composition: About 5 percent
Slope: 1 to 7 percent
Drainage class: Well drained
Ecological site: Sandy

Fragua and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Foothills

314—Fragua-Waumac-Royosa complex, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,600 to 6,200 feet (1,707 to 1,890 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Fragua and similar soils: 40 percent
Waumac and similar soils: 30 percent
Royosa and similar soils: 25 percent
Minor components: 5 percent

Component Descriptions

Fragua soils
Landscape: Uplands
Landform: Dipslopes, fan remnants
Position on landform: Footslopes

Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium derived from sandstone
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 7.0 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Foothills
Potential native vegetation: Indian ricegrass, blue grama, western wheatgrass, alkali sacaton, mesa dropseed, oneseed juniper, twoneedle pinyon
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 3 inches; loamy sand
Bt1—3 to 8 inches; sandy loam
Bt2—8 to 24 inches; sandy loam
C—24 to 60 inches; sandy loam

Waumac soils
Landscape: Uplands
Landform: Valley floors
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 8.1 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: Indian ricegrass, blue grama, western wheatgrass, alkali sacaton, mesa dropseed, oneseed juniper, twoneedle pinyon
Land capability subclass (nonirrigated): 6s

Typical Profile:
A—0 to 3 inches; loamy fine sand
C—3 to 60 inches; fine sandy loam

Royosa soils
Landscape: Uplands
Landform: Dunes
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Convex/convex
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 3.5 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 3 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, blue grama, dropseed, needleandthread, oneseed juniper, squirreltail
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 7 inches; fine sand
C—7 to 60 inches; fine sand

Minor Components
Flugle and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Savannah

317—Elpedro loam, 1 to 8 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,700 to 6,300 feet (1,737 to 1,920 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Elpedro and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Elpedro soils
Landscape: Uplands
Landform: Valley sides, benches, fan piedmonts, hills, mesas
Position on landform: Footslopes

Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone over colluvium derived from limestone
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 10.6 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: juniper, twoneedle pinyon
Other plants: blue grama, galleta, oak, bottlebrush squirreltail, western wheatgrass
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 2 inches; loam
Bt—2 to 22 inches; silty clay loam
Btk—22 to 60 inches; loam

Minor Components
Flugle and similar soils
Composition: About 8 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Savannah

Waumac and similar soils
Composition: About 7 percent
Slope: 1 to 7 percent
Drainage class: Well drained
Ecological site: Sandy

319—Bamac-Rock outcrop complex, 15 to 55 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,600 to 6,400 feet (1,707 to 1,951 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Bamac and similar soils: 60 percent
Rock outcrop: 25 percent
Minor components: 15 percent

Component Descriptions

Bamac soils
Landscape: Uplands
Landform: Fan remnants, fan remnants, ridges, hills
Position on landform: Footslopes
Position on landform: Head slope, side slope
Parent material: Alluvium derived from igneous and sedimentary rock
Slope: 15 to 55 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 2.0 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Foothills
Potential native vegetation: blue grama, hairy grama, black grama, sideoats grama, New Mexico Feathergrass, galleta, oneseed juniper, sacahuista
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 4 inches; very gravelly loamy sand
AC—4 to 10 inches; loamy sand
C1—10 to 21 inches; very gravelly loamy coarse sand
C2—21 to 37 inches; very gravelly loamy coarse sand
C3—37 to 60 inches; very gravelly loamy coarse sand

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Benches, ledges
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Espiritu and similar soils
Composition: About 10 percent
Slope: 15 to 40 percent
Drainage class: Well drained
Ecological site: Foothills

Waumac and similar soils
Composition: About 5 percent
Slope: 1 to 15 percent
Drainage class: Well drained
Ecological site: Sandy

320—Sparham silt loam, 0 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,500 to 7,500 feet (1,981 to 2,286 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Sparham and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Sparham soils
Landscape: Valleys
Landform: Flood plains, valley sides, alluvial fans
Position on landform: Toeslopes
Position on landform: Rise
Parent material: Fan alluvium derived from sandstone and shale
Slope: 0 to 3 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 9.8 inches (high)
Shrink-swell potential: About 7.2 percent (high)
Flooding hazard: Occasional
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Clayey
Potential native vegetation: western wheatgrass, alkali sacaton, bottlebrush squirreltail, prairie junegrass
Land capability subclass (irrigated): 3s
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 9 inches; silt loam
C1—9 to 32 inches; silty clay
C2—32 to 60 inches; silty clay

Minor Components
Hickman and similar soils
Composition: About 10 percent
Slope: 1 to 5 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Swale

Royosa and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Somewhat excessively drained
Ecological site: Deep Sand

321—Waumac-Royosa association, 1 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,600 to 6,700 feet (1,707 to 2,042 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Waumac and similar soils: 60 percent
Royosa and similar soils: 30 percent
Minor components: 10 percent

Component Descriptions

Waumac soils
Landscape: Valleys
Landform: Valley floors
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Fan alluvium derived from igneous and sedimentary rock
Slope: 1 to 15 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 8.1 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: Indian ricegrass, blue grama, western wheatgrass, alkali sacaton, mesa dropseed, oneseed juniper, twoneedle pinyon
Land capability subclass (nonirrigated): 6s

Typical Profile:
A—0 to 3 inches; loamy fine sand
C—3 to 60 inches; fine sandy loam

Royosa soils
Landscape: Valleys
Landform: Dunes
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian deposits derived from sandstone
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Convex/convex
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 3.5 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 3 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, blue grama, dropseed, needleandthread, bottlebrush squirreltail, oneseed juniper
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 12 inches; fine sand
C—12 to 60 inches; fine sand

Minor Components
Bamac and similar soils
Composition: About 5 percent
Slope: 1 to 15 percent
Drainage class: Excessively drained
Ecological site: Foothills

Fragua and similar soils
Composition: About 3 percent
Slope: 1 to 15 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Foothills

Rock outcrop
Composition: About 2 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

322—Fragua very cobbly fine sandy loam, 15 to 70 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,600 to 7,400 feet (1,707 to 2,256 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Fragua and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Fragua soils
Landscape: Uplands
Landform: Dipslopes, fan remnants
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Eolian deposits over fan alluvium derived from sandstone
Slope: 15 to 70 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Deep and very deep
Depth to restrictive feature: 40 to 80 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 4.6 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Foothills
Potential native vegetation: blue grama, hairy grama, black grama, sideoats grama, New Mexico Feathergrass, galleta, sacahuista
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 3 inches; very cobbly fine sandy loam
Bt1—3 to 16 inches; very fine sandy loam
Bk—16 to 45 inches; loamy fine sand
Cr—45 to 60 inches; bedrock

Minor Components
Flugle and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Savannah

Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Vessilla and similar soils
Composition: About 3 percent
Slope: 5 to 30 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Waumac and similar soils
Composition: About 2 percent
Slope: 1 to 15 percent
Drainage class: Well drained
Ecological site: Sandy

324—Rock outcrop-Atarque-Menefee complex, 5 to 25 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,700 to 6,600 feet (1,737 to 2,012 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Rock outcrop: 30 percent
Atarque and similar soils: 25 percent
Menefee and similar soils: 25 percent
Minor components: 20 percent

Component Descriptions

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Ledges, escarpments
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Atarque soils
Landscape: Uplands
Landform: Cuestas, hills, dipslopes, mesas
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Slope alluvium derived from sandstone and shale
Slope: 5 to 25 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (lithic)

Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 2.0 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Shallow Sandstone
Potential native vegetation: sideoats grama, blue grama, little bluestem, Indian ricegrass, galleta, twoneedle pinyon
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; sandy loam
Bt—3 to 9 inches; sandy clay loam
Btk—9 to 14 inches; sandy clay loam
R—14 to 60 inches; bedrock

Menefee soils
Landscape: Uplands
Landform: Hillslopes, mesas, mountainsides
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Colluvium over residuum weathered from shale
Slope: 8 to 25 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 1.8 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 5 percent
Gypsum maximum: About 1 percent
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Shallow
Potential native vegetation: blue grama, New Mexico Feathergrass, sideoats grama, little bluestem, black grama, galleta
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 2 inches; gravelly loam
C—2 to 9 inches; clay loam
2Cr—9 to 60 inches; bedrock

Minor Components
Waumac and similar soils
Composition: About 10 percent
Slope: 1 to 15 percent
Drainage class: Well drained
Ecological site: Sandy

Vessilla and similar soils
Composition: About 10 percent
Slope: 5 to 30 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

325—Rock outcrop-Vessilla-Espiritu complex, 25 to 65 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 6,400 feet (1,829 to 1,951 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Rock outcrop: 35 percent
Vessilla and similar soils: 25 percent
Espiritu and similar soils: 25 percent
Minor components: 15 percent

Component Descriptions

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Ledges, escarpments
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Vessilla soils
Landscape: Mountains
Landform: Mesas, hills, breaks, ridges, structural benches
Position on landform: Footslopes
Position on landform: Mountainflank, lower third
Parent material: Eolian deposits over slope alluvium over residuum weathered from sandstone
Slope: 25 to 55 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)

Available water capacity: About 1.1 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: sideoats grama, New Mexico Feathergrass, blue grama, little bluestem, galleta
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 1 inch; very gravelly sandy loam
C—1 inch to 10 inches; gravelly loam
R—10 to 60 inches; bedrock

Espiritu soils
Landscape: Mountains
Landform: Mountain slopes, mesas
Position on landform: Toeslopes
Position on landform: Mountainflank, lower third
Parent material: Alluvium, eolian material and colluvium derived from igneous and sedimentary rock
Slope: 25 to 65 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 5.1 inches (low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Foothills
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: blue grama, wavyleaf oak, black grama, hairy grama, needle and thread, sideoats grama, true mountain mahogany
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 2 inches; very gravelly fine sandy loam
Bt—2 to 20 inches; very gravelly sandy clay loam
Bk—20 to 60 inches; very gravelly loam

Minor Components

Atarque and similar soils
Composition: About 5 percent
Slope: 25 to 45 percent
Depth to restrictive feature: 8 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

Fragua and similar soils
Composition: About 5 percent
Slope: 5 to 25 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Foothills

Sedillo and similar soils
Composition: About 3 percent
Slope: 5 to 25 percent
Drainage class: Well drained
Ecological site: Foothills

Skyvillage and similar soils
Composition: About 2 percent
Slope: 8 to 25 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

342—Waumac-Vessilla-Rock outcrop complex, 5 to 40 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,200 to 6,900 feet (1,890 to 2,103 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Waumac and similar soils: 35 percent
Vessilla and similar soils: 25 percent
Rock outcrop: 20 percent
Minor components: 20 percent

Component Descriptions

Waumac soils
Landscape: Uplands
Landform: Valley floors
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Fan alluvium derived from igneous and sedimentary rock

Slope: 5 to 20 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 6.9 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Sandy
Potential native vegetation: Indian ricegrass, blue grama, western wheatgrass, alkali sacaton, mesa dropseed, oneseed juniper, twoneedle pinyon
Land capability subclass (nonirrigated): 6s

Typical Profile:
A—0 to 5 inches; loamy fine sand
C—5 to 60 inches; sandy loam

Vessilla soils
Landscape: Uplands
Landform: Hills, ridges, breaks, mesas
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Eolian deposits over slope alluvium over residuum weathered from sandstone
Slope: 5 to 40 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 1.8 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Indian ricegrass, blue grama, mountain big sagebrush, oak, galleta, sideoats grama
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; fine sandy loam
C—3 to 13 inches; fine sandy loam
R—13 to 60 inches; bedrock

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Ledges, escarpments
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Badland
Composition: About 10 percent
Slope: 15 to 35 percent
Depth to restrictive feature: 0 inches to bedrock (paralithic)

Royosa and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Somewhat excessively drained
Ecological site: Deep Sand

Menefee and similar soils
Composition: About 5 percent
Slope: 15 to 35 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

345—Espiritu-Bamac association, 15 to 55 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,500 to 6,600 feet (1,676 to 2,012 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Espiritu and similar soils: 50 percent
Bamac and similar soils: 35 percent
Minor components: 15 percent

Component Descriptions

Espiritu soils
Landscape: Uplands
Landform: Fan piedmonts, mesas
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Slope alluvium over colluvium derived from igneous and sedimentary rock
Slope: 15 to 55 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 10 percent subrounded cobbles

Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 4.7 inches (low)
Shrink-swell potential: About 3.3 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Foothills
Potential native vegetation: blue grama, hairy grama, black grama, sideoats grama, New Mexico Feathergrass, galleta, oneseed juniper, sacahuista
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 6 inches; very gravelly fine sandy loam
Bt1—6 to 15 inches; very gravelly sandy clay loam
Bt2—15 to 22 inches; very gravelly sandy clay loam
Bk1—22 to 29 inches; very cobbly sandy clay loam
Bk2—29 to 38 inches; very cobbly sandy clay loam
2C1—38 to 46 inches; fine sandy loam
3C2—46 to 60 inches; very gravelly sandy loam

Bamac soils
Landscape: Uplands
Landform: Fan remnants, hills, ridges, fan remnants
Position on landform: Summits
Position on landform: Side slope, head slope
Parent material: Slope alluvium derived from igneous and sedimentary rock
Slope: 15 to 55 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 1.8 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Foothills
Potential native vegetation: blue grama, hairy grama, black grama, sideoats grama, New Mexico Feathergrass, galleta, oneseed juniper, sacahuista
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 3 inches; very gravelly loamy sand
C1—3 to 30 inches; very gravelly loamy sand
C2—30 to 60 inches; stratified very gravelly loamy sand to loamy sand

Minor Components
Waumac and similar soils
Composition: About 5 percent
Slope: 1 to 7 percent
Drainage class: Well drained
Ecological site: Sandy

Cochiti and similar soils
Composition: About 5 percent
Slope: 15 to 40 percent
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

346—Espiritu, cobbly-Bamac association, 15 to 40 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,900 to 6,900 feet (1,798 to 2,103 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Espiritu, cobbly and similar soils: 70 percent
Bamac and similar soils: 20 percent
Minor components: 10 percent

Component Descriptions

Espiritu, cobbly soils
Landscape: Uplands
Landform: Fan piedmonts, mesas
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Slope alluvium over colluvium derived from igneous and sedimentary rock
Slope: 15 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 7 percent subrounded cobbles
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 3.3 inches (low)
Shrink-swell potential: About 2.6 percent (low)
Runoff class: High
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)

Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Foothills
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: black grama, blue grama, sideoats grama, hairy grama, needle and thread, true mountain mahogany, wavyleaf oak
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 2 inches; extremely cobbly sandy loam
Bt—2 to 24 inches; very gravelly sandy clay loam
Bk—24 to 36 inches; extremely gravelly sandy loam
2C—36 to 60 inches; very gravelly loamy sand

Bamac soils
Landscape: Uplands
Landform: Hills, ridges, fan remnants
Position on landform: Shoulders
Position on landform: Side slope, head slope
Parent material: Slope alluvium derived from igneous and sedimentary rock
Slope: 15 to 40 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 2.4 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Foothills
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: black grama, blue grama, sideoats grama, hairy grama, needle and thread, true mountain mahogany, wavyleaf oak
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 3 inches; very gravelly loamy sand
C1—3 to 30 inches; very gravelly loamy coarse sand
C2—30 to 45 inches; loamy sand
C3—45 to 60 inches; very gravelly loamy sand

Minor Components
Cochiti and similar soils
Composition: About 5 percent
Slope: 15 to 40 percent
Drainage class: Well drained

Rock outcrop
Composition: About 3 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Royosa and similar soils
Composition: About 2 percent
Slope: 1 to 8 percent
Drainage class: Somewhat excessively drained
Ecological site: Deep Sand

348—Wauquie-Rock outcrop complex, 25 to 45 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 6,800 feet (1,829 to 2,073 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Wauquie and similar soils: 60 percent
Rock outcrop: 20 percent
Minor components: 20 percent

Component Descriptions

Wauquie soils
Landscape: Mountains
Landform: Mountain slopes, hills, mesas, benches, canyons
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Slope alluvium over colluvium derived from igneous and sedimentary rock
Slope: 25 to 45 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 3.7 inches (low)
Shrink-swell potential: About 2.2 percent (low)
Runoff class: High
Calcium carbonate maximum: About 3 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Juniperus monosperma-Pinus edulis/Fallugia paradoxa-Chrysothamnus nauseosus/Bouteloua hirsuta-Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Eriogonum, blue grama, skunkbush sumac, slender wheatgrass, bottlebrush squirreltail, wavyleaf oak
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 2 inches; extremely gravelly sandy clay loam
Bt1—2 to 16 inches; very gravelly clay loam
Bt2—16 to 40 inches; very gravelly sandy loam
Bk—40 to 60 inches; extremely gravelly loamy sand

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Escarpments, ledges
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Bamac and similar soils
Composition: About 5 percent
Slope: 15 to 55 percent
Drainage class: Excessively drained
Ecological site: Foothills

Waumac and similar soils
Composition: About 5 percent
Slope: 1 to 7 percent
Drainage class: Well drained
Ecological site: Sandy

Vessilla and similar soils
Composition: About 5 percent
Slope: 5 to 30 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

Royosa and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Somewhat excessively drained
Ecological site: Deep Sand

353—Cochiti-Espiritu association, 15 to 55 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,300 to 6,400 feet (1,615 to 1,951 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Cochiti and similar soils: 50 percent
Espiritu and similar soils: 45 percent
Minor components: 5 percent

Component Descriptions

Cochiti soils
Landscape: Uplands
Landform: Fan remnants
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Slope alluvium derived from igneous and sedimentary rock
Slope: 15 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 3 percent subrounded cobbles
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 3.8 inches (low)
Shrink-swell potential: About 2.5 percent (low)
Runoff class: High
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Juniperus monosperma-Pinus edulis/Fallugia paradoxa-Chrysothamnus nauseosus/Bouteloua hirsuta-Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: blue grama, bottlebrush squirreltail, sideoats grama
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 4 inches; extremely gravelly loam
Bt—4 to 22 inches; very gravelly clay loam
C—22 to 60 inches; very gravelly loamy sand

Espiritu soils
Landscape: Uplands
Landform: Fan piedmonts, mesas
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Slope alluvium over colluvium derived from igneous and sedimentary rock
Slope: 25 to 55 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 3 percent subrounded cobbles
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 2.4 inches (very low)
Shrink-swell potential: About 2.2 percent (low)
Runoff class: High
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)

Ecological site: Foothills
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: black grama, blue grama, sideoats grama, hairy grama, needle and thread, true mountain mahogany, wavyleaf oak
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 3 inches; very gravelly loam
Bt—3 to 16 inches; very gravelly sandy clay loam
Bk—16 to 60 inches; extremely gravelly loamy sand

Minor Components
Teco and similar soils
Composition: About 3 percent
Slope: 8 to 40 percent
Drainage class: Well drained
Ecological site: Clayey

Waumac and similar soils
Composition: About 2 percent
Slope: 1 to 7 percent
Drainage class: Well drained
Ecological site: Sandy

354—Waumac Variant very gravelly sandy loam, 1 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,600 to 5,900 feet (1,707 to 1,798 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Waumac Variant and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Waumac Variant soils
Landscape: Uplands
Landform: Ridges, hills
Position on landform: Summits
Position on landform: Nose slope
Parent material: Residuum weathered from tuff
Slope: 1 to 15 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)

Available water capacity: About 0.7 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Apache plume, black grama, blue grama, broom snakeweed, little bluestem, sandhill muhly
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; very gravelly sandy loam
C—3 to 12 inches; very gravelly sandy loam
Cr—12 to 60 inches; bedrock

Minor Components
Rock outcrop
Composition: About 10 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Waumac and similar soils
Composition: About 5 percent
Slope: 1 to 7 percent
Drainage class: Well drained
Ecological site: Sandy

358—Deama-Elpedro-Rock outcrop complex, 10 to 55 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,800 to 6,800 feet (1,768 to 2,073 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Deama and similar soils: 35 percent
Elpedro and similar soils: 25 percent
Rock outcrop: 25 percent
Minor components: 15 percent

Component Descriptions

Deama soils
Landscape: Uplands
Landform: Plateaus, hills, ridges, mesas
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Colluvium over residuum weathered from limestone

Slope: 10 to 55 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 1.3 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 60 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: twoneedle pinyon
Other plants: blue grama, sideoats grama, New Mexico Feathergrass
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 3 inches; very gravelly loam
Bk—3 to 19 inches; very gravelly loam
2R—19 to 60 inches; bedrock

Elpedro soils
Landscape: Uplands
Landform: Valley sides, mesas, hills, fan piedmonts, benches
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian deposits over colluvium derived from limestone
Slope: 10 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 10.8 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Juniperus monosperma-Pinus edulis/Fallugia paradoxa-Chrysothamnus nauseosus/Bouteloua hirsuta-Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: blue grama, bottlebrush squirreltail, galleta, oak, western wheatgrass
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 3 inches; very gravelly loam
Bt—3 to 37 inches; silty clay loam
Btk—37 to 60 inches; loam

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Escarpments
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Espiritu and similar soils
Composition: About 10 percent
Slope: 15 to 40 percent
Drainage class: Well drained
Ecological site: Foothills

Menefee and similar soils
Composition: About 5 percent
Slope: 5 to 35 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

396—Atarque-Menefee-Rock outcrop complex, 25 to 45 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 6,600 feet (1,829 to 2,012 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Atarque and similar soils: 30 percent
Menefee and similar soils: 30 percent
Rock outcrop: 25 percent
Minor components: 15 percent

Component Descriptions

Atarque soils
Landscape: Uplands
Landform: Dipslopes, hills, mesas, cuestas
Position on landform: Shoulders
Position on landform: Nose slope
Parent material: Slope alluvium derived from sandstone and shale
Slope: 25 to 45 percent
Aspect: East to west
Shape (down/across): Linear/linear

Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 3.1 inches (low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Shallow Sandstone
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: sideoats grama, New Mexico Feathergrass, blue grama, little bluestem
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 2 inches; extremely gravelly sandy loam
Bt—2 to 16 inches; clay loam
R—16 to 60 inches; bedrock

Menefee soils
Landscape: Uplands
Landform: Hillslopes, mesas, mountainsides
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Colluvium over residuum weathered from shale
Slope: 25 to 45 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 2.7 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Bigelow sagebrush, mormon tea, Indian ricegrass, Mexican cliffrose, bluegrass, galleta, green rabbitbrush
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 2 inches; gravelly clay loam
C—2 to 14 inches; clay loam
2Cr—14 to 60 inches; bedrock

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Hills, escarpments
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Waumac and similar soils
Composition: About 5 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: Sandy

Flugle and similar soils
Composition: About 5 percent
Slope: 1 to 5 percent
Drainage class: Well drained
Ecological site: Savannah

Vessilla and similar soils
Composition: About 5 percent
Slope: 3 to 15 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

397—Rock outcrop-Cucho-Vessilla complex, 25 to 70 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 7,200 feet (1,829 to 2,195 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Rock outcrop: 30 percent
Cucho and similar soils: 25 percent
Vessilla and similar soils: 25 percent
Minor components: 20 percent

Component Descriptions

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.

Landform: Hills, escarpments
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Cucho soils
Landscape: Uplands
Landform: Cuestas, fan remnants
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Colluvium derived from shale
Slope: 25 to 70 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 45 percent subrounded gravel
Depth class: Moderately deep
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 4.4 inches (low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Juniperus monosperma-Pinus edulis/Fallugia paradoxa-Chrysothamnus nauseosus/Bouteloua hirsuta-Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Indian ricegrass, bottlebrush squirreltail, galleta, mountain mahogany, needle and thread, sideoats grama, skunkbush sumac, wavyleaf oak
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 2 inches; very gravelly clay loam
C1—2 to 9 inches; clay loam
C2—9 to 37 inches; very gravelly clay loam
Cr—37 to 60 inches; bedrock

Vessilla soils
Landscape: Uplands
Landform: Structural benches, hills, ridges, breaks, mesas
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Eolian material and alluvium derived from sandstone
Slope: 25 to 65 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)

Available water capacity: About 1.1 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: sideoats grama, New Mexico Feathergrass, blue grama, little bluestem, galleta
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 2 inches; gravelly fine sandy loam
C—2 to 11 inches; gravelly fine sandy loam
R—11 to 60 inches; bedrock

Minor Components
Atarque and similar soils
Composition: About 5 percent
Slope: 25 to 45 percent
Depth to restrictive feature: 8 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

Menefee and similar soils
Composition: About 5 percent
Slope: 25 to 45 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Skyvillage and similar soils
Composition: About 5 percent
Slope: 8 to 25 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Shallow Sandstone

Waumac and similar soils
Composition: About 5 percent
Slope: 1 to 7 percent
Drainage class: Well drained
Ecological site: Sandy

398—Espiritu-Cucho association, 8 to 55 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 6,900 feet (1,829 to 2,103 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)

Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Espiritu and similar soils: 45 percent
Cucho and similar soils: 35 percent
Minor components: 20 percent

Component Descriptions

Espiritu soils
Landscape: Uplands
Landform: Mountain slopes, mesas
Position on landform: Backslopes
Position on landform: Mountainflank, lower third, side slope
Parent material: Slope alluvium and colluvium derived from igneous and sedimentary rock
Slope: 8 to 55 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 20 percent subrounded gravel
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 3.0 inches (very low)
Shrink-swell potential: About 2.6 percent (low)
Runoff class: High
Calcium carbonate maximum: About 1 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Foothills
Potential native vegetation: blue grama, hairy grama, black grama, sideoats grama, New Mexico Feathergrass, galleta, oneseed juniper, sacahuista
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 4 inches; very gravelly fine sandy loam
Bt—4 to 24 inches; very gravelly sandy clay loam
Bk—24 to 60 inches; extremely gravelly sandy loam

Cucho soils
Landscape: Uplands
Landform: Cuestas, fan remnants
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Colluvium derived from shale
Slope: 15 to 55 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Moderately deep
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 7.2 inches (moderate)

Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Juniperus monosperma-Pinus edulis/Fallugia paradoxa-Chrysothamnus nauseosus/Bouteloua hirsuta-Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Indian ricegrass, bottlebrush squirreltail, galleta, mountain mahogany, needle and thread, sideoats grama, skunkbush sumac, wavyleaf oak
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 2 inches; very gravelly clay loam
C—2 to 37 inches; silty clay loam
Cr—37 to 60 inches; bedrock

Minor Components
Menefee and similar soils
Composition: About 10 percent
Slope: 5 to 35 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow

Waumac and similar soils
Composition: About 5 percent
Slope: 1 to 7 percent
Drainage class: Well drained
Ecological site: Sandy

Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

399—Cucho-Teco complex, 8 to 40 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,900 to 7,000 feet (1,798 to 2,134 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Cucho and similar soils: 45 percent
Teco and similar soils: 35 percent
Minor components: 20 percent

Component Descriptions

Cucho soils
Landscape: Uplands
Landform: Cuestas, fan remnants
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Colluvium derived from shale
Slope: 15 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 50 percent subrounded gravel
Depth class: Moderately deep
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 7.2 inches (moderate)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Juniperus monosperma-Pinus edulis/Fallugia paradoxa-Chrysothamnus nauseosus/Bouteloua hirsuta-Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Indian ricegrass, bottlebrush squirreltail, galleta, mountain mahogany, needle and thread, sideoats grama, skunkbush sumac, wavyleaf oak
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 2 inches; very gravelly clay loam
C—2 to 37 inches; clay loam
Cr—37 to 60 inches; bedrock

Teco soils
Landscape: Uplands
Landform: Hills, cuestas
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Slope alluvium derived from sandstone and shale
Slope: 8 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 7.7 inches (moderate)
Shrink-swell potential: About 6.2 percent (high)
Runoff class: Very high
Calcium carbonate maximum: About 13 percent
Gypsum maximum: None
Salinity maximum: About 8 mmhos/cm (slightly saline)

Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Clayey
Potential native vegetation: alkali sacaton, western wheatgrass, New Mexico Feathergrass, blue grama, galleta, fourwing saltbush, winterfat
Land capability subclass (nonirrigated): 6e

Typical Profile:
A—0 to 1 inch; very cobbly fine sandy loam
Bt1—1 inch to 7 inches; sandy clay
Bt2—7 to 23 inches; clay
Btk—23 to 40 inches; clay
2C—40 to 45 inches; very gravelly fine sandy loam
3Bkb—45 to 60 inches; channery sandy clay loam

Minor Components
Espiritu and similar soils
Composition: About 10 percent
Slope: 15 to 40 percent
Drainage class: Well drained
Ecological site: Foothills

Menefee and similar soils
Composition: About 5 percent
Slope: 5 to 35 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

405—Charo complex, 1 to 5 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,100 to 8,300 feet (2,469 to 2,530 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Charo and similar soils: 50 percent
Charo, noncobbly, and similar soils: 40 percent
Minor components: 10 percent

Component Descriptions

Charo soils
Landscape: Mountains
Landform: Mesas, ridges, hills
Position on landform: Shoulders
Position on landform: Crest, mountaintop
Parent material: Eolian deposits over residuum weathered from basalt

Slope: 1 to 5 percent
Aspect: East to west
Shape (down/across): Convex/linear
Surface fragments: About 2 percent subrounded stones
Depth class: Moderately deep
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 4.0 inches (low)
Shrink-swell potential: About 7.4 percent (high)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa-Juniperus deppeana/Quercus gambelii
Potential native vegetation:
Common trees: Rocky Mountain juniper, twoneedle pinyon, ponderosa pine
Other plants: blue grama, Arizona fescue, mountain muhly, spineless horsebrush, Fendler ceanothus, prairie junegrass
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 5 inches; cobbly loam
Bt1—5 to 12 inches; clay
Bt2—12 to 15 inches; clay
Bt3—15 to 25 inches; clay
C—25 to 28 inches; clay
R—28 to 60 inches; bedrock

Charo, noncobbly soils
Landscape: Mountains
Landform: Hills, ridges, mesas
Position on landform: Shoulders
Position on landform: Crest, mountaintop
Parent material: Eolian deposits over residuum weathered from basalt
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Moderately deep
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 6.5 inches (moderate)
Shrink-swell potential: About 4.2 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Mountain Grassland
Potential native vegetation: Arizona fescue, mountain muhly, muttongrass, prairie junegrass
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 8 inches; loam
Bt—8 to 38 inches; clay
R—38 to 60 inches; bedrock

Minor Components
Rock outcrop
Composition: About 10 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

409—Santa Fe very gravelly sandy loam, 15 to 40 percent slopes, stony

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,800 to 7,600 feet (2,073 to 2,316 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Santa Fe and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Santa Fe soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Slope alluvium over residuum weathered from granite
Slope: 15 to 40 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 0.5 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: sideoats grama, blue grama, galleta, pinyon ricegrass
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; very gravelly sandy loam
Bt—3 to 8 inches; very gravelly sandy clay loam
2R—8 to 60 inches; bedrock

Minor Components
Rock outcrop
Composition: About 10 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)
Ecological site: pinyon-juniper forest

Vessilla and similar soils
Composition: About 3 percent
Slope: 5 to 40 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Waumac and similar soils
Composition: About 2 percent
Slope: 5 to 20 percent
Drainage class: Well drained
Ecological site: Sandy

410—Zia loam, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Zia and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Zia soils
Landscape: Valleys
Landform: Stream terraces
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Eolian deposits over stream alluvium derived from sandstone
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 8.1 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low

Calcium carbonate maximum: About 15 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: blue grama, spike muhly, western wheatgrass, bottlebrush squirreltail, fourwing saltbush, oneseed juniper, winterfat
Land capability subclass (irrigated): 3e
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 10 inches; loam
C—10 to 60 inches; stratified sandy loam to fine sandy loam

Minor Components
Pinavetes and similar soils
Composition: About 10 percent
Landform: Dunes, valley sides
Slope: 1 to 3 percent
Aspect: East to west
Drainage class: Excessively drained
Ecological site: Deep Sand

El Rancho and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Loamy

414—Wauquie very gravelly fine sandy loam, 8 to 25 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,400 to 6,700 feet (1,951 to 2,042 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Wauquie and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Wauquie soils
Landscape: Uplands
Landform: Mesas, canyons, fan piedmonts, benches, hills
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Slope alluvium over colluvium derived from igneous and sedimentary rock

Slope: 8 to 25 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 3.6 inches (low)
Shrink-swell potential: About 2.9 percent (low)
Runoff class: Medium
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Juniperus monosperma-Pinus edulis/Fallugia paradoxa-Chrysothamnus nauseosus/Bouteloua hirsuta-Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Eriogonum, blue grama, skunkbush sumac, slender wheatgrass, bottlebrush squirreltail, wavyleaf oak
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; very gravelly fine sandy loam
Bt—3 to 30 inches; very gravelly sandy clay loam
Bk—30 to 60 inches; stratified very gravelly sandy loam to very gravelly loamy coarse sand

Minor Components

Santa Fe and similar soils
Composition: About 5 percent
Slope: 15 to 40 percent
Depth to restrictive feature: 8 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Bamac and similar soils
Composition: About 5 percent
Slope: 15 to 55 percent
Drainage class: Excessively drained
Ecological site: Foothills

Laventana and similar soils
Composition: About 5 percent
Slope: 3 to 15 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

417—Jocity loam, 0 to 2 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,300 to 5,500 feet (1,615 to 1,676 meters)

Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Jocity and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Jocity soils
Landscape: Valleys
Landform: Alluvial fans, flood plains
Position on landform: Toeslopes
Position on landform: Rise, base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 0 to 2 percent
Aspect: East to west
Shape (down/across): Linear, concave/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.6 inches (high)
Shrink-swell potential: About 4.0 percent (moderate)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 7c

Typical Profile:
Ap—0 to 10 inches; loam
C1—10 to 26 inches; silty clay loam
C2—26 to 32 inches; loam
C3—32 to 50 inches; sandy clay loam
C4—50 to 56 inches; sandy loam
C5—56 to 60 inches; loamy sand

Minor Components
Zia and similar soils
Composition: About 5 percent
Slope: 1 to 3 percent
Drainage class: Well drained
Ecological site: Sandy

Aga and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Sparham and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

418—Jocity clay loam, 0 to 2 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,300 to 5,600 feet (1,615 to 1,707 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Jocity and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Jocity soils
Landscape: Valleys
Landform: Alluvial fans, flood plains
Position on landform: Toeslopes
Position on landform: Base slope, rise
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 0 to 2 percent
Aspect: East to west
Shape (down/across): Concave, linear/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 8.6 inches (moderate)
Shrink-swell potential: About 2.9 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 12 inches; clay loam
C1—12 to 30 inches; clay loam
C2—30 to 60 inches; stratified loamy sand to sandy loam

Minor Components
Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Aga and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Sparham and similar soils
Composition: About 3 percent
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

Zia and similar soils
Composition: About 2 percent
Slope: 1 to 4 percent
Drainage class: Well drained
Ecological site: Sandy

419—Santa Fe-Wauquie-Rock outcrop complex, 25 to 70 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,400 to 8,400 feet (1,951 to 2,560 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Santa Fe and similar soils: 40 percent
Wauquie and similar soils: 30 percent
Rock outcrop: 20 percent
Minor components: 10 percent

Component Descriptions

Santa Fe soils
Landscape: Mountains
Landform: Mountain slopes

Position on landform: Backslopes, mountainflanks
Parent material: Slope alluvium over residuum weathered from granite
Slope: 25 to 70 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 0.8 inches (very low)
Shrink-swell potential: About 3.2 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: sideoats grama, blue grama, galleta, pinyon ricegrass
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 9 inches; extremely cobbly coarse sandy loam
Bt—9 to 16 inches; very gravelly sandy clay loam
2R—16 to 60 inches; bedrock

Wauquie soils
Landscape: Mountains
Landform: Benches, mountain slopes, canyons, hills, mesas
Position on landform: Footslopes
Position on landform: Mountainflank
Parent material: Slope alluvium over residuum weathered from granite
Slope: 25 to 55 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 1.4 inches (very low)
Shrink-swell potential: About 2.3 percent (low)
Runoff class: High
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Juniperus monosperma-Pinus edulis/Fallugia paradoxa-Chrysothamnus nauseosus/Bouteloua hirsuta-Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: skunkbush sumac, Gambel oak, bluegrass, bottlebrush squirreltail, mountain big sagebrush, mountain mahogany, mountain muhly, pine dropseed, pinyon ricegrass, prairie junegrass
Land capability subclass (nonirrigated): 7e

Typical Profile:
A—0 to 4 inches; extremely cobbly fine sandy loam
Bt1—4 to 11 inches; extremely cobbly sandy clay loam
Bt2—11 to 18 inches; extremely cobbly sandy clay loam
Bt3—18 to 29 inches; extremely cobbly sandy loam
Bk—29 to 60 inches; extremely cobbly sand

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Escarpments, hills
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Minor Components
Osha and similar soils
Composition: About 10 percent
Slope: 35 to 55 percent
Drainage class: Somewhat excessively drained
Ecological site: Pinus ponderosa/Quercus gambelii

420—Pinavetes loamy sand, 1 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 5,200 to 6,000 feet (1,585 to 1,829 meters)
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Map Unit Composition

Pinavetes and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Pinavetes soils
Landscape: Uplands
Landform: Dunes, valley sides
Position on landform: Shoulders
Position on landform: Side slope
Parent material: Eolian sands derived from sandstone
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Convex/convex
Depth class: Very deep
Drainage class: Excessively drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 2.7 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None

Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, blue grama, sand sagebrush
Land capability subclass (irrigated): 3s
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 10 inches; loamy sand
C—10 to 60 inches; sand

Minor Components
Zia and similar soils
Composition: About 5 percent
Slope: 5 to 20 percent
Drainage class: Well drained
Ecological site: Sandy

El Rancho and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Loamy

Pinavetes and similar soils
Composition: About 5 percent
Slope: 5 to 15 percent
Drainage class: Excessively drained
Ecological site: Deep Sand

421—Gilco loam, moderately saline, sodic, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,100 to 5,500 feet (1,554 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Gilco, moderately saline, sodic and similar soils: 90 percent
Minor components: 10 percent

Component Descriptions

Gilco, moderately saline, sodic soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock

Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 9.0 inches (high)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Salty Bottomland
Potential native vegetation: alkali sacaton, galleta, bottlebrush squirreltail, fourwing saltbush, greasewood
Land capability subclass (irrigated): 4s
Land capability subclass (nonirrigated): 7c

Typical Profile:
Ap—0 to 7 inches; loam
C1—7 to 19 inches; very fine sandy loam
C2—19 to 60 inches; stratified fine sandy loam to loam

Minor Components

Aga and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Jocity and similar soils
Composition: About 3 percent
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Peralta and similar soils
Composition: About 2 percent
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

422—Vessilla-Menefee-Orlie association, 0 to 30 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,100 to 7,200 feet (1,859 to 2,195 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Vessilla and similar soils: 35 percent
Menefee and similar soils: 30 percent
Orlie and similar soils: 25 percent
Minor components: 10 percent

Component Descriptions

Vessilla soils
Landscape: Uplands
Landform: Ridges, breaks, mesas, hills
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Eolian deposits over slope alluvium over residuum weathered from sandstone
Slope: 5 to 30 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 1.8 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis/Rhus trilobata/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: Indian ricegrass, blue grama, mountain big sagebrush, oak, galleta, sideoats grama
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 1 inch; sandy loam
C—1 inch to 15 inches; sandy loam
R—15 to 60 inches; bedrock

Menefee soils
Landscape: Uplands
Landform: Hillslopes, mesas, mountainsides

Position on landform: Backslopes
Position on landform: Side slope
Parent material: Colluvium over residuum weathered from shale
Slope: 2 to 9 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very shallow and shallow
Depth to restrictive feature: 8 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 2.0 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 15 percent
Gypsum maximum: About 1 percent
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: Rocky Mountain juniper, oneseed juniper, twoneedle pinyon
Other plants: blue grama, galleta, Gambel oak, big sagebrush, sideoats grama
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 3 inches; clay loam
C—3 to 10 inches; clay loam
2Cr—10 to 60 inches; bedrock

Orlie soils
Landscape: Uplands
Landform: Mesas, valley sides, hills, cuestas
Position on landform: Footslopes
Position on landform: Side slope
Parent material: Eolian material and alluvium derived from sandstone and shale
Slope: 0 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 11.7 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 2 (slightly sodic)
Ecological site: Loamy
Potential native vegetation: western wheatgrass, big sagebrush, galleta, Indian ricegrass, needle and thread, fourwing saltbush
Land capability subclass (nonirrigated): 6c

Typical Profile:
A—0 to 4 inches; loam
Bt—4 to 14 inches; silty clay loam
C—14 to 60 inches; silty clay loam

Minor Components
Sparank and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Well drained
Flooding hazard: Occasional
Ecological site: Clayey Bottomland

Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

423—Gilco loam, 1 to 4 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,300 to 5,500 feet (1,615 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Gilco and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Gilco soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 1 to 4 percent
Aspect: East to west
Shape (down/across): Concave/linear
Surface fragments: About 12 percent subrounded gravel
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 9.6 inches (high)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)

Ecological site: Bottomland
Potential native vegetation: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 4e
Land capability subclass (nonirrigated): 7e

Typical Profile:
Ap—0 to 8 inches; loam
C1—8 to 14 inches; loam
C2—14 to 60 inches; stratified fine sandy loam to silt loam

Minor Components
Peralta and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

Jocity and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Aga and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

426—Aga loam, moderately saline, sodic, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Aga, moderately saline, sodic and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Aga, moderately saline, sodic soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock

Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 5.0 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Bottomland
Potential native vegetation: alkali sacaton, fourwing saltbush, giant sacaton, inland saltgrass, greasewood
Land capability subclass (irrigated): 4s
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 8 inches; loam
C1—8 to 20 inches; loam
2C2—20 to 36 inches; loamy sand
2C3—36 to 60 inches; gravelly sand

Minor Components
Gilco and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Peralta and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

427—Aga loam, 1 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Aga and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Aga soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 7.6 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 42 to 60 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 8 inches; loam
C1—8 to 28 inches; loam
2C2—28 to 60 inches; loamy fine sand

Minor Components
Gilco and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Jocity and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

428—Aga loam, moderately saline, sodic, 1 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,200 to 5,500 feet (1,585 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Aga, moderately saline, sodic and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Aga, moderately saline, sodic soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 5.5 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Salty Bottomland
Potential native vegetation: alkali sacaton, fourwing saltbush, giant sacaton, inland saltgrass, greasewood
Land capability subclass (irrigated): 4s
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 4 inches; loam
C1—4 to 16 inches; very fine sandy loam
2C2—16 to 22 inches; loam
2C3—22 to 60 inches; stratified sand to loamy sand

Minor Components
Peralta and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Jocity and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

430—Trail loam, 1 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Trail and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Trail soils
Landscape: Valleys
Landform: Flood plains, valley floor remnants, channels, alluvial fans
Position on landform: Toeslopes
Position on landform: Rise, base slope
Parent material: Eolian deposits over stream alluvium derived from sandstone
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 4.4 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Runoff class: Very low
Calcium carbonate maximum: About 5 percent

Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation: alkali sacaton, giant sacaton, fourwing saltbush
Land capability subclass (irrigated): 4e
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 10 inches; loam
C1—10 to 34 inches; loamy sand
C2—34 to 60 inches; stratified sand to fine sandy loam

Minor Components
Aga and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Peralta and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

431—Trail loamy sand, 1 to 4 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Trail and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Trail soils
Landscape: Valleys
Landform: Valley floor remnants, flood plains, channels, alluvial fans
Position on landform: Toeslopes

Position on landform: Base slope, rise
Parent material: Eolian deposits over stream alluvium derived from sandstone
Slope: 1 to 4 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 5.1 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Runoff class: Very low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Deep Sand
Potential native vegetation: Indian ricegrass, black grama, sand sagebrush, dropseed
Land capability subclass (irrigated): 4e
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 10 inches; loamy sand
C—10 to 60 inches; stratified loamy sand to sand to gravelly sand to fine sandy loam

Minor Components

El Rancho and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Loamy

Aga and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Riverwash
Composition: About 3 percent
Landscape: Valleys
Landform: Streams, channels
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 3 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Zia and similar soils
Composition: About 2 percent
Slope: 1 to 9 percent
Drainage class: Well drained
Ecological site: Sandy

433—Peralta loam, 0 to 1 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Peralta and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Peralta soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 8.6 inches (moderate)
Shrink-swell potential: About 1.8 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 24 to 36 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 8 mmhos/cm (slightly saline)
Sodium adsorption ratio maximum: About 13 (moderately sodic)
Ecological site: Bottomland
Potential native vegetation: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 3e
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 10 inches; loam
C—10 to 60 inches; stratified very fine sandy loam to fine sandy loam to loamy fine sand

Minor Components

Aga and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

434—Peralta loam, 1 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,400 feet (1,524 to 1,646 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Peralta and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Peralta soils

Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes, base slopes
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 7.8 inches (moderate)
Shrink-swell potential: About 2.3 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 24 to 36 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 8 mmhos/cm (slightly saline)
Sodium adsorption ratio maximum: About 13 (moderately sodic)
Ecological site: Bottomland
Potential native vegetation: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 3e
Land capability subclass (nonirrigated): 7c

Typical Profile:
Ap—0 to 10 inches; loam
C1—10 to 16 inches; very fine sandy loam
C2—16 to 20 inches; clay loam
C3—20 to 28 inches; fine sandy loam
C4—28 to 40 inches; loamy sand
C5—40 to 45 inches; silt loam
C6—45 to 60 inches; loamy fine sand

Minor Components
Aga and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

437—Peralta loam, moderately saline, sodic, 1 to 3 percent slopes

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,400 feet (1,524 to 1,646 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Peralta, moderately saline, sodic and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Peralta, moderately saline, sodic soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 8.4 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)

Flooding hazard: Rare
Seasonal high water table depth: About 24 to 36 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Salty Bottomland
Potential native vegetation: alkali sacaton, fourwing saltbush, giant sacaton, inland saltgrass, greasewood
Land capability subclass (irrigated): 4s
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 4 inches; loam
C—4 to 60 inches; stratified loam to fine sandy loam to loamy sand

Minor Components
Aga and similar soils
Composition: About 10 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

500—Rock outcrop-Osha-Rubble land complex, 40 to 70 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 7,000 to 9,000 feet (2,134 to 2,743 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Rock outcrop: 40 percent
Osha and similar soils: 30 percent
Rubble land: 20 percent
Minor components: 10 percent

Component Descriptions

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.

Landform: Ledges, escarpments, benches
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Osha soils
Landscape: Mountains
Landform: Mountain slopes, ridges
Position on landform: Backslopes
Position on landform: Mountainflank, crest
Parent material: Colluvium over residuum weathered from granite
Slope: 40 to 70 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Deep
Depth to restrictive feature: 40 to 60 inches to bedrock (lithic)
Drainage class: Somewhat excessively drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 1.4 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii
Potential native vegetation:
Common trees: ponderosa pine
Other plants: Gambel oak, blue grama, New Mexico locust, Rocky Mountain juniper, mountain muhly, prairie junegrass, skunkbush sumac, wavyleaf oak
Land capability subclass (nonirrigated): 7c

Typical Profile:
AB—0 to 10 inches; very gravelly coarse sandy loam
Bw—10 to 20 inches; very gravelly coarse sandy loam
Ct—20 to 43 inches; extremely gravelly loamy coarse sand
R—43 to 60 inches; bedrock

Rubble land
Description: Rubble land consists of areas with 90 percent or more of the surface covered with cobbles, stones, and boulders.
Landform: Hills
Position on landform: Side slope
Slope: 40 to 70 percent
Aspect: East to west
Drainage class: Excessively drained
Available water capacity: About 0.6 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 0 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Land capability subclass (nonirrigated): 8s

Minor Components

Cypher and similar soils
Composition: About 5 percent
Slope: 15 to 35 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Pinus ponderosa/Quercus gambelii

Palon and similar soils
Composition: About 5 percent
Slope: 15 to 35 percent
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

503—Cajete-Cypher association, 8 to 50 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 7,000 to 7,300 feet (2,134 to 2,225 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Cajete and similar soils: 65 percent
Cypher and similar soils: 25 percent
Minor components: 10 percent

Component Descriptions

Cajete soils

Landscape: Mountains
Landform: Hills, mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank, upper third, crest
Parent material: Residuum weathered from pumice
Slope: 8 to 30 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 3.3 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii

Potential native vegetation:
Common trees: ponderosa pine
Other plants: Arizona fescue, Kentucky bluegrass, Thurber fescue, bluegrass, common juniper, mountain muhly, needlegrass, pine dropseed, sedge, western wheatgrass
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 8 inches; extremely gravelly coarse sandy loam
C—8 to 60 inches; very gravelly sandy loam

Cypher soils
Landscape: Mountains
Landform: Ridges, mountain slopes
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Colluvium derived from tuff over residuum weathered from rhyolite
Slope: 30 to 50 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 2 percent subrounded cobbles
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 0.8 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii
Potential native vegetation:
Common trees: ponderosa pine
Other plants: Arizona fescue, little bluestem, mountain muhly, California brome, big bluestem, sideoats grama
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 3 inches; very gravelly loam
BC1—3 to 11 inches; very gravelly sandy loam
BC2—11 to 15 inches; extremely gravelly sandy loam
2R—15 to 60 inches; bedrock

Minor Components
Laventana and similar soils
Composition: About 5 percent
Slope: 3 to 15 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: ponderosa forest

Mirand and similar soils
Composition: About 3 percent
Slope: 5 to 30 percent
Drainage class: Well drained
Ecological site: Pinus ponderosa/Quercus gambelii

Rock outcrop
Composition: About 2 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

504—Orejas-Guaje complex, 1 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 36
Elevation: 6,000 to 7,000 feet (1,829 to 2,134 meters)
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (8.9 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Map Unit Composition

Orejas and similar soils: 40 percent
Guaje and similar soils: 35 percent
Minor components: 25 percent

Component Descriptions

Orejas soils
Landscape: Uplands
Landform: Plateaus, mesas
Position on landform: Summits
Position on landform: Side slope
Parent material: Eolian material, slope alluvium and colluvium derived from basalt
Slope: 5 to 15 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 1.7 inches (very low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: Very high
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: twoneedle pinyon, oneseed juniper
Other plants: big sagebrush, blue grama, sideoats grama
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 2 inches; very cobbly loam
Bt—2 to 9 inches; very cobbly clay loam
C—9 to 17 inches; very gravelly clay loam
R—17 to 60 inches; bedrock

Guaje soils
Landscape: Uplands
Landform: Hills, volcanic cones
Position on landform: Backslopes
Position on landform: Side slope
Parent material: Eolian material and alluvium derived from volcanic rock
Slope: 1 to 8 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 20 percent subrounded gravel
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 3.1 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: About 20 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua gracilis
Potential native vegetation:
Common trees: oneseed juniper, twoneedle pinyon
Other plants: blue grama, galleta, sideoats grama, New Mexico Feathergrass, little bluestem, mountain muhly, pine dropseed, sand dropseed
Land capability subclass (nonirrigated): 6s

Typical Profile:
A—0 to 4 inches; gravelly sandy loam
Bw—4 to 12 inches; gravelly sandy loam
Bk1—12 to 17 inches; very gravelly sandy loam
Bk2—17 to 45 inches; extremely gravelly sandy loam
Bk3—45 to 60 inches; very gravelly sandy loam

Minor Components
Elpedro and similar soils
Composition: About 10 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Guaje, very cobbly and similar soils
Composition: About 10 percent
Slope: 1 to 8 percent
Drainage class: Well drained
Ecological site: pinyon-juniper forest

Orejas, steep and similar soils
Composition: About 5 percent
Slope: 15 to 40 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: pinyon-juniper forest

600—Rock outcrop-Cypher complex, 35 to 60 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 6,500 to 7,400 feet (1,981 to 2,256 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Rock outcrop: 50 percent
Cypher and similar soils: 35 percent
Minor components: 15 percent

Component Descriptions

Rock outcrop
Description: Rock outcrop consists of barren or nearly barren areas of bedrock as benches, ledges, and escarpments.
Landform: Mountain slopes, scarps
Aspect: East to west
Depth to restrictive feature: 0 inches to bedrock (lithic)
Land capability subclass (nonirrigated): 8s

Cypher soils
Landscape: Mountains
Landform: Mountain slopes, ridges
Position on landform: Backslopes, mountainflanks
Parent material: Colluvium and residuum weathered from tuff and/or colluvium and residuum weathered from rhyolite
Slope: 35 to 60 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 3 percent subrounded gravel
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 1.5 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Very high
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii

Potential native vegetation:
Common trees: ponderosa pine
Other plants: Arizona fescue, California brome, little bluestem, mountain muhly
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 4 inches; very cobbly loam
BC1—4 to 14 inches; very gravelly loam
BC2—14 to 16 inches; very gravelly loam
2R—16 to 60 inches; bedrock

Minor Components
Cypher and similar soils
Composition: About 5 percent
Slope: 15 to 35 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Pinus ponderosa/Quercus gambelii

Cajete and similar soils
Composition: About 5 percent
Slope: 8 to 30 percent
Drainage class: Well drained
Ecological site: Mountain Grassland

Laventana and similar soils
Composition: About 3 percent
Slope: 3 to 15 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Pinus ponderosa/Quercus gambelii

Rock outcrop
Composition: About 2 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

601—Laventana gravelly sandy loam, 3 to 15 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 7,400 to 7,600 feet (2,256 to 2,316 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Laventana and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Laventana soils
Landscape: Mountains
Landform: Pediments, mountain slopes
Position on landform: Footslopes
Position on landform: Mountainflank
Parent material: Colluvium derived from granite and/or colluvium derived from andesite
Slope: 3 to 15 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Deep
Depth to restrictive feature: 40 to 60 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 4.1 inches (low)
Shrink-swell potential: About 4.4 percent (moderate)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii
Potential native vegetation:
Common trees: ponderosa pine
Other plants: Gambel oak, mountain mahogany, bottlebrush squirreltail, prairie junegrass, sedge
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 5 inches; gravelly sandy loam
E—5 to 9 inches; very gravelly loam
Bt—9 to 50 inches; very gravelly sandy clay loam
2R—50 to 60 inches; bedrock

Minor Components
Mirand and similar soils
Composition: About 10 percent
Slope: 5 to 30 percent
Drainage class: Well drained
Ecological site: Pinus ponderosa/Quercus gambelii

Rock outcrop
Composition: About 5 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

603—Laventana-Mirand very cobbly loams, 15 to 55 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 7,000 to 8,900 feet (2,134 to 2,713 meters)

Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Laventana and similar soils: 50 percent
Mirand and similar soils: 35 percent
Minor components: 15 percent

Component Descriptions

Laventana soils
Landscape: Mountains
Landform: Pediments, mountain slopes
Position on landform: Footslopes
Position on landform: Mountainflank
Parent material: Colluvium derived from granite and/or colluvium derived from andesite
Slope: 20 to 55 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Deep
Depth to restrictive feature: 40 to 60 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 4.8 inches (low)
Shrink-swell potential: About 4.5 percent (moderate)
Runoff class: High
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii
Potential native vegetation:
Common trees: ponderosa pine
Other plants: Gambel oak, mountain mahogany, bottlebrush squirreltail, prairie junegrass, sedge
Land capability subclass (nonirrigated): 7c

Typical Profile:
Oi—0 to 1 inch; slightly decomposed plant material
A—1 inch to 5 inches; very cobbly loam
E—5 to 12 inches; gravelly silt loam
Bt1—12 to 20 inches; very cobbly loam
Bt2—20 to 31 inches; very gravelly loam
Bt3—31 to 51 inches; very gravelly loam
2R—51 to 60 inches; bedrock

Mirand soils
Landscape: Mountains
Landform: Mountain slopes
Position on landform: Toeslopes
Position on landform: Mountainflank
Parent material: Colluvium derived from rhyolite and/or colluvium derived from tuff

Slope: 15 to 25 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 8.0 inches (moderate)
Shrink-swell potential: About 7.4 percent (high)
Runoff class: Very high
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii
Potential native vegetation:
Common trees: ponderosa pine
Other plants: Arizona fescue, mountain muhly, prairie junegrass, California brome, Gambel oak, bottlebrush squirreltail, muttongrass, pine dropseed
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 6 inches; very cobbly loam
Bt1—6 to 27 inches; cobbly clay
Bt2—27 to 60 inches; sandy clay

Minor Components
Cypher and similar soils
Composition: About 5 percent
Slope: 15 to 35 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Pinus ponderosa/Quercus gambelii

Cajete and similar soils
Composition: About 5 percent
Slope: 8 to 30 percent
Drainage class: Well drained
Ecological site: Mountain Grassland

Rock outcrop
Composition: About 3 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Totavi and similar soils
Composition: About 2 percent
Slope: 0 to 5 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Pinus ponderosa-Juniperus deppeana/Quercus gambelii

604—Cypher-Mirand complex, 15 to 55 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 6,900 to 9,000 feet (2,103 to 2,743 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Cypher and similar soils: 55 percent
Mirand and similar soils: 30 percent
Minor components: 15 percent

Component Descriptions

Cypher soils
Landscape: Mountains
Landform: Mountain slopes, ridges
Position on landform: Summits
Position on landform: Mountainflank
Parent material: Colluvium derived from tuff over residuum weathered from rhyolite
Slope: 15 to 35 percent
Aspect: East to west
Shape (down/across): Linear/linear
Surface fragments: About 10 percent subrounded gravel
Depth class: Shallow
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 1.5 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: High
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii
Potential native vegetation:
Common trees: ponderosa pine
Other plants: Arizona fescue, little bluestem, mountain muhly, California brome, big bluestem, sideoats grama
Land capability subclass (nonirrigated): 7c

Typical Profile:
Oi—0 to 1 inch; slightly decomposed plant material
A—1 inch to 4 inches; very gravelly loam
BCw—4 to 11 inches; very gravelly loam
C—11 to 19 inches; extremely gravelly sandy loam
2R—19 to 60 inches; bedrock

Mirand soils
Landscape: Mountains
Landform: Mountain slopes

Position on landform: Toeslopes
Position on landform: Mountainflank
Parent material: Colluvium derived from rhyolite and/or colluvium derived from tuff
Slope: 15 to 55 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Well drained
Slowest permeability: .06 to 0.2 in./hr. (slow)
Available water capacity: About 6.4 inches (moderate)
Shrink-swell potential: About 7.5 percent (high)
Runoff class: High
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii
Potential native vegetation:
Common trees: ponderosa pine
Other plants: Arizona fescue, mountain muhly, California brome, Gambel oak, bottlebrush squirreltail, muttongrass, pine dropseed, prairie junegrass
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 4 inches; very cobbly loam
Bt—4 to 60 inches; cobbly clay

Minor Components
Alanos and similar soils
Composition: About 5 percent
Slope: 20 to 40 percent
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

Laventana and similar soils
Composition: About 5 percent
Slope: 3 to 15 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (lithic)
Drainage class: Well drained
Ecological site: Pinus ponderosa/Quercus gambelii

Rock outcrop
Composition: About 3 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

Totavi and similar soils
Composition: About 2 percent
Slope: 0 to 5 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Pinus ponderosa-Juniperus deppeana/Quercus gambelii

608—Osha association, 3 to 55 percent slopes

Map Unit Setting

Major Land Resource Area: 48A
Elevation: 8,500 to 9,000 feet (2,591 to 2,743 meters)
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Map Unit Composition

Osha, steep and similar soils: 60 percent
Osha and similar soils: 30 percent
Minor components: 10 percent

Component Descriptions

Osha, steep soils
Landscape: Mountains
Landform: Mountain slopes, ridges
Position on landform: Backslopes
Position on landform: Mountainflank
Parent material: Colluvium over residuum weathered from granite
Slope: 35 to 55 percent
Aspect: East to west
Shape (down/across): Linear/linear
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 1.8 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Medium
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii
Potential native vegetation:
Common trees: ponderosa pine
Other plants: Arizona fescue, pine dropseed, prairie junegrass, Gambel oak, New Mexico locust, bluegrass, mountain muhly
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 3 inches; gravelly coarse sandy loam
AB—3 to 8 inches; gravelly coarse sandy loam
Bw—8 to 16 inches; gravelly coarse sandy loam
Ct1—16 to 32 inches; extremely gravelly coarse sandy loam
Ct2—32 to 60 inches; extremely gravelly loamy coarse sand

Osha soils
Landscape: Mountains
Landform: Ridges, mountain slopes
Position on landform: Shoulders
Position on landform: Mountainflank

Parent material: Colluvium and residuum weathered from granite
Slope: 3 to 35 percent
Aspect: East to west
Shape (down/across): Convex/linear
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 2.2 inches (very low)
Shrink-swell potential: About 1.5 percent (low)
Runoff class: Low
Calcium carbonate maximum: None
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 0 (nonsodic)
Ecological site: Pinus ponderosa/Quercus gambelii
Potential native vegetation:
Common trees: ponderosa pine
Other plants: Arizona fescue, Gambel oak, New Mexico locust, bluegrass, grouse whortleberry, mountain muhly, pine dropseed, prairie junegrass
Land capability subclass (nonirrigated): 7c

Typical Profile:
AB—0 to 8 inches; gravelly coarse sandy loam
Bw—8 to 16 inches; gravelly coarse sandy loam
Ct1—16 to 32 inches; extremely gravelly coarse sandy loam
Ct2—32 to 60 inches; extremely gravelly loamy coarse sand

Minor Components
Palon and similar soils
Composition: About 8 percent
Slope: 15 to 35 percent
Drainage class: Well drained
Ecological site: Pseudotsuga menziesii-Pinus ponderosa/Muhlenbergia

Rock outcrop
Composition: About 2 percent
Depth to restrictive feature: 0 inches to bedrock (lithic)

823—Gilco loam, 1 to 4 percent slopes, unprotected

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Gilco, unprotected and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Gilco, unprotected soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 1 to 4 percent
Aspect: East to west
Shape (down/across): Concave/linear
Surface fragments: About 12 percent subrounded medium and coarse gravel
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 9.4 inches (high)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation:
Common trees: Rio Grande cottonwood
Other plants: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 4e
Land capability subclass (nonirrigated): 7e

Typical Profile:
Ap—0 to 8 inches; loam
C—8 to 60 inches; stratified fine sandy loam to loam to silt loam

Minor Components
Jocity and similar soils
Composition: About 6 percent
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Aga and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Peralta and similar soils
Composition: About 2 percent
Slope: 1 to 3 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

Trail and similar soils
Composition: About 2 percent
Slope: 1 to 3 percent
Drainage class: Somewhat excessively drained
Flooding hazard: Rare
Ecological site: Bottomland

827—Aga loam, 1 to 3 percent slopes, unprotected

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Aga, unprotected and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Aga, unprotected soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 7.6 inches (moderate)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 42 to 60 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation: giant sacaton, alkali sacaton, fourwing saltbush
Land capability subclass (irrigated): 2e
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 8 inches; loam
C1—8 to 28 inches; loam
2C2—28 to 60 inches; loamy fine sand

Minor Components
Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Jocity and similar soils
Composition: About 3 percent
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Riverwash
Composition: About 3 percent
Landscape: Valleys
Landform: Channels, streams
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 1 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Peralta and similar soils
Composition: About 2 percent
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

Trail and similar soils
Composition: About 2 percent
Slope: 0 to 1 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Bottomland

830—Trail loam, 1 to 3 percent slopes, unprotected

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.7 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Trail, unprotected and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Trail, unprotected soils
Landscape: Valleys
Landform: Valley floor remnants, alluvial fans, channels, flood plains
Position on landform: Toeslopes
Position on landform: Base slope, rise
Parent material: Eolian deposits over stream alluvium derived from sandstone
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Linear, concave/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 2.0 to 6.0 in./hr. (moderately rapid)
Available water capacity: About 5.4 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Very low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 4 mmhos/cm (very slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland
Potential native vegetation: alkali sacaton, giant sacaton, fourwing saltbush
Land capability subclass (irrigated): 4e
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 8 inches; loam
C—8 to 60 inches; stratified loamy sand to sand to sandy loam

Minor Components
Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Aga and similar soils
Composition: About 5 percent
Slope: 1 to 3 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Riverwash
Composition: About 3 percent
Landscape: Valleys
Landform: Channels, streams
Position on landform: Toeslopes, base slopes
Slope: 0 to 1 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Peralta and similar soils
Composition: About 2 percent
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

831—Trail loamy sand, 1 to 3 percent slopes, unprotected

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Trail, unprotected and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Trail, unprotected soils
Landscape: Valleys
Landform: Alluvial fans, channels, flood plains, valley floor remnants
Position on landform: Toeslopes
Position on landform: Rise, base slope
Parent material: Eolian deposits over stream alluvium derived from sandstone
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Concave, linear/linear
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability: 6.0 to 20 in./hr. (rapid)
Available water capacity: About 3.3 inches (low)
Shrink-swell potential: About 1.5 percent (low)
Flooding hazard: Rare
Seasonal high water table depth: About 48 to 72 inches
Runoff class: Very low
Calcium carbonate maximum: About 5 percent
Gypsum maximum: None
Salinity maximum: About 2 mmhos/cm (nonsaline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland

Potential native vegetation: alkali sacaton, giant sacaton, fourwing saltbush
Land capability subclass (irrigated): 4s
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 10 inches; loamy sand
C1—10 to 30 inches; loamy sand
C2—30 to 60 inches; stratified sand to gravelly sand to sandy loam

Minor Components
Aga and similar soils
Composition: About 5 percent
Slope: 1 to 3 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Riverwash
Composition: About 3 percent
Landscape: Valleys
Landform: Streams, channels
Position on landform: Toeslopes, base slopes
Slope: 0 to 1 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Peralta and similar soils
Composition: About 2 percent
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Flooding hazard: Rare
Ecological site: Bottomland

835—Peralta loam, 1 to 3 percent slopes, unprotected

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Peralta, unprotected, and similar soils: 85 percent
Minor components: 15 percent

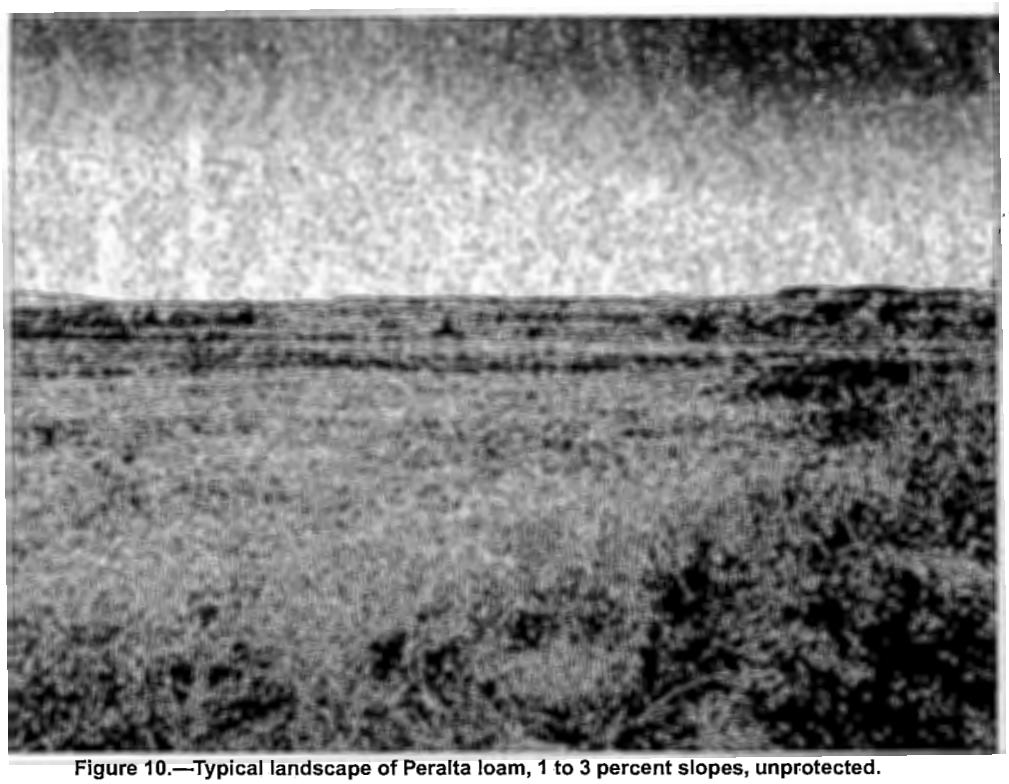


Figure 10.—Typical landscape of Peralta loam, 1 to 3 percent slopes, unprotected.

Component Descriptions

Peralta, unprotected soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 1 to 3 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability: 0.6 to 2.0 in./hr. (moderate)
Available water capacity: About 9.2 inches (high)
Shrink-swell potential: About 3.8 percent (moderate)
Flooding hazard: Occasional
Seasonal high water table depth: About 24 to 36 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 8 mmhos/cm (slightly saline)
Sodium adsorption ratio maximum: About 5 (slightly sodic)
Ecological site: Bottomland

Potential native vegetation:
Common trees: Rio Grande cottonwood
Other plants: giant sacaton, alkali sacaton, fourwing saltbush, willow
Land capability subclass (nonirrigated): 7c

Typical Profile:
A—0 to 6 inches; loam
C—6 to 16 inches; loam
C—16 to 60 inches; stratified sandy loam to clay loam

Minor Components
Gilco and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Aga and similar soils
Composition: About 5 percent
Slope: 1 to 3 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Riverwash
Composition: About 3 percent
Landscape: Valleys
Landform: Channels, streams
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 1 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

Trail and similar soils
Composition: About 2 percent
Slope: 0 to 1 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Bottomland

842—Peralta clay loam, moderately saline, sodic, 0 to 2 percent slopes, unprotected

Map Unit Setting

Major Land Resource Area: 42
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Map Unit Composition

Peralta, moderately saline, sodic, unprotected and similar soils: 85 percent
Minor components: 15 percent

Component Descriptions

Peralta, moderately saline, sodic, unprotected soils
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes
Position on landform: Base slope
Parent material: Stream alluvium derived from igneous and sedimentary rock
Slope: 0 to 2 percent
Aspect: East to west
Shape (down/across): Concave/linear
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability: 0.2 to 0.6 in./hr. (moderately slow)
Available water capacity: About 9.4 inches (high)
Shrink-swell potential: About 4.5 percent (moderate)
Flooding hazard: Rare
Seasonal high water table depth: About 24 to 36 inches
Runoff class: Low
Calcium carbonate maximum: About 10 percent
Gypsum maximum: None
Salinity maximum: About 16 mmhos/cm (moderately saline)
Sodium adsorption ratio maximum: About 30 (strongly sodic)
Ecological site: Salty Bottomland
Potential native vegetation: alkali sacaton, fourwing saltbush, giant sacaton, inland saltgrass, greasewood
Land capability subclass (irrigated): 4s
Land capability subclass (nonirrigated): 7s

Typical Profile:
A—0 to 10 inches; clay loam
C—10 to 60 inches; stratified sandy clay loam to sandy loam to clay loam

Minor Components
Trail and similar soils
Composition: About 5 percent
Slope: 0 to 1 percent
Drainage class: Well drained
Flooding hazard: Rare
Ecological site: Bottomland

Jocity and similar soils
Composition: About 5 percent
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Flooding hazard: Rare
Ecological site: Bottomland

Riverwash
Composition: About 5 percent
Landscape: Valleys
Landform: Channels, streams
Position on landform: Toeslopes
Position on landform: Base slope
Slope: 0 to 1 percent
Shape (down/across): Concave/linear
Drainage class: Somewhat poorly drained
Flooding hazard: Frequent

850—Water

Map Unit Setting

Major Land Resource Area: 36

Map Unit Composition

Water: 95 percent
Minor components: 5 percent

Component Descriptions

Water
Aspect: East to west

Minor Components
Typic Torrifluvents and similar soils
Composition: About 5 percent
Landscape: Valleys
Landform: Flood plains
Position on landform: Toeslopes, base slopes
Slope: 0 to 1 percent
Aspect: East to west
Shape (down/across): Concave/linear
Drainage class: Moderately well drained
Flooding hazard: Frequent

DAM—Dam

Map Unit Setting

Major Land Resource Area: 36

Map Unit Composition

Dam: 100 percent

Component Descriptions

Dam

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, slightly limited, somewhat limited,* and *very limited.* The suitability ratings are expressed as *well suited, moderately well suited, poorly suited,* and *unsuited* or as *good, fair,* and *poor.*

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact

on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops, hay, and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil in the section *Detailed Soil Map Units*. Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Cropland in the survey area comprises about 16,000 acres. The major concerns are a moderate hazard of soil blowing, moderate to low available water capacity, slow water intake rate, and seasonal high water tables.

Soil blowing is best controlled by cropping systems that keep the soil covered during the spring season. Low available water capacity can be overcome by method of irrigation, more frequent light irrigations, and crop selection. Slow water intake rates can be overcome by frequent, light applications after a deep early irrigation. High water tables can be overcome by drainage, crop selection, and irrigation water management.

Fertilization

All crops generally respond favorably to applications of nitrogen fertilizer. On sandy soils or on soils that have regularly received heavy applications of nitrogen and phosphorus, potassium may be needed. On cropland areas, soils should be tested at least every other year to determine present nutrient levels. Due to the high pH (8.0 - 8.5) of most of the soils in the area, some trace elements such as iron and zinc may become limiting. Lowering the pH by applying sulfur allows the trace elements to become available, as well as allowing for more efficient uptake of the major nutrients.

All of the soils in the area have low contents of organic matter. Use of barnyard manure, growing green manure crops that are plowed under, or returning large amounts of crop residues to the soil are beneficial practices. Care should be taken to avoid a buildup of salts when large amounts of manure are used.

Irrigation

All of the cropland in Sandoval County is irrigated. For the most part, water is supplied from the Rio Grande and the Jemez River. *Irrigation water management* is controlling the application of irrigation water in such a way that good crop growth is obtained without wasting water or causing soil erosion.

To irrigate properly, the farmer should know the amount of water the soil will hold, the depth to which plant roots penetrate, and the water requirements of the crop. Most crops should be irrigated when 40 to 50 percent of the available soil moisture has been depleted. A soil probe, auger, or even a shovel can be used to determine the moisture content of the root zone. The most visible symptoms of moisture stress are wilting leaves or leaves that take on a bluish cast. More drought-tolerant plants just exhibit a slow rate of growth. A check of the soil profile should be made about 48 hours after irrigation to determine whether the water reached the desired depth and whether it was applied uniformly. This simple check can reveal many problems of which the producer would not otherwise be aware.

The furrow and border methods are the two primary irrigation methods used in the survey area. The *border* method, which consists of surface flooding between low dikes on leveled land, is most widely used for alfalfa, pastures, and small grain. The *furrow* method, consisting of deeper, large furrows between the rows, is used for row crops.

If water is applied too rapidly on clayey soils such as the Sparham series in the survey area, it runs off or ponds at the lower end of the field. (Alfalfa is easily drowned.) If water is applied too slowly on sandy soils such as the Trail series, it penetrates below the root zone and is lost to plant use. A properly designed irrigation system matches the soil characteristics with the amount of water applied. Concrete-lined ditches and pipelines also are used to help conserve water.

Tillage

Most irrigated soils in this survey area have weak structure or poor tilth. Tillage performed when the soil is wet breaks down the soil structure and compacts the soil, resulting in restricted movement of air and water into the root zone. When farm equipment is driven over wet soil, a compacted layer (usually called a *plowpan*), commonly develops several inches below the surface due to the weight of the equipment. This one- to two-inch thick, tightly compressed layer restricts water intake and is often so dense that plant roots have difficulty penetrating it.

Tillage should be performed at varying depths, and only when the soil is dry, to prevent formation of a plowpan. The effect of such a pan can be corrected by chiseling or subsoiling and by growing deep-rooted crops such as alfalfa. Using a grass crop in a long-term rotation also helps to eliminate such restrictive layers. The practice of minimum tillage limits the number of trips over the field to only those that are essential, and this prevents soil damage. Growing "green manure crops," which are crops that are plowed under, is also very beneficial to these soils. Both of these practices can improve soil tilth, improve the water intake rate, and improve the soil structure. Minimum tillage also lowers operating costs.

Conservation Cropping

A *conservation cropping sequence* is the growing of crops with the needed cultural and management measures to maintain or improve soil tilth. The conservation cropping sequence should also help to control erosion. Cropping systems include rotations that contain grasses and legumes, as well as rotations that provide benefits without these crops. In this survey area, a simple crop sequence usually is used. The sequence is influenced by the needs and choices of the operator.

Use of Crop Residue

To maintain good crop yields, it is essential to incorporate crop residues into the soil. Stubble from small grains and other crop residues are important sources of organic matter. When residues are incorporated into the soil, soil microorganisms decompose them. This process of decomposition improves the soil structure, which, in turn, improves water intake and increases soil aeration. The organisms also release plant nutrients from the material they are breaking down, and the nutrients again become available to the growing crop.

Alfalfa Production

Alfalfa produces well in the Rio Grande and Jemez Valleys. Alfalfa stands with a density of less than 4 to 5 plants per square foot generally are not profitable and are grassy and weedy. Such stands should be rotated out of alfalfa for 1 to 2 years before replanting to alfalfa. Alfalfa roots produce a chemical that kills alfalfa seedlings and takes at least a year to dissipate. Consequently, at least one other crop should be

grown in the field prior to replanting alfalfa to prevent this early thinning due to the toxin in the soil.

Considerations when planting alfalfa are: 1) avoid soils that have a fluctuating high water table; 2) select the best adapted varieties; 3) prepare a good seedbed; 4) incorporate phosphorus fertilizer before planting; 5) control weeds (fall seedings have fewer weed problems); 6) use correct seeding rate (rates vary depending on variety and seeding method); 7) do not use a companion crop unless needed to prevent soil blowing; and 8) control insects at the proper time.

After a good stand is established, maintain the stand by cutting at about 1/10 bloom. This is a compromise that provides good quality and quantity without damaging the stand.

Yields per Acre

The average irrigated yields per acre that can be expected of the principal crops under a high level of management are shown in Table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in Table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

The *productivity index* is a relative rating of the capacity of a soil to produce a specific plant under a defined management system. The index is determined from yield data on a few benchmark soils and is used to calculate yields, the net returns from crops, land assessment values, and taxes and to perform risk analysis when land management decisions are made.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include

possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

Land capability classifications for the individual soils in this survey can be found in the section *Detailed Soil Map Units*.

In the capability system, soils are generally grouped at two levels—capability class and subclass.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

Prime Farmland and Farmland of Statewide and Local Importance

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops

when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slopes generally range from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service There is no farmland in the survey that meets the criteria for prime farmland without supplemental irrigation. Statewide important farmlands are those having an irrigated land capability class of IV or better and are irrigated with a supply of irrigation water that will meet crop needs throughout the growing season.

In some local areas there is a need for certain additional farmlands for the production of food, feed, fiber, and forage, even though these lands are not identified as having national or statewide importance. Where appropriate, these lands are to be identified by the local agency or agencies concerned. In places, additional farmlands of local importance may include tracts of land that have been designated for agriculture by local ordinance.

The map units in the survey area that are considered prime farmland when irrigated listed in Table 6. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described in the section *Detailed Soil Map Units*.

Rangeland

By George Chavez, State Rangeland Management Specialist, Natural Resource Conservation Service

Rangeland is land on which the historic climax plant community is predominantly grasses, grasslike plants, forbs, or shrubs. In areas that have similar climate and topography, the kind and amount of vegetation produced on rangeland is closely related to the kind of soil. Effective management is based on knowledge about the relationship among the soils, vegetation, and water.

The *historic climax plant community* is the association of plants that are best adapted to a unique combination of environmental factors. Even on the same soil, the proportion of these plants varies from place to place and from year to year. The dominant plant or plants are used to characterize the plant community because of their relative stability in areas where abnormal disturbance or deterioration has not occurred. The grasses, forbs and shrubs that characterize the potential natural plant community on each major soil are listed by common name.

Once the plant community has been characterized for each soil, similar plant communities are grouped into ecological sites. An *ecological site* is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.

Soil properties that have the greatest influence on the productivity of range plants are those that affect the availability of moisture and plant nutrients. Other soil properties such as soil reaction, salt content, and the presence or absence of a high water table during any period of the year, are also important factors in differentiating ecological sites.

Ecological site descriptions can be used to identify the proportions of the total annual production of each plant. Detailed information on the ecological sites in this

survey area is available in the local office of the Natural Resource Conservation Service.

About 55 percent of the survey area is rangeland that supports grasses, forbs, and shrubs suitable for grazing. Yearlong cow and calf operations are the dominant ranch enterprise, but many cattle and sheep ranches and yearling operations are in the area. The livestock produced on these ranches provide the principal agricultural income in the area.

Management of grazing to increase ground cover improves the vigor and reproduction of the more productive grasses and shrubs. Continuous yearlong grazing or grazing the same pasture during the growing season every year may result in the deterioration of the plant community, reducing its value for livestock grazing, watershed, wildlife habitat, and erosion control.

A proper degree of grazing use combined with deferred grazing or prescribed grazing that varies the season of grazing is needed to maintain a healthy, balanced plant community. This practice will also result in high quality forage throughout the year. Periodic rest during different seasons of the year benefits different plants. Rest in summer encourages the production and reproduction of warm-season grasses such as sideoats grama, black grama, galleta, and blue grama. Rest in spring or fall, or both, is beneficial to the cool-season grasses such as western wheatgrass, New Mexico feathergrass, and bottlebrush squirreltail. Rest during fall and winter months benefits shrubs such as fourwing saltbush and winterfat.

Flexibility in livestock and wildlife numbers and in the frequency and intensity of grazing is essential to the success of any grazing program. Effective livestock distribution is accomplished by the proper use of fences, livestock water developments, and salt for livestock.

The major management concern on most rangeland is to control the time and intensity of grazing so that the kinds and amounts of plants that make up the desired plant community may be maintained or reestablished. Forage production often is less than half of the potential because the natural vegetation in many parts of the county has been greatly depleted due to drought, infrequent beneficial wildfires, or continuous and excessive use. Brush, weeds, and cacti have increased or invaded on much of the rangeland, causing further depletion of the grass cover. Soil erosion generally occurs when the soils are not adequately covered.

In many areas where the landscape is broken by mesas, or where pastures are large, the distribution of grazing by livestock generally is poor. Poor distribution of livestock grazing results in areas that are underused and areas that are excessively used. This in turn results in loss of cover, invasion of undesirable plants, and accelerated erosion. Prescribed grazing that improves grazing distribution and proper grazing use is a management concern that may be facilitated by the installation of fencing and additional water. Manipulating or reducing undesirable brush species and minimizing soil erosion are other management concerns.

Table 7 shows, for each soil that supports vegetation suitable for grazing, the ecological site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. An explanation of the column headings in Table 7 follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in

total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service.

Total dry-weight production is the amount of vegetation that can be expected to grow annually in a well managed area that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *rangeland composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in the "National Range and Pasture Handbook," which is available in local offices of the Natural Resources Conservation Service.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Forest Productivity

The tables in this section can help forest owners or managers plan the use of soils for wood crops. They show the potential productivity of the soils for wood crops and rate the soils according to the limitations that affect various aspects of forest management.

Forest Productivity

In Table 8, the *potential productivity* of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. *Commonly grown trees* are those that forest managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site

index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Recreation

The soils of the survey area are rated in Tables 9A and 9B according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in Tables 9A and 9B can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas.

The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The

soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Wildlife Habitat

The six general areas containing wildlife habitat in the Sandoval County Area are discussed in the following paragraphs.

Plateaus, mesas, and *terraces* contain soils that have grasslands and pinyon-juniper forests on the gently undulating to steep slopes. Grasses and shrubs grow on soils ranging from very shallow to very deep.

The summits of plateaus and mesas support pinyon-juniper forests. Elevations range from 6,800 to 7,800 feet. A variety of wildlife utilizes these areas, some of which include gray squirrels, cottontail rabbits, prairie rattlesnakes, and pinyon jays.

Fan remnants and stream terraces form near valleys and mountains. These upland sites are home to badger, stripped skunk, prairie dogs, prairie rattlesnakes, black-tailed jackrabbit, and hawks. Antelope could be reintroduced in the northern half of the survey if given protection until established. Badgers and other burrowing animals make extensive use of areas of coarse and moderately coarse textured soils.

Mountains occur in the northeastern portion of the survey area north of Bernalillo. The Jemez Mountains contain some of the most important wildlife habitat in the survey area. Woodlands of ponderosa pine, Douglas-fir, pinyon, juniper, and Gambel oak, provide habitat for turkey, mule deer, Elk, black bear, porcupine, cottontail rabbits, gray squirrel, band-tailed pigeons, owls, hawks, prairie rattlesnakes, and songbirds.

Open grassy valleys are home to prairie dogs. The Long tailed weasel also occurs in these areas. Local wetlands are important for many birds, waterfowl, and local mammals. Steep slopes and variable topography also play important roles in wildlife habitat.

River and stream valleys occur along such streams as the Rio Grande, Rio Puerco, and Jemez River. They contain riparian vegetation and water for wildlife use. These areas are used by all local wildlife for some part of their needs.

Songbirds nest in cottonwood and willow trees in large numbers. Cavity nesting birds find many nest sites in holes within large cottonwood trees. Quail use the thick vegetation for cover and seed sources. The abundant prey species attract many predators such as coyote, hawks, prairie rattlesnakes, and bobcat. Mule deer may spend their whole lives in these river bottoms.

The potential for competition between livestock and wildlife is high. The plant communities in these riparian areas must be maintained in good condition to provide wildlife habitat, flood protection, water quality, and soil erosion control.

Wetlands are areas containing hydrophytic vegetation, hydric soils, and wetland hydrology. Marshes are wetlands dominated by grasses and grass-like plants, and they occur in few areas of the survey area. Some are in channels of the Rio Grande, Rio Puerco, and Jemez River valleys and are produced by ground water. Other small marshes are man-induced and formed by irrigation impoundments.

All of these wetlands are used extensively by a large variety of wildlife species. Predators and prey species alike gather at these oases in an otherwise dry landscape.

Wetlands provide natural protection from flooding, enhance water quality, furnish habitat for wildlife, and conserve water. Wetlands need protection from excessive grazing, drainage projects, and poorly planned urban development.

Breaks are the steep, broken lands on the escarpments of mesas and plateaus. Breaks are very eroded and dissected, with many small ridges and gullies. Vegetation grows on the soils occurring in breaks, but not in large amounts. Although annual production of air-dry vegetation is generally low, plant diversity is high. This botanic diversity along with the physical cover provided by the terrain provides an attractive habitat for wildlife. Mule deer hide in breaks and feed on browse plants such as true mountainmahogany. Coyote and red fox find cover in the intricate, rocky landscapes. Trees growing on breaks of higher elevation provide nest sites and hunting perches for raptors such as the red-tailed hawk.

Rock outcrops furnish wildlife habitat when they occur as cliffs below rims of plateaus, mesas, and canyons. Although little or no vegetation grows on rock outcrops, they are still important to many species. Eagles, hawks, turkey vultures, owls, diamondback rattlers, and swallows utilize cliffs and ledges. Migratory bats seasonally roost in cracks and caves. Foxes, bobcats, bear, and cougars have dens in alcoves and caves.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the *Soil Properties* section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the *Glossary*.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 10A and 10B show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building

site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

Tables 11A and 11B show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level

floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can

contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Construction Materials

Tables 12A and 12B give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

The soils are rated *good, fair,* or *poor* as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

The soils are rated as a *probable* or *improbable* source of sand and gravel. A rating of *probable* means that the source material is likely to be in or below the soil. The numerical ratings in these columns indicate the degree of probability. The number 0.00 indicates that the soil is an improbable source. A number between 0.00 and 1.00 indicates the degree to which the soil is a probable source of sand or gravel.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In Table 12A, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the lowest layer of the soil contains sand or gravel, the soil is rated as a probable source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water

capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In the table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

Table 13 also gives, for each soil, the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill.

The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, a cemented pan, or other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

Table 14 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the *Glossary.*

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1998) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1998).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages

are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

Table 15 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In Table 15, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In Table 15, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In Table 15, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential,

available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In Table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in Table 15 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 16 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Soil Features

Table 17 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 18 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 18 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 18 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare,

rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Classification of the Soils

Soils are classified so that we can more easily remember significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their responses to manipulation. Through classification and then the use of soil maps, we can apply our knowledge of soils to specific areas.

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1998 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Aridisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Argid (*Arg*, meaning presence of argillic horizon, plus *id*, from Aridisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplargids (*Hapl*, meaning minimal horizonation, plus *argid*, the suborder of the Aridisols that has a argillic horizon).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplargids.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, , mesic Typic Haplargids.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The Grieta series is an example of a fine-loamy, mixed, mesic Typic Haplargid.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1975,). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The classifications given in Table 19 are those of the classifications at the time of correlation of this survey (1987).

Aga Series

Map units: 22, 27, 426, 427, 428, 827
Depth class: very deep
Drainage class: moderately well drained
Landform: flood plains
Parent material: stream alluvium derived from mixed sources
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Slope: 0 to 3 percent
Climatic data:
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Taxonomic class: Coarse-loamy over sandy or sandy-skeletal, mixed, calcareous, mesic Typic Torrifluvents

Typical Pedon

Aga loam, in an area of mapping unit 27, Aga loam, 0 to 1 percent slopes; Sandoval County; Santo Domingo Pueblo Quadrangle, unsectionized state plane coordinates N. 1,659,900 feet and E. 471,850 feet. NAD 83, UTM 13—03 78 346 E—39 35 898 N.

A—0 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; many fine and very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

C1—10 to 23 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

2C2—23 to 43 inches; light yellowish brown (10YR 6/4) sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; few fine and very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

2C3—43 to 60 inches; very pale brown (10YR 7/4) sand, light yellowish brown (10YR 6/4) moist; single grain; loose, nonsticky and nonplastic; 10 percent gravel; slightly effervescent; moderately alkaline.

Range in Characteristics

A horizon
Texture: loam or silty clay loam

C horizon
Texture: very fine sandy loam

2C horizon
Hue: 10YR or 7.5YR
Value: 5 to 7 when dry, and 4 to 6 when moist
Chroma: 3 or 4
Texture: sand, loamy sand, gravelly sand, or loamy fine sand
Salinity: from less than 2 to 16 mmhos/cm.

Note: The water table ranges from 4 to 6 feet.

Alanos Series

Map units: 283, 290
Depth class: very deep
Drainage class: well drained
Landform: mountain slopes and hillsides
Parent material: slope alluvium and colluvium derived from tuff and rhyolite
Elevation: 7,800 to 9,500 feet (2,377 to 2,896 meters)
Slope: 5 to 40 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Clayey-skeletal, mixed Typic Eutroboralfs

Typical Pedon

Alanos loam, in an area of mapping unit 290, Alanos-Rock outcrop complex, 20 to 40 percent slopes; Los Alamos County; Frijoles Quadrangle. NAD 83, UTM 13—03 78 360 E—39 67 869 N.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many fine and medium roots; 10 percent gravel; neutral; abrupt smooth boundary.

E—4 to 9 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few fine vesicular pores; 10 percent gravel; neutral; abrupt smooth boundary.

BE—9 to 18 inches; pinkish gray (7.5YR 7/2) and reddish brown (5YR 5/4) very gravelly loam, brown (7.5YR 5/2) and reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common very fine roots; common fine black (5YR 2/1) iron and manganese concretions; 55 percent gravel; medium acid; clear smooth boundary.

Bt1—18 to 26 inches; reddish brown (5YR 5/4) extremely gravelly clay, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; hard, firm, sticky and plastic; few fine roots; few fine tubular pores; common fine black (5YR 2/1) iron and manganese concretions; common thin clay films in pores and on gravel; 20 percent cobbles and 55 percent gravel; medium acid; clear smooth boundary.

Bt2—26 to 60 inches; brown (7.5YR 5/4) extremely gravelly clay, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; few fine tubular pores; few thin clay films in pores and on gravel; 20 percent cobbles and 55 percent gravel; medium acid.

Range in Characteristics

Particle-size control section: 35 to 55 percent clay
Other features: Some pedons are slightly alkaline in the lower subhorizons.

A horizon
Hue: 7.5YR or 10YR
Value: 5 or 6 dry, 3 to 5 moist
Chroma: 2 or 3
Texture: loam or cobbly loam

E horizon
Hue: 7.5YR or 10YR
Value: 6 or 7 dry, 4 or 5 moist
Chroma: 2 to 4
Texture: loam, gravelly loam, or cobbly loam

Bt horizon
Hue: 7.5YR or 10YR
Value: 5 to 7 dry, 3 to 6 moist
Chroma: 2 to 6
Texture: extremely gravelly clay loam, extremely gravelly clay, or very gravelly clay
Concretions: fine or medium iron and manganese concretions are in the upper part of the Bt horizon.

Note: C horizons are below 38 inches in some pedons.

Atarque Series

Map units: 324, 396
Depth class: very shallow to shallow
Drainage class: well drained
Landform: breaks; dipslopes of cuestas, hills, mesas, and ridges
Parent material: slope alluvium derived from sandstone and shale
Elevation: 5,700 to 6,600 feet (1,737 to 2,012 meters)
Slope: 5 to 45 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Loamy, mixed, mesic Lithic Haplustalfs

Typical Pedon

Atarque sandy loam, in an area of mapping unit 324, Rock outcrop-Atarque-Menefee complex, 5 to 25 percent slopes; Sandoval County; Ponderosa Quadrangle; about 2 miles northeast of the Jemez Pueblo; 200 feet south and 1,400 feet east of the northwest corner of sec. 11, T 16 N, R 2 E. NAD 27; UTM 13—03 45 805 E—39 44 974 N.

A—0 to 3 inches; light brown (7.5YR 6/4) sandy loam, dark brown (7.5YR 4/4) moist; moderate very thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots; neutral; clear smooth boundary.
Bt—3 to 9 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; many thin clay films on faces of peds and lining pores; neutral; clear smooth boundary.

Btk—9 to 14 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; weak moderate subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; many very fine tubular pores; common thin clay films on faces of peds and lining pores; violently effervescent; common fine irregular shaped soft masses of calcium carbonate; slightly alkaline.
R—14 inches; sandstone bedrock.

Range in Characteristics

A horizon
Hue: 10YR to 5YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 2 to 6
Texture: sandy loam or extremely gravelly sandy loam

B horizons
Hue: 10YR to 5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 to 6
Texture: sandy clay loam or clay loam

Note: Depth to bedrock: 6 to 20 inches

Bamac Series

Map units: 300, 319, 345, 346
Depth class: very deep
Drainage class: excessively drained
Landform: alluvial fans, fan remnants, fan terraces, hills, and ridges
Parent material: slope and fan alluvium derived from mixed sources
Elevation: 5,400 to 6,900 feet (1,646 to 2,103 meters)
Slope: 1 to 55 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Sandy-skeletal, mixed, mesic Typic Ustorthents

Typical Pedon

Bamac very gravelly loamy sand, in an area of mapping unit 319, Bamac-Rock outcrop complex, 15 to 55 percent slopes; Sandoval County; Santo Domingo Pueblo SW Quadrangle; about 2.5 miles southwest of the Cochiti Pueblo; 2,550 feet east and 100 feet south of the northwest corner of sec. 26, T. 16 N., R. 5 E. NAD 83, UTM 13—03 74 829 E—39 39 774 N.

A—0 to 4 inches; light yellowish brown (10YR 6/4) very gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots; 55 percent gravel; slightly effervescent; moderately alkaline; clear smooth boundary.
AC—4 to 10 inches; light yellowish brown (10YR 6/4) loamy sand, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common medium roots; 10 percent gravel; slightly effervescent; moderately alkaline; clear wavy boundary.
C1—10 to 21 inches; very pale brown (10YR 7/3) very gravelly loamy coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few

fine roots; 45 percent gravel; slightly effervescent; moderately alkaline; gradual wavy boundary

C2—21 to 37 inches; pale brown (10YR 6/3) very gravelly loamy coarse sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; 55 percent gravel; slightly effervescent; moderately alkaline; gradual wavy boundary.

C3—37 to 60 inches; pink (7.5YR 7/4) very gravelly loamy coarse sand, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; 50 percent gravel; slightly effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 0 to 5 percent clay

A horizon

Value: 5 or 6 dry, 4 or 5 moist
Chroma: 3 or 4
Texture: Gravelly or very gravelly loamy sand or sandy loam or extremely gravelly coarse sandy loam

C horizon

Hue: 7.5YR or 10YR
Value: 3 to 7 dry, 4 to 6 moist
Chroma: 3 to 6 moist or dry
Texture: very gravelly coarse sand, very gravelly loamy sand, or very gravelly loamy coarse sand. Some pedons have thin strata of loamy sand or coarse sand.

Note: Some pedons have Ck horizons.

Betonnie Series

Map unit: 150
Depth class: very deep
Drainage class: well drained
Landform: dipslopes on cuestas, fan terraces, hills, valley sides, summits of plateaus and mesas
Parent material: eolian material and slope alluvium derived from sandstone
Elevation: 6,600 to 7,000 feet (2,012 to 2,134 meters)
Slope: 5 to 8 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Coarse-loamy, mixed, mesic Ustalfic Haplargids

Typical Pedon

Betonnie fine sandy loam, in an area of mapping unit 150, Doakum-Betonnie fine sandy loams, 0 to 8 percent slopes; Sandoval County; Mule Dam Quadrangle; about 15 miles south of Councelor and 500 feet south and 2,400 feet west of the northeast corner of sec. 29, T. 22 N., R. 6 W. NAD 83, UTM 13—02 75 951 E—39 99 372 N.

A—0 to 2 inches; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine and fine continuous pores; moderately alkaline; clear smooth boundary.

BA—2 to 4 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine continuous pores; moderately alkaline; clear smooth boundary.

Bt—4 to 12 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; common fine continuous pores; clay bridging sand grains and few thin clay films on faces of peds; moderately alkaline; clear smooth boundary.

BC—12 to 18 inches; brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; few very fine continuous pores; moderately alkaline; clear smooth boundary.

C1—18 to 34 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; strongly effervescent; strongly alkaline; clear gradual boundary.

C2—34 to 60 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; slightly hard, firm, slightly sticky and nonplastic; strongly effervescent; moderately alkaline.

Range in Characteristics

A horizon

Hue: 7.5YR or 10YR
Value: 5 to 6 dry, 3 or 5 moist
Chroma: 3 or 4
Texture: loamy fine sand, fine sandy loam, or sandy loam

Bt horizon

Hue: 5YR or 7.5YR
Value: 4 to 6 dry and moist
Chroma: 3 to 6
Texture: fine sandy loam or sandy loam

C horizon

Hue: 7.5YR or 10YR
Value: 4 to 7 dry, 4 to 6 moist
Chroma: 3 to 6
Texture: fine sandy loam, loamy sand, and sandy loam

Note: Some pedons have Bk horizons; some contain thin strata of loamy sand.

Blancot Series

Map units: 101, 270
Depth class: very deep
Drainage class: well drained
Landform: valley sides and ridges
Parent material: fan alluvium derived from sandstone and shale
Elevation: 6,600 to 7,000 feet (2,012 to 2,134 meters)
Slope: 2 to 8 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Fine-loamy, mixed, mesic Ustalfic Haplargids

Typical Pedon

Blancot fine sandy loam, in an area of mapping unit 101, Blancot-Lybrook association, 0 to 8 percent slopes; Sandoval County; Galisteo Quadrangle; about 2,580 feet north and 1,450 feet east of the southwest corner of sec. 15, T. 22 N., R. 7 W. NAD 83, UTM 13—02 69 104 E—40 02 257 N.

A—0 to 2 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine and fine continuous pores; moderately alkaline; clear smooth boundary.

Bt1—2 to 5 inches; grayish brown (10YR 5/2) clay loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and medium roots; common very fine and fine continuous pores; few thin clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bt2—5 to 14 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common very fine and fine continuous pores; few thin clay films on faces of peds; moderately alkaline; clear smooth boundary.

Btk—14 to 23 inches; yellowish brown (10YR 5/4) clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine continuous pores; few thin clay films on faces of peds; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—23 to 40 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; hard, friable, nonsticky and nonplastic; few very fine and fine roots; slightly effervescent; moderately alkaline; clear gradual boundary.

C2—40 to 49 inches; light brownish gray (10YR 6/2) silty clay loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, sticky and plastic; strongly effervescent; moderately alkaline; clear gradual boundary.

C2—49 to 60 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; strongly effervescent; strongly alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay

A horizon
- *Hue:* 10YR or 2.5Y
- *Value:* 5 to 7 dry, 3 to 5 moist
- *Chroma:* 2 to 4
- *Texture:* fine sandy loam, loam, or silt loam

Bt horizon
- *Hue:* 10YR or 2.5Y
- *Value:* 4 to 6 dry, 3 to 5 moist
- *Chroma:* 2 to 6 dry and moist
- *Texture:* loam, sandy clay loam, or clay loam

Btk, Bk, and C horizons (when present)
- *Hue:* 10YR or 2.5Y
- *Value:* 5 or 6 dry, 3 to 5 moist
- *Chroma:* 2 to 6 dry and moist
- *Texture:* sandy loam, loam, sandy clay loam, clay loam, fine sandy loam, or silty clay loam

Note: Some pedons have accumulations of secondary calcium carbonate.

Bond Series

Map unit: 227
Depth class: very shallow to shallow
Drainage class: well drained
Landform: cuestas, hills, mesas, and ridges
Parent material: eolian material and slope alluvium derived from sandstone
Elevation: 5,700 to 6,000 feet (1,737 to 1,829 meters)
Slope: 1 to 8 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Loamy, mixed, mesic Lithic Ustollic Haplargids

Typical Pedon

Bond loamy fine sand, in an area of mapping unit 227, Hagerman-Bond association, 1 to 8 percent slopes; Sandoval County; Ojito Spring Quadrangle; about 3/4 mile north and 1/2 mile east of the Ojito Spring (along the Ojito Arroyo) on the Zia Pueblo portion of the Ojo Del Espiritu Santo Grant. NAD 83, UTM 13—03 23 191 E—39 39 809 N.

A—0 to 4 inches; light yellowish brown (10YR 6/4) loamy fine sand, yellowish brown (10YR 5/4) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine and few medium roots; slightly alkaline; clear smooth boundary.
Bt—4 to 12 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; few fine tubular pores; common thin clay films on faces of peds; neutral; abrupt smooth boundary.
R—12 inches; sandstone bedrock.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay
Depth to lithic contact: 6 to 20 inches

A horizon
Hue: 5YR, 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 4
Texture: loamy fine sand, sandy loam, or fine sandy loam

Bt horizon
Hue: 5YR or 7.5YR
Value: 4 or 6 dry, 3 to 6 moist
Chroma: 3 to 6
Texture: sandy clay loam, loam, sandy loam, or clay loam

C horizon (when present)
Hue: 5YR or 7.5YR
Value: 5 to 8 dry, 5 or 6 moist
Chroma: 4 to 6 dry and moist
Texture: sandy clay loam, loam, sandy loam, or clay loam

Note: Some pedons have Btk horizons.

Cajete Series

Map units: 308, 503
Depth class: very deep
Drainage class: well drained
Landform: mountain slopes, hills, and stream terraces
Parent material: residuum derived from pumice
Elevation: 7,000 to 8,500 feet (2,134 to 2,591 meters)
Slope: 0 to 30 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Ashy-skeletal, frigid Mollic Vitrandepts

Typical Pedon

Cajete gravelly loam, in an area of mapping unit 308, Cajete gravelly loam, 0 to 8 percent slopes; Sandoval County; Redondo Peak Quadrangle; about 100 yards south of dirt tank and 10 yards north of ridge crest, Baca location No. 1. NAD 83, UTM 13—03 58 759 E—39 66 454 N.

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and medium roots; 20 percent pumice gravel; neutral; clear smooth boundary.

A2—7 to 15 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine and medium roots; 20 percent pumice gravel; neutral; gradual wavy boundary.

Bw—15 to 33 inches; pale brown (10YR 6/3) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; 40 percent pumice gravel; neutral; abrupt wavy boundary.

C1—33 to 45 inches; matrix: light gray (10YR 7/2) very gravelly sand, pale brown (10YR 6/3) moist; single grain; loose, nonsticky and nonplastic; many fine and medium roots concentrated near lamella; wavy lamella 0.5 to 1 inch thick, strong brown (7.5YR 5/6) extremely gravelly sandy loam, yellowish brown (10YR 5/6) moist, 75 percent pumice gravel; matrix has 50 percent pumice gravel; neutral; abrupt wavy boundary.

C2—45 to 49 inches; very pale brown (10YR 7/3) extremely gravelly sand, light yellowish brown (10YR 6/4) moist; single grain; loose, nonsticky and nonplastic; 60 percent pumice gravel; slightly alkaline; abrupt wavy boundary.

C3—49 to 60 inches; matrix; light gray (10YR 7/2) very gravelly sand, pale brown (10YR 6/3) and light yellowish brown (10YR 6/4) moist; single grain; loose, nonsticky and nonplastic; lamella 0.25-0.5 inch thick with colors similar to those described in the C1; 50 percent fine pumice gravel; slightly alkaline.

Range in Characteristics

Depth to the base of the cambic horizon: 20 to 35 inches

A horizons
Value: 3 to 5 dry, 2 or 3 moist
Chroma: 1 to 3
Texture: extremely gravelly coarse sandy loam or gravelly loam
Content of rock fragments: 15 to 80 percent pumice

Bw horizon
Hue: 7.5YR or 10YR
Value: 6 to 8 dry, 5 or 6 moist
Chroma: 2 to 4
Content of rock fragments: 35 to 60 percent pumice gravel

C horizons
Hue: 7.5YR or 10YR
Value: 6 to 8 dry, 5 to 6 moist
Chroma: 2 to 4
Texture: very gravelly sand or very gravelly sandy loam
Content of rock fragments: 35 to 60 percent pumice

Calaveras Series

Map units: 82, 83, 311
Depth class: very deep
Drainage class: well drained
Landform: mountain slopes
Parent material: colluvium derived from tuff
Elevation: 8,500 to 9,200 feet (2,591 to 2,804 meters)
Slope: 5 to 60 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Loamy-skeletal, mixed, frigid Dystric Eutrochrepts

Typical Pedon

Calaveras silt loam, in an area of mapping unit 311, Cosey-Tranquilar-Calaveras association, 5 to 20 percent slopes; Sandoval County, Valle San Antonio Quadrangle; about .1 mile south of movie set on the main ranch road, Baca Location No. 1; NAD 83, UTM 13—03 63 714 E—39 71 088 N.

A—0 to 4 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; 5 percent gravel; slightly acid; clear smooth boundary.

E—4 to 11 inches; pale brown (10YR 6/3) silt loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; 10 percent gravel; slightly acid; clear smooth boundary.

Bw—11 to 17 inches; pale brown (10YR 6/3) gravelly silt loam, dark brown (10YR 4/3) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse roots; 5 percent stones and 20 percent gravel; slightly acid; clear wavy boundary.

2Bt1—17 to 30 inches; pale brown (10YR 6/3) very cobbly loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse roots; few thin patchy clay films on rock fragments; 5 percent stones, 20 percent cobbles, and 20 percent gravel; medium acid; gradual wavy boundary.

2Bt2—30 to 39 inches; light brown (7.5YR 6/4) extremely cobbly coarse sandy loam, brown (7.5YR 5/4) moist; weak fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few coarse roots; many clay films bridging sand grains and many thick clay films occur on tops of rock fragments; 5 percent stones, 30 percent cobbles, and 30 percent gravel; neutral; gradual wavy boundary.

3Bt3—39 to 60 inches; light brown (7.5YR 6/4) extremely cobbly loamy sand, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few coarse roots; clay bridging sand grains; 10 percent stones, 30 percent cobbles, and 20 percent gravel; neutral.

Range in Characteristics

Particle-size control section: 5 to 20 percent clay

Content of rock fragments: 10 to 85 percent total; 0 to 50 percent stones or cobbles, and 15 to 50 percent gravel

A horizon

Hue: 10YR or 7.5YR
Value: 3 to 7 dry, 2 to 5 moist
Chroma: 1 to 4
Texture: silt loam, loam, or very gravelly sandy loam

E horizon

Hue: 7.5YR or 10YR
Value: 6 or 7 dry, 3 or 4 moist
Chroma: 2 to 4
Texture: silt loam and sandy clay loam

2B horizons

Hue: 7.5YR or 10YR
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 2 to 4
Texture: extremely cobbly coarse sandy loam, very cobbly sandy loam, or very cobbly loam. In some pedons, extremely cobbly loamy coarse sand or extremely cobbly loamy sand occurs below 35 inches.

Note: Some pedons may have an AE horizon of sandy loam texture.

Camino Series

Map unit: 15
Depth class: deep
Drainage class: well drained
Landform: valley sides and plateaus
Parent material: fan alluvium and residuum derived from shale
Elevation: 5,900 to 6,200 feet (1,798 to 1,890 meters)
Slope: 1 to 6 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine, mixed, mesic Ustollic Camborthids

Typical Pedon

Camino silty clay loam, in an area of mapping unit 15, Camino-Sandoval complex, 1 to 8 percent slopes; Sandoval County; Sky Village NW Quadrangle; on Alamo Ranch 800 feet south and 400 feet east of the northwest corner of sec. 14, T. 14 N., R. 1 W. NAD 83, UTM 13—03 25 862 E—39 24 200 N.

A—0 to 2 inches; pale olive (5Y 6/3) silty clay loam, olive (5Y 5/3) moist; weak fine subangular blocky structure; soft, friable, sticky and plastic; few very fine roots; strongly effervescent; slightly alkaline; abrupt smooth boundary.

Bw1—2 to 5 inches; pale olive (5Y 6/3) clay, olive (5Y 5/3) moist; weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few fine and very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bw2—5 to 20 inches; pale olive (5Y 6/3) clay, olive (5Y 5/3) moist; weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few fine and very fine roots; strongly effervescent; few fine irregular soft masses of calcium carbonate; moderately alkaline; gradual smooth boundary.

Bk—20 to 51 inches; pale olive (5Y 6/3) clay, olive (5Y 5/3) moist; massive; very hard, very firm, very sticky and very plastic; 5 percent shale fragments; strongly effervescent; common fine irregular soft masses of calcium carbonate; moderately alkaline; clear wavy boundary.

Cr—51 inches; soft olive shale.

Range in Characteristics

Particle-size control section: 40 to 50 percent clay
Salinity: EC of 2 to 4
Depth to bedrock: 40 to more than 60 inches

A horizon
- *Hue:* 2.5Y or 5Y
- *Value:* 5 or 6 dry, 4 or 5 moist
- *Chroma:* 3 or 4

Bw and Bk horizons
- *Hue:* 2.5Y or 5Y
- *Value:* 5 to 7 dry, 4 to 6 moist
- *Chroma:* 3 or 4

Carjo Series

Map unit: 281
Depth class: moderately deep
Drainage class: well drained
Landform: hills, mesas, and summits of ridges
Parent material: residuum derived from tuff
Elevation: 7,000 to 8,000 feet (2,134 to 2,438 meters)
Slope: 1 to 9 percent
Climatic data:
- *Mean annual precipitation:* 20 to 25 inches (508 to 635 millimeters)
- *Mean annual air temperature:* 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
- *Frost-free period:* 60 to 90 days

Taxonomic class: Fine, mixed Mollic Eutroboralfs

Typical Pedon

Carjo loam, in an area of mapping unit 281, Carjo loam, 1 to 9 percent slopes; Los Alamos County; Frijoles Quadrangle; at the east end of 2-mile mesa; 1,100 feet south and 1,500 feet west of the northeast corner of sec. 20, T. 19 N., R. 6 E. NAD 83, UTM 13—03 80 426 E—39 70 016 N.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; many very fine interstitial pores; neutral; clear smooth boundary.

BA—4 to 12 inches; brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, very friable, sticky and plastic; many fine roots; many very fine interstitial pores; neutral; clear smooth boundary.

Bt—12 to 20 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate fine angular blocky structure; hard, firm, sticky and plastic; many fine and medium roots; common fine tubular pores; thin discontinuous clay films on faces of peds; neutral; clear smooth boundary.

C—20 to 25 inches; light brown (7.5YR 6/4) very fine sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; common fine tubular pores; slightly alkaline; abrupt smooth boundary.

2R—25 inches; tuff bedrock.

Range in Characteristics

Depth to bedrock: 20 to 40 inches

A horizon
- *Hue:* 7.5YR or 10YR
- *Value:* 3 to 5 dry, 2 or 3 moist
- *Chroma:* 1 to 5
- *Texture:* fine sandy loam or loam
- *Content of rock fragments:* 0 to 35 percent cobbles or flagstones, 0 to 15 percent gravel or channers

B horizon
- *Hue:* 10YR, 7.5YR or 5YR
- *Value:* 3 to 6 dry, 2 to 5 moist
- *Chroma:* 2 to 6
- *Texture:* clay or clay loam
- *Content of rock fragments:* 0 to 15 percent

C or BC horizon
- *Hue:* 7.5YR or 5YR
- *Value:* 5 or 6 dry, 4 or 5 moist
- *Chroma:* 3 or 4
- *Texture:* sandy loam, very fine sandy loam, or clay loam

Note: B/E or E horizons occur in some pedons.

Cascajo Series

Map units: 47, 54
Depth class: very deep
Drainage class: excessively drained
Landform: hills, knolls, ridges, and structural benches
Parent material: fan alluvium derived from sandstone
Elevation: 5,300 to 6,500 feet (1,615 to 1,981 meters)

Slope: 5 to 30 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Sandy-skeletal, mixed, mesic Ustollic Calciorthids

Typical Pedon

Cascajo very gravelly sandy loam, in an area of mapping unit 47, Cascajo very gravelly sandy loam, 12 to 30 percent slopes; Sandoval County; San Felipe Pueblo Quadrangle; about 7 miles northeast of Ball Ranch Headquarters; 600 feet west and 700 feet south of the northeast corner of sec. 27, T. 14 N., R. 6 E. NAD 27; UTM 13—03 83 258 E—39 20 070 N.

A—0 to 2 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; 19 percent cobbles and 40 percent gravel; violently effervescent; slightly alkaline; abrupt smooth boundary.

Bw—2 to 5 inches; very pale brown (10YR 7/3) very gravelly sandy loam, pale brown (10YR 6/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; 18 percent cobbles and 40 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.

Bk1—5 to 11 inches; very pale brown (10YR 8/3) very gravelly sandy loam, very pale brown (10YR 7/3) moist; weak fine subangular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; 5 percent cobbles and 40 percent gravel; violently effervescent; many fine filaments and threads of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—11 to 23 inches; pale brown (10YR 6/3) very gravelly loamy sand, brown (10YR 5/3) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; few medium roots; 5 percent cobbles and 50 percent gravel; violently effervescent; common fine filaments and threads of calcium carbonate; moderately alkaline; clear smooth boundary.

C1—23 to 30 inches; light brown (7.5YR 6/4) very gravelly loamy sand, yellowish brown (10YR 5/3) moist; massive; soft, friable, nonsticky and nonplastic; few medium roots; 10 percent cobbles and 45 percent gravel; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—30 to 60 inches; light brown (7.5YR 6/4) extremely cobbly loamy sand, brown (7.5YR 5/4) moist; massive; soft, very friable; nonsticky and nonplastic; few medium roots; 50 percent cobbles and 30 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

A horizon
Hue: 10YR
Value: 6 dry and 4 moist
Chroma: 3 dry and moist

B and C horizons
Hue: 10YR or 7.5YR
Value: 4 to 8 dry and 5 to 7 moist
Texture: very gravelly sand, extremely cobbly loamy sand, or very gravelly loamy sand. Some pedons may have horizons of very gravelly sandy loam above the C horizons.

Charo Series

Map unit: 405
Depth class: moderately deep
Drainage class: well drained
Landform: hills, mesas, and ridges
Parent material: eolian material and residuum derived from basalt
Elevation: 8,100 to 8,300 feet (2,469 to 2,530 meters)
Slope: 1 to 5 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Fine, mixed Typic Argiborolls

Typical Pedon

Charo very cobbly loam, in an area of mapping unit 405, Charo complex, 1 to 5 percent slopes; Sandoval County; Laguna Seca Quadrangle; about one mile west of Laguna Seca; unsectionized; NAD 27; UTM 13—02 91 297 E—39 20 794 N.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) cobbly loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and many medium roots; 2 percent stones, 15 percent cobbles and 15 percent gravel; neutral; clear smooth boundary.

Bt1—5 to 12 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; weak medium angular blocky structure; hard, firm, sticky and plastic; many fine roots and common very fine roots; few fine tubular pores; few thin dark reddish gray (5YR 4/2) clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—12 to 15 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; moderate medium and coarse angular blocky structure; hard, firm, sticky and plastic; many very fine roots; common, moderately thick, dark reddish gray (10YR 4/2), clay films on faces of peds; neutral; gradual wavy boundary.

Bt3—15 to 25 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; weak coarse angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; few fine and few medium pores; few thin clay films on faces of peds, in pores, and on coarse fragments; 5 percent cobbles and 5 percent gravel; slightly alkaline; gradual wavy boundary.

C—25 to 28 inches; reddish brown (5YR 4/4) and dark reddish gray (5YR 4/2) clay, dark reddish brown (5YR 3/4) and (5YR 3/2) moist; massive; very hard, very firm, very sticky and very plastic; few very fine and fine pores; 10 percent cobbles and 10 percent gravel; slightly alkaline; abrupt wavy boundary.

R—28 inches; hard basalt.

Range in Characteristics

Particle-size control section: 35 to 60 percent clay
Depth to bedrock: 20 to 40 inches

A horizon
Hue: 7.5YR or 10YR
Chroma: 2 or 3
Texture: loam, cobbly loam or very cobbly loam

Bt horizon
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 3 to 6
Texture: clay loam or clay

Note: C horizons occur in some pedons.

Clovis Series

Map units: 1, 2, 143 ,211
Depth class: very deep
Drainage class: well drained
Landform: fan terraces, mesas, and plains
Parent material: eolian material and slope alluvium derived from sandstone and shale
Elevation: 5,500 to 7,300 feet (1,676 to 2,225 meters)
Slope: 1 to 8 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine-loamy, mixed, mesic Ustollic Haplargids

Typical Pedon

Clovis fine sandy loam, in an area of mapping unit 143, Clovis fine sandy loam, 1 to 4 percent slopes; Sandoval County; Arroyo de las Calabacillas Quadrangle; about 24 miles northwest of Rio Rancho at the far northwest corner of the west mesa; 1,600 feet west and 2,000 feet north of the southeast corner of sec. 17, T. 13 N., R. 1 E. NAD 83, UTM 13—03 31 377 E—39 13 673 N.

A—0 to 3 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and few medium roots; slightly alkaline; abrupt wavy boundary.

Bt1—3 to 7 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common fine and few medium roots; many thin clay films on sand grains; moderately alkaline; clear smooth boundary.

Bt2—7 to 12 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; hard, friable, sticky and plastic; few fine roots; many thin clay films on sand grains; moderate alkaline; gradual wavy boundary.

Bt3—12 to 22 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; few fine roots; many thin clay films on sand grains; moderately alkaline; clear wavy boundary.

Bk1—22 to 34 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; weak coarse prismatic structure; very hard, firm, sticky and plastic; violently effervescent; common fine filaments and threads of calcium carbonate; moderately alkaline; diffuse wavy boundary.

Bk2—34 to 60 inches; reddish yellow (7.5YR 6/6) sandy clay loam, brown (7.5YR 5/4) moist; weak coarse prismatic structure; very hard, firm, sticky and plastic; violently effervescent; common medium irregular soft masses of calcium carbonate; moderately alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent
Content of rock fragments: 0 to 15 percent stones, cobbles, or gravel

A horizon
Hue: 5YR, 7.5YR, or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 6 dry, 2 to 4 moist
Texture: fine sandy loam or loam

BA, Bt, Btk horizons
Hue: 2.5YR, 5YR, or 7.5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 4 or 6
Texture: sandy clay loam or clay loam

Bk horizon
Hue: 7.5YR or 10YR
Value: 6 to 8 dry, 5 to 7 moist
Chroma: 2 to 6
Texture: fine sandy loam or sandy clay loam

Cochiti Series

Map units: 104, 353
Depth class: very deep
Drainage class: well drained
Landform: fan terrace, hills, mesas, plains, and stream terraces
Parent material: gravelly alluvium
Elevation: 5,300 to 7,000 feet (1,615 to 2,134 meters)
Slope: 3 to 40 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Clayey-skeletal, mixed, mesic Aridic Haplustalfs

Typical Pedon

Cochiti gravelly loam, in an area of mapping unit 104, Cochiti-Montecito association, 1 to 30 percent slopes; Sandoval County; Canada Quadrangle; about 10 miles west of Cochiti Pueblo; 1,500 feet east and 300 feet north of the center of sec. 11, T. 16 N., R. 4 E. NAD 83, UTM 13—03 65 807 E—39 44 031 N.

A—0 to 7 inches; dark yellowish brown (10YR 4/4) gravelly loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard, firm, sticky and plastic; many fine and medium roots; 5 percent cobbles and 15 percent gravel; neutral; clear smooth boundary.

Bt1—7 to 12 inches; reddish brown (5YR 4/3) gravelly clay loam, reddish brown (5YR 4/3) moist; strong medium subangular blocky structure; very hard, firm, very sticky and very plastic; common fine and coarse roots; thick continuous clay films on faces of peds; 5 percent cobbles and 25 percent gravel; slightly acid; clear smooth boundary.

Bt2—12 to 20 inches; reddish brown (5YR 4/4) very gravelly clay, reddish brown (5YR 4/4) moist; strong medium and coarse subangular blocky structure; very hard, firm, very sticky and very plastic; few fine and coarse roots; thick continuous clay

films on faces of peds; 5 percent cobbles and 40 percent gravel; neutral; clear smooth boundary.

Bt3—20 to 29 inches; light reddish brown (5YR 6/4) very gravelly clay loam, reddish brown (5YR 5/4) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few fine and coarse roots; thin and continuous clay films on faces of peds; 5 percent cobbles and 40 percent gravel; neutral; clear smooth boundary.

C—29 to 60 inches; light reddish brown (5YR 6/4) very gravelly sandy loam, reddish brown (5YR 5/4) moist; massive; loose, nonsticky and nonplastic; few fine and coarse roots; 5 percent cobbles and 50 percent gravel; neutral.

Range in Characteristics

Particle-size control section: 35 to 45 percent clay
Content of rock fragments: 35 to 50 percent by volume with 5 to 10 percent cobbles and 30 to 40 percent gravel

A horizon
Hue: 7.5YR or 10YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 3 or 4
Texture: gravelly loam or extremely gravelly loam

B horizon
Hue: 7.5YR or 5YR
Value: 4 to 6 dry, 4 or 5 moist
Chroma: 3 or 4
Texture: very gravelly clay or very gravelly clay loam

2C horizon
Hue: 7.5YR or 5YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 3 to 6
Texture: very gravelly loamy sand or very gravelly sandy loam

Cosey Series

Map units: 304, 311
Depth class: very deep
Drainage class: well drained
Landform: mountain slopes
Parent material: slope alluvium and colluvium derived from rhyolite
Elevation: 8,600 to 9,200 feet (2,621 to 2,804 meters)
Slope: 2 to 20 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Loamy-skeletal, mixed Typic Paleborolls

Typical Pedon

Cosey silt loam, in an area of mapping unit 304, Cosey-Jarmillo association, 2 to 20 percent slopes; Sandoval County; Valle Toledo Quadrangle; about 13 miles northeast of La Cueva, 300 feet south of the pipeline, and 2 miles southeast of road junction at west end of Toledo Valley, Baca Location No. 1; unsectionized; NAD 83, UTM 13—03 67 849 E—39 78 865 N.

A1—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots; slightly acid; clear smooth boundary.
A2—9 to 15 inches; grayish brown (10YR 5/2) silt loam, very dark brown (10YR 2/2) moist; moderate coarse granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; slightly acid; clear smooth boundary.
BA—15 to 28 inches; very pale brown (10YR 7/3) gravelly loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; 10 percent cobbles and 20 percent gravel; slightly acid; gradual smooth boundary.
Bt1—28 to 34 inches; very pale brown (10YR 7/3) very gravelly sandy clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; common moderately thick clay films on faces of peds; 10 percent cobbles and 50 percent gravel; slightly acid; gradual smooth boundary.
Bt2—34 to 60 inches; light brown (7.5YR 6/4) crushed, extremely cobbly clay loam, dark brown (7.5YR 4/4) moist; strata of very pale brown (10YR 7/3) silty clay loam and brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; hard, firm, sticky and plastic; continuous thick clay films on faces of peds; 40 percent cobbles and 30 percent gravel; slightly acid.

Range in Characteristics

Particle-size control section: 27 to 35 percent clay
Depth to argillic horizon: 22 to 35 inches

A horizon
Value: 3, 4 or 5 dry, 2 or 3 moist
Chroma: 1 to 3
Texture: loam, silt loam

BA horizon
Value: 6 to 8 dry, 4 to 6 moist
Chroma: 2 or 3
Texture: gravelly sandy loam, gravelly fine sandy loam, and gravelly loam

Bt horizon
Hue: 7.5YR or 10YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 3 or 4
Texture: very gravelly sandy clay loam or extremely cobbly clay loam

Councelor Series

Map units: 180, 270
Depth class: very deep
Drainage class: well drained
Landform: stream terraces, fan terraces, valley floors, and valley sides
Parent material: eolian material and stream alluvium derived from sandstone and shale
Elevation: 6,600 to 7,000 feet (2,012 to 2,134 meters)
Slope: 1 to 30 percent

Climatic data:

Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Coarse-loamy, mixed, calcareous, mesic Ustic Torriorthents

Typical Pedon

Councelor fine sandy loam, in an area of mapping unit 180, Councelor-Eslendo-Mespun complex, 5 to 30 percent slopes; Sandoval County; Galisteo SE Quadrangle; about 15 miles southwest of Councelor; 1,500 feet north and 1,500 feet east of the southwest corner of sec. 6, T. 21 N., R. 6 W. NAD 83, UTM 13—02 73 616 E—39 95 265 N.

A—0 to 2 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

C1—2 to 7 inches; pale brown (10YR 6/3) fine sandy loam, dark brown (10YR 5/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—7 to 37 inches; pale brown (10YR 6/3) fine sandy loam, yellowish brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; slightly effervescent; moderately alkaline; gradual smooth boundary.

C3—37 to 40 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; massive; hard, firm, sticky and plastic; few fine and very fine roots; strongly effervescent; very few fine irregular soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

C4—40 to 60 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; soft, friable, slightly sticky and slightly plastic; strongly effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 8 to 18 percent clay

A horizon

Hue: 7.5YR or 10YR
Value: 5 or 6 dry, 3 to 5 moist
Chroma: 2 to 4

C horizon

Hue: 7.5YR or 10YR
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 2 to 4 dry, 2 to 6 moist
Texture: fine sandy loam, sandy loam, or clay loam

Note: The C horizon contains thin strata of loamy sand, loamy fine sand, and sandy clay loam in some pedons.

Cucho Series

Map units: 397, 398, 399
Depth class: moderately deep
Drainage class: well drained
Landform: cuestas and fan terraces

Parent material: colluvium derived from shale
Elevation: 5,900 to 7,200 feet (1,798 to 2,195 meters)
Slope: 15 to 70 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Fine-silty, mixed, calcareous, mesic Typic Ustorthents

Typical Pedon

Cucho very gravelly clay loam in an area of mapping unit 397, Rock outcrop-Cucho-Vessilla complex, 25 to 70 percent slopes; Sandoval County; Holy Ghost Spring Quadrangle; 1.5 miles east of state highway 44 and 0.5 miles south of the Jemez-Zia Indian Reservations boundary. unsectionized; NAD 83, UTM 13—03 27 007 E—39 52 487 N.

A—0 to 2 inches; pale yellow (2.5Y 7/4) and very pale brown (10YR 7/4) very gravelly clay loam, light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/4) moist; moderate fine granular structure; slightly hard, friable, sticky and slightly plastic; common fine and few medium roots; 45 percent gravel; slightly effervescent; slightly alkaline; abrupt smooth boundary.
C1—2 to 9 inches; light gray (5Y 7/2) clay loam, light olive gray (5Y 6/2) moist; massive; hard, firm, sticky and plastic; few medium roots; slightly effervescent; neutral; gradual wavy boundary.
C2—9 to 37 inches; pale olive (5Y 6/3) clay loam, olive (5Y 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few medium roots in upper part; 50 percent soft weathered shale fragments at upper boundary grading to 90 percent at lower boundary; matrix slightly effervescent; few medium strongly effervescent irregular soft masses of calcium carbonate; slightly alkaline; gradual wavy boundary.
Cr—37 to 60 inches; fractured shale.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay, less than 15 percent fine sand or coarser
Calcium carbonate equivalent: 1 to 10 percent
Depth to a Cr horizon: 20 to 40 inches

A horizon
Hue: 2.5Y or 10YR
Value: 6 or 7 dry

C horizon
Hue: 5Y or 2.5Y
Value: 6 or 7 dry, 5 or 6 moist
Chroma: 2 to 4
Texture: clay loam or silty clay loam

Cypher Series

Map units: 503, 600, 604
Depth class: shallow
Drainage class: well drained
Landform: mountain slopes and ridges
Parent material: colluvium and residuum derived from rhyolite and tuff

Elevation: 6,500 to 9,000 feet (1,981 to 2,743 meters)
Slope: 15 to 60 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Loamy-skeletal, mixed, frigid Lithic Ustochrepts

Typical Pedon

Cypher very gravelly loam, in an area of mapping unit 604, Cypher-Mirand complex, 15 to 55 percent slopes; Sandoval County; Bear Springs Peak Quadrangle; about 3/4 mile north of the Bear Springs Guard Station in the Canada de Cochiti; unsectionized; NAD 83, UTM 13—03 59 321 E—39 49 884 N.

Oi—0 to 1 inch; slightly decomposed forest litter.
A—1 inch to 5 inches; brown (10YR 5/3) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak platy structure parting to weak very fine granular; soft, very friable, slightly sticky and nonplastic; many very fine roots; few very fine tubular pores; 10 percent cobbles and 45 percent gravel; slightly acid; clear smooth boundary.
Bw—5 to 12 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; weak medium angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, few fine, and few coarse roots; common very fine tubular pores; 10 percent cobbles and 40 percent gravel; medium acid; clear smooth boundary.
C—12 to 20 inches; light brown (7.5YR 6/4) extremely gravelly sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine, few fine, and few coarse roots; common thin clay films on coarse fragments; 10 percent cobbles and 75 percent gravel; slightly acid; abrupt wavy boundary.
2R—20 inches; rhyolite bedrock.

Range in Characteristics

Particle-size control section: 10 to 25 percent clay
Calcium carbonate equivalent: 0 to 5 percent
Depth to bedrock from mineral surface: 10 to 20 inches

A horizon
Hue: 7.5YR or 10YR
Value: 2 to 5 dry, 2 to 4 moist
Chroma: 2 to 4
Texture: very gravelly loam or very cobbly loam

Bw horizon
Hue: 7.5YR or 10YR
Value: 5 to 7 dry, 4 to 6 moist
Chroma: 2 to 4
Texture: very gravelly sandy loam or very gravelly loam

C horizon
Hue: 5YR, 7.5YR or 10YR
Value: 6 or 7 dry, 4 or 5 moist
Chroma: 2 to 4
Texture: extremely gravelly sandy loam or very gravelly loam

Deama Series

Map units: 58, 358
Depth class: very shallow and shallow
Drainage class: well drained
Landform: hills, plateaus, and mesas
Parent material: colluvium derived from limestone
Elevation: 5,800 to 7,000 feet (1,768 to 2,134 meters)
Slope: 10 to 55 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Loamy-skeletal, carbonatic, mesic Lithic Calciustolls

Typical Pedon

Deama very stony silt loam, in an area of mapping unit 58, Deama-El Pedro association, 5 to 30 percent slopes; Sandoval County; Sandia Crest Quadrangle; about .75 mile northwest of La Madera; 1,300 feet west and 1,800 feet south of the northeast corner of sec. 35, T. 12 N., R. 5 E. NAD 83, UTM 13—03 74 645 E—38 98 880 N.

A—0 to 7 inches; dark brown (7.5YR 3/2) very stony silt loam, very dark brown (7.5YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many medium and coarse roots; 20 percent stones, 10 percent cobbles, and 10 percent gravel; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk—7 to 14 inches; pinkish gray (7.5YR 7/2) very cobbly silt loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable, sticky and plastic; many coarse roots; 7 percent stones, 15 percent cobbles, and 20 percent gravel; violently effervescent; many thin filaments of calcium carbonate; moderately alkaline; abrupt smooth boundary.

2R—14 inches; limestone.

Range in Characteristics

Particle-size control section: 18 to 27 percent clay
Calcium carbonate equivalent: 40 to 60 percent in the particle-size control section
Depth to bedrock: 7 to 20 inches

A horizon
Hue: 5YR to 10YR
Value: 3 to 6 dry, 2 to 4 moist
Chroma: 2 or 3, dry or moist
Texture: very gravelly loam or very stony silt loam

Bk horizon
Hue: 5YR to 10YR
Value: 4 to 8 dry, 3 to 7 moist
Chroma: 2 to 4, dry or moist
Texture: very gravelly loam or very cobbly silt loam

Doakum Series

Map unit: 150
Depth class: very deep
Drainage class: well drained
Landform: bajadas, dipslopes on cuestas, plateaus, drainageways, and hills
Parent material: eolian material and slope alluvium derived from sandstone and shale
Elevation: 6,600 to 7,000 feet (2,012 to 2,134 meters)
Slope: 0 to 5 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Fine-loamy, mixed, mesic Ustalfic Haplargids

Typical Pedon

Doakum fine sandy loam, in an area of mapping unit 150, Doakum-Betonnie fine sandy loams, 0 to 8 percent slopes; Sandoval County; Mule Dam Quadrangle; about 8 miles southwest of Councelor, 800 feet south and 1,400 feet west of the northeast corner of sec. 29, T. 22 N., R. 6 W. NAD 83, UTM 13—02 76 101 E—39 99 272 N.

A—0 to 5 inches; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine continuous pores; moderately alkaline; clear smooth boundary.

Bt1—5 to 11 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine and medium roots; common very fine and fine continuous pores; few thin clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bt2—11 to 17 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; very hard, firm, slightly sticky and slight plastic; common fine and medium roots; common very fine and fine continuous pores; few thin clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bk1—17 to 24 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; hard, firm, slightly sticky and plastic; common very fine roots; few very fine and fine continuous pores; strongly effervescent; few medium irregular soft masses of calcium carbonate; strongly alkaline; clear smooth boundary.

Bk2—24 to 31 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; massive; hard, firm, sticky and plastic; few very fine roots; violently effervescent; few medium irregular soft masses of calcium carbonate; strongly alkaline; clear smooth boundary.

Bk3—31 to 44 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; very hard, firm, slightly sticky and slightly plastic; few very fine roots; violently effervescent; few medium soft masses and seams of calcium carbonate; strongly alkaline; clear gradual boundary.

C—44 to 60 inches; very pale brown (10YR 7/4) loam, light yellowish brown (10YR 6/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; violently effervescent; strongly alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay
Salinity: EC of 2 to 8

A horizon
Hue: 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 4

Bt or Btk horizons
Hue: 5YR or 7.5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 6 dry and moist
Texture: loam, sandy clay loam, or clay loam

Bk horizon
Hue: 5YR, 7.5YR or 10YR
Value: 4 to 8 dry, 4 to 7 moist
Chroma: 2 to 6
Texture: loam, fine sandy loam, sandy clay loam, or clay loam
Calcium carbonate equivalent: less than 15 percent

C horizon
Hue: 10YR or 7.5YR
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 3 or 4
Texture: loam, very fine sandy loam, fine sandy loam, or loamy fine sand

El Rancho Series

Map units: 95, 97
Depth class: very deep
Drainage class: well drained
Landform: stream terraces
Parent material: stream alluvium derived from mixed sources
Elevation: 5,300 to 5,500 feet (1,615 to 1,676 meters)
Slope: 0 to 2 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine-loamy, mixed, calcareous, mesic Ustic Torriorthents

Typical Pedon

El Rancho loam, in an area of mapping unit 95, El Rancho loam, 0 to 2 percent slopes; Sandoval County; San Ysidro Quadrangle; the north edge of San Ysidro; unsectionized; NAD 83, UTM 13—03 39 479 E—39 36 553 N.

Ap—0 to 5 inches; reddish brown (5YR 5/3) loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; hard, friable, slightly sticky and slightly plastic; common fine and medium roots; violently effervescent; moderately alkaline; abrupt smooth boundary.

C1—5 to 20 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

C2—20 to 38 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; massive; hard, firm, sticky and plastic; few fine and very fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

2C3—38 to 60 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; violently effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 10 to 27 percent clay and greater than 50 percent sand

A horizon
Hue: 5YR or 7.5YR
Value: 5 or 6 dry, 3 or 4 moist
Chroma: 3 or 4
Texture: loam or clay loam

C horizon
Hue: 5YR or 7.5YR
Value: 5 to 7 dry, 3 to 5 moist
Chroma: 3 to 6
Texture: sandy loam or sandy clay loam

Elpedro Series

Map units: 58, 317, 358
Depth class: very deep
Drainage class: well drained
Landform: benches, fan piedmonts, hills, mesas, and valley sides
Parent material: eolian material and colluvium derived from limestone
Elevation: 5,700 to 7,000 feet (1,737 to 2,134 meters)
Slope: 1 to 40 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Fine-silty, mixed, mesic Aridic Haplustalfs

Typical Pedon

Elpedro loam, in an area of mapping unit 58, Deama-Elpedro association, 5 to 30 percent slopes; Sandoval County; Sandia Park Quadrangle; about 2 miles northeast of La Madera; unsectionized; NAD 83, UTM 13—03 76 147 E—39 00 367 N.

A—0 to 5 inches; brown (7.5YR 4/4) loam, dark brown (7.5YR 3/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; slightly alkaline; abrupt smooth boundary.
Bt1—5 to 12 inches; dark brown (7.5YR 3/4) silty clay loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; many fine and coarse roots; few thin discontinuous clay films on faces of peds; slightly alkaline; clear smooth boundary.
Bt2—12 to 19 inches; brown (7.5YR 5/4) silty clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and coarse roots; thin discontinuous clay films on faces of peds; slightly effervescent; moderately alkaline; clear smooth boundary.
Bt3—19 to 25 inches; brown (7.5YR 5/4) silty clay loam, brown (7.5YR 4/4) moist; moderate fine and medium prismatic structure parting to moderate fine subangular blocky; hard, friable, sticky and plastic; few very fine roots; thick continuous clay films on faces of peds; slightly effervescent; few seams and filaments of calcium carbonate; moderately alkaline; clear smooth boundary.

Btk1—25 to 36 inches; brown (7.5YR 5/4) silty clay loam, brown (7.5R 4/4) moist; strong fine prismatic structure parting to strong fine and medium subangular blocky; hard, friable, sticky and plastic; few very fine roots; thick continuous clay films on faces of peds; strongly effervescent; thin filaments of calcium carbonates on peds; slightly alkaline; clear smooth boundary.

Btk2—36 to 45 inches; brown (7.5YR 5/4) silt loam, brown (7.5YR 4/4) moist; weak medium prismatic structure; hard, friable, sticky and plastic; few very fine roots; thin continuous clay films on faces of peds; strongly effervescent; seams and filaments of calcium carbonate on faces of peds; slightly alkaline; clear smooth boundary.

Btk3—45 to 60 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; weak coarse prismatic structure; hard, friable, sticky and plastic; few very fine roots; thin discontinuous clay films on faces of peds; strongly effervescent; few calcium carbonate accumulations; slightly alkaline.

Range in Characteristics

Particle-size control section: 27 to 35 percent clay
Calcium carbonate equivalent: 0 to 15 percent
Reaction: slightly to moderately alkaline

A horizon
Hue: 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 4
Texture: loam or very gravelly loam

Bt and Btk horizons
Hue: 10YR to 5YR
Value: 3 to 6 dry, 4 to 5 moist
Chroma: 3 to 5
Texture: silty clay loam, loam, and silt loam

Bk horizon (when present)
Hue: 7.5YR or 10YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 3 or 4
Texture: loam, silt loam, or silty clay loam

Embudo Series

Map units: 108, 109
Depth class: very deep
Drainage class: well drained
Landform: fan remnants and fan terraces
Parent material: fan alluvium derived from granite
Elevation: 5,000 to 5,600 feet (1,524 to 1,707 meters)
Slope: 1 to 15 percent
Climatic data:
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Taxonomic class: Coarse-loamy, mixed, mesic Typic Camborthids

Typical Pedon

Embudo gravelly sandy loam, in an area of mapping unit 109, Embudo-Tijeras association, 1 to 9 percent slopes; Sandoval County; Alameda Quadrangle; about 1.5 miles east of Interstate Highway 25 and about 1 mile north of the Bernalillo-Sandoval County line; 950 feet east and 2,050 feet south of the northwest corner of sec. 32, T. 12 N., R. 4 E. NAD 83, UTM 13—03 59 192 E—38 99 070 N.

A—0 to 4 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; 20 percent gravel; slightly alkaline; clear wavy boundary.

Bw—4 to 12 inches; pale brown (10YR 6/3) gravelly fine sandy loam; dark yellowish brown (10YR 4/3) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; common fine roots; 15 percent gravel; slightly alkaline; gradual wavy boundary.

Bk1—12 to 30 inches; pale brown (10YR 6/4) gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, nonsticky and nonplastic; few fine roots; 20 percent gravel; slightly effervescent with few medium rounded soft masses of calcium carbonate; moderately alkaline; gradual wavy boundary.

2Bk2—30 to 60 inches; pale brown (10YR 6/4) gravelly loamy coarse sand, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; 30 percent gravel; slightly effervescent; few fine rounded soft masses of calcium carbonate; moderately alkaline.

Range in Characteristics

Particle-size control section: 5 to 15 percent clay

A and Bw horizons
- *Value:* 4 to 6 dry, 3 to 5 moist
- *Chroma:* 2 to 4

Bk horizon
- *Value:* 4 to 6 dry, 3 to 5 moist
- *Chroma:* 2 to 6
- *Texture:* gravelly coarse sandy loam and sandy loam

2Bk horizon
- *Value:* 4 to 6 dry, 3 to 5 moist
- *Chroma:* 2 to 6
- *Content of rock fragments:* 10 to 70 percent gravel
- *Texture:* gravelly loamy coarse sand or loamy sand
- *Depth to sandy layer:* 18 to 30 inches

Eslendo Series

Map unit: 180
Depth class: very shallow to shallow
Drainage class: well drained
Landform: ridges
Parent material: residuum derived from shale
Elevation: 6,600 to 7,000 feet (2,012 to 2,134 meters)
Slope: 5 to 30 percent
Climatic data:
- *Mean annual precipitation:* 10 to 13 inches (254 to 330 millimeters)
- *Mean annual air temperature:* 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
- *Frost-free period:* 110 to 130 days

Taxonomic class: Loamy, mixed, calcareous, mesic, shallow Ustic Torriorthents

Typical Pedon

Eslendo clay loam, in an area of mapping unit 180, Councelor-Eslendo-Mespun complex, 5 to 30 percent slopes; Galisteo SE Quadrangle; about 16 miles south of Galisteo; 1,760 feet south and 2,400 feet west of the northeast corner of sec. 29, T. 21 N., R. 7 W. NAD 83, UTM 13—02 65 871 E—39 89 619 N.

A—0 to 3 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak fine granular structure; hard, firm, sticky and plastic; few very fine and fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.
C—3 to 10 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; massive; hard, firm, sticky and plastic; few fine roots; few fine pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.
Cr—10 inches; soft shale.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay
Soil depth: 4 to 20 inches to soft shale

Espiritu Series

Map units: 325, 345, 346, 353, 398
Depth class: very deep
Drainage class: well drained
Landform: mountain slopes and mesas
Parent material: slope alluvium and colluvium derived from mixed sources
Elevation: 5,300 to 6,900 feet (1,615 to 2,103 meters)
Slope: 8 to 65 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Loamy-skeletal, mixed, mesic Aridic Haplustalfs

Typical Pedon

Espiritu very gravelly fine sandy loam, in an area of mapping unit 345, Espiritu-Bamac association, 15 to 55 percent slopes; Sandoval County; Loma Creston Quadrangle; 11 miles northeast of the Zia Pueblo; unsectionized; NAD 83, UTM 13—03 60 501 E—39 35 768 N.

A—0 to 6 inches; brown (10YR 5/3) very gravelly fine sandy loam, dark brown (10YR 4/3) moist; weak very fine granular structure; soft, very friable, nonsticky and slightly plastic; many fine and common medium roots; 10 percent cobbles and 30 percent gravel; slightly alkaline; clear smooth boundary.
Bt1—6 to 15 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; common fine roots; few fine tubular pores; common thin clay films on faces of peds; 10 percent cobbles and 30 percent gravel; slightly alkaline; clear wavy boundary.
Bt2—15 to 22 inches; light brown (7.5YR 6/4) very gravelly sandy clay loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; few fine tubular pores; few thin

clay films of faces of peds; 10 percent cobbles and 35 percent gravel; slightly alkaline; gradual wavy boundary.

Bk1—22 to 29 inches; pale brown (10YR 6/3) very cobbly sandy clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine tubular pores; 25 percent cobbles and 25 percent gravel; strongly effervescent; few medium irregular soft masses of calcium carbonate; slightly alkaline; gradual wavy boundary.

Bk2—29 to 38 inches; pale brown (10YR 6/3) very cobbly sandy clay loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky, and slightly plastic; 25 percent cobbles and 25 percent gravel; strongly effervescent; few medium irregular soft masses of calcium carbonate; slightly alkaline; clear wavy boundary.

2C1—38 to 46 inches; strong brown (7.5YR 5/6) fine sandy loam, brown (7.5YR 4/4) moist; massive; hard, friable, slightly sticky and slightly plastic; strongly effervescent; slightly alkaline; gradual wavy boundary.

3C2—46 to 60 inches; reddish yellow (7.5YR 6/6) very gravelly sandy loam, strong brown (7.5YR 4/6) moist; massive; hard, friable, nonsticky and nonplastic; 3 percent cobbles and 35 percent gravel; strongly effervescent; slightly alkaline.

Range in Characteristics

Particle-size control section: 15 to 35 percent clay

A horizon
- *Hue:* 7.5YR or 10YR
- *Value:* 4 or 5 dry, 3 or 4 moist
- *Chroma:* 2 to 4
- *Texture:* extremely cobbly sandy loam, very gravelly loam, and very gravelly fine sandy loam

Bt horizon
- *Hue:* 5YR, 7.5YR or 10YR
- *Value:* 4 to 6 dry, 3 to 5 moist
- *Chroma:* 3 to 6

Bk horizon
- *Hue:* 5YR, 7.5YR or 10YR
- *Value:* 5 or 6 dry, 4 or 5 moist
- *Chroma:* 3 to 6
- *Texture:* extremely gravelly loamy sand, extremely gravelly sandy loam, very gravelly loam, and very cobbly sandy clay loam

C horizons (when present)
- *Hue:* 5YR, 7.5YR or 10YR
- *Value:* 5 or 6 dry, 4 or 5 moist
- *Chroma:* 3 to 6
- *Texture:* very gravelly sandy loam, extremely gravelly sandy loam, fine sandy loam, or very gravelly loam

Note: In some pedons, the lower C horizons are sand, very gravelly loamy sand, or extremely gravelly loamy sand.

Ess Series

Map unit: 215
Depth class: very deep
Drainage class: well drained
Landform: mountain slopes

Parent material: colluvium derived from rhyolite
Elevation: 9,000 to 11,000 feet (2,743 to 3,353 meters)
Slope: 5 to 45 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Loamy-skeletal, mixed Argic Cryoborolls

Typical Pedon

Ess very cobbly sandy loam, in an area of mapping unit 215, Ess-Rock outcrop complex, 5 to 45 percent slopes; Sandoval County; Valle Toledo Quadrangle; about 100 yards west of ski lift near Baca Location No. 1; unsectionized; NAD 83, UTM 13—03 73 642 E—39 71 846 N.

A1—0 to 7 inches; very dark gray (10YR 3/1) very cobbly sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; 5 percent stones, 35 percent cobbles and 10 percent gravel; neutral; clear smooth boundary.
A2—7 to 15 inches; very dark gray (10YR 3/1) very cobbly sandy loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; 5 percent stones, 30 percent cobbles and 10 percent gravel; neutral; clear smooth boundary.
Bt—15 to 29 inches; strong brown (7.5YR 5/6) very cobbly sandy clay loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine roots; few thin discontinuous clay films on rock fragments; 10 percent stones, 30 percent cobbles and 10 percent gravel; neutral; gradual wavy boundary.
C—29 to 60 inches; very pale brown (10YR 7/3) very cobbly loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; 5 percent stones, 20 percent cobbles, and 30 percent gravel; neutral.

Range in Characteristics

Particle-size control section: 20 to 30 percent clay

A horizon
Hue: 7.5YR, 10YR
Value: 3 to 5 dry, and 2 or 3 moist
Chroma: 1 to 3

B horizon
Hue: 5YR, 7.5YR, 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 to 6

Flugle Series

Map unit: 307
Depth class: very deep
Drainage class: well drained
Landform: cuestas, fan terraces, hills, ridges, and valley sides
Parent material: eolian material and fan alluvium derived from sandstone and shale
Elevation: 5,600 to 6,100 feet (1,707 to 1,859 meters)
Slope: 1 to 5 percent

Climatic data:

Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Fine-loamy, mixed, mesic Aridic Haplustalfs

Typical Pedon

Flugle loam, in an area of mapping unit 307, Flugle-Waumac complex, 1 to 8 percent slopes; Sandoval County; Jemez Pueblo Quadrangle; about 3 miles northeast of Zia Pueblo; 630 feet west and 750 feet south of the northeast corner of sec. 13, T. 15 N., R. 2 E. NAD 83, UTM 13—03 48 170 E—39 33 463 N.

A—0 to 3 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 4/3) moist; weak thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots; neutral; abrupt smooth boundary.

Bt—3 to 7 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine roots; many very fine tubular pores; common moderately thick clay films on faces of peds; neutral; clear smooth boundary.

Btk1—7 to 12 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine roots; many very fine tubular pores; many moderately thick clay films on faces of peds; strongly effervescent; common fine irregular filaments of calcium carbonate; slightly alkaline; clear smooth boundary.

Btk2—12 to 19 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; few thin clay films on faces of peds; strongly effervescent; few fine calcium carbonate accumulations; slightly alkaline; clear smooth boundary.

Bk—19 to 60 inches; pink (7.5YR 7/4) fine sandy loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine pores; strongly effervescent; few coarse calcium carbonate accumulations; slightly alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay and greater than 35 percent sand

A horizon

Hue: 5YR, 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 4

B horizon

Hue: 5YR, 7.5YR or 10YR
Value: 3 to 6 dry, 3 to 5 moist
Chroma: 2 to 6

C or Bk horizon

Hue: 7.5YR or 10YR
Value: 5 to 7 dry, 4 to 6 moist
Chroma: 3 to 6

Fragua Series

Map units: 314, 322
Depth class: deep and very deep
Drainage class: well drained
Landform: fan remnants and dipslopes
Parent material: eolian material and fan alluvium derived from sandstone
Elevation: 5,600 to 7,400 feet (1,707 to 2,256 meters)
Slope: 1 to 70 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Coarse-loamy, mixed, mesic Aridic Haplustalfs

Typical Pedon

Fragua loamy sand, in an area of mapping unit 314, Fragua-Waumac-Royosa complex, 1 to 8 percent slopes; Sandoval County; Jemez Pueblo Quadrangle; 4 miles northeast of Zia Pueblo; 1,310 feet west and 760 feet north of the southeast corner of sec. 7, T. 15 N., R. 3 E. NAD 83, UTM 13—03 49 686 E—39 33 977 N.

A—0 to 3 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots; slightly alkaline; clear smooth boundary.

Bt1—3 to 8 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and few very fine roots; common thin clay films on faces of peds; slightly alkaline; gradual wavy boundary.

Bt2—8 to 24 inches; brown (7.5YR 5/6) sandy loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; hard, friable, nonsticky and nonplastic; few fine roots; few thin clay films on faces of peds; slightly alkaline; clear wavy boundary.

C—24 to 60 inches; brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; slightly alkaline.

Range in Characteristics

Particle-size control section: 10 to 18 percent clay
Depth to bedrock: 40 to more than 60 inches

A horizon
Hue: 7.5YR or 10YR
Value: 5 or 6 dry, 3 or 5 moist
Chroma: 3 or 4 dry, 2 to 4 moist
Texture: loamy sand or very cobbly fine sandy loam

Bt horizon
Hue: 5YR to 10YR
Value: 4 or 6 dry, 3 to 5 moist
Chroma: 4 to 6
Texture: sandy loam, fine sandy loam, or very fine sandy loam

Bk or C horizon
Hue: 7.5YR or 10YR
Value: 5 to 7 dry, 3 to 6 moist
Chroma: 4 to 8 dry, 4 or 6 moist
Texture: loamy fine sand, fine sandy loam, or sandy loam

Frijoles Series

Map unit: 185
Depth class: very deep
Drainage class: well drained
Landform: summits of mesas
Parent material: eolian material and alluvium derived from pumice
Elevation: 6,000 to 7,000 feet (1,829 to 2,134 meters)
Slope: 1 to 8 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Loamy-skeletal over fragmental, mixed, mesic Aridic Haplustalfs

Typical Pedon

Frijoles very fine sandy loam, in an area of mapping unit 185, Frijoles very fine sandy loam, 1 to 8 percent slopes; Los Alamos County; Frijoles Quadrangle; unsectionized; NAD 83, UTM 13—03 83 492 E—39 62 785 N.

A—0 to 3 inches; brown (10YR 5/3) very fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine vesicular pores; neutral; abrupt smooth boundary.
Bt1—3 to 8 inches; brown (7.5YR 4/4) very gravelly clay loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; many fine roots; many fine vesicular pores; thin discontinuous clay films on faces of peds; 35 percent fine pumice gravel; neutral; clear smooth boundary.
Bt2—8 to 13 inches; brown (7.5YR 5/4) very gravelly clay loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, sticky and plastic; many fine roots; many fine vesicular pores; thin discontinuous clay films on faces of peds; 45 percent fine pumice gravel; neutral clear smooth boundary.
2C1—13 to 20 inches; pinkish gray (7.5YR 7/2) extremely gravelly sandy loam, pinkish gray (7.5YR 6/2) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine roots; 70 percent pumice gravel; neutral; clear wavy boundary.
3C2—20 to 60 inches; pinkish white (7.5YR 8/2) pumice gravel, pinkish gray (7.5YR 7/2) moist; few fine roots; strong brown (7.5YR 5/6) lamella; few fine thin discontinuous clay films within the lamella.

Range in Characteristics

Particle-size control section: 27 to 35 percent clay
Depth to contrasting particle-size: 15 to 30 inches

A horizon
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 2 or 3

Bt horizon
Value: 4 to 6 dry, 3 or 4 moist
Chroma: 4 or 6

Galisteo Series

Map units: 92, 130, 226
Depth class: very deep
Drainage class: well drained
Landform: stream terraces and alluvial fans
Parent material: stream alluvium derived from mixed sources
Elevation: 5,500 to 7,000 feet (1,676 to 2,134 meters)
Slope: 0 to 3 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 50 to 54 degrees F. (10.0 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine, mixed, calcareous, mesic Ustic Torriorthents

Typical Pedon

Galisteo silty clay loam, in an area of mapping unit 92, Galisteo silty clay loam, moderately saline, sodic, 0 to 1 percent slopes; Sandoval County; San Ysidro Quadrangle; on the west edge of San Ysidro between old and new highway; unsectionized; NAD 83, UTM 13—03 38 222 E—39 35 960 N.

Ap—O to 12 inches; reddish brown (2.5YR 4/4) silty clay loam, dark reddish brown (2.5YR 3/4) moist; massive; hard, firm, very sticky and very plastic; common fine and medium roots; strongly effervescent; strongly alkaline; clear smooth boundary.
C—12 to 60 inches; reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; massive; very hard, extremely firm, very sticky and very plastic; few fine and very fine roots; strongly effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 35 to 59 percent clay
Salinity: EC of 8 to 16
Sodicity: SAR of 5 to 30

A horizon
Hue: 2.5YR to 7.5YR
Value: 4 to 6 dry and 3 to 5 moist
Chroma: 2 to 4 dry and moist
Texture: loam, clay loam, and silty clay loam

C horizon
Hue: 2.5YR to 7.5YR
Value: 4 to 6 dry and 3 to 5 moist
Chroma: 2 to 4 dry and moist
Texture: silty clay loam and clay

Gilco Series

Map units: 20, 25, 421, 423, 823
Depth class: very deep
Drainage class: moderately well drained
Landform: flood plains
Parent material: stream alluvium derived from mixed sources
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Slope: 0 to 4 percent
Climatic data:
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Taxonomic class: Coarse-loamy, mixed, calcareous, mesic Typic Torrifluvents

Typical Pedon

Gilco loam, in an area of mapping unit 25, Gilco loam, 0 to 1 percent slope; Sandoval County; Santo Domingo Pueblo Quadrangle; in Pena Blanca area; unsectionized; NAD 83, UTM 13—03 78 027 E—39 35 759 N.

Ap—0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—4 to 34 inches; light yellowish brown (10YR 6/4) stratified silt loam, loam, and fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—34 to 60 inches; light yellowish brown (10YR 6/4) stratified loam and fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine roots; strongly effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 10 to 18 percent clay
Salinity: EC of 0 to 16
Sodium: SAR less than 13

A Horizon
Hue: 10YR or 7.5YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 2 to 4
Texture: loam or clay loam

C Horizon
Hue: 10YR or 7.5YR
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 2 to 4
Texture: very fine sandy loam, fine sandy loam, silt loam, or loam

Note: The Gilco soil in mapping unit 421 Gilco loam, moderately saline, sodic, 0 to 1 percent slopes, has higher sodium absorption ratios than is typical for the Gilco Series and is considered a taxadjunct to the series.

Grieta Series

Map units: 142, 145
Depth class: very deep
Drainage class: well drained
Landform: fan remnants, mesas, plateaus, and ridges
Parent material: eolian material and fan alluvium derived from mixed sources
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Slope: 1 to 5 percent
Climatic data:
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Taxonomic class: Fine-loamy, mixed, mesic Typic Haplargids

Typical Pedon

Grieta loamy fine sand, in an area of mapping unit 145, Grieta-Sheppard loamy fine sands, 2 to 9 percent slopes; Sandoval County; Arroyo de las Calabacillas Quadrangle; about 6 miles northwest of Rio Rancho and 450 feet north and 720 feet east of the southwest corner of sec. 20, T. 13 N., R. 2 E. NAD 83, UTM 13—03 40 104 E—39 11 426 N.

A—0 to 7 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few fine and few very fine roots; slightly alkaline; clear smooth boundary.

Bt1—7 to 14 inches; yellowish brown (7.5YR 5/4) sandy clay loam, dark yellowish brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and common very fine roots; common thin clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bt2—14 to 21 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine very fine roots; 5 percent gravel; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk1—21 to 38 inches; light yellowish brown (10YR 6/4) coarse sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; 10 percent gravel; strongly effervescent; few fine irregularly shaped masses and thin coatings of calcium carbonate on undersides of coarse fragments; moderately alkaline; clear smooth boundary.

Bk2—38 to 50 inches; white (10YR 8/2) coarse sandy loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, slightly sticky and nonplastic; 2 percent gravel; violently effervescent; calcium carbonate as coatings on sand grains and as common fine irregularly shaped masses; moderately alkaline; gradual smooth boundary.

Bk3—50 to 60 inches; very pale brown (10YR 7/4) coarse sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; 3 percent gravel; strongly effervescent; calcium carbonate as few fine irregularly shaped masses; moderately alkaline.

Range in Characteristics

Particle-size control section: 18 t0 35 percent clay and greater than 35 percent sand
Depth to calcic horizon: 20 to 40 inches

A horizon
Hue: 5YR, 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 to 6
Texture: loamy fine sand or fine sandy loam

Bt horizon
Hue: 5YR, 7.5YR or 10YR
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 3 to 6
Texture: fine sandy loam or sandy clay loam

Bk horizon
Hue: 7.5YR or 10YR
Value: 5 to 8 dry, 4 to 6 moist
Chroma: 2 to 6
Texture: coarse sandy loam, sandy clay loam or loamy sand

Guaje Series

Map unit: 504
Depth class: very deep
Drainage class: well drained
Landform: basalt-capped mesas, hills, and volcanic cones
Parent material: basalt, volcanic ash, and pumice
Elevation: 6,000 to 7,000 feet (1,829 to 2,134 meters)
Slope: 1 to 8 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Medial-skeletal, mesic Aridic Ustochrepts

Typical Pedon

Guaje gravelly sandy loam, in an area of mapping unit 504, Orejas-Guaje complex, 1 to 15 percent slopes; Sandoval County; Cochiti Dam Quadrangle; about 2 miles east of the Witt Peak recreation area boat dock; unsectionized; NAD 83, UTM 13—03 85 099 E—39 44 994 N.

A—0 to 4 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 4/3) moist; weak medium granular structure; soft, very friable, slightly sticky and nonplastic; many fine and very fine medium roots; common fine interstitial pores; 20 percent fine pumice gravel; slightly effervescent; slightly alkaline; clear smooth boundary.

Bw—4 to 12 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and common very fine roots; few fine interstitial pores; 10 percent cobbles and 20 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.

Bk1—12 to 17 inches; very pale brown (10YR 7/4) very gravelly sandy loam, light yellowish brown (10YR 6/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; 5 percent cobbles and 55 percent gravel; slightly effervescent; calcium carbonate as common fine soft masses and as coatings on coarse fragments; moderately alkaline; clear wavy boundary.

Bk2—17 to 45 inches; white (N 8/0) and very pale brown (10YR 8/3) extremely gravelly sandy loam, light gray (10YR 7/2) and very pale brown (10YR 7/3) moist; massive; hard, firm, nonsticky and nonplastic; weakly cemented; few fine roots; few fine tubular pores; strongly effervescent; calcium carbonate and siliceous material dominant throughout entire horizon causing 90 percent weak cementation, interrupted only by fractures less than 3 mm wide and less than 4 inches apart; 5 percent cobbles and 60 percent gravel; moderately alkaline; diffuse irregularly boundary.

Bk3—45 to 60 inches; very pale brown (10YR 7/3) very gravelly sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; 5 percent cobbles and 50 percent gravel; strongly effervescent; calcium carbonate disseminated throughout and engulfing coarse fragments; moderately alkaline.

Range in Characteristics

Particle-size control section: 5 to 15 percent clay
Depth to the weakly cemented horizon: 12 to 26 inches

A horizon
Hue: 7.5YR or 10YR
Value: 5 to 7 dry, 3 to 5 moist
Chroma: 2 to 4

B horizons
Hue: 7.5YR or 10YR
Value: 5 to 8 dry, 4 to 7 moist
Chroma: 0 to 4
Texture: gravelly, very gravelly, and extremely gravelly sandy loams

Hackroy Series

Map units: 21, 162
Depth class: very shallow to shallow
Drainage class: well drained
Landform: summits of mesas and plateaus
Parent material: residuum from tuff
Elevation: 6,000 to 7,200 feet (1,829 to 2,195 meters)
Slope: 1 to 8 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Clayey, mixed, mesic Lithic Haplustalfs

Typical Pedon

Hackroy sandy loam, in an area of mapping unit 162, Hackroy-Nyjack association, 1 to 5 percent slopes; Los Alamos County; White Rock Quadrangle; on the east end of Ancho Canyon Trail; unsectionized; NAD 83, UTM 13—03 87 647 E—39 61 208 N.

A—0 to 3 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; hard, friable, nonsticky and nonplastic; many fine roots; common fine tubular pores; slightly alkaline; abrupt smooth boundary.

Bt—3 to 13 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate fine prismatic structure; hard, firm, sticky and plastic; many fine roots; few very fine tubular pores; 3 percent gravel; continuous clay films on faces of peds; slightly alkaline; abrupt smooth boundary.
2R—13 inches; tuff.

Range in Characteristics

Particle-size control section: 35 to 50 percent clay
Depth to lithic contact: 8 to 20 inches

A horizon
Hue: 7.5YR or 10YR
Value: 4 or 6 dry, 2 to 4 moist
Chroma: 2 to 4

Bt1 horizon
Hue: 7.5YR or 5YR
Value: 3 to 6 dry, 3 or 4 moist
Chroma: 4 or 6, dry or moist

Hagerman Series

Map units: 227, 240
Depth class: moderately deep
Drainage class: well drained
Landform: hills, mesas and ridges
Parent material: eolian material and alluvium derived from sandstone
Elevation: 5,700 to 6,400 feet (1,737 to 1,951 meters)
Slope: 1 to 5 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine-loamy, mixed, mesic Ustollic Haplargids

Typical Pedon

Hagerman fine sandy loam, in an area of mapping unit 240, Penistaja-Hagerman association, 1 to 5 percent slopes; Sandoval County; Cabezon Peak Quadrangle; about 1.5 miles southeast of the Rio Puerco along the Gas Company of New Mexico pipeline; unsectionized; NAD 83, UTM 13—03 13 428 E—39 43 499 N.

A—0 to 2 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common medium and many fine roots; moderately alkaline; clear smooth boundary.
Bt—2 to 9 inches; brown (7.5YR 4/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic; common medium and many fine roots; thin continuous clay films on faces of peds; moderately alkaline; clear smooth boundary.
Btk—9 to 24 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few medium and many fine roots; few thin clay films on faces of peds; strongly effervescent; few fine accumulations of calcium carbonate; moderately alkaline; clear smooth boundary.
2R—24 inches; sandstone.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay
Depth to bedrock: 20 to 40 inches

A horizon
Hue: 5YR to 10YR
Value: 4 to 6 dry, 3 or 4 moist
Chroma: 2 to 6

Bt horizon
Hue: 7.5YR to 2.5YR
Value: 4 to 7 dry or moist
Chroma: 3 to 6

Btk horizon (when present)
Hue: 7.5YR to 2.5YR
Value: 6 to 8 dry, 5 to 8 moist
Chroma: 3 or 4

Harvey Series

Map units: 53, 54, 59, 65
Depth class: very deep
Drainage class: well drained
Landform: ridges, bajadas, mesas, and plateaus
Parent material: eolian material and fan alluvium derived from mixed sources
Elevation: 5,000 to 6,800 feet (1,524 to 2,073 meters)
Slope: 1 to 15 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine-loamy, mixed, mesic Ustollic Calciorthids

Typical Pedon

Harvey loam, in an area of mapping unit 59, Harvey-Ildefonso-La Fonda association, 3 to 15 percent slopes; Sandoval County; Sandia Park Quadrangle; about 1.8 miles west and 50 feet south along pipeline from Highway 14; unsectionized; NAD 83, UTM 13—03 83 907 E—39 00 604 N.

A—0 to 4 inches; pinkish gray (7.5YR 6/2) loam, brown (7.5YR 5/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots; violently effervescent; moderately alkaline; abrupt smooth boundary.

Bw—4 to 10 inches; pinkish gray (7.5YR 6/2) loam, brown (7.5YR 5/2) moist, weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

Bk1—10 to 18 inches; pinkish gray (7.5YR 7/2) clay loam, pink (7.5YR 7/4) moist; weak fine subangular blocky structure; hard, firm, sticky and plastic; few fine roots; violently effervescent; many filaments and threads of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—18 to 41 inches; pink (7.5YR 7/4) clay loam, pink (7.5YR 7/4) moist; weak medium angular blocky structure; hard, firm, sticky and plastic; few fine roots; violently effervescent; common filaments and threads of calcium carbonate; moderately alkaline; gradual smooth boundary.

C—41 to 60 inches; reddish yellow (7.5YR 6/6) sandy clay loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; violently effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay

A horizon
Hue: 2.5YR to 10YR
Value: 5 to 7 dry, 3 to 6 moist
Chroma: 2 to 6
Texture: fine sandy loam or loam

Bw horizon (when present)
Hue: 5YR, 7.5YR, or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 4
Texture: fine sandy loam, loam, or clay loam

Bk horizon
Hue: 2.5YR to 10YR
Value: 5 to 8 dry, 4 to 7 moist
Chroma: 0 to 6
Texture: sandy loam, loam, sandy clay loam, or clay loam

Hickman Series

Map unit: 23
Depth class: very deep
Drainage class: well drained
Landform: flood plains and valley floors
Parent material: stream alluvium derived from mixed sources
Elevation: 6,500 to 7,500 feet (1,981 to 2,286 meters)
Slope: 1 to 3 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Fine-loamy, mixed, calcareous, mesic Typic Ustifluvents

Typical Pedon

Hickman clay loam, 1 to 3 percent slopes, map unit 23; Sandoval County; Cuba Quadrangle; about 1/2 mile east of La Jara; about 2,100 feet west and 300 feet south of the northeast corner of sec. 33, T. 22 N., R. 1 W. NAD 83, UTM 13—03 24 826 E—39 96 568 N.

A—0 to 4 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; many very fine and fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C1—4 to 12 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; many very fine and few fine roots; strongly effervescent; slightly alkaline; clear smooth boundary.
C2—12 to 49 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; few fine and few very fine roots; strongly effervescent; slightly alkaline; clear smooth boundary.
C3—49 to 60 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine and few very fine roots; strongly effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay

A horizon
Hue: 2.5Y, 10YR or 7.5YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 3 or 4

C horizon
Hue: 2.5Y, 10YR or 7.5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 to 6

Ildefonso Series

Map units: 34, 56, 59, 64, 65, 210, 218
Depth class: very deep
Drainage class: well drained
Landform: hills, mesas, and fan terraces
Parent material: fan alluvium and colluvium derived from mixed sources
Elevation: 5,000 to 6,800 feet (1,524 to 2,073 meters)
Slope: 1 to 70 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Loamy-skeletal, mixed, mesic Ustollic Calciorthids

Typical Pedon

Ildefonso cobbly loam, in an area of mapping unit 59, Harvey-Ildefonso-La Fonda association, 3 to 15 percent slopes; Sandoval County; Sandia Park Quadrangle; about 1 mile west along pipeline from Highway 14 and the 0.5 mile north in the San Pedro Land Grant; unsectionized, NAD 83, UTM 13—03 85 342 E—38 99 611 N.

A—0 to 2 inches; brown (7.5YR 5/2) cobbly loam, dark brown (7.5YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots; 10 percent cobbles and 5 percent gravel; slightly effervescent; moderately alkaline; abrupt smooth boundary.
Bw1—2 to 8 inches; brown (7.5YR 5/2) very gravelly loam, dark brown (7.5YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, sticky and plastic; many fine and very fine roots; 10 percent cobbles and 40 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.

Bw2—8 to 13 inches; pale brown (10YR 6/3) very gravelly loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, friable, sticky and plastic; common very fine and medium roots; 15 percent cobbles and 40 percent gravel; violently effervescent; moderately alkaline; clear wavy boundary.

Bk1—13 to 32 inches; very pale brown (10YR 7/3) very cobbly sandy loam, light brown (7.5YR 6/4) moist; massive; hard, firm, sticky and plastic; few medium roots; 35 percent cobbles and 20 percent gravel; violently effervescent; many filaments and seams of calcium carbonate, and thick coatings of calcium carbonate on coarse fragments; moderately alkaline; clear wavy boundary.

Bk2—32 to 40 inches; very pale brown (10YR 7/3) very cobbly sandy loam, pink (7.5YR 7/4) moist; massive; hard, firm, sticky and plastic; few coarse roots; 35 percent cobbles and 20 percent gravel; violently effervescent; common filaments and seams of calcium carbonate, and thick coatings of calcium carbonate on coarse fragments; moderately alkaline; clear wavy boundary.

C—40 to 60 inches; very pale brown (10YR 7/3) extremely cobbly sand, light brown (7.5YR 6/4) moist; single grain; loose, nonsticky and nonplastic; 60 percent cobbles and 20 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 8 to 25 percent clay

A and Bw horizons
- *Hue:* 5YR, 7.5YR, 10YR
- *Value:* 4 to 6 dry, 3 or 4 moist
- *Chroma:* 2 to 6
- *Texture:* very stony loam, very cobbly loam, cobbly loam, gravelly sandy loam, and very gravelly sandy loam

Bk horizon
- *Hue:* 5YR, 7.5YR, 10YR
- *Value:* 5 to 8 dry, 4 to 7 moist
- *Chroma:* 1 to 4
- *Texture:* very cobbly loam, very cobbly sandy loam, very gravelly sandy loam, very stony loam, and extremely cobbly sand
- *Note:* This horizon is weakly cemented in some pedons.

Jarmillo Series

Map units: 302, 304
Depth class: very deep
Drainage class: well drained
Landform: stream terraces
Parent material: alluvium, colluvium, and lacustrine sediments derived from rhyolite and tuff
Elevation: 8,500 to 8,800 feet (2,591 to 2,682 meters)
Slope: 1 to 20 percent
Climatic data:
- *Mean annual precipitation:* 20 to 25 inches (508 to 635 millimeters)
- *Mean annual air temperature:* 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
- *Frost-free period:* 60 to 90 days

Taxonomic class: Coarse-loamy, mixed Pachic Haploborolls

Typical Pedon

Jarmillo loam, in an area of mapping unit 302, Tranquilar-Jarmillo complex, 1 to 8 percent slopes; Sandoval County; Valle San Antonio Quadrangle; about 6 miles northeast of La Cueva on the south side of the east-west fence in San Antonio Valley, and 450 feet west of the point where the fence intersects the road between San Antonio Valley and Sulphur Springs, Baca Location No. 1; unsectionized; NAD 83, UTM 13—03 55 699 E—39 81 078 N.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine, common very fine, and few medium roots; slightly acid; clear smooth boundary.

A2—4 to 13 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and few medium roots; slightly acid; clear smooth boundary.

AB—13 to 20 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; slightly acid; clear wavy boundary.

Bw1—20 to 26 inches; light brownish gray (10YR 6/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; neutral; gradual wavy boundary.

Bw2—26 to 36 inches; matrix of very pale brown (10YR 7/3) loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; lamellae (12) are 1/32 to 5/32 inch thick, brown (10YR 5/3) dry and dark brown (10YR 4/3) moist; few fine and medium roots; neutral; gradual wavy boundary.

Bw3—36 to 41 inches; matrix of light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; lamellae (5) are 1/16 to 1/4 inch thick, grayish brown (10YR 5/2) dry and dark grayish brown (10YR 4/2) moist; few very fine and medium roots; neutral; abrupt wavy boundary.

2Bw4—41 to 51 inches; white (2.5Y 8/2) clay loam, light yellowish brown (2.5Y 6/4) moist; moderate coarse prismatic structure; hard, firm, slightly sticky and plastic; organic stains on prism faces; neutral; abrupt wavy boundary.

3C—51 to 60 inches; white (2.5Y 8/2) very fine sandy loam, light yellowish brown (2.5Y 6/4) moist; massive; hard, firm, slightly sticky and slightly plastic; lamellae (1) 1/8 inch thick, grayish brown (10YR 5/2) dry and very dark grayish brown (10YR 3/2) moist; neutral; clear wavy boundary.

Range in Characteristics

Particle-size control section: 8 to 18 percent clay

A horizon
- *Hue:* 2.5Y or 10YR
- *Value:* 4 or 5 dry, 2 or 3 moist
- *Chroma:* 2 or 3
- *Texture:* silt loam or loam

B horizon
- *Hue:* 2.5Y or 10YR
- *Value:* 6 to 8 dry, 3 to 6 moist
- *Chroma:* 2 to 4
- *Texture:* fine sandy loam, loam, and clay loam

C horizon
Hue: 2.5Y or 10YR
Value: 6 to 8 dry, 5 to 7 moist
Chroma: 2 to 4
Texture: loam, very fine sandy loam, and sandy loam

Jarola Series

Map unit: 301
Depth class: very deep
Drainage class: poorly drained
Landform: stream terraces and valley floors
Parent material: stream alluvium derived from rhyolite, tuff, and pumice
Elevation: 8,400 to 8,600 feet (2,560 to 2,621 meters)
Slope: 1 to 5 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Fine-loamy, mixed, frigid Typic Argialbolls

Typical Pedon

Jarola silt loam, in an area of mapping unit 301, Vastine-Jarola silt loams, 0 to 5 percent slopes; Sandoval County; Bland Quadrangle; about 100 feet east of main road to headquarters and about 250 feet south of the Jemez River, Baca Location No. 1; unsectionized; NAD 83, UTM 13—03 65 529 E—39 67 968 N.

A—0 to 9 inches; grayish brown (10YR 5/2) silt loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; many fine and very fine roots; slightly acid; abrupt smooth boundary.
E—9 to 11 inches; light gray (10YR 6/1) silt loam, very dark gray (10YR 3/1) moist; weak thin platy structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; neutral; abrupt smooth boundary.
Bt1—11 to 17 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; many fine roots; many thick clay and organic coatings on faces of peds; neutral; clear smooth boundary.
Bt2—17 to 21 inches; gray (10YR 5/1) clay loam, dark gray (10YR 4/1) moist; moderate medium subangular blocky structure; very hard, very firm, sticky and plastic; few fine roots; common moderately thick organic and clay coatings on faces of peds; neutral; clear smooth boundary.
2C1—21 to 42 inches; grayish brown (10YR 5/2) gravelly sandy clay loam, dark grayish brown (10YR 4/2) moist; massive; hard, firm, sticky and plastic; few fine roots; 15 percent gravel; neutral; gradual smooth boundary.
2C2—42 to 60 inches; grayish brown (2.5Y 5/2) very gravelly sandy loam, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky and nonplastic; 40 percent gravel; neutral.

Range in Characteristics

Particle-size control section: 25 to 40 percent clay

A horizon
Value: 4 or 5 dry, 2 or 3 moist
Chroma: 1 or 2

E horizon
Value: 5 to 7 dry, 3 to 5 moist
Chroma: 1 or 2

B horizon
Hue: 10YR or 2.5Y
Chroma: 1 to 3
Texture: silty clay loam or clay loam

C horizon
Hue: 10YR or 2.5Y
Value: 5 to 7 dry, 4 to 6 moist
Chroma: 1 to 4

Jemez Series

Map units: 88, 163
Depth class: moderately deep
Drainage class: well drained
Landform: hills and interfluves of plateaus
Parent material: slope alluvium derived from tuff
Elevation: 7,000 to 8,800 feet (2,134 to 2,682 meters)
Slope: 1 to 15 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Fine-loamy, mixed Mollic Eutroboralfs

Typical Pedon

Jemez loam, in an area of mapping unit 88, Totavi-Jemez-Rock outcrop association, 0 to 15 percent slopes; Sandoval County; Redondo Peak Quadrangle; about 2 miles east of Redondo Campground, Baca Location No. 1; unsectionized; NAD 83, UTM 13—03 54 807 E—39 67 297 N.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; slightly alkaline; clear smooth boundary.
A2—6 to 13 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common medium roots; slightly alkaline; clear smooth boundary.
E—13 to 19 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common medium roots; slightly alkaline; clear smooth boundary.
Bt—19 to 27 inches; pink (7.5YR 7/4) sandy clay loam, brown (7.5YR 5/4) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; common thin discontinuous clay films on faces of peds; slightly alkaline; abrupt wavy boundary.
R—27 inches; tuff.

Range in Characteristics

Particle-size control section: 20 to 35 percent clay
Depth to lithic contact: 20 to 40 inches

A horizon
Hue: 10YR or 7.5YR
Value: 2 to 5 dry, 2 to 4 moist
Chroma: 1 to 4

E horizon (a lower A horizon in some pedons)
Hue: 10YR or 7.5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 4

Bt horizon
Hue: 5YR to 10YR
Value: 4 to 7 dry, 4 or 5 moist
Chroma: 2 to 6
Texture: clay loam or sandy clay loam
Note: 10YR colors occur in the upper part of the Bt horizon or as coatings on faces of peds.

Jocity Series

Map units: 417, 418
Depth class: very deep
Drainage class: moderately well drained
Landform: flood plains and alluvial fans
Parent material: stream alluvium derived from mixed sources
Elevation: 5,300 to 5,600 feet (1,615 to 1,707 meters)
Slope: 0 to 2 percent
Climatic data:
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Taxonomic class: Fine-loamy, mixed, calcareous, mesic Typic Torrifluvents

Typical Pedon

Jocity loam, 0 to 2 percent slope, map unit 417; on the Sandia Pueblo, Sandoval County; Bernalillo Quadrangle; 400 feet south and 450 feet east of the center of sec. 24, of T. 12 N., R. 3 E. NAD 83, UTM 13—03 56 572 E—39 02 182 N.

Ap—0 to 10 inches; brown (10YR 4/3) loam, dark yellowish brown (10YR 3/4) moist; massive; hard, friable, sticky, plastic; common very fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.
C1—10 to 26 inches; brown (10YR 4/3) silty clay loam, dark yellowish brown (10YR 3/4) moist; massive; very hard, firm, very sticky and plastic; common very fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.
C2—26 to 32 inches; yellowish brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; massive; very hard, friable, very sticky and plastic; few very fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.
C3—32 to 50 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; massive; very hard, friable, sticky and plastic; few very fine roots; violently effervescent; moderately alkaline; gradual smooth boundary.

C4—50 to 56 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; violently effervescent; strongly alkaline; abrupt smooth boundary.
C5—56 to 60 inches; light yellowish brown (10YR 6/4) loamy sand, yellowish brown (10YR 5/4) moist; loose, nonsticky and nonplastic; violently effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay

A horizon
Hue: 5YR, 7.5YR, 10YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 1 to 5, dry or moist
Texture: loam or clay loam

C horizon
Hue: 5YR, 7.5YR, 10YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 1 to 6, dry or moist
Texture: stratified, loamy sand, sandy loam, fine sandy loam, loam, silt loam, sandy clay loam, or clay loam

La Fonda Series

Map units: 55, 59
Depth class: very deep
Drainage class: well drained
Landform: fan terraces and fan piedmonts
Parent material: fan alluvium derived from mixed sources
Elevation: 6,000 to 6,800 feet (1,829 to 2,073 meters)
Slope: 1 to 7 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine-loamy, mixed, mesic Ustollic Camborthids

Typical Pedon

La Fonda loam, in an area of mapping unit 59, Harvey-Ildefonso-La Fonda association, 3 to 15 percent slopes; Sandoval County; Sandia Park Quadrangle; about 1.8 miles west along pipeline from Highway 14 and 700 feet north; unsectionized; NAD 83, UTM 13—03 85 343 E—38 99 641 N.

A—0 to 3 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and medium roots; common very fine irregular pores; violently effervescent; moderately alkaline; abrupt smooth boundary.
Bw1—3 to 7 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; many fine and very fine roots; common very fine irregular pores; violently effervescent; few fine calcium carbonate accumulations; moderately alkaline; clear smooth boundary.

Bw2—7 to 14 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine roots; common very fine irregular pores; violently effervescent; few fine calcium carbonate masses; moderately alkaline; clear smooth boundary.

Bw3—14 to 26 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; common very fine irregular pores; violently effervescent; few fine calcium carbonate masses; moderately alkaline; clear smooth boundary.

Bk1—26 to 42 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine irregular pores; violently effervescent; common fine soft calcium carbonate accumulations; moderately alkaline; clear smooth boundary.

Bk2—42 to 60 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine irregular pores; violently effervescent; common fine soft calcium carbonate masses; moderately alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay

A horizon
Hue: 2.5YR to 7.5YR
Value: 4 to 6 dry, 3 or 4 moist
Chroma: 3 or 4

Bw horizon
Hue: 2.5YR to 7.5YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 3 to 6

Bk and C horizons
Hue: 5YR or 7.5YR
Chroma: 3 or 4

Laventana Series

Map units: 601, 603
Depth class: deep
Drainage class: well drained
Landform: mountain slopes and pediments
Parent material: colluvium derived from andesite and granite
Elevation: 7,000 to 8,900 feet (2,134 to 2,713 meters)
Slope: 3 to 55 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Loamy-skeletal, mixed, Mollic Eutroboralfs

Typical Pedon

Laventana very cobbly loam in an area of mapping unit 603, Laventana-Mirand very cobbly loams, 15 to 55 percent slopes; Sandoval County; Bear Springs Peak

Quadrangle; about 2 miles northwest of Bear Springs Peak; NAD 83, UTM 13—03 56 588 E—39 51 074 N.

O—0 to 1 inch; forest litter.
A—1 inch to 4 inches; brown (10YR 4/3) very cobbly loam, dark brown (10YR 3/3) moist; moderate very thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; many very fine tubular pores; 2 percent stones, 35 percent cobbles, and 15 percent gravel; slightly acid; clear smooth boundary.
E—4 to 11 inches; light yellowish gray (10YR 6/2) gravelly silt loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine and a few fine, medium and coarse roots; common very fine and a few fine tubular pores; 5 percent cobbles and 20 percent gravel; slightly acid; clear smooth boundary.
Bt1—11 to 19 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 4/3) moist; strong medium subangular blocky structure parting to strong fine angular blocky; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; common thin clay films on faces of peds and in pores; 25 percent cobbles and 15 percent gravel; slightly acid; gradual smooth boundary.
Bt2—19 to 30 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 4/3) moist; strong very fine and medium angular blocky structure; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; common thin clay films on faces of peds and in pores; 10 percent cobbles and 40 percent gravel, slightly acid; gradual smooth boundary.
Bt3—30 to 50 inches; pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 4/3) moist; moderate medium angular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and in pores; 10 percent cobbles and 40 percent gravel; neutral; abrupt wavy boundary.
2R—50 inches; fractured andesite.

Range in Characteristics

Particle-size control section: 20 to 35 percent clay
Depth to bedrock: between 40 and 60 inches

A horizon
Value: 3 to 6 dry, 2 or 3 moist (when mixed to 7 inches the values are 5 or less dry)
Chroma: 2 or 3
Texture: gravelly sandy loam or very cobbly

E horizon
Value: 5 to 7 dry
Chroma: 2 or 3
Texture: very gravelly loam or gravelly silt loam

Bt horizons
Hue: 7.5YR or 10YR
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 3 to 6
Texture: very gravelly loam, very cobbly loam, or very gravelly sandy clay loam
Depth to the base of the Bt horizons: 40 inches or more

Lybrook Series

Map unit: 101
Depth class: very deep
Drainage class: well drained
Landform: stream terraces and valley floors
Parent material: stream alluvium derived from mixed sources
Elevation: 6,600 to 7,000 feet (2,012 to 2,134 meters)
Slope: 0 to 2 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Fine, mixed, calcareous, mesic Ustic Torriorthents

Typical Pedon

Lybrook clay loam in an area of map unit 101, Blancot-Lybrook association, 0 to 8 percent slopes; Sandoval County; Lybrook SE Quadrangle; about 15 miles south of Lybrook; 2,640 feet north and 2,640 feet east of the southwest corner of sec. 3, T. 21 N., R. 7 W. NAD 83, UTM 13—02 69 155 E—39 95 751 N.

A—0 to 1 inch; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; few very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.
C1—1 inch to 5 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; moderately alkaline; clear smooth boundary.
C2—5 to 21 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; massive; very hard, very firm, sticky and plastic; few very fine roots; moderately alkaline; clear gradual boundary.
C3—21 to 30 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.
C4—30 to 60 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; few fine roots; strongly effervescent; very strongly alkaline.

Range in Characteristics

Particle-size control section: 35 to 45 percent clay
Salinity: EC of 2 to 4
Sodicity: SAR of 13 to 30

A horizon
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 2 or 3

C horizon
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 2 through 4
Texture: clay loam or silty clay loam

Menefee Series

Map units: 17, 105, 129, 220, 324, 396, 422
Depth class: very shallow and shallow
Drainage class: well drained
Landform: hillslopes, mesas, and mountainsides
Parent material: colluvium and residuum derived from shale
Elevation: 5,700 to 7,800 feet (1,737 to 2,377 meters)
Slope: 2 to 45 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Loamy, mixed, calcareous, mesic, shallow Typic Ustorthents

Typical Pedon

Menefee clay loam, in an area of mapping unit 129, Menefee clay loam, 5 to 35 percent slopes; Sandoval County; Regina Quadrangle; about 1.5 miles north and 1.5 miles east of Regina; 50 feet east and 50 feet north of the center of sec. 22, T. 23 N., R. 1 W. NAD 83, UTM 13—03 26 573 E—40 08 671 N.

A—0 to 5 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and few fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.
C1—5 to 10 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; massive; hard, firm, sticky and plastic; few fine and medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.
C2—10 to 17 inches; light brownish gray (2.5Y 6/3) clay loam, grayish brown (2.5Y 5/3) moist; massive; hard, firm, sticky and plastic; few very fine and medium roots; strongly effervescent; very strongly alkaline; gradual irregular boundary.
2Cr—17 inches; soft calcareous shale.

Range in Characteristics

Depth to paralithic contact: 8 to 20 inches

A horizon
Hue: 10YR or 2.5Y
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 2 to 4
Texture: loam, clay loam, gravelly loam, or gravelly clay loam

C horizons
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 5

Mespun Series

Map unit: 180
Depth class: very deep
Drainage class: excessively drained
Landform: dunes
Parent material: eolian sands derived mainly from sandstone
Elevation: 6,600 to 7,000 feet (2,012 to 2,134 meters)

Slope: 5 to 30 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Mixed, mesic Ustic Torripsamments

Typical Pedon

Mespun loamy fine sand, in an area of mapping unit 180, Councelor-Eslendo-Mespun complex, 5 to 30 percent slopes; Sandoval County; Galisteo SE Quadrangle; about 17 miles south of Galisteo; 1,560 feet south and 2,400 feet east of the NW corner of sec. 29, T. 21 N., R. 7 W. NAD 27; UTM 13—02 65 728 E—39 89 688 N.

A—0 to 6 inches; light yellowish brown (10YR 6/4) loamy fine sand, yellowish brown (10YR 5/4) moist; weak fine granular structure; loose, nonsticky and nonplastic; few very fine roots; moderately alkaline; clear smooth boundary.
C—6 to 60 inches; brown (7.5YR 5/4) loamy sand, brown (7.5YR 4/4) moist; single grain, loose, nonsticky and nonplastic; few very fine roots; moderately alkaline.

Range in Characteristics

Particle-size control section: 3 to 8 percent clay

A horizon
Hue: 7.5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 to 6

C horizon
Hue: 7.5YR
Value: 4 to 7 dry, 3 to 6 moist
Chroma: 3 to 8

Mirand Series

Map units: 283, 603, 604
Depth class: very deep
Drainage class: well drained
Landform: mountain slopes and canyons
Parent material: colluvium derived from rhyolite and tuff
Elevation: 6,900 to 9,500 feet (2,103 to 2,896 meters)
Slope: 5 to 55 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Fine, mixed Mollic Eutroboralfs

Typical Pedon

Mirand loam, in an area of mapping unit 283, Mirand-Alanos complex, 5 to 40 percent slopes; Sandoval County; Valle San Antonio Quadrangle; in the upper end of Redondo Canyon, 20 feet south of gate leading from hot well area into Baca Location No. 1; unsectionized; NAD 83, UTM 13—03 58 447 E—39 73 092 N.

O—0 to 2 inches; decomposed organic matter from grasses and needles.

A—2 to 4 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; hard, very friable, sticky and plastic; few fine roots; 5 percent gravel; neutral; abrupt smooth boundary.
Bt1—4 to 9 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine roots; common thin clay films on faces of peds; 10 percent gravel; slightly acid; clear smooth boundary.
Bt2—9 to 15 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common fine and medium roots; many thick clay films on faces of peds; 15 percent gravel; neutral; clear smooth boundary.
Bt3—15 to 24 inches; yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, very sticky and very plastic; few fine roots; many thick clay films on faces of peds; 10 percent gravel; neutral; clear smooth boundary.
Bt4—24 to 45 inches; reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; moderate medium and coarse prismatic structure parting to moderate medium subangular blocky; extremely hard, firm, very sticky and very plastic; few very fine roots; many thick clay films on faces of peds; 10 percent gravel; slightly acid; abrupt wavy boundary.
2Bt5—45 to 60 inches; pink (7.5YR 7/4) clay loam, light brown (7.5YR 6/4) moist; common fine distinct strong brown (7.5YR 5/6) mottles; massive; very hard, firm, sticky and plastic; few medium roots; common thick clay film line pores; 10 percent gravel; very strongly acid.

Range in Characteristics

Particle-size control section: 35 to 55 percent clay

A horizon
Value: 3 to 5 dry, 2 or 3 moist
Chroma: 1 or 2
Texture: loam or very cobbly loam

Bt horizon
Hue: 5YR to 10YR
Value: 5 to 7 dry, 4 to 6 moist
Chroma: 3 to 6
Texture: clay loam, gravelly clay loam, sandy clay, clay, or cobbly clay

Montecito Series

Map units: 3, 4, 104
Depth class: very deep
Drainage class: well drained
Landform: hills, summits of mesas and plains
Parent material: eolian material and fan alluvium derived from sandstone and shale
Elevation: 6,000 to 7,600 feet (1,829 to 2,316 meters)
Slope: 1 to 30 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Fine, mixed, mesic Aridic Haplustalfs

Typical Pedon

Montecito loam, in an area of mapping unit 104, Cochiti-Montecito association, 1 to 30 percent slopes; Sandoval County; Canada Quadrangle; 10 miles northwest of Cochiti Pueblo; 2,400 feet north and 300 feet east of the center of sec. 2, T. 16 N., R. 4 E. NAD 83, UTM 13—03 65 540 E—39 46 249 N.

A—0 to 3 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; weak fine granular structure; slightly hard, friable, sticky and plastic; common medium roots; neutral; abrupt smooth boundary.

Bt1—3 to 9 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, very sticky and very plastic; few fine and very fine roots; many thick clay films on faces of peds; neutral; clear smooth boundary.

Bt2—9 to 15 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, very sticky and very plastic; few very fine roots; many thick clay films on faces of peds; slightly alkaline; clear smooth boundary.

Bt3—15 to 22 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; many thick clay films on faces of peds; moderately alkaline; abrupt wavy boundary.

2Bk1—22 to 37 inches; pinkish white (7.5YR 8/2) sandy loam, pink (7.5YR 7/4) moist; massive; soft, friable, slightly sticky and slightly plastic; few very fine roots; 10 percent gravel; violently effervescent; common weakly cemented calcium carbonate masses; moderately alkaline; gradual wavy boundary.

2Bk2—37 to 60 inches; pinkish white (7.5YR 8/2) gravelly sandy loam, pink (7.5YR 7/4) moist; massive; soft, friable, slightly sticky and slightly plastic; 25 percent gravel; violently effervescent; common weakly cemented calcium carbonate masses; moderately alkaline.

Range in Characteristics

Particle-size control section: 35 to 50 percent clay
Depth to the calcic horizon: 10 to 35 inches

A Horizon
Hue: 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 to 6
Texture: fine sandy loam, loam, or extremely bouldery loam

Bt Horizon
Hue: 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist.
Chroma: 3 to 6

Bk Horizon
Hue: 7.5YR or 10YR
Value: 6 to 8 dry, 5 to 8 moist
Chroma: 1 to 4
Texture: sandy loam, gravelly sandy loam, loam, or clay loam

Nyjack Series

Map unit: 162
Depth class: moderately deep
Drainage class: well drained
Landform: summits of mesas and plateaus
Parent material: eolian material and slope alluvium derived from tuff
Elevation: 6,000 to 7,000 feet (1,829 to 2,134 meters)
Slope: 1 to 5 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Fine-loamy, mixed, mesic Aridic Haplustalfs

Typical Pedon

Nyjack loam, in an area of mapping unit 162, Hackroy-Nyjack association, 1 to 5 percent slopes; Los Alamos County; Frijoles Quadrangle; about .5 mile east of LASL Administration Building, 2,000 feet west, 660 feet west, 660 feet south of the southwest corner of sec. 21, T. 19 N., R. 6 E. NAD 83, UTM 13—03 81 468 E—39 68 841 N.

A—0 to 3 inches; brown (10YR 5/3) loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; many vesicular pores; slightly acid; abrupt smooth boundary.
Bt1—3 to 13 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine medium roots; many vesicular pores; few thin clay films on faces of peds; neutral; clear smooth boundary.
Bt2—13 to 24 inches; brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; many fine tubular pores; thin discontinuous clay films on faces of peds; neutral; abrupt smooth boundary.
2C—24 to 39 inches; light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; 25 percent pumice gravel; neutral; abrupt smooth boundary.
Cr—39 inches; tuff bedrock.

Range in Characteristics

Particle-size control section: 27 to 35 percent clay
Depth to paralithic contact: 20 to 40 inches

A horizon
Hue: 7.5YR or 10YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 2 to 4, dry or moist

Bt horizons
Hue: 5YR to 10YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 3 to 6, dry or moist

Bt3 horizon (when present)
Hue: 5YR to 10YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 3 to 6, dry or moist

2C horizon
Hue: 5YR to 10YR
Value: 4 to 6 dry, 4 or 5 moist
Chroma: 3 or 4 dry

Orejas Series

Map units: 3, 100, 504
Depth class: shallow
Drainage class: well drained
Landform: mesas and plateaus
Parent material: eolian material, slope alluvium, and colluvium derived from basalt
Elevation: 6,000 to 7,600 feet (1,829 to 2,316 meters)
Slope: 1 to 40 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Clayey-skeletal, mixed, mesic Lithic Haplustalfs

Typical Pedon

Orejas cobbly loam, in an area of mapping unit 3, Montecito-Orejas complex, 1 to 7 percent slopes; Sandoval County; Cabezon Peak Quadrangle; on Mesa Prieta; 2,000 feet north and 350 feet east of the southwest corner of sec. 10, T. 15 N., R. 2 W. NAD 83, UTM 13—03 14 762 E—39 34 960 N.

A—0 to 2 inches; yellowish brown (10YR 5/4) cobbly loam, dark yellowish brown (10YR 3/4) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; 30 percent cobbles; slightly alkaline; abrupt smooth boundary.
Bt1—2 to 5 inches; brown (10YR 4/3) very cobbly clay loam, dark brown(10YR 3/3) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; common moderately thick clay films on faces of peds; 45 percent cobbles; neutral; clear smooth boundary.
Bt2—5 to 14 inches; dark yellowish brown (10YR 4/4) very cobbly clay loam, dark yellowish brown (10YR 3/4); moderate fine and medium subangular blocky structure; hard, firm, very sticky and very plastic; many thick clay films on faces of peds; 45 percent cobbles; moderately alkaline; clear smooth boundary.
Bt3—14 to 17 inches; brown (10YR 5/3) very cobbly clay loam, brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure; hard, firm, sticky and plastic; few moderately thick clay films on faces of peds; 45 percent cobbles; slightly effervescent; moderately alkaline; clear smooth boundary.
C—17 to 19 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; 10 percent cobbles and 30 percent gravel; violently effervescent; moderately alkaline; abrupt smooth boundary.
R—19 inches; basalt.

Range in Characteristics

Particle-size control section: 35 to 50 percent clay
Depth to bedrock: 10 to 20 inches

A horizon
Hue: 7.5YR or 10YR
Value: 5 or 6 dry, 3 or 4 moist
Chroma: 2 to 4
Texture: cobbly loam, very cobbly loamy, or very stony loam

Bt horizon
Hue: 7.5YR or 10YR
Value: 4 to 6 dry, 3 or 4 moist
Chroma: 2 to 4

C horizons
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 2 or 3
Texture: very gravelly clay loam or very cobbly clay loam

Origo Series

Map units: 74, 75
Depth class: very deep
Drainage class: well drained
Landform: mountain slopes
Parent material: slope alluvium and colluvium derived from rhyolite and tuff
Elevation: 8,600 to 10,000 feet (2,621 to 3,048 meters)
Slope: 15 to 65 percent
Climatic data:
Mean annual precipitation: 25 to 30 inches (635 to 762 millimeters)
Mean annual air temperature: 38 to 42 degrees F. (3.3 to 5.6 degrees C.)
Frost-free period: 45 to 60 days

Taxonomic class: Loamy-skeletal, mixed Psammentic Cryoboralfs

Typical Pedon

Origo very cobbly sandy loam, in an area of mapping unit 75, Origo very cobbly sandy loam, 35 to 65 percent slopes; Sandoval County; Valle San Antonio Quadrangle; about 7 miles north of La Cueva on the north side of Cerro Seco, Baca Location No. 1; NAD 83, UTM 13—03 58 587 E—39 80 079 N.

0—0 to 1 inch; leaves, needles, twigs, and bark.
A1—1 inch to 5 inches; gray (10YR 5/1) very cobbly sandy loam, very dark gray (10YR 3/1) moist; moderate fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; few coarse and many fine roots; 10 percent stones, 40 percent cobbles, and 5 percent gravel; slightly acid; clear smooth boundary.
A2—5 to 11 inches; light brownish gray (10YR 6/2) very cobbly sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many fine, medium roots and common coarse roots; 10 percent stones, 40 percent cobbles, and 5 percent gravel; neutral; gradual smooth boundary.
E—11 to 31 inches; very pale brown (10YR 7/3) very cobbly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and nonplastic; many fine and common medium roots; 10 percent stones, 40 percent cobbles, and 5 percent gravel; neutral; gradual wavy boundary.
Bt1—31 to 55 inches; very pale brown (10YR 7/3) very cobbly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; (lamellae are 1/4 to 1 inch thick and comprise about 7 inches of the horizon; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist;) massive; slightly hard, friable, slightly sticky and slightly plastic; few coarse medium roots;) clay films on sand grains and clay bridging sand grains in

lamellae; 10 percent stones and 40 percent cobbles; very strongly acid; gradual wavy boundary.

Bt2—55 to 60 inches; white (10YR 8/2) very cobbly loamy sand, very pale brown (10YR 7/3) moist; massive; slightly hard, firm, nonsticky and nonplastic; (lamellae are 1/4 to 1 inch thick; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; clay films on sand grains and clay bridging sand grains;) few coarse and medium roots; 10 percent stones and 40 percent cobbles; very strongly acid.

Range in Characteristics

Particle-size control section: 5 to 20 percent clay

A horizon
Value: 5 or 6 dry, 3 to 5 moist
Chroma: 1 to 3

E horizon
Hue: 7.5YR or 10YR
Value: 7 or 8 dry, 5 to 7 moist
Chroma: 1 to 4
Texture: extremely cobbly sandy loam and very cobbly sandy loam

Bt horizon
Hue: 10YR or 7.5YR
Value: 5 to 8 dry, 5 to 7 moist
Chroma: 2 to 4
Texture: very cobbly loamy sand, very cobbly sandy loam, and extremely cobbly sandy loam
Depth to the Bt horizon: 18 to 34 inches

Bt lamellae
Hue: 7.5YR or 10YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 3 or 4
Texture: sandy loam and sandy clay loam

Orlie Series

Map units: 24, 26, 422
Depth class: very deep
Drainage class: well drained
Landform: dipslopes of cuestas, mesas, hills, and valley sides
Parent material: eolian material and fan alluvium derived from sandstone and shale
Elevation: 6,100 to 7,500 feet (1,859 to 2,286 meters)
Slope: 0 to 8 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Fine-loamy, mixed, mesic Aridic Haplustalfs

Typical Pedon

Orlie loam, in an area of mapping unit 26, Orlie loam, 0 to 8 percent slopes; Sandoval County; Jarosa Quadrangle; 6 miles west of the continental divide along the boundary

of the Jicarilla Indian Reservation; 1,075 feet south and 700 feet west of the northeast corner of sec. 6, T. 21 N., R. 3 E. NAD 83, UTM 13—03 51 252 E—39 94 408 N.

A—0 to 2 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; few coarse and common fine roots; moderately alkaline; clear smooth boundary.

Bt1—2 to 13 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots; few thin clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bt2—13 to 22 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; few thin clay films on faces of peds; slightly effervescent; moderately alkaline; clear smooth boundary.

C1—22 to 36 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; massive; hard, firm, sticky and plastic; few very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

C2—36 to 50 inches; brown (7.5YR 5/4) clay loam, brown (10YR 5/3) moist; massive; hard, firm, sticky and plastic; few very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

C3—50 to 60 inches; pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; few fine roots; slightly effervescent; moderate alkaline.

Range in Characteristics

Particle-size control section: 27 to 35 percent clay

A horizon
- *Hue:* 7.5YR or 10YR
- *Value:* 4 to 6 dry, 3 to 5 moist
- *Chroma:* 2 to 4
- *Texture:* fine sandy loam or loam

Bt horizon
- *Hue:* 5YR, 7.5YR or 10YR
- *Value:* 4 to 6 dry, 3 to 5 moist
- *Chroma:* 3 to 6
- *Texture:* clay loam or silty clay loam

C or Bk horizons (when present)
- *Hue:* 7.5YR or 10YR
- *Value:* 4 or 6 dry, 3 or 5 moist
- *Chroma:* 3 or 4 dry, 3 to 6 moist
- *Texture:* sandy clay loam, clay loam, or silty clay loam

Osha Series

Map units: 500, 608
Depth class: deep
Drainage class: somewhat excessively drained
Landform: mountain slopes and ridges
Parent material: colluvium and residuum derived from granite
Elevation: 7,000 to 9,000 feet (2,134 to 2,743 meters)
Slope: 3 to 70 percent

Climatic data:

Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Loamy-skeletal, mixed Typic Haploborolls

Typical Pedon

Osha gravelly coarse sandy loam, in an area of mapping unit 608, Osha association, 3 to 55 percent slopes; Sandoval County; San Miquel Mountain Quadrangle; about 6 miles east and 2 miles south of Laventana; NAD 83, UTM 13—03 31 585 E—39 62 960 N.

A—0 to 3 inches; very dark gray (10YR 3/1) gravelly coarse sandy loam, (10YR 2/1) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; common very fine tubular pores; 20 percent gravel; neutral; clear smooth boundary.

AB—3 to 8 inches; grayish brown (10YR 5/2) gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and medium and few coarse roots; many very fine tubular pores; 20 percent gravel; slightly acid; clear smooth boundary.

Bw—8 to 16 inches; light brown (7.5YR 6/4) gravelly coarse sandy loam, dark yellowish brown (10YR 3/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and common medium roots; many very fine tubular pores; 20 percent gravel; neutral; clear smooth boundary.

Ct1—16 to 32 inches; strong brown (7.5YR 5/6) extremely gravelly coarse sandy loam, strong brown (7.5YR 4/6) moist; massive; weathered granite has retained the original shape and relative position of the altered minerals; fractures between mineral grains that are less than 1 inch apart; hard, firm, nonsticky and nonplastic; many very fine roots; common moderately thick clay films on mineral grains; 75 percent gravel; neutral; diffuse wavy boundary.

Ct2—32 to 60 inches; reddish yellow (7.5YR 6/6) extremely gravelly loamy coarse sand, strong brown (7.5YR 5/6) moist; massive; consolidated rock structure; weathered granite has retained the original shape and relative position of the altered minerals; fractures between mineral grains are 0.5 to 2.5 inches apart; hard, friable, nonsticky and nonplastic; common very fine roots; few moderately thick clay films on mineral grains; 80 percent gravel; neutral.

Range in Characteristics

Particle-size control section: 6 to 12 percent clay
Depth to granite (lithic) contact: 40 to 60 inches, and deeper in some pedons

A horizon

Hue: 7.5YR or 10YR
Value: 3 to 5 dry, 2 or 3 moist
Chroma: 1 to 3
Texture: gravelly coarse sandy loam and very gravelly coarse sandy loam

B or C horizon

Hue: 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 to 6
Texture: gravelly coarse sandy loam, very gravelly coarse sandy loam, extremely gravelly coarse sandy loam, or extremely gravelly loamy coarse sand

Palon Series

Map units: 71, 72
Depth class: very deep
Drainage class: well drained
Landform: mountain slopes
Parent material: slope alluvium and colluvium derived mainly of rhyolite
Elevation: 8,500 to 9,500 feet (2,591 to 2,896 meters)
Slope: 15 to 65 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Loamy-skeletal, mixed Psammentic Eutroboralfs

Typical Pedon

Palon very cobbly sandy loam; 35 to 65 percent slopes, map unit 72; Sandoval County; Valle San Antonio Quadrangle; about 5 miles north of La Cueva on the south side of Cerro Seco, Baca Location No. 1; NAD 83, UTM 13—03 58 417 E—39 78 037 N.

Oi—0 to 2 inches; leaves, needles, twigs, and bark.
A1—2 to 4 inches; dark gray (10YR 4/3) very cobbly sandy loam, very dark gray (10YR 3/1) moist; moderate fine and medium granular structure; soft, very friable, slightly sticky and nonplastic; many fine and very fine roots and common medium roots; 10 percent stones, 30 percent cobbles, and 5 percent gravel; neutral; abrupt smooth boundary.
A2—4 to 10 inches; light brownish gray (10YR 6/2) extremely cobbly sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium granular structure; soft, very friable, slightly sticky and nonplastic; many fine and very fine roots and common medium roots; 20 percent stones, 40 percent cobbles, and 10 percent gravel; neutral; clear wavy boundary.
E—10 to 32 inches; light gray (10YR 7/2) extremely cobbly sandy loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many medium, common fine, and few coarse roots; 20 percent stones, 45 percent cobbles, and 5 percent gravel; neutral; abrupt wavy boundary.
Bt1—32 to 53 inches; pink (7.5YR 7/4) very cobbly sandy loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; (lamellae are 1/4 to 1 inch thick; total thickness of lamellae is 6 inches or more; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; clay bridging sand grains;) few fine and medium roots; 15 percent stones, 35 percent cobbles, and 5 percent gravel; neutral; gradual wavy boundary.
Bt2—53 to 60 inches; pink (7.5YR 7/4) very cobbly sandy loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; (lamellae are 1/4 to 1 inch thick; total thickness is 6 inches or more; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; clay bridging sand grains;) few fine roots; 10 percent stones, 30 percent cobbles, and 5 percent gravel; neutral.

Range in Characteristics

Particle-size control section: 10 to 25 percent clay

A horizon
Value: 4 to 6 dry, 2 to 4 moist
Chroma: 1 to 3
Texture: cobbly sandy loam, very cobbly sandy loam, or extremely cobbly sandy loam

E horizon
Hue: 7.5YR or 10YR
Value: 6 to 8 dry, 4 to 7 moist
Chroma: 2 to 6
Texture: very cobbly sandy loam or extremely cobbly sandy loam

Bt horizon
Hue: 7.5YR or 10YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 2 to 6
Texture: very cobbly sandy loam or extremely cobbly sandy loam

Pastura Series

Map unit: 262
Depth class: very shallow to shallow
Drainage class: well drained
Landform: sideslopes of hills and mesas
Parent material: residuum derived from limestone
Elevation: 5,400 to 5,800 feet (1,646 to 1,768 meters)
Slope: 1 to 4 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 140 to 150 days

Taxonomic class: Loamy, mixed, mesic, shallow Ustollic Paleorthids

Typical Pedon

Pastura loam, in an area of mapping unit 262, Pastura loam, 1 to 4 percent slopes; Sandoval County; San Felipe Mesa Quadrangle; about 4 miles northwest of Placitas and 100 feet east and 2,640 feet south of the northwest corner of sec. 20, T. 13 N., R. 1 W. NAD 83, UTM 13—03 20 663 E—39 12 515 N.

A—0 to 3 inches; light yellowish brown (10YR 6/4) loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; moderately alkaline; abrupt smooth boundary.
Bw—3 to 10 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; 15 percent gravel; moderately alkaline; clear smooth boundary.
Bk—10 to 14 inches; very pale brown (10YR 7/4) gravelly loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; few fine and very fine roots; 15 percent gravel; moderately alkaline; abrupt wavy boundary.
Bkm—14 inches; indurated petrocalcic broken into plates 3 to 12 inches horizontally and 2 to 4 inches vertically.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay
Depth to petrocalcic horizon: 5 to 20 inches

A horizon
Hue: 5YR to 10YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 2 to 6

Bw horizon (or Bk horizon where present)
Hue: 5YR to 10YR
Value: 4 to 7 dry, 4 to 6 moist
Chroma: 2 to 6

Note: A Bkm horizon, which consists of a series of strongly cemented to indurated petrocalcic horizons, may be present beneath the uppermost-indurated horizon. These layers range in thickness from 6 to 36 inches separated by gravelly and cobbly soil material.

Pavo Series

Map unit: 74
Depth class: very deep
Drainage class: well drained
Landform: mountain slopes
Parent material: colluvium derived mainly from tuff and pumice
Elevation: 8,600 to 10,000 feet (2,621 to 3,048 meters)
Slope: 5 to 20 percent
Climatic data:
Mean annual precipitation: 25 to 30 inches (635 to 762 millimeters)
Mean annual air temperature: 38 to 42 degrees F. (3.3 to 5.6 degrees C.)
Frost-free period: 45 to 60 days

Taxonomic class: Fine-loamy, mixed Cryic Paleborolls

Typical Pedon

Pavo loam, in an area of mapping unit 74, Origo-Pavo association, 5 to 35 percent slopes; Sandoval County; Valle San Antonio Quadrangle; about 1 mile south of hot springs in the San Antonio Valley, Baca Location No. 1; unsectionized; NAD 83, UTM 13—03 58 992 E—39 80 935 N.

A1—0 to 9 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; slightly acid; clear wavy boundary.

A2—9 to 12 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; 5 percent cobbles and 5 percent gravel; neutral; clear wavy boundary.

E—12 to 25 inches; very pale brown (10YR 7/3) sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine roots; 10 percent gravel; neutral; clear wavy boundary.

E/Bt1—25 to 35 inches; very pale brown (10YR 7/3) sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; (lamellae are .4 to .7 inch thick and total 1.5 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; slightly hard, friable, slightly

sticky and slightly plastic; clay films on sand grains and clay bridges between grains in lamellae;) 5 percent gravel; neutral; clear wavy boundary.

E/Bt2—35 to 45 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; (lamellae are about .5 inch thick and total about 5 inches yellowish brown (10YR 5/4) sandy clay loam, brown (10YR 4/3) moist; hard, friable, slightly sticky and slightly plastic; clay films on sand grains and clay bridges between grains in lamellae;) 5 percent gravel; neutral; clear smooth boundary.

2Bt1—45 to 50 inches; brown (7.5YR 5/4) gravelly clay loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; thick continuous clay films on coarse fragments; 30 percent gravel; slightly acid; clear smooth boundary.

3Bt2—50 to 60 inches; very pale brown (10YR 7/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; clay films on sand grains and clay bridges between grains; 9 percent cobbles and 5 percent gravel; neutral.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay
Argillic horizon: greater than 24 inches deep and composed mainly of lamellae thicker than 1 cm

A horizon
Value: 4 or 5 dry, 2 or 3 moist
Chroma: 2 or 3
Texture: loam or sandy loam

E horizon
Hue: 7.5YR or 10YR
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 3 or 4
Texture: sandy loam or fine sandy loam

Bt horizon
Hue: 5YR to 10YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 3 or 4
Texture: sandy loam, fine sandy loam, or sandy clay loam

2 and 3Bt horizons
Hue: 5YR to 10YR
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 3 or 4
Texture: gravelly clay loam or sandy loam

Penistaja Series

Map units: 68, 207, 240
Depth class: very deep
Drainage class: well drained
Landform: alluvial fans, bajadas, cuestas, hills, mesas, and plateaus
Parent material: eolian material and fan alluvium derived from sandstone and shale
Elevation: 5,400 to 6,400 feet (1,646 to 1,951 meters)
Slope: 1 to 7 percent

Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine-loamy, mixed, mesic Ustollic Haplargids

Typical Pedon

Penistaja loamy fine sand, in an area of mapping unit 68, Penistaja-Querencia complex, 2 to 7 percent slopes; Sandoval County; about 4 miles east of Marquez; 700 feet north and 2,100 feet west of the southeast corner of sec. 24, T. 12 N., R. 2 W.

A—0 to 2 inches; light yellowish brown (10YR 6/4) loamy fine sand, yellowish brown (10YR 5/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; slightly alkaline; abrupt smooth boundary.
Bt—2 to 15 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots; common moderately thick clay films on faces of peds; slightly alkaline; clear smooth boundary.
Btk—15 to 27 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; few thin clay films on faces of peds; slightly effervescent; slightly alkaline; clear smooth boundary.
Bk—27 to 38 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; few fine roots; slightly effervescent; few fine calcium carbonate accumulations; moderately alkaline; gradual smooth boundary.
C—38 to 60 inches; light yellowish brown (10YR 6/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, sticky and plastic; slightly effervescent; slightly alkaline.

Range in Characteristics

Particle-size control section: 20 to 35 percent clay

A horizon
Hue: 5YR to 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 6
Texture: loamy fine sand, fine sandy loam, and very fine sandy loam

Bt horizon
Hue: 5YR or 7.5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 to 6
Texture: sandy clay loam or clay loam

Bk and C horizons
Hue: 5YR to 10YR
Value: 4 to 8 dry, 3 to 7 moist
Chroma: 3 to 6
Texture: loam, fine sandy loam, loam, or sandy clay loam

Peralta Series

Map units: 433, 434, 437, 835, 842
Depth class: very deep
Drainage class: somewhat poorly drained

Landform: flood plains
Parent material: stream alluvium derived from mixed sources
Elevation: 5,000 to 5,500 feet (1,524 to 1,676 meters)
Slope: 0 to 3 percent
Climatic data:
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Taxonomic class: Coarse-loamy, mixed, calcareous, mesic Typic Ustifluvents

Typical Pedon

Peralta loam, in an area of mapping unit 434, Peralta loam, 1 to 3 percent slopes; Sandoval County; Bernalillo Quadrangle; about 1.5 miles northwest of the Sandia Pueblo; 300 feet south and 1,980 feet east of the northwest corner of sec. 13, T. 12 N., R. 3 E. NAD 83, UTM 13—03 56 360 E—39 04 486 N.

Ap—0 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; massive; hard, firm, sticky and slightly plastic; many fine and very fine roots; strongly effervescent; slightly alkaline; abrupt smooth boundary.
C1—10 to 16 inches; brown (7.5YR 5/4) very fine sandy loam, dark brown (7.5YR 3/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; common fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.
C2—16 to 20 inches; brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4) moist; few fine faint brown (10YR 5/3) and few fine distinct brown (7.5YR 4/6) mottles; massive; very hard, firm, sticky and plastic; very fine roots; violently effervescent; moderately alkaline, abrupt smooth boundary.
C3—20 to 28 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; few fine and prominent strong brown (7.5YR 5/6) mottles; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; strongly effervescent, moderately alkaline; clear smooth boundary.
C4—28 to 40 inches; pale brown (10YR 6/3) loamy sand, dark yellowish brown (10YR 4/4) moist; massive; loose, nonsticky and nonplastic; few very fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.
C5—40 to 45 inches; brown (7.5YR 5/2) silt loam, dark brown (7.5YR 3/2) moist; common fine distinct yellowish red (5YR 4/6) mottles; massive; hard, firm, sticky and slightly plastic; violently effervescent; moderately alkaline; abrupt smooth boundary.
C6—45 to 60 inches; yellowish brown (10YR 5/4) loamy fine sand, dark yellowish brown (10YR 3/4) moist; single grain; loose, nonsticky and nonplastic; strongly effervescent; slightly alkaline.

Range in Characteristics

Particle-size control section: less than 18 percent clay
Depth to redoximorphic features: 12 to 30 inches

A horizon
Value: 5 or 6 dry, 3 to 5 moist
Chroma: 3 or 4
Texture: loam or clay loam

C horizon
Hue: 7.5YR or 10YR
Value: 3 to 7 dry, 3 to 5 moist
Chroma: 2 to 4
Texture: stratified silt loam, clay loam, very fine sandy loam, coarse sand, loam, sandy clay loam, fine sandy loam, sandy loam, loamy fine sand, and loamy sand
Salinity: EC of 4 to 16

Pinavetes Series

Map units: 120, 130, 213, 250, 420
Depth class: very deep
Drainage class: excessively drained
Landform: dunes and valley sides
Parent material: eolian sands derived from sandstone
Elevation: 5,200 to 6,100 feet (1,585 to 1,859 meters)
Slope: 0 to 35 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Mixed, mesic Ustic Torripsamments

Typical Pedon

Pinavetes loamy sand, in an area of mapping unit 120, Pinavetes loamy sand, 3 to 5 percent slopes; Sandoval County; Bernalillo NM Quadrangle; about 5 miles southeast of Zia Pueblo; 1,100 feet south and 1,525 feet east of the northwest corner of section 24, T. 14 N., R. 2 E. NAD 83, UTM 13—03 47 076 E—39 22 110 N.

A—0 to 10 inches; light yellowish brown (10YR 6/4) loamy sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; many very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.
C1—10 to 35 inches; light yellowish brown (10YR 6/4) sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; strongly effervescent; strongly alkaline; clear smooth boundary.
C2—35 to 60 inches; light yellowish brown (10YR 6/4) sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; 10 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

A horizon
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 or 4
Texture: sand, loamy sand, or loamy fine sand

C horizon
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 3 to 6
Texture: sand, fine sand, or loamy sand

Pinitos Series

Map unit: 206
Depth class: very deep
Drainage class: well drained
Landform: dipslopes of cuestas, hills, mesas, and fan terraces
Parent material: fan alluvium derived from sandstone and shale
Elevation: 7,000 to 7,600 feet (2,134 to 2,316 meters)
Slope: 1 to 15 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 49 to 51 degrees F. (9.5 to 10.5 degrees C.)
Frost-free period: 100 to 120 days

Taxonomic class: Fine-loamy, mixed, mesic Aridic Haplustalfs

Typical Pedon

Pinitos loam, in an area of mapping unit 206, Pinitos loam, 1 to 15 percent slopes; Sandoval County; Regina Quadrangle; 1,500 feet south and 1,300 feet east of the northwest corner of sec. 33, T. 23 N., R. 1 W. NAD 83, UTM 13—03 24 475 E—40 05 845 N.

A—0 to 4 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine and common fine roots; many very fine and fine pores; neutral; clear smooth boundary.

Bt1—4 to 10 inches; brown (7.5YR 4/4) clay loam, dark brown (10YR 3/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; few medium pores; many thick clay films on faces of peds; neutral; clear smooth boundary.

Bt2—10 to 27 inches; strong brown (7.5YR 5/6) clay loam, dark brown (7.5YR 4/4) moist; moderate medium and coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common and medium moderately thick clay films on faces of peds; neutral; clear smooth boundary.

Btk—27 to 39 inches; strong brown (7.5YR 5/6) clay loam, dark brown (7.5YR 4/4) moist; moderate coarse subangular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; many very fine and fine pores; few fine clay films on faces of peds; slightly effervescent; few fine accumulations of calcium carbonate; slightly alkaline; gradual smooth boundary.

C—39 to 60 inches; strong brown (7.5YR 5/6) clay loam, dark brown (7.5YR 4/4) moist; massive; hard, firm, sticky and plastic; few fine and medium roots; slightly effervescent; slightly alkaline.

Range in Characteristics

Particle-size control section: 20 to 35 percent clay

A Horizon
Hue: 7.5YR or 10YR
Value: 5 or 6 dry, 3 or 4 moist
Chroma: 3 or 4 moist

Bt Horizon
Hue: 7.5YR or 10YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 4 to 6 dry

Bk or C Horizons
Hue: 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 4 to 6

Placitas Series

Map unit: 63
Depth class: moderately deep
Drainage class: well drained
Landform: fan terraces
Parent material: fan alluvium from conglomerate
Elevation: 5,700 to 6,300 feet (1,737 to 1,920 meters)
Slope: 8 to 40 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Loamy-skeletal, mixed, mesic Ustollic Calciorthids

Typical Pedon

Placitas gravelly loam, in an area of mapping unit 63, Placitas gravelly loam, 8 to 40 percent slopes; Sandoval County; Placitas Quadrangle; about 2 miles northeast of Placitas; 400 feet north and 200 feet west of the southeast corner of sec. 21, T. 13 N., R. 5 E. NAD 83, UTM 13—03 71 988 E—39 10 875N.

A—0 to 5 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; weak fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and few very fine roots; 30 percent gravel; strongly effervescent; moderately alkaline; clear smooth boundary.
Bw—5 to 10 inches; very pale brown (10YR 7/4) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few fine and very fine roots; 40 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.
Bk—10 to 27 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine and very fine roots; 55 percent gravel; violently effervescent; many seams and filaments of calcium carbonate; moderately alkaline; clear smooth boundary.
R—27 inches; conglomerate.

Range in Characteristics

Particle-size control section: 10 to 18 percent clay
Depth to lithic contact: 20 to 40 inches

A horizon
Hue: 10YR to 5YR
Value: 4 or 5 moist
Chroma: 2 to 4

B horizon
Hue: 7.5YR or 10YR
Value: 6 or 7 dry, 4 or 5 moist
Chroma: 3 or 4

Poley Series

Map units: 67
Depth class: very deep
Drainage class: well drained
Landform: sideslopes of fan terraces
Parent material: colluvium derived from shale and sandstone
Elevation: 6,000 to 7,000 feet (1,829 to 2,134 meters)
Slope: 3 to 30 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine, mixed, mesic Ustollic Haplargids

Typical Pedon

Poley very cobbly loam in an area of mapping unit 67, Sandoval-Poley complex, 3 to 30 percent slopes; Sandoval County; Cerro Tinaja Quadrangle; about 1 mile northeast of Cerro de Nuestra Senora; NAD 83, UTM 13—03 03 752 E—39 19 661 N.

A—0 to 3 inches; brown (7.5YR 5/4) very cobbly loam, dark brown (7.5YR 4/4) moist; weak thin platy structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; 25 percent cobbles and 30 percent gravel; slightly effervescent; slightly alkaline; clear smooth boundary.

Bt1—3 to 12 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard friable, sticky and plastic; many very fine roots; few very fine tubular pores; few fine clay films on faces of peds; 10 percent gravel; slightly effervescent; slightly alkaline; clear smooth boundary.

Bt2—12 to 17 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine roots; few very fine tubular pores; common thin, faint clay skins on faces of peds; slightly effervescent; slightly alkaline; clear smooth boundary.

Btk—17 to 21 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; few very fine roots; few very fine tubular pores; few thin faint clay skins on faces of peds; 10 percent gravel; violently effervescent; with common medium irregularly shaped seams and filaments of segregated calcium carbonate; moderately alkaline; gradual smooth boundary.

Bk1—21 to 40 inches; pink (7.5YR 7/4) clay loam, light brown (7.5YR 6/4) moist; weak fine subangular blocky structure; slightly hard, very friable, sticky and plastic; few very fine roots; few very fine tubular pores; 2 percent cobbles and 10 percent gravel; violently effervescent; many fine irregularly shaped filaments of segregated calcium carbonate; moderately alkaline; gradual smooth boundary.

Bk2—40 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; massive; loose, nonsticky and nonplastic; few very fine roots; 40 percent gravel; violently effervescent; many fine irregularly shaped filaments of segregated calcium carbonate; slightly alkaline.

Range in Characteristics

Particle-size control section: 30 to 55 percent clay
Depth to calcic horizon: 20 to 40 inches

A horizon
Hue: 5YR, 7.5YR
Value: 3 to 6 dry, 3 to 5 moist
Chroma: 4 to 6 dry, 3 to 5 moist

Bt horizon
Hue: 2.5YR, 5YR, 7.5YR
Value: 4, 5 or 6 dry, 3, 4 or 5 moist
Chroma: 3 to 8, dry or moist

Bk horizon
Hue: 5YR, 7.5YR, 10YR
Value: 5 to 8 dry, 4 to 8 moist
Chroma: 1 to 6, dry or moist

Prieta Series

Map units: 2, 16
Depth class: shallow
Drainage class: well drained
Landform: lava flows and mesas
Parent material: eolian material and slope alluvium derived from basalt
Elevation: 5,600 to 7,300 feet (1,707 to 2,225 meters)
Slope: 3 to 15 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Clayey-skeletal, mixed, mesic Lithic Ustollic Haplargids

Typical Pedon

Prieta very stony loam, in an area of mapping unit 2, Clovis-Prieta-Silver association, 3 to 15 percent slopes; Sandoval County; Casa Salazar Quadrangle; on Prieta Mesa, 580 feet east and 2,600 feet north of the southwest corner of sec. 15, T. 14 N., R. 2 W. NAD 83, UTM 13—03 14 613 E—39 23 855 N.

A—0 to 3 inches; brown (10YR 5/3) very stony loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; 40 percent stones and 10 percent gravel; neutral; clear smooth boundary.

Bt1—3 to 10 inches; brown (7.5YR 5/4) very stony clay loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; hard, firm, very sticky and very plastic; common fine and very fine roots; thin continuous clay films on faces of peds; 40 percent stones and 10 percent gravel; slightly alkaline; gradual smooth boundary.

Bt2—10 to 14 inches; brown (7.5YR 5/4) very stony clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots; thin continuous clay films on faces of peds; 25 percent stones and 10 percent gravel; moderately alkaline; clear smooth boundary.

Bk—14 to 19 inches; very pale brown (10YR 7/3) very stony clay loam, brown (10YR 5/3) moist; massive; slightly hard, friable, sticky and plastic; few fine roots; 40 percent stones and 10 percent gravel; common fine filaments of calcium carbonate; moderately alkaline; abrupt smooth boundary.

R—19 inches; basalt.

Range in Characteristics

Particle-size control section: 35 to 50 percent clay
Depth to basalt: 10 to 20 inches

A horizon
Hue: 10YR or 7.5YR
Value: 4 to 6 dry, 3 or 4 moist
Chroma: 2 to 4
Texture: very stony loam or stony silt loam

Bt horizon
Hue: 10YR or 7.5YR
Value: 4 or 6 dry, 3 or 5 moist
Chroma: 2 to 4

Bk horizon
Hue: 10YR or 7.5YR
Value: 4 to 7 dry, 3 or 6 moist
Chroma: 2 to 4

Querencia Series

Map units: 13, 68, 231, 234
Depth class: very deep
Drainage class: well drained
Landform: alluvial fans, stream terraces, and valley sides
Parent material: fan alluvium and colluvium derived from sandstone and shale
Elevation: 5,700 to 6,900 feet (1,737 to 2,103 meters)
Slope: 1 to 8 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine-loamy, mixed, mesic Ustollic Camborthids

Typical Pedon

Querencia sandy clay loam, in an area of mapping unit 13, Sandoval-Querencia association, 2 to 7 percent slopes; Sandoval County; Sky Village NW Quadrangle; about 3/4 mile southeast of Trujillo Tank, Alamo Ranch; 1,100 feet south and 1,500 feet west of the northeast corner of sec. 4, T. 13 N., R. 1 W. NAD 83, UTM 13—03 23 504 E—39 17 713 N.

A—0 to 4 inches; light brownish gray (2.5Y 6/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common coarse, many fine and very fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

Bw1—4 to 12 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; weak fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; many fine and very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw2—12 to 24 inches; pale yellow (2.5Y 7/4) loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; many fine and very fine roots; slightly effervescent; moderately alkaline; gradual smooth boundary.

Bk—24 to 60 inches; pale yellow (2.5Y 7/4) loam, light olive brown (2.5Y 5/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine and very fine roots; slightly effervescent; calcium carbonate as few fine irregular masses; moderately alkaline; gradual smooth boundary.

Range in Characteristics

Calcium carbonate equivalent: less than 15 percent, calcareous in all parts
Content of rock fragments: 0 to 10 percent gravel
Reaction: slightly alkaline to moderately alkaline

A horizon
Hue: 2.5Y or 10YR;
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 2 to 4
Texture: fine sandy loam, loam, or sandy clay loam

Bw horizon
Hue: 2.5Y or 10YR;
Value: 4 to 7 dry, 4 or 5 moist
Chroma: 2 to 6
Texture: loam, sandy clay loam, or clay

Bk horizon
Hue: 2.5Y or 10YR
Value: 4 to 7 dry, 4 or 5 moist
Chroma: 2 to 6
Texture: fine sandy loam and loam

Redondo Series

Map units: 85, 86, 87
Depth class: very deep
Drainage class: well drained
Landform: mountain slopes
Parent material: colluvium derived from tuff
Elevation: 8,700 to 11,000 feet (2,652 to 3,353 meters)
Slope: 15 to 80 percent
Climatic data:
Mean annual precipitation: 25 to 30 inches (635 to 762 millimeters)
Mean annual air temperature: 38 to 42 degrees F. (3.3 to 5.6 degrees C.)
Frost-free period: 45 to 60 days

Taxonomic class: Loamy-skeletal, mixed Typic Cryoboralfs

Typical Pedon

Redondo coarse sandy loam, in an area of mapping unit 85, Redondo coarse sandy loam; 15 to 35 percent slopes; Sandoval County; Valle San Antonio Quadrangle; about 3 miles northwest of Baca Location No. 1 Headquarters; unsectionized; NAD 83, UTM 13—03 63 260 E—39 72 828 N.

A—0 to 2 inches; grayish brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and few medium roots; slightly acid; clear smooth boundary.

E1—2 to 7 inches; light brownish gray (10YR 6/2) coarse sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium platy and weak fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine and few medium roots; few thin silt coatings on faces of peds; slightly acid; clear smooth boundary.

E2—7 to 15 inches; light gray (10YR 7/2) coarse sandy loam, brown (10YR 5/3) moist; weak medium platy and weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few medium roots; very few very thin silt coating on faces of peds; 1 percent cobbles and 2 percent gravel; medium acid; clear wavy boundary.

BE—15 to 22 inches; pink (7.5YR 7/4) coarse sandy loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few thin silt coatings on faces of peds; 3 percent gravel; medium acid; clear wavy boundary.

Bt1—22 to 29 inches; light gray (10YR 7/2) gravelly coarse sandy loam, brown (10YR 5/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common moderately thick clay films on faces of peds; 25 percent gravel; medium acid; gradual wavy boundary.

Bt2—29 to 38 inches; light brown (7.5YR 6/4) very gravelly coarse sandy loam, brown (7.5YR 4/4) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine medium and coarse roots; common moderately thick clay films on rock fragments and bridging sand grains; 5 percent stones, 10 percent cobbles and 30 percent gravel; medium acid; diffuse wavy boundary.

Bt3—38 to 54 inches; light brown (7.5YR 6/4) extremely gravelly coarse sandy loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common moderately thick clay films on rock fragments and bridging sand grains; 10 percent stones, 10 percent cobbles, and 60 percent gravel; medium acid; diffuse wavy boundary.

Bt4—54 to 60 inches; light brown (7.5YR 6/4) extremely cobbly coarse sandy loam, brown (7.5YR 4/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few medium roots; few moderately thick clay films on rock fragments and bridging sand grains; 15 percent stones, 25 percent cobbles, and 50 percent gravel; medium acid; diffuse wavy boundary.

Range in Characteristics

Particle-size control section: 10 to 18 percent clay

A horizon
Hue: 7.5YR or 10YR
Value: 5 to 7 dry, 3 to 5 moist
Chroma: 2 or 3, dry or moist
Texture: cobbly coarse sandy loam, coarse sandy loam, and cobbly loam

E horizon
Hue: 7.5YR or 10YR
Value: 6 to 8 dry, 4 to 6 moist
Chroma: 1 to 4, dry or moist
Texture: coarse sandy loam, very cobbly coarse sandy loam, or extremely cobbly coarse sandy loam

B horizon
Hue: 7.5YR or 10YR
Value: 4 to 8 dry, 4 or 5 moist
Chroma: 2 to 4, dry or moist
Texture: gravelly coarse sandy loam, very gravelly coarse sandy loam, very cobbly coarse sandy loam, or extremely cobbly coarse sandy loam

Royosa Series

Map units: 312, 314, 321
Depth class: very deep
Drainage class: somewhat excessively drained and excessively drained
Landform: dunes
Parent material: eolian sands derived from sandstone
Elevation: 5,600 to 6,700 feet (1,707 to 2,042 meters)
Slope: 1 to 8 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Mixed, mesic Typic Ustipsamments

Typical Pedon

Royosa sand, in an area of mapping unit 312, Royosa sand, 1 to 8 percent slopes; Sandoval County; Jemez Pueblo Quadrangle; about 4 miles north of the Zia Pueblo; 2,550 feet east and 2,000 feet north of the southwest corner of sec. 32, T. 16 N., R. 3 E. NAD 83, UTM 13—03 50 811 E—39 37 468 N.

A—0 to 5 inches; very pale brown (10YR 7/3) sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; slightly alkaline; clear smooth boundary.
C1—5 to 16 inches; brown (7.5YR 5/4) sand, brown (7.5YR 4/4) moist; single grain; loose, nonsticky and nonplastic; common medium and coarse roots; slightly alkaline; gradual smooth boundary.
C2—16 to 60 inches; brownish yellow (10YR 6/6) loamy sand, yellowish brown (10YR 5/6) moist; single grain; loose, nonsticky and nonplastic; slightly alkaline.

Range in Characteristics

Reaction: neutral to moderately alkaline

A horizon
Hue: 10YR to 5YR
Value: 5 to 7 dry, 3 to 5 moist
Chroma: 3 to 6
Texture: sand or fine sand

C horizon
Hue: 10YR to 5YR
Value: 4 to 7 dry, 3 to 6 moist
Chroma: 3 to 6
Texture: sand, fine sand, or loamy sand

Saido Series

Map unit: 110
Depth class: very deep
Drainage class: well drained
Landform: cuestas, fans, mesas, and knolls
Parent material: slope alluvium derived from silty gypsiferous material
Elevation: 5,300 to 6,000 feet (1,615 to 1,829 meters)
Slope: 5 to 40 percent
Climatic data:
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Coarse-silty, gypsic, mesic Typic Gypsiorthids

Typical Pedon

Saido silt loam, in an area of mapping unit 110, Rock outcrop-Saido complex, 5 to 40 percent slopes; Sandoval County; San Ysidro Quadrangle; on the gypsum mine haul road about 2 miles south of San Ysidro; 1,500 feet north and 1,800 feet east of the southwest corner of sec. 13, T. 15 N., R. 1 E. NAD 83, UTM 13—03 37 730 E—39 32 751 N.

A—0 to 5 inches; very pale brown (10YR 8/3) silt loam, pink (7.5YR 7/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few fine and coarse roots; common fine interstitial pores; strongly effervescent; moderately alkaline; clear smooth boundary.

By1—5 to 9 inches; white (10YR 8/2) silt loam, very pale brown (10YR 7/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine and coarse roots; common fine tubular pores; many medium masses of gypsum crystals; violently effervescent; moderately alkaline; clear smooth boundary.

By2—9 to 15 inches; white (10YR 8/2) silt loam, white (10YR 8/2) moist; massive; soft, very friable, nonsticky and nonplastic; many medium masses of gypsum crystals; violently effervescent; moderately alkaline; clear smooth boundary.

By3—15 to 25 inches; white (10YR 8/2) silt loam, white (10YR 8/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many medium masses of gypsum crystals; violently effervescent; moderately alkaline; clear smooth boundary.

C—25 to 60 inches; pink (7.5YR 8/4) loam, pink (7.5YR 7/4) moist; massive; soft, very friable, nonsticky and nonplastic; few medium masses of gypsum crystals; violently effervescent; moderately alkaline.

Range in Characteristics

Depth to gypsic horizon: 2 to 5 inches

A horizon
Hue: 5YR, 7.5YR, or 10YR
Value: 5 to 8 dry, 4 to 7 moist
Chroma: 3 or 4

B and C horizons
Hue: 7.5YR or 10YR
Value: 6 to 8 dry, 5 to 7 moist
Chroma: 1 to 4

San Mateo Series

Map units: 114, 170
Depth class: very deep
Drainage class: well drained
Landform: flood plains, alluvial fans, and valley sides
Parent material: stream alluvium from mixed sources
Elevation: 5,500 to 6,800 feet (1,676 to 2,073 meters)
Slope: 0 to 3 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine-loamy, mixed, calcareous, mesic Ustic Torrifluvents

Typical Pedon

San Mateo loam, in an area of mapping unit 170, San Mateo loam, 0 to 3 percent slopes; Sandoval County; San Ysidro Quadrangle; about 5 miles southwest of San Ysidro; 200 feet south and 1,500 feet east of the center of sec. 27, T. 15 N., R. 1 E. NAD 83, UTM 13—03 35 171 E—39 29 854 N.

A—0 to 2 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; common medium and fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—2 to 10 inches; dark yellowish brown (10YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; massive; soft, friable, slightly sticky and slightly plastic; common medium, fine and very fine roots; strongly effervescent; strongly alkaline; clear smooth boundary.

C2—10 to 23 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, firm, sticky and plastic; common fine and very fine roots; few medium roots; strongly effervescent; strongly alkaline; clear smooth boundary.

C3—23 to 32 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, firm, sticky and plastic; few fine and very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C4—32 to 54 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, firm, sticky and plastic; few very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C5—54 to 60 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; massive; slightly hard, firm, sticky and plastic; strongly effervescent; strongly alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry, 3 to 5 moist
Chroma: 2 to 6 dry and moist
Texture: sandy loam and loam

C horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 to 5, moist
Chroma: 2 to 6
Texture: stratified sandy loam, loam, silty clay loam, and clay loam
Sodicity: SAR of 5 to 30

Sandoval Series

Map units: 13, 15, 67, 230, 235
Depth class: shallow
Drainage class: well drained
Landform: hills and ridges
Parent material: slope alluvium derived from shale
Elevation: 5,800 to 7,000 feet (1,768 to 2,134 meters)
Slope: 1 to 30 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Loamy, mixed, calcareous, mesic, shallow Ustic Torriorthents

Typical Pedon

Sandoval fine sandy loam, in an area of mapping unit 13, Sandoval-Querencia association, 2 to 7 percent slopes; Sandoval County; Sky Village NW Quadrangle; about 5 miles south of the Alamo Ranch headquarters; 1,100 feet south and 2,700 feet east of the northwest corner of sec. 4, T. 13 N., R. 1 W. NAD 83, UTM 13—03 23 157 E—39 17 735 N.

A1—0 to 2 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; slightly effervescent; strongly alkaline; abrupt smooth boundary.
A2—2 to 6 inches; light gray (2.5YR 7/2) clay loam, light olive brown (2.5YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.
C1—6 to 10 inches; light brownish gray (2.5YR 6/2) clay loam, grayish brown (2.5YR 5/2) moist; massive; hard, firm, sticky and plastic; common fine and very fine and few medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.
C2—10 to 15 inches; light brownish gray (2.5YR 6/2) clay loam, dark grayish brown (2.5YR 4/2) moist; massive; hard, firm, sticky and plastic; few fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.
Cr—15 inches; soft calcareous shale.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay
Content of gypsum: 5 to 10 percent
Salinity: EC of 2 to 4
Sodicity: SAR of 8 to 13
Depth to paralithic contact: 10 to 20 inches

A horizon
Hue: 10YR or 2.5Y
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 2 to 6
Texture: loam, clay loam, and fine sandy loam

C horizon
Hue: 2.5Y or 5Y
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 2 to 4

Santa Fe Series

Map units: 409, 419
Depth class: very shallow to shallow
Drainage class: well drained
Landform: mountain slopes
Parent material: slope alluvium and residuum derived from granite
Elevation: 6,400 to 8,400 feet (1,951 to 2,560 meters)
Slope: 15 to 70 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Loamy-skeletal, mixed, mesic Lithic Argiustolls

Typical Pedon

Santa Fe very gravelly sandy loam, in an area of mapping unit 409, Santa Fe very gravelly sandy loam, 15 to 40 percent slopes; Sandoval County; Gilman Quadrangle; about 8 miles west of the Jemez Pueblo; 1,300 feet north and 350 feet west of the SE corner of sec. 8, T. 16 N., R. 1 E. NAD 83, UTM 13—03 32 465 E—39 44 119 N

A—0 to 3 inches; dark reddish gray (5YR 4/2) very gravelly sandy loam, dark reddish brown (5YR 3/2) moist; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; common very fine tubular pores; 2 percent stones, 3 percent cobbles and 40 percent gravel; neutral; clear smooth boundary.
Bt—3 to 8 inches; weak red (2.5YR 4/2) very gravelly sandy clay loam, dusky red (2.5YR 3/2) moist; strong fine angular block structure; slightly hard, firm, sticky and plastic, common very fine roots, many very fine tubular pores, 10 percent cobbles and 35 percent gravel; many thin clay films on faces of peds; neutral, clear smooth boundary.
2R—8 inches; granite.

Range in Characteristics

Particle-size control section: 20 to 35 percent clay
Depth to bedrock: 8 to 20 inches

A horizon
Hue: 5YR to 10YR
Value: 3 to 5 dry, 2 or 3 moist
Chroma: 2 or 3
Texture: gravelly sandy loam or extremely cobbly coarse sandy loam

Bt horizon
Hue: 2.5YR to 7.5YR
Value: 3 to 5 dry, 2 or 3 moist
Chroma: 2 or 3

Sedgran Series

Map unit: 201
Depth class: very shallow to shallow
Drainage class: excessively drained
Landform: mountain slopes
Parent material: colluvium derived from granite and sandstone
Elevation: 5,800 to 8,000 feet (1,768 to 2,438 meters)
Slope: 25 to 55 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Sandy-skeletal, mixed, mesic Lithic Ustic Torriorthents

Typical Pedon

Sedgran extremely gravelly loamy coarse sand, in an area of mapping unit 201, Rock outcrop-Sedgran association, 25 to 55 percent slopes; Sandoval County; Alameda Quadrangle; about 3 1/4 miles east of Interstate Highway 25 and 1/8 miles north of the Sandoval-Bernalillo county line on the Sandia Pueblo Indian Reservation; 1,300 feet east and 450 of north of the southwest corner of sec. 34, T. 12 N., R. 4 E. NAD 83, UTM 13—03 62 490 E—38 98 152 N.

A—0 to 4 inches; yellowish brown (10YR 5/4) extremely gravelly loamy coarse sand, dark yellowish brown (10YR 3/4) moist; moderate medium granular structure; loose, very friable, nonsticky and nonplastic; many fine roots; 20 percent cobbles and 45 percent gravel; neutral; clear wavy boundary.
C—4 to 13 inches; reddish yellow (7.5YR 6/6) and yellowish brown (7.5YR 5/4) very gravelly loamy coarse sand, brownish yellow (7.5YR 5/6) and dark yellowish brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; 5 percent cobbles and 40 percent gravel; slightly alkaline; diffuse wavy boundary.
2R—13 inches; granite bedrock.

Range in Characteristics

Particle-size control section: 5 to 10 percent clay
Depth to lithic contact: 6 to 20 inches

A horizon
Hue: 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 to 6

C horizon
Hue: 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 4 to 6

Sedillo Series

Map units: 200, 208
Depth class: very deep
Drainage class: well drained
Landform: bajadas, fan terraces, and stream terraces
Parent material: gravelly fan alluvium derived from mixed sources
Elevation: 5,100 to 6,500 feet (1,554 to 1,981 meters)
Slope: 5 to 55 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Loamy-skeletal, mixed, mesic Ustollic Haplargids

Typical Pedon

Sedillo very gravelly fine sandy loam, in an area of mapping unit 208, Sedillo very gravelly fine sandy loam, 25 to 55 percent slopes; Sandoval County; San Felipe Pueblo Quadrangle; about one mile southeast of the San Felipe Pueblo, about 2000 feet south and 300 feet west of NE corner of sec. 29, T. 14 N., R. 5 E. NAD 83, UTM 13—03 70 512 E—39 19 951 N.

A—0 to 2 inches; brown (10YR 4/3) very gravelly fine sandy loam, dark brown (10YR 3/3) moist; weak thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots, 55 percent gravel; slightly effervescent; slightly alkaline; clear smooth boundary.

Bt—2 to 8 inches; brown (10YR 4/3) very gravelly sandy clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium and fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; few thin clay films on faces of peds; 50 percent gravel; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk1—8 to 12 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; 50 percent gravel; slightly effervescent; few coatings on undersides of rock fragments of calcium carbonate; slightly alkaline; gradual smooth boundary.

Bk2—12 to 60 inches; very pale brown (10YR 8/3) extremely gravelly sandy loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; many very fine tubular pores; 60 percent gravel; violently effervescent; undersides of rock fragments coated with calcium carbonate; slightly alkaline.

Range in Characteristics

Particle-size control section: 20 to 35 percent clay

A horizon
Hue: 5YR to 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 or 4
Texture: very cobbly sandy loam and very gravelly fine sandy loam

Bt horizon
Hue: 10YR to 5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 to 6

Bk horizon
Hue: 5YR to 10YR
Value: 5 to 8 dry, 3 to 7 moist
Chroma: 2 to 6
Texture: extremely gravelly coarse sandy loam, very gravelly sandy loam, and extremely gravelly sandy loam

Sedmar Series

Map unit: 146
Depth class: very shallow to shallow
Drainage class: excessively drained
Landform: dipslopes of cuestas and ridges
Parent material: slope alluvium and residuum derived from sandstone
Elevation: 7,000 to 8,000 feet (2,134 to 2,438 meters)
Slope: 1 to 15 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Sandy, mixed, frigid Lithic Ustorthents

Typical Pedon

Sedmar loamy sand, in an area of mapping unit 146, Sedmar loamy sand, 1 to 15 percent slopes; Sandoval County; Cuba Quadrangle; about 1 mile north of Cuba; 2,600 feet south and 200 feet west of the northeast corner of sec. 17, T. 21 N., R. 1 W. NAD 83, UTM 13—03 23 734 E—39 91 047 N.

A—0 to 3 inches; light yellowish brown (10YR 6/4) loamy sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; neutral; abrupt smooth boundary.
C1—3 to 13 inches; brownish yellow (10YR 6/6) and brown (10YR 5/3) sandy loam, brown (10YR 4/3) and yellowish brown (10YR 5/6) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few common distinct yellowish brown (10YR 5/8) iron stains; neutral; clear smooth boundary.
C2—13 to 18 inches; brownish yellow (10YR 6/6) loamy sand, brownish yellow (10YR 6/6) moist; single grain; loose, nonsticky and nonplastic; neutral; abrupt smooth boundary.
2R—18 inches; sandstone.

Range in Characteristics

Particle-size control section: 5 to 15 percent clay
Depth to lithic contact: 6 to 20 inches

A and C horizons
Value: 5 to 7 dry, 4 to 6 moist
Chroma: 3 to 6
Texture: loamy sand stratified with layers of sandy loam

Sheppard Series

Map units: 145, 183, 191
Depth class: very deep
Drainage class: somewhat excessively drained
Landform: dunes, alluvial fans, benches, structural benches, terraces, and stream terraces
Parent material: eolian sands derived from sandstone
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Slope: 1 to 40 percent
Climatic data:
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Taxonomic class: Mixed, mesic Typic Torripsamments

Typical Pedon

Sheppard loamy fine sand, in an area of mapping unit 191, Sheppard loamy fine sand, 3 to 8 percent slopes; Sandoval County; Bernalillo Quadrangle; unsectionized; NAD 83, UTM 13—03 55 559 E—39 06 478 N.

A—0 to 3 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.
C1—3 to 27 inches; strong brown (7.5YR 5/6) loamy fine sand, brown (7.5YR 4/4) moist; single grain; loose, nonsticky and nonplastic; few fine and medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.
C2—27 to 60 inches; pink (7.5YR 7/4) loamy fine sand, brown (7.5YR 5/4) moist; single grain; loose, nonsticky and nonplastic; strongly effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 3 to 10 percent clay

A horizon
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 3 or 4

C horizon
Hue: 2.5YR to 7.5YR
Value: 5 to 7 (4 to 6 moist)
Chroma: 3 to 6
Texture: loamy fine sand, sand, or loamy sand

Silver Series

Map units: 1, 2
Depth class: very deep
Drainage class: well drained
Landform: mesas, fan terraces, hills, and plateaus
Parent material: eolian material and slope alluvium derived from shale and sandstone
Elevation: 5,600 to 7,300 feet (1,707 to 2,225 meters)
Slope: 1 to 8 percent

Climatic data:

Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine, mixed, mesic Ustollic Haplargids

Typical Pedon

Silver loam, in an area of mapping unit 1, Silver-Clovis loams, 1 to 7 percent slopes; Sandoval County; Casa Salazar Quadrangle; on Mesa Prieta; 1,300 feet north and 150 feet east of the center of sec. 9, T. 14 N., R. 2 W. NAD 83, UTM 13—03 13 700 E—39 25 879 N.

A—0 to 4 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak thick platy structure parting to moderate medium granular; slightly hard, friable, sticky and plastic; common fine and very fine roots; neutral; clear smooth boundary.

Bt1—4 to 8 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; few thin clay films on faces of peds; slightly alkaline; clear smooth boundary.

Bt2—8 to 20 inches; brown (7.5YR 5/2) silty clay loam, brown (7.5YR 4/2) moist; moderate fine and medium subangular blocky structure; hard, firm, very sticky and very plastic; common fine and very fine roots; continuous thick clay films on faces of peds; slightly alkaline; gradual smooth boundary.

Bt3—20 to 39 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, very sticky and very plastic; few fine and very fine roots; many thick clay films on faces of peds; slightly alkaline; clear smooth boundary.

C—39 to 60 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; massive; hard, firm, very sticky and very plastic; slightly alkaline.

Range in Characteristics

Particle-size control section: 35 to 50 percent clay

A horizon

Hue: 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 4

Bt and Btk horizons

Hue: 7.5YR or 10YR
Value: 4 to 7 dry, 3 to 6 moist
Chroma: 2 to 4
Texture: clay loam or silty clay loam

Bk and C horizons (where present)

Hue: 7.5YR or 10YR
Value: 6 to 8 dry, 5 to 7 moist
Chroma: 2 to 4
Texture: clay loam and silty clay loam

Skyvillage Series

Map units: 64, 190, 230
Depth class: very shallow to shallow
Drainage class: well drained

Landform: breaks, structural benches, dipslopes of cuestas, summits of mesas and hills, and ridges
Parent material: slope alluvium derived from sandstone
Elevation: 5,800 to 6,400 feet (1,768 to 1,951 meters)
Slope: 3 to 40 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Loamy, mixed, calcareous, mesic Lithic Ustic Torriorthents

Typical Pedon

Skyvillage fine sandy loam, in an area of mapping unit 190, Zia-Skyvillage-Rock outcrop complex, 5 to 40 percent slopes; Sandoval County; Sky Village NW Quadrangle; about 6 miles northeast of the Alamo Ranch headquarters; 700 feet north and 600 feet east of the center of sec. 22, T. 14 N., R. 1 W. NAD 83, UTM 13—03 25 078 E—39 22 260 N.

A—0 to 2 inches; pale yellow (2.5Y 7/4) fine sandy loam, light olive brown (2.5Y 5/4) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; few fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.
C1—2 to 11 inches; light gray (2.5Y 7/2) fine sandy loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.
C2—11 to 16 inches; light gray (2.5Y 7/2) fine sandy loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; 10 percent gravel; slightly effervescent; slightly alkaline.
2R—16 inches; sandstone.

Range in Characteristics

Particle-size control section: 10 to 27 percent clay
Depth to bedrock: 6 to 20 inches

A and C horizons
Hue: 2.5Y to 7.5YR
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 2 to 6
Texture: sandy loam or fine sandy loam

Sparank Series

Map units: 236, 237
Depth class: very deep
Drainage class: well drained
Landform: stream terraces, alluvial fans, valley sides, and flood plains
Parent material: stream alluvium derived from sandstone and shale
Elevation: 5,500 to 6,400 feet (1,676 to 1,951 meters)
Slope: 0 to 3 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine, mixed, calcareous, mesic Ustic Torrifluvents

Typical Pedon

Sparank clay loam, in an area of mapping unit 236, Sparank clay loam, moderately saline, sodic, 0 to 1 percent slopes; Sandoval County; Holy Ghost Spring Quadrangle; about 3 miles northeast of San Luis; unsectionized; NAD 83, UTM 13—03 19 302 E—39 55 938 N.

A—0 to 2 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate fine granular structure; slightly hard, friable, sticky and plastic; few fine roots; slightly effervescent; strongly alkaline; clear smooth boundary.

C1—2 to 10 inches; brown (10YR 5/3) silty clay, brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; common fine roots; slightly effervescent; strongly alkaline; gradual smooth boundary.

C2—10 to 24 inches; brown (10YR 4/3) silty clay, brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; common medium roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C3—24 to 40 inches; pale brown (10YR 6/3) silty clay loam with thin strata of silt loam, brown (10YR 5/3) moist; massive; hard, firm, slightly sticky and slightly plastic; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C4—40 to 44 inches; dark grayish brown (10YR 4/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; hard, firm, sticky and plastic; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C5—44 to 60 inches; pale brown (10YR 6/3) silty clay, brown (10YR 5/3) moist; massive; hard, firm, sticky and plastic; slightly effervescent; strongly alkaline.

Range in Characteristics

Sodicity: SAR less than 13, typically
Salinity: EC of 4 to 8, typically

A horizon
Hue: 10YR to 5Y
Value: 4 to 6 moist, 3 to 6 dry
Chroma: 1 to 4
Texture: sandy clay loam, silt loam, clay loam, silty clay loam, silty clay, or clay
Reaction: moderately alkaline or strongly alkaline

C horizon
Hue: 10YR to 5Y
Value: 3 to 7 dry or moist
Chroma: 1 to 4
Texture: clay, silty clay, silty clay loam, or clay loam. Usually contains thin strata of silt loam or loamy sand.
Reaction: moderately alkaline to very strongly alkaline

Note: Some pedons have few to many fine prominent relict mottles of 5Y or 2.5Y 4/6 to 4/8 below 20 inches.

Sparham Series

Map units: 18, 24, 51, 102, 320
Depth class: very deep
Drainage class: well drained, somewhat poorly drained
Landform: alluvial fans, flood plains, and valley sides
Parent material: fan and stream alluvium derived from sandstone and shale
Elevation: 5,000 to 7,500 feet (1,524 to 2,286 meters)

Slope: 0 to 3 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 50 to 55 degrees F. (10.0 to 12.8 degrees C.)
Frost-free period: 110 to 160 days

Taxonomic class: Fine, mixed, calcareous, mesic Typic Ustifluvents

Typical Pedon

Sparham clay, in an area of mapping unit 102, Sparham clay loam, 1 to 3 percent slopes; Sandoval County; Cuba Quadrangle; about 1 mile northwest of Cuba; 1,500 feet south and 1,100 feet east of the northwest corner of sec. 20, T. 21 N., R. 1 W. NAD 83, UTM 13—03 22 490 E—39 89 805 N.

A—0 to 7 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; many very fine and common fine roots; neutral; clear smooth boundary.
C1—7 to 20 inches; light brownish gray (10YR 6/2) clay loam, dark gray (10YR 4/1) moist; common medium prominent strong brown (7.5YR 5/8) mottles; massive; very hard, very firm, very sticky and very plastic; common very fine roots; slightly effervescent; slightly alkaline; clear smooth boundary.
C2—20 to 29 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; common fine prominent strong brown (7.5YR 5/8) mottles; massive; very hard, very firm, very sticky and very plastic; few very fine roots; slightly effervescent; moderately alkaline; gradual smooth boundary.
C3—29 to 47 inches; very pale brown (10YR 7/4) silty clay loam, yellowish brown (10YR 5/4) moist; few fine prominent strong brown (7.5YR 5/8) mottles; massive; very hard, very firm, very sticky and very plastic; few very fine roots; slightly effervescent; slightly alkaline; clear smooth boundary.
C4—47 to 53 inches; very pale brown (10YR 7/4) clay loam, yellowish brown (10YR 5/4) moist; common medium prominent strong brown (7.5YR 5/8) mottles; massive; very hard, very firm, very sticky and very plastic; slightly effervescent; moderately alkaline; abrupt smooth boundary.
C5—53 to 60 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; massive; very hard, very firm, very sticky and very plastic; 10 percent fine gravel; moderately alkaline.

Range in Characteristics

Particle-size control section: 35 to 59 percent clay
Redoximorphic features: concentrations and depletions close to the surface are relict features
Depth to salts: 20 to 35 inches, when present
Depth to water table: typically 6 feet or greater (4 to 5 feet in some pedons)

A horizon
Hue: 10YR, 2.5Y or 5Y
Value: 4 to 6 dry, 3 to 6 moist. When crushed, moist value is less than 3.5, thickness is less than 7 inches.
Chroma: 1 to 4 dry
Texture: clay loam, silty clay loam, silt loam, or clay

C horizon
Hue: 10YR, 2.5Y or 5Y
Value: 3 to 7 dry, 3 to 6 moist
Chroma: 1 to 4 dry and 1 to 6 moist

Texture: stratified clay loam, silty clay loam, silty clay, or clay (there are strata of textures as coarse as loamy sand)
Reaction: slightly alkaline to strongly alkaline
Sodicity: SAR of 5 to 30
Salinity: EC of 2 to 16, typically

Note: The Sparham component in map unit 51 is somewhat poorly drained and outside the range in characteristics of the series. The component is a taxadjunct to the series.

Stumble Series

Map unit: 106
Depth class: very deep
Drainage class: somewhat excessively drained
Landform: alluvial fans, fan aprons, fan remnants, and inset fans
Parent material: eolian sands derived from sandstone
Elevation: 5,000 to 5,600 feet (1,524 to 1,707 meters)
Slope: 1 to 40 percent
Climatic data:
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Taxonomic class: Mixed, mesic Typic Torripsamments

Typical Pedon

Stumble very gravelly fine sandy loam in an area of map unit 106, Stumble association, 1 to 40 percent slopes; Sandoval County; Bernalillo Quadrangle; about 1.5 miles northeast of the Sandia Indian Pueblo; 1,400 feet east and 401 feet north of the southwest corner of sec. 17, T. 12 N., R. 4 E. NAD 83, UTM 13—03 59 375 E—39 03 017 N.

A—0 to 4 inches; pale brown (10YR 6/3) very gravelly fine sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and few medium roots; 45 percent pebbles; slightly effervescent; moderately alkaline; clear smooth boundary.
Bw—4 to 10 inches; brown (7.5YR 5/4) gravelly fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine roots; 25 percent pebbles; slightly effervescent; mildly alkaline; gradual wavy boundary.
C1—10 to 24 inches; very pale brown (10YR 7/4) loamy sand, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine roots; 10 percent pebbles; slightly effervescent; moderately alkaline; gradual wavy boundary.
C2—24 to 60 inches; very pale brown (10YR 7/3) gravelly coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few fine roots; 20 percent pebbles; slightly effervescent; moderately alkaline.

Range in Characteristics

A horizon
Value: 6 or 7 dry, 4 or 5 moist
Chroma: 2 or 3, dry or moist
Reaction: neutral to moderately alkaline
Texture: gravelly loamy sand or very gravelly fine sandy loam

Bw horizon (when present)
Texture: gravelly fine sandy loam or loamy sand

C horizons
Hue: 10YR or 2.5Y
Value: 6 or 7 dry, 4 or 5 moist
Chroma: 2 or 3, dry or moist
Texture: loamy sand or gravelly coarse sand, with strata of fine sand and sand

Teco Series

Map unit: 399
Depth class: very deep
Drainage class: well drained
Landform: cuestas and hills
Parent material: slope alluvium derived from sandstone and shale
Elevation: 5,900 to 7,000 feet (1,798 to 2,134 meters)
Slope: 8 to 40 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Fine, mixed, mesic Aridic Haplustalfs

Typical Pedon

Teco very cobbly fine sandy loam, in an area of mapping unit 399; Cucho-Teco complex, 8 to 40 percent slopes; Sandoval County; Holy Ghost Spring Quadrangle; about 3 miles south of the Jemez-Zia Pueblo boundary along State Highway 44 then east .25 mile; unsectionized; NAD 83, UTM 13—03 27 701 E—39 48 805 N.

A—0 to 1 inch; yellowish brown (10YR 5/4) very cobbly fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; loose, very friable, nonsticky and nonplastic; many fine and few medium roots; 20 percent cobbles, 15 percent gravels; slightly alkaline; abrupt smooth boundary.

Bt1—1 inch to 7 inches; reddish brown (5YR 5/4) sandy clay, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure parting to moderate fine granular; hard, firm, sticky and plastic; common fine roots; few fine tubular pores; few fine clay films lining pores; slightly alkaline; clear smooth boundary.

Bt2—7 to 23 inches; reddish yellow (7.5YR 6/6) clay, strong brown (7.5YR 5/6) moist; moderate fine subangular and angular blocky structure; hard, firm, very sticky and very plastic; common fine roots; common fine tubular pores; few thin faint dark brown (7.5YR 4/4) clay skins on vertical faces of peds; slightly effervescent; slightly alkaline; gradual wavy boundary.

Btk—23 to 40 inches; pink (7.5YR 7/4) clay, light brown (7.5YR 6/4) moist; massive; hard, firm, sticky and plastic; few fine roots; strongly effervescent; few fine clay films on faces of peds; common medium irregularly shaped segregated soft masses of calcium carbonate; slightly alkaline; clear wavy boundary.

2C—40 to 45 inches; light yellowish brown (10YR 6/4) very gravelly fine sandy loam, yellowish brown (10YR 5/4) moist; massive; loose, nonsticky and nonplastic; strongly effervescent; 30 percent gravel, 10 percent cobbles; slightly alkaline; gradual wavy boundary.

3Bkb—45 to 60 inches; pale yellow (5Y 8/3) channery sandy clay loam, pale yellow (5Y 7/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; 25 percent soft shale fragments; strongly effervescent; many large, white (5YR 8/2) soft masses of calcium carbonate in rounded pockets and vertical seams; slightly alkaline.

Range in Characteristics

Particle-size control section: 35 to 45 percent clay
Depth to calcic horizon: 20 to 40 inches

A horizon
Hue: 10YR to 5YR
Value: 5 to 7 dry, 3 to 6 moist
Chroma: 3 or 4

Bt horizon
Hue: 7.5YR to 2.5YR
Value: 4 to 7 dry, 3 to 7 moist
Chroma: 2 to 6

Bk horizon
Hue: 7.5YR to 2.5YR
Value: 5 to 7 dry, 3 to 7 moist
Chroma: 4 to 8

Tijeras Series

Map units: 109, 112
Depth class: very deep
Drainage class: well drained
Landform: fan remnants and ridges
Parent material: fan alluvium derived from granite
Elevation: 5,100 to 5,600 feet (1,554 to 1,707 meters)
Slope: 1 to 6 percent
Climatic data:
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Taxonomic class: Fine-loamy, mixed, mesic Typic Haplargids

Typical Pedon

Tijeras gravelly fine sandy loam, in an area of mapping unit 109; Embudo-Tijeras association, 1 to 9 percent slopes; Sandoval County; Alameda Quadrangle; located about 2 miles east of interstate highway 25 and .75 mile north of the Bernalillo-Sandoval County line; 2,500 feet east and 2,000 feet south of the northwest corner of sec. 32, T. 12 N., R. 4 E. NAD 83, UTM 13—03 59 674 E—38 99 074 N.

A—0 to 4 inches; pale brown (10YR 6/3) gravelly fine sandy loam; brown (10YR 4/3) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and nonplastic; many fine roots; 20 percent gravel; moderately alkaline; clear smooth boundary.

Bt—4 to 10 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; common fine roots; common fine tubular pores; common thin clay films on faces of peds; moderately alkaline; clear wavy boundary.

Btk—10 to 20 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common fine tubular pores; few thin clay films on faces of peds; slightly effervescent; few fine rounded calcium carbonate masses; moderately alkaline; clear wavy boundary.

Bk1—20 to 26 inches; pink (7.5YR 7/4) gravelly sandy loam, light brown (10YR 6/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine tubular pores; 20 percent gravel; strongly effervescent; few, medium rounded calcium carbonate masses; moderately alkaline; gradual wavy boundary.

Bk2—26 to 60 inches; pink (7.5YR 7/4) very gravelly coarse sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; 50 percent gravel; slightly effervescent; few fine rounded pink calcium carbonate masses; moderately alkaline.

Range in Characteristics

Particle-size control section: 18 to 30 percent clay

A horizon
Hue: 7.5YR or 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 4

Bt horizon
Hue: 5YR to 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 5

Bk horizon
Hue: 7.5YR or 10YR
Value: 5 to 7 dry, 4 to 6 moist
Content of rock fragments: 35 to 70 percent granite gravel

Tocal Series

Map unit: 282
Depth class: very shallow to shallow
Drainage class: well drained
Landform: interfluves on plateaus
Parent material: eolian material over residuum derived from tuff
Elevation: 7,000 to 8,000 feet (2,134 to 2,438 meters)
Slope: 3 to 8 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90days

Taxonomic class: Clayey, mixed Lithic Eutroboralfs

Typical Pedon

Tocal very fine sandy loam, in an area of mapping unit 282, Tocal very fine sandy loam, 3 to 8 percent slopes; Los Alamos County; Guaje Mountain Quadrangle; about .5 mile northwest of LASL administration building; 750 feet west and 700 feet south of the center of sec. 17, T. 19 N., R. 6 E. NAD 83, UTM 13—03 79 860 E—39 70 969 N.

A—0 to 5 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; many interstitial pores; neutral; abrupt smooth boundary.

Bt1—5 to 8 inches; reddish brown (5YR 5/3) clay loam, reddish brown (5YR 4/3) moist; moderate fine subangular blocky structure; hard, friable, sticky and plastic; many fine roots; few very fine interstitial pores; thin continuous clay films on faces of peds; neutral; abrupt smooth boundary.

Bt2—8 to 11 inches; reddish brown (5YR 5/3) clay, reddish brown (5YR 4/3) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; many medium roots; few very fine tubular pores; thick continuous clay films on faces of peds; neutral; clear smooth boundary.

2Bt3—11 to 14 inches; light brown (7.5YR 6/4) silt loam, dark brown (7.5YR 4/4) moist; massive; hard, friable, sticky and plastic; many medium roots; few very fine tubular pores; few reddish brown (5YR 4/4) clay filling in pores; neutral; abrupt smooth boundary.

2Cr—14 inches; tuff.

Range in Characteristics

Particle-size control section: 15 to 45 percent clay
Depth to tuff bedrock: 8 to 20 inches

A horizon
Hue: 7.5YR or 10YR
Value: 4 to 6 dry, 2 to 4 moist
Chroma: 2 or 3

B horizon
Hue: 7.5YR or 5YR
Value: 4 to 6 dry, 3 or 4 moist
Chroma: 3 to 6

Totavi Series

Map units: 52, 88
Depth class: very deep
Drainage class: somewhat excessively drained
Landform: stream terraces, closed depressions, and valley floors
Parent material: stream alluvium derived from tuff and pumice
Elevation: 7,000 to 8,800 feet (2,134 to 2,682 meters)
Slope: 0 to 5 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Ashy, frigid Mollic Vitrandepts

Typical Pedon

Totavi loamy sand, in an area of mapping unit 52, Totavi loamy sand, 0 to 5 percent slopes; Los Alamos County; Frijoles Quadrangle; about 1.4 miles east of Meson Lab entrance; 100 feet south and 150 feet east of the center of sec. 24, T. 19 N., R. 6 E. NAD 83, UTM 13—03 86 516 E—39 69 460 N.

A—0 to 15 inches; grayish brown (10YR 5/2) loamy sand, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; 10 percent pebble-sized tuff and pumice fragments; neutral; abrupt wavy boundary.
C1—15 to 19 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, very friable, nonsticky and nonplastic; common very fine and fine roots; about 50 percent of the fine earth fraction is medium or coarser sand; 10 percent pebble-sized tuff and pumice fragments; neutral; abrupt boundary.
C2—19 to 60 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and plastic; few very fine roots; about 35 percent of the fine earth fraction is medium or coarser sand; 10 percent pebble-sized tuff and pumice fragments; neutral.

Range in Characteristics

Particle-size control section: 5 to 15 percent clay
Content of rock fragments: tuff, pumice, latite, dacite

A horizon
Hue: 7.5YR or 10YR
Value: 4 or 5 dry, 2 or 3 moist
Chroma: 2 or 3, dry or moist
Texture: loamy sand or sandy loam

C or Bw horizon
Hue: 7.5YR or 10YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 2 to 4

Trail Series

Map units: 10, 11, 29, 430, 431, 830, 831
Depth class: very deep
Drainage class: moderately well drained, somewhat excessively drained
Landform: flood plains, alluvial fans, channels, and valley floor remnants
Parent material: eolian material and stream alluvium derived from sandstone
Elevation: 5,000 to 6,000 feet (1,524 to 1,829 meters)
Slope: 0 to 4 percent
Climatic data:
Mean annual precipitation: 8 to 10 inches (203 to 254 millimeters)
Mean annual air temperature: 53 to 55 degrees F. (11.7 to 12.8 degrees C.)
Frost-free period: 140 to 160 days

Taxonomic class: Sandy, mixed, mesic Typic Torrifluvents

Typical Pedon

Trail fine sandy loam, in an area of mapping unit 11, Trail fine sandy loam, 0 to 1 percent slopes; Sandoval County; Jemez Pueblo Quadrangle; Pena Blanca Area, unsectionized; NAD 83, UTM 13—03 47 611 E—39 36 023 N.

Ap—0 to 9 inches; light yellowish brown (10YR 6/4) fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; common fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—9 to 36 inches; very pale brown (10YR 7/4) loamy sand with stratum of sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; strongly effervescent; strongly alkaline; clear smooth boundary.
C2—36 to 60 inches; very pale brown (10YR 7/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; strongly effervescent; strongly alkaline.

Range in Characteristics

A horizon
Hue: 2.5YR to 10YR
Value: 5 to 7 dry, 4 to 6 moist
Chroma: 2 to 6 dry, 2, 3 or 4 moist
Texture: loamy sand, fine sandy loam, loam, or silty clay loam

C horizon
Hue: 2.5YR to 10YR
Value: 5 to 7 dry, 4 to 6 moist
Chroma: 2 to 6 dry, 2, 3 or 4 moist
Texture: loamy sand, loamy fine sand, fine sand, sand with thin strata of sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam

Tranquilar Series

Map units: 302, 311
Depth class: very deep
Drainage class: somewhat poorly drained
Landform: stream terraces and valley floors
Parent material: lacustrine deposits from rhyolite and tuff
Elevation: 8,500 to 9,200 feet (2,591 to 2,804 meters)
Slope: 1 to 8 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Very-fine, montmorillonitic, frigid Typic Argialbolls

Typical Pedon

Tranquilar silty clay loam, in an area of mapping unit 302, Tranquilar-Jarmillo complex, 1 to 8 percent slopes; Sandoval County; Valle San Antonio Quadrangle; about 2.5 miles southeast from the northwest corner of Baca Location No. 1; unsectionized; NAD 83, UTM 13—03 56 228 E—39 83 041 N.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, sticky and plastic; many fine and very fine roots; slightly acid; clear smooth boundary.
A2—4 to 8 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and few medium roots; slightly acid; clear smooth boundary.
E1—8 to 11 inches; gray (10YR 6/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; slightly acid; abrupt smooth boundary.

E2—11 to 13 inches; light gray (10YR 7/2) ped exteriors silty clay loam, dark grayish brown (10YR 4/2) moist; ped interiors, light brownish gray (10YR 6/2), very dark grayish brown (10YR 3/2) moist; few fine faint reddish yellow (7.5YR 6/6) mottles inside peds; weak thin platy structure; slightly hard, friable, sticky and plastic; few very fine roots; medium acid; abrupt smooth boundary.

Bt1—13 to 20 inches; very dark grayish brown (10YR 3/2) ped exteriors clay, very dark brown (10YR 2/2) moist; ped interiors brown (10YR 5/3), dark brown (10YR 3/3) moist; few fine faint reddish yellow (7.5YR 6/6) mottles inside peds; strong medium prismatic structure parting to strong medium angular blocky; very hard, very firm, very sticky and very plastic; few very fine and few medium roots; thin organic films; thin clay films on faces of peds; pressure faces on a few peds; strongly acid; gradual wavy boundary.

Bt2—20 to 34 inches; dark grayish brown (10YR 4/2) ped exteriors clay, very dark grayish brown (10YR 3/2) moist; clay interiors very pale brown (10YR 7/3), brown (10YR 4/3) moist; few fine faint reddish yellow (7.5YR 6/6) mottles inside peds; strong medium angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; continuous moderately thick clay films and organic stains on faces of peds; pressure faces on a few peds; very strongly acid; gradual wavy boundary.

Bt3—34 to 42 inches; light yellowish brown (10YR 6/4) clay, dark yellowish brown (10YR 4/4) moist; common fine prominent yellowish red (5YR 5/6) mottles; moderate coarse prismatic structure parting to moderate fine and medium angular blocky; very hard, very firm, very sticky and very plastic; few very fine and medium roots; continuous moderately thick clay films on faces of peds with discontinuous patchy organic films; pressure faces on a few peds; very strongly acid; gradual wavy boundary.

Bt4—42 to 50 inches; light gray (2.5Y 7/2) clay, light brownish gray (2.5Y 6/2) moist; common, fine, prominent reddish yellow (7.5YR 6/6) mottles; weak coarse prismatic structure parting to moderate fine and medium angular blocky; very hard, very firm, very sticky and very plastic; few very fine and medium roots; continuous moderately thick clay films on faces of peds; pressure faces on a few peds; extremely acid; gradual wavy boundary.

Bt5—50 to 60 inches; light gray (2.5Y 7/2) clay, light brownish gray (2.5Y 6/2) moist; common fine prominent reddish yellow (7.5YR 6/8) mottles; very dark grayish brown (2.5Y 3/2) moist; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, sticky and plastic; few very fine and medium roots; continuous moderately thick clay films on faces of peds; very strongly acid; gradual wavy boundary.

Range in Characteristics

Particle-size control section: 60 to 75 percent clay
Depth to a seasonal water table: 20 to 48 inches from March to July

A horizon
Value: 3 to 5 dry, 2 or 3 moist
Chroma: 1 or 2 dry or moist
Texture: silt loam, silty clay loam

E horizon
Value: 5 to 7 dry, 3 to 6 moist
Chroma: 1 or 2 dry or moist
Texture: silt loam or silty clay loam

Bt horizon
Hue: 7.5YR or 10YR
Value: 3 to 7 dry, 2 to 7 moist
Chroma: 3 to 8

Tsosie Series

Map unit: 270
Depth class: very deep
Drainage class: well drained
Landform: stream terraces and alluvial fans
Parent material: stream alluvium derived from shale and sandstone
Elevation: 6,600 to 7,000 feet (2,012 to 2,134 meters)
Slope: 0 to 3 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Fine-loamy, mixed, calcareous, mesic Ustic Torriorthents

Typical Pedon

Tsosie clay loam, in an area of mapping unit 270, Blancot-Councelor-Tsosie association, 0 to 5 percent slopes; Sandoval County; Galisteo SE Quadrangle; about 8 miles south of Galisteo, 1,100 feet north and 2,200 feet west of the southeast corner of sec. 6, T. 21 N., R. 6 W. NAD 83, UTM 13—02 74 088 E—39 95 089 N.

A—0 to 2 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine continuous pores; slightly effervescent; moderately alkaline; clear smooth boundary.
C1—2 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; massive; hard, firm, slightly sticky and slightly plastic; common very fine roots; slightly effervescent; strongly alkaline; clear gradual boundary.
C2—10 to 20 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; massive; very hard, very firm, sticky and plastic; few very fine roots; strongly effervescent; strongly alkaline; clear smooth boundary.
C3—20 to 26 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine roots; slightly effervescent; strongly alkaline; clear smooth boundary.
C4—26 to 36 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine continuous pores; strongly alkaline; clear smooth boundary.
C5—36 to 44 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; moderately alkaline; clear smooth boundary.
C6—44 to 55 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; strongly alkaline; clear smooth boundary.
C7—55 to 60 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; strongly effervescent; strongly alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay

A horizon
Hue: 2.5Y or 10YR
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 2 to 4

C horizon
Hue: 2.5Y or 10YR
Value: 5 to 7 dry, 3 to 5 moist
Chroma: 2 to 4
Texture: clay loam, sandy clay loam, or loam in upper part of the subsoil; stratified sandy loam to silty clay loam in the lower part.

Note: In some pedons, fine sandy loam, sandy loam, and silt loam textures occur below the control section or as thin lenses within it.

Vastine Series

Map unit: 301
Depth class: very deep
Drainage class: poorly drained
Landform: flood plains, stream terraces, and valley floors
Parent material: mixed stream alluvium
Elevation: 8,400 to 8,600 feet (2,560 to 2,621 meters)
Slope: 0 to 3 percent
Climatic data:
Mean annual precipitation: 20 to 25 inches (508 to 635 millimeters)
Mean annual air temperature: 42 to 45 degrees F. (5.6 to 7.2 degrees C.)
Frost-free period: 60 to 90 days

Taxonomic class: Fine-loamy over sandy or sandy-skeletal, mixed, frigid Typic Haplaquolls

Typical Pedon

Vastine silt loam, in an area of mapping unit 301, Vastine-Jarola silt loams, 0 to 5 percent slopes; Sandoval County; Valle San Antonio Quadrangle; about .1 mile southwest of hot springs in San Antonio Valley, Baca Location No. 1; unsectionized; NAD 83, UTM 13—03 59 079 E—39 81 660 N.

A1—0 to 4 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; moderate medium granular structure; slightly hard, firm, sticky and plastic; many fine and very fine roots; neutral; clear smooth boundary.
A2—4 to 11 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine and few very fine roots; neutral; gradual smooth boundary.
Bw—11 to 24 inches; light gray (10YR 6/1) loam, gray (10YR 5/1) moist; common fine distinct pale yellow (2.5Y 7/4) mottles; moderate medium blocky structure; hard, firm, sticky and plastic; few fine roots; 10 percent gravel; neutral; clear smooth boundary.
2C—24 to 60 inches; gray (10YR 5/1) very gravelly loamy sand, dark gray (10YR 4/1) moist; massive; loose, nonsticky and nonplastic; 55 percent gravel; slightly alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay in the upper part of the subsoil
Depth to a seasonal high water table: 12 to 36 inches
Depth to the gravelly substratum: 24 to 33 inches

A horizon
Hue: 5Y to 7.5YR
Value: 4 or 5 dry, 2 or 3 moist
Chroma: 1 or 2

B horizon
Hue: 5Y to 7.5YR
Value: 4 to 6 dry, 2 to 5 moist
Chroma: 0 to 8.
Other features: colors in this horizon are variegated in some pedons

2C horizon
Hue: 5Y to 7.5YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 1 to 3
Content of rock fragments: 35 to 60 percent gravel is common below 24 inches
Other features: colors in this horizon are variegated in some pedons

Vessilla Series

Map units: 17, 220, 325, 342, 397, 422
Depth class: very shallow to shallow
Drainage class: well drained
Landform: structural benches on escarpments and breaks; sideslopes of hills, mesas, and ridges
Parent material: eolian material, slope alluvium, and residuum derived from sandstone
Elevation: 6,000 to 7,500 feet (1,829 to 2,286 meters)
Slope: 3 to 65 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Loamy, mixed, calcareous, mesic Lithic Ustorthents

Typical Pedon

Vessilla gravelly fine sandy loam, in an area of mapping unit 397, Rock outcrop-Cucho-Vessilla complex, 25 to 70 percent slopes; Sandoval County; Holy Ghost Spring Quadrangle; 15 miles northwest of San Ysidro; NAD 83, UTM 13—03 28 014 E—39 50 605 N.

A—0 to 2 inches; light yellowish brown (10YR 6/4) gravelly fine sandy loam, yellowish brown (10YR 5/4) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; common fine and medium fine roots; 25 percent gravel; strongly effervescent; moderately alkaline; clear smooth boundary.
C—2 to 11 inches; light brown (7.5YR 6/4) gravelly fine sandy loam, brown (7.5YR 5/4) moist; massive; loose, nonsticky and nonplastic; common fine roots; 20 percent gravel; strongly effervescent; moderately alkaline; abrupt smooth boundary.
R—11 inches; sandstone.

Range in Characteristics

Particle-size control section: 12 to 20 percent clay
Depth to sandstone: 4 to 20 inches

A and C horizons
Hue: 7.5YR or 10YR
Value: 4 to 7 dry, 4 to 6 moist
Chroma: 3 to 6 dry or moist
Texture: sandy loam, fine sandy loam, loamy sand, loam, gravelly fine sandy loam, gravelly loamy sand, gravelly sandy loam, very gravelly sandy loam, gravelly loam, and channery loam

Waumac Series

Map units: 300, 307, 314, 321, 342
Depth class: very deep
Drainage class: well drained
Landform: alluvial fans, valley floors, and stream terraces
Parent material: fan and stream alluvium derived from sandstone and igneous rocks
Elevation: 5,400 to 6,900 feet (1,646 to 2,103 meters)
Slope: 1 to 20 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Coarse-loamy, mixed, calcareous, mesic Typic Ustorthents

Typical Pedon

Waumac loamy sand, in an area of mapping unit 300, Waumac-Bamac association, 1 to 7 percent slopes; Sandoval County; Santo Domingo Pueblo Quadrangle; one-half mile south of the Cochiti Indian Pueblo, 100 yards east of the Highway 85; 100 feet west and 1,070 feet north of the southeast corner of sec. 24, T. 16 N., R. 5 E. NAD 83, UTM 13—03 77 273 E—39 40 079 N.

A—0 to 3 inches; pale brown (10YR 6/3) loamy sand, dark grayish brown (10YR 4/2) moist; weak thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots; few fine tubular pores; moderately alkaline; clear smooth boundary.
C1—3 to 31 inches; pale brown (10YR 6/3) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; loose, nonsticky and nonplastic; few very fine roots; slightly effervescent; moderately alkaline; gradual wavy boundary.
C2—31 to 60 inches; pale brown (10YR 6/3) gravelly fine sandy loam; dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; 20 percent gravel; slightly effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 10 to 18 percent clay

A horizon
Hue: 7.5YR, 10YR or 2.5Y
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 2 to 4
Texture: loamy sand or loamy fine sand

C horizon
Hue: 5YR, 7.5YR or 10YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 3 or 4
Texture: sandy loam, fine sandy loam, and gravelly fine sandy loam
Note: Thin strata of loamy sand and coarse sandy loam occur in some pedons. This horizon can be noncalcareous to depths of 18 inches in some pedons.

Waumac Variant Series

Map unit: 354
Depth class: shallow
Drainage class: well drained
Landform: hills
Parent material: coarse textured material derived from tuff
Elevation: 5,600 to 5,900 feet (1,707 to 1,798 meters)
Slope: 1 to 15 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (305 to 356 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10.0 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Ashy-skeletal, mesic, shallow Typic Ustorthents

Typical Pedon

Waumac Variant very gravelly sandy loam, in an area of mapping unit 354, Waumac variant very gravelly sandy loam, 1 to 15 percent slopes; Sandoval County; Cochiti Dam Quadrangle; 0.5 mile south of the old sawmill, 2,200 feet north and 1,000 feet east of the southwest corner of sec. 31, T. 17 N., R. 6 E. NAD 83, UTM 13—03 77 535 E—39 46 752 N.

A—0 to 3 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common interstitial pores; 55 percent gravel; slightly alkaline; clear smooth boundary.
C—3 to 12 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; common interstitial pores; 55 percent gravel; slightly alkaline.
Cr—12 inches; tuff.

Range in Characteristics

Particle-size control section: 10 to 18 percent clay
Depth to paralithic contact: 10 to 20 inches

A horizon:
Hue: 10YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 2 to 4

C horizon
Hue: 10YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 3 or 4

Wauquie Series

Map units: 348, 414, 419
Depth class: very deep
Drainage class: well drained
Landform: mountain slopes, benches, canyons, hills, and mesas
Parent material: slope alluvium and colluvium derived from granite and shale
Elevation: 6,000 to 8,400 feet (1,829 to 2,560 meters)
Slope: 8 to 55 percent
Climatic data:
Mean annual precipitation: 13 to 16 inches (330 to 406 millimeters)
Mean annual air temperature: 48 to 52 degrees F. (10 to 11.1 degrees C.)
Frost-free period: 110 to 130 days

Taxonomic class: Loamy-skeletal, mixed, mesic Aridic Haplustalfs

Typical Pedon

Wauquie extremely cobbly fine sandy loam, in an area of mapping unit 419; Santa Fe-Wauquie-Rock outcrop, 25 to 70 percent slopes; Sandoval County; La Ventana Quadrangle; about 5 miles east of La Ventana; unsectionized; NAD 83, UTM 13—03 28 986 E—39 62 292 N.

A—0 to 4 inches; reddish brown (5YR 5/4) extremely cobbly fine sandy loam, dark reddish brown (5YR 3/4) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and common medium roots; many very fine vesicular pores; 5 percent stones; 25 percent cobbles, and 45 percent gravel; neutral; clear smooth boundary.

Bt1—4 to 11 inches; reddish brown (2.5YR 4/4) extremely cobbly sandy clay loam, dark reddish brown (2.5YR 3/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; many very fine and common medium roots; common very fine tubular pores; common distinct clay films on faces of peds and in pores; 5 percent stones, 25 percent cobbles and 45 percent gravel; neutral; gradual smooth boundary.

Bt2—11 to 18 inches; reddish brown (2.5YR 4/4) extremely cobbly sandy clay loam, dark reddish brown (2.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium roots; common very fine tubular pores; common distinct clay films on faces of peds and in pores; 5 percent stones, 25 percent cobbles and 45 percent gravel; neutral; gradual smooth boundary.

Bt3—18 to 29 inches; reddish brown (5YR 4/4) extremely cobbly sandy loam, dark reddish brown (5YR 3/4) moist; massive; soft, friable, nonsticky and nonplastic; common medium roots; few very fine tubular pores; many colloidal stains on sand grains and gravel; 5 percent stones, 25 percent cobbles and 50 percent gravel; slightly alkaline; gradual smooth boundary.

Bk—29 to 60 inches; light reddish brown (5YR 6/4) extremely cobbly sand, reddish brown (5YR 5/4) moist; massive; loose, nonsticky and nonplastic; few medium roots; few interstitial pores; 5 percent stones, 25 percent cobbles, and 50 percent gravel; few calcium carbonate coatings on underside of gravel; slightly alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay

A horizon
Hue: 5YR to 10YR
Value: 3 to 6 dry, 2 to 4 moist
Chroma: 2 to 4
Texture: extremely gravelly sandy clay loam, extremely cobbly fine sandy loam, or very gravelly fine sandy loam

Bt horizon (Btk horizon in some pedons)
Hue: 2.5YR to 10YR
Value: 4 to 6 dry, 3 or 4 moist
Chroma: 2 to 6
Texture: very gravelly clay loam, extremely cobbly sandy clay loam, very gravelly sandy clay loam, and extremely cobbly sandy loam

Bk horizon
Hue: 2.5YR to 10YR
Value: 5 to 8 dry, 4 to 6 moist
Chroma: 2 to 6
Texture: very gravelly sandy loam, very gravelly loamy coarse sand, extremely gravelly loamy sand, extremely cobbly sandy loam, extremely cobbly sand, extremely cobbly loam

Winona Series

Map unit: 228
Depth class: shallow
Drainage class: well drained
Landform: hills and plateaus
Parent material: material derived from travertine
Elevation: 5,900 to 6,300 feet (1,798 to 1,920 meters)
Slope: 8 to 25 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Loamy-skeletal, carbonatic, mesic Lithic Ustollic Calciorthids

Typical Pedon

Winona very channery fine sandy loam, in an area of mapping unit 228, Winona very channery fine sandy loam, 8 to 25 percent slopes; Sandoval County; San Ysidro Quadrangle; about 10 miles northwest of San Ysidro; NAD 83, UTM 13—03 30 477 E—39 42 612 N.

A—0 to 2 inches; brown (7.5YR 5/4) very channery fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; 15 percent cobbles and 40 percent channers; coarse fragments are carbonate concretions and travertine fragments coated with pendants of calcium carbonate; violently effervescent; slightly alkaline; clear smooth boundary.

Bk—2 to 13 inches; brown (7.5YR 5/4) very channery loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; 45 percent channers with calcium carbonate pendants; violently effervescent; slightly alkaline.

R—13 inches; travertine.

Range in Characteristics

Particle-size control section: 15 to 30 percent clay
Depth to bedrock: 11 to 20 inches

A horizon
Hue: 5YR, 7.5YR, 10YR
Value: 4, 5, or 6 dry, 3 or 4 moist
Chroma: 2, 3, or 4 dry

Bk horizon
Hue: 5YR, 7.5YR, 10YR
Value: 5, 6, or 7 dry; 3, 4, 5, or 6 moist
Chroma: 2, 3, or 4, dry or moist

Witt Series

Map units: 34, 53, 217
Depth class: very deep
Drainage class: well drained
Landform: bajadas, fan terraces, and mesas
Parent material: Eolian material and fan alluvium from basalt
Elevation: 5,200 to 6,700 feet (1,585 to 2,042 meters)
Slope: 1 to 8 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Fine-silty, mixed, mesic Ustollic Haplargids

Typical Pedon

Witt loam, in an area of mapping unit 53, Witt-Harvey association, 1 to 7 percent slopes; Sandoval County; Golden Quadrangle; about 3 miles northwest of Golden; 300 feet south and 900 feet west of the northeast corner of sec. 1, T. 12 N., R. 6 E. NAD 83, UTM 13—03 86 526 E—39 07 226 N.

A—0 to 3 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; moderately alkaline; abrupt smooth boundary.

BA—3 to 6 inches; brown (7.5YR 4/4) silt loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; mildly alkaline; clear smooth boundary.

Bt1—6 to 11 inches; brown (7.5YR 4/4) silty clay loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and plastic; common fine and very fine roots; few thin clay films on faces of peds; strongly effervescent; mildly alkaline; clear smooth boundary.

Bt2—11 to 18 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots; few thin clay films on faces of peds; strongly effervescent; moderately alkaline; clear smooth boundary.

Btk—18 to 25 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots; few thin clay films on faces of peds; strongly effervescent; common medium masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk1—25 to 39 inches; light brown (7.5YR 6/4) silt loam, brown (7.5YR 4/4) moist; weak medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; many fine and very fine roots; strongly effervescent; common medium masses of calcium carbonate; moderately alkaline; abrupt smooth boundary.

Bk2—39 to 53 inches; pinkish white (7.5YR 8/2) silt loam, pinkish gray (7.5YR 7/2) moist; massive; slightly hard, firm, sticky and plastic; few very fine roots; violently effervescent; many medium masses of calcium carbonate; moderately alkaline; gradual wavy boundary.

C—53 to 60 inches; pink (7.5YR 7/4) silt loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; violently effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 18 to 35 percent clay

A horizon
Hue: 5YR, 7.5YR, 10YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 2 to 4
Texture: very fine sandy loam or loam

Bt horizon
Hue: 5YR, 7.5YR, 10YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 2 to 6
Texture: silty clay loam, silt loam, and loam

Bk horizon
Hue: 5YR or 7.5YR
Value: 5 to 8 dry, 4 to 7 moist
Chroma: 2 to 4
Texture: loam, silt loam, silty clay loam, or very fine sandy loam

Note: A C horizon is present in some pedons.

Zia Series

Map units: 66, 91, 93, 111, 114, 190, 207, 211, 234, 410
Depth class: very deep
Drainage class: somewhat excessively well drained
Landform: alluvial fans, stream terraces, summits of mesas and plateaus
Parent material: eolian material and fan and stream alluvium derived from sandstone
Elevation: 5,000 to 6,900 feet (1,524 to 2,103 meters)
Slope: 0 to 25 percent
Climatic data:
Mean annual precipitation: 10 to 13 inches (254 to 330 millimeters)
Mean annual air temperature: 52 to 54 degrees F. (11.1 to 12.2 degrees C.)
Frost-free period: 120 to 140 days

Taxonomic class: Coarse-loamy, mixed, calcareous, mesic Ustic Torriorthents

Typical Pedon

Zia sandy loam, in an area of mapping unit 211, Zia-Clovis association, 2 to 10 percent slopes; Sandoval County; Arroyo de las Calabacillas Quadrangle; about 6

miles east of Alamo Ranch Headquarters; 1,400 feet west and 300 feet north of the southeast corner of sec. 21, T. 13 N., R. 1 E. NAD 83, UTM 13—03 33 005 E—39 11 510 N.

A—0 to 5 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 3/3) moist; weak medium granular structure; soft, friable, slightly sticky and slightly plastic; common very fine and few fine roots; 5 percent gravel; slightly effervescent; slightly alkaline; clear smooth boundary.

Bw—5 to 14 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; few fine and very fine roots; strongly effervescent; slightly alkaline; clear smooth boundary.

C1—14 to 33 inches; light gray (10YR 7/2) sandy loam, brown (10YR 5/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; strongly effervescent; slightly alkaline; gradual smooth boundary.

C2—33 to 46 inches; very pale brown (10YR 7/3) sandy clay loam, yellowish brown (10YR 5/4) moist; massive; hard, firm, sticky and plastic; few fine and very fine roots; 5 percent gravel; violently effervescent; calcium carbonate as very few fine irregular masses; moderately alkaline; clear smooth boundary.

C3—46 to 60 inches; light yellowish brown (10YR 6/4) sandy loam, brown (10YR 5/3) moist; massive; soft, friable, slightly sticky and slightly plastic; 10 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Particle-size control section: 8 to 18 percent clay

A horizon

Hue: 5YR to 10YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 2 to 6
Texture: loamy sand, sandy loam, fine sandy loam, or loam

Bw or C horizon

Hue: 5YR to 10YR
Value: 4 to 8 dry, 3 to 7 moist
Chroma: 2 to 6
Texture: fine sandy loam or sandy loam. The C horizon contains strata of loamy sand or sandy clay loam in most pedons.

Factors of Soil Formation

Soil is a collection of natural bodies occurring on the earth's surface and is capable of supporting plants. Its properties result from the extent to which physical, chemical, and biological processes have affected the material from which soil is derived, the parent material. The main processes active in the soils of the Sandoval County area are: weathering of soil particles and rock material through dissolution and disintegration; accumulation and oxidation of organic matter in surface layers; formation of soil structure and surface crusting; movement of dissolved soil constituents with soil water, and precipitation of soil constituents from soil water; and movement of clay particles with soil water downward through the soil.

Most of these soil processes enhance plant growth, and some bring about hindrances to plant growth. Some soil processes are dependent upon other processes having reached a certain stage. Soil processes, or their lack, give the present soil its characteristics and are governed by five soil-forming factors: *time, parent material, climate, relief*, and *living organisms*. Understanding and recognizing soil-forming processes that occur affords the soil user the ability to predict the capability of soils for many uses.

Climate

The *climate* of an area is greatly responsible for the types of soil processes and for the rate at which these processes occur. The main features of climate affecting soil processes are precipitation and temperature.

The climate of the Sandoval County area at present is semi-arid continental. The lowest areas have annual precipitation of about eight inches and mean annual air temperature of about 55 degrees. These being the driest are areas of least vegetation. The small amount of organic matter produced by the vegetation is rapidly oxidized, resulting in soils with light colored surface horizons as in Sheppard and Grieta series.

With increased temperature, chemical and biochemical reactions are hastened. In addition, freeze-thaw cycles speed the weathering of soil and rock particles. The temperature also greatly affects evaporation of water from the soil and transpiration of water from plants.

As the amount of precipitation increases, the potential amount of vegetation on a soil increases. The number of days per year that the soil is moist during the frost-free period determines how much vegetation can be supported and the time during which soil processes occur. The depth to which water penetrates the soil is also very important as it determines the maximum depth of root penetration and the depth beyond which soil transforming processes are greatly slowed. If there is not enough precipitation for water to move through the entire soil and enter the ground water system, calcium carbonate deposits are precipitated at the depth of maximum water penetration.

In the cold, wet, mountainous areas of the Sandoval County area, soils such as Redondo and Calaveras series support stands of large trees. These areas receive 25 or more inches of precipitation per year and the average annual air temperature is about 40 degrees F. The soils in these areas are moist more days per year than most

other soils in the Sandoval County area. The cooler temperatures allow for a buildup of organic matter in the surface layers of these soils.

Older soils in the area have been influenced by past climates. Past climates were similar to the present one, but slightly more moist and cooler. Similar soil processes took place, at an accelerated rate when compared to present conditions. For this reason, some soils in the driest part of the Sandoval County area have strongly developed features such as the petrocalcic horizon of the Pastura series, and the calcic and argillic horizons of the Clovis series.

Living Organisms

The life associated with a soil greatly influences the processes within, the features and the characteristics of a soil.

The vegetation supported by a soil is part of this life. Plant roots provide channels for water flow into depths of soils which otherwise might receive little water. Plant material provides the bulk of the organic portion of soil that is important to fertility. Plant life is very important in retaining soils in place, protecting them from erosion. A good plant cover will reduce evaporation of water from the soil surface and reduce runoff, providing a soil with more moist days each year. The plant cover also shades the soil surface and causes the soil to stay cooler than areas exposed to direct sunlight.

Soil insects, worms, and rodents affect aeration and intake rate by mixing and burrowing. Some animals affect the vegetation on the soil by their eating habits. Large animals, especially in dry areas where soil crusts form, enhance seed germination by walking across the soil surface, providing in their hoof prints a favorable seedbed.

Microscopic organisms function importantly in nutrient cycling. Fungi, bacteria, nematodes, and others process organic material and release nutrients for further plant growth. They also add acids, gases, and other chemical compounds that affect soil processes.

Many soils have been changed as a result of human intervention. People change vegetation on soils, animal and microbial life of soils, soil climate, and relief, through urban development, farming, ranching, logging, and sundry enterprises.

Topography

Soil *topography* has a profound influence on the development of soil features. Its many facets, including degree of slope, direction of slope, shape and roughness of slope, influence the climate of a soil and the extent of erosive forces affecting a soil.

On steep soils, erosion potential is greatest and soil features develop slowly. As organic matter accumulations and weathered soil material washes away, new soil parent material or bedrock nears the surface. If the erosion is moderate or severe, it is accompanied by a decrease in vegetation and an increase in runoff water, which in turn enhances the erosion.

Soils on very slight or level slopes often receive depositions of soil material. This process also slows the development of soil features, since soil material is buried too deeply before soil transforming processes are able to cause features to develop. This process is accompanied by an increase in amount of vegetation since along with new material, the soil receives run-on water.

The climate of a soil is affected greatly by the runoff or run-on water it sheds or receives.

Soils with a concave slope such as San Mateo or Sparank series receive a great amount of their moisture from adjacent, steeper slopes. Soils with more slope shed various amounts of water, depending on their steepness, amount of vegetation, and surface roughness. Soils with a very gravelly surface composed of angular pebbles

protruding from the surface can retain precipitation, even with a steep slope. A very gravelly surface of rounded, imbedded gravel however will shed water rapidly and deprive the soil of moisture.

On steep slopes there is a wide difference in climate between adjacent north-facing and south-facing slopes. Less direct sunlight on north-facing slopes results in an evapotranspiration rate and temperatures lower than that on south-facing slopes. This accounts for more days during which the soil is moist and more vegetation on north-facing slopes.

Topography has been an important factor in developing the landforms of this area. The following are landforms recognized in the survey area and some of the soils associated with them. Landforms are not static; they are continually being created and eroded.

Alluvial Fans

Alluvial fans originate from upslope landscapes. Sediment loads are deposited when slope gradients change from upland positions to less sloping landforms. An inherent feature of fan development is the continuously changing pattern of channels and loci of deposition. Over a long period of time, these changes ensure the maintenance of fans formed by distributing material widely over the surface. The soils on this landscape position are generally very deep with soil textures highly variable depending on the local geology from which they are formed. In this survey, the soil series found on alluvial fan positions are the Querencia series.

Dunes

This landform has developed from Holocene-age and present-day eolian sands. These relatively small transverse dunes formed perpendicular to the prevailing winds. Most dunes in this area are stable due to the establishment of vegetation that restricts their activity. *Dunes* can be found as a component on most of the other landforms portrayed in this section. These soils can be very deep and located in large dune fields or as a shallow mantle over bedrock controlled surfaces. The Mespun series is found on dunes.

Escarpments

Escarpments are a familiar feature in the survey area. They are relatively steep slopes or cliffs produced by erosion and faulting. Due to the steep slopes the soils formed on this landform are generally shallow. Examples of soil series on escarpments are the Skyvillage and Santa Fe series.

Fan Remnants

On this position, soils exhibit different degrees of pedogenic (soil) development. The degree of development depends upon the amounts of translocated calcium carbonate and/or silicified clays, which are related to the age of the soil.

Fan remnants have been dissected or downcut to the point at which flooding rarely occurs. This landform has two important components. One is the summit, where erosional activity is relatively low. This area will show the different degrees of soil development and age. The second component is the side slope, where erosional activity is cutting uphill into the more stable summit. In most areas in the survey, the surface has a thick eolian mantle that is being eroded.

Soils on fan remnants vary greatly in their makeup. The Pinitos series can be found in the survey area on fan remnants.

Flood Plains

This landform is formed by early Holocene-age to present-day stream alluvium. In this survey area, floodwaters flow at low to very low gradients along valley floors and

are elongated in nature. The soils on these flood plains receive periodic depositions of fresh alluvium, causing an irregular decrease in organic carbon and weak to no soil development. Soils on this landform are predominantly very deep with soil textures highly variable depending on the local geology they are formed from. The Jocity and Trail soils are formed in flood plains found along the Rio Grande and Jemez Rivers.

Mesas and Cuestas

These landforms have two important components. The first consists of the mesa summit and the cuesta dipslope. They are both nearly level to gently sloping, bedrock-controlled surfaces that are generally stable. The Bond and Hagerman series are found on these surfaces. The soils are characterized by well-developed argillic horizons.

The second component is the escarpment, where erosional activity is cutting back into the more stable summit. Soils on this component have little or no horizon development due to the steep slopes where erosional activity is greatest. Typical soils representing this escarpment component are the Vessilla and Skyvillage series.

Mesas differ from cuestas in that an escarpment on all sides terminates the mesa summit, while a cuesta will generally have one or more sides that grade into the surrounding terrain following gentle slopes.

Stream Terraces

This position is the erosional remnant of the active flood plains that existed during the late Pleistocene to Holocene ages. The slopes are in the same general direction as the current flood plain. The soils in this position are underlain by stratified sand, gravel, loamy, silty, or clayey sediments and, in some cases, buried paleosols.

The soils on stream terraces have been stable for a sufficient time period to form cambic horizons. Formation of soil structure and accumulations of calcium carbonate and sometimes gypsum characterize a cambic horizon. This position is still subject to some flooding during major events. These rare flooding occurrences and the thin alluvial deposits from the floodwaters do not inhibit soil development. Typical soils that represent stream terraces are the Zia and Councelor series.

Mountains

The mountain slopes consist of multiple landforms and positions and may be formed by several processes are therefore not considered a geomorphic surface. Soil development on these landforms is highly dependent on the nature of the bedrock such as its chemical composition, grain size, and hardness. The most influential soil-forming factors in determining how soil developed on hills and mountains are time and the slope gradient of the bedrock.

Soils on this landform vary greatly in horizon development, from soils with no development to soils with well-developed argillic horizons. Soils that have little or no horizon development are usually found on the steeper slopes where erosional activity is greatest. Soils that have well-developed horizons are generally on gently sloping to moderately steep slopes where erosion is slight to moderate. The Redondo and Palon series are examples of soils found in the Jemez Mountains.

The interaction of all the facets of soil topography can account for wide soil variations over short distances.

Parent Material

A complex geologic history, ranging from formation of sedimentary rocks while great seas covered the earth, to volcanism and mountain forming processes provided a great many rock formations in the Sandoval County area, the constituents of which to a great extent, determined the chemical, mineralogical, and textural attributes of

the soils. Unless already unconsolidated, it is the decomposition and disintegration of these rocks which give rise to the *parent material* of soil.

Parent materials in the Sandoval County area fall into two broad categories. The first is material that, after weathering from rock, is not moved, but remains in place and is subject to soil-forming processes. The second category is unconsolidated rock-derived material that has been transported by water, wind, or by force of gravity.

Soils formed in non-transported materials have mineralogical, chemical and textural traits, which are directly related to the rock from which the material is derived. There are many examples of such soils in the Sandoval County area. The Bond, Hagerman, Skyvillage, Vessilla, and Sedgran series all contain high amounts of sand-sized quartz, inherited from their weathered sandstone parent material. Soils developed from weathered shale, such as Menefee, Sandoval, Camino, and Cucho series contain a great deal of silt- and clay-sized particles of various clay minerals, feldspars, and some quartz. Other soils formed in place from weathered rock material include the Sedgran and Osha series from weathered granite, the Redondo series from weathered tuff, and the Deama series from weathered limestone.

Soils formed in transported materials can have particles weathered from one rock type, a few or many types, depending on the method and distance of transport. *Colluvial* soils are formed in material moved by the force of gravity, which is transported a relatively short distance, down slopes. The Wauquie series formed in material moved down slopes after weathering from granite and shale. Alanos series formed in transported weathered tuff, and Palon series are formed in weathered rhyolite that has moved down slopes.

The second type of transported soil parent material is *eolian*, or wind blown sediments. These are materials that begin as particles on the surface of other soils, and end up comprising the entire depth of a new soil. The Pinavetes, Sheppard, and Royosa series, when found in upland areas, are derived from eolian sand.

Alluvium is the third type of transported soil parent material found in the Sandoval County area. It is material that has been moved and deposited by streams and rivers. Alluvium is rarely derived from one rock type, and its sediments generally are of diverse mineralogy diversified. Often alluvial sediments are sorted according to texture. It is deposited in layers, which are often well defined and contrasting in texture, color, and organic matter content. Alluvium is found throughout the Sandoval County area and its age varies greatly. Recent deposits of alluvium are found along the Rio Grande, Rio Puerco and their tributaries. Soils such as the Gilco, Aga, San Mateo, Peralta, Sparank, Jocity, and Sparham series are formed in recent alluvium and display well defined layering. Older alluvium, much of which was deposited by the ancestral Rio Grande and its tributaries is locally extensive in the survey area. Soil development processes have obliterated most evidence of layering in these soils. Some soils formed in old alluvium are Sheppard, Bamac, Espiritu, Cascajo, and Grieta series.

Many soils in the Sandoval County area are formed in more than one kind of parent material. Mountain soils, such as Laventana series, are often formed in a mantle of colluvium overlying in situ material weathered from bedrock. Soils atop basalt mesas, like Prieta series formed in in situ weathered basalt material mixed with eolian silt. Fragua series formed in eolian sands mixed with weathered sandstone, and sometimes have a cap of colluvial basalt particles. All soils in the area receive eolian deposits, in varying amounts. Often this is in minor yearly contributions of calcareous dust, which over many years can bring about a highly calcareous soil.

In addition to being the initial material on which soil processes act, the parent material partly affects which and how fast soil-transforming processes occur. This is affected mainly by the rate that the parent material weathers, its mineralogy and the particle size of its weathering products.

Time

The formation of parent material (the unconsolidated mineral and organic material which when exposed at the earth's surface give rise to soil) by the weathering of geologic deposits requires a great amount of *time*. In addition, soil processes require a period of time before bringing about soil properties significantly different from properties inherited from the parent material. Many soil processes are dependent on the previous operation of other, different soil processes.

Therefore, the amount of time that a soil has been in place is very important to its present character. In the Sandoval County area, soils in the Rio Grande and Rio Puerco valleys have been there a short time, resulting in soils like Gilco, Aga, Jocity, and Sparank series that have little evidence of operating soil processes except for the accumulation of a small amount of organic matter in the surface layer. These and other young soils resemble very closely the original parent material from which they were derived.

Older soils have developed features, such as argillic horizons, calcic horizons, cambic horizons, which indicate the relative length of time a soil has been in place, and which processes have been operational in the soil. The older a soil becomes, the less it resembles the parent material from which it was derived.

Recognition of horizons and features, with knowledge of how their accompanying processes affect soil fertility, soil bulk density and other properties give great insight into the value of soil for specific uses. All of the five soil-forming factors occur in wide variation throughout the Sandoval County area, resulting in a great variety of soils. These soils represent a great natural resource and provide for a multiplicity of land uses. Knowledge of soils and their formation can help the user to protect and use the resources wisely.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial cone. The material washed down the sides of mountains and hills by ephemeral streams and deposited at the mouth of gorges in the form of a moderately steep, conical mass descending equally in all directions from the point of issue.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Arroyo. The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in alluvium.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Bajada. A broad alluvial slope extending from the base of a mountain range out into a basin and formed by coalescence of separate alluvial fans.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See "Crown.")

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a "channer."

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common

compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coppice dune. A small dune of fine grained soil material stabilized around shrubs or small trees.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cuesta. A hill or ridge that has a gentle slope on one side and a steep slope on the other; specifically, an asymmetric, homoclinal ridge capped by resistant rock layers of slight or moderate dip.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Desert pavement. On a desert surface, a layer of gravel or larger fragments that was emplaced by upward movement of the underlying sediments or that remains after finer particles have been removed by running water or the wind.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a

consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fan remnant. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.
B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.
C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.
Cr horizon.—Soft, consolidated bedrock beneath the soil.
R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K_{sat}. Saturated hydraulic conductivity. (See "Permeability.")

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Major Land Resource Area. These are geographically associated land resource units. Identification of these large areas is important in statewide agricultural planning and has value in interstate, regional, and national planning.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See "Reaction, soil.")

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Paleosols. A soil that formed on a landscape in the past with distinctive morphological features resulting from a soil-forming environment that no longer exists at the site.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See "Reaction, soil.")

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See "Climax plant community."

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.
Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.
Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.
Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.
Root zone. The part of the soil that can be penetrated by plant roots.
Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.
Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.
Salinity. The degree to which a soil is affected by soluble salts. Salinity is expressed as a electrical conductivity (EC) of a saturation extract. The solution resistance is measured in mmhos/cm. The degrees of salinity and their respective ratios are:

Non saline	0-2
Very slightly saline	2-4
Slightly saline	4-8
Moderately saline	8-16
Strongly saline	>16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.
Sandstone. Sedimentary rock containing dominantly sand-sized particles.
Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.
Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.
Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.
Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.
Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.
Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.
Shale. Sedimentary rock formed by the hardening of a clay deposit.
Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.
Shrink-Swell. Soil volume changes due to increases or decreases in moisture content. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a

fraction, the resulting value is COLE, coefficient of linear extensibility. The Shrink-swell classes are defined as follows:

Class	LEP
Low	<3
Moderate	3-6
High	6-9
Very High	>9

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of

climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and precipitation

(Recorded in the period 1971-2000 at Cuba, NM #2241)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have: Maximum temperature higher than--	2 years in 10 will have: Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have--: Less than--	2 years in 10 will have--: More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In.	In.	In.		In.
January-----	42.0	7.7	24.8	61	-24	1	0.82	0.16	1.44	2	8.5
February----	46.0	13.7	29.8	63	-19	6	0.50	0.10	0.87	2	5.1
March-------	53.5	20.8	37.2	71	-2	42	0.90	0.22	1.53	2	3.9
April-------	61.6	25.8	43.7	77	6	148	0.63	0.08	1.14	2	1.6
May---------	70.9	33.7	52.3	85	18	374	0.87	0.18	1.47	2	0.0
June--------	81.4	40.7	61.1	94	25	631	0.80	0.14	1.36	2	0.0
July--------	85.1	48.7	66.9	95	34	832	1.91	0.94	2.85	5	0.0
August------	82.7	48.3	65.5	93	35	773	2.20	1.36	2.94	6	0.0
September---	76.2	39.7	57.9	89	21	538	1.41	0.48	2.29	3	0.0
October-----	65.7	27.4	46.5	80	8	222	1.10	0.38	1.76	3	0.6
November----	51.9	17.3	34.6	71	-7	26	0.89	0.16	1.61	2	2.7
December----	44.1	10.2	27.1	62	-15	1	0.53	0.05	0.91	1	5.2
Yearly:											
Average---	63.4	27.8	45.6	---	---	---	---	---	---	---	---
Extreme---	100	-38	---	96	-25	---	---	---	---	---	---
Total-----	---	---	---	---	---	3594	12.57	9.48	14.18	32	27.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F.)

Table 1.--Temperature and precipitation--continued

(Recorded in the period 1971-2000 at Jemez Springs, NM #4369)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have: Maximum temperature higher than--	2 years in 10 will have: Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In.	In.	In.		In.
January-----	46.2	19.8	33.0	63	-2	13	1.25	0.36	2.07	3	9.5
February----	51.7	23.9	37.8	68	3	46	0.88	0.34	1.46	2	6.3
March-------	58.3	28.9	43.6	74	12	146	1.26	0.46	1.99	3	4.5
April-------	66.8	34.5	50.6	81	19	326	0.97	0.18	1.72	2	2.3
May---------	75.4	42.1	58.8	89	29	583	1.14	0.40	1.89	3	0.2
June--------	86.0	50.5	68.3	98	37	842	1.01	0.28	1.70	2	0.0
July--------	88.5	55.6	72.0	98	46	984	2.47	1.63	3.24	6	0.0
August------	85.4	54.4	69.9	95	45	923	2.98	1.93	3.88	7	0.0
September---	79.5	47.8	63.7	91	32	707	1.94	0.92	2.79	4	0.0
October-----	69.1	37.9	53.5	84	21	422	1.53	0.21	2.89	3	0.3
November----	55.4	27.6	41.5	73	8	114	1.25	0.46	1.95	3	2.9
December----	47.1	20.9	34.0	63	0	20	0.95	0.17	1.63	2	6.4
Yearly:											
Average---	67.5	37.0	52.2	---	---	---	---	---	---	---	---
Extreme---	101	-18	---	99	-5	---	---	---	---	---	---
Total-----	---	---	---	---	---	5124	17.63	13.03	20.72	40	32.5

Table 1.--Temperature and precipitation--continued

(Recorded in the period 1971-2000 at Torreon Navajo Mission, NM #9031)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have: Maximum temperature higher than--	2 years in 10 will have: Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have--: Less than--	2 years in 10 will have--: More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In.	In.	In.		In.
January-----	42.0	15.3	28.6	60	-10	4	0.61	0.19	0.98	2	5.7
February----	47.9	20.8	34.4	65	-3	21	0.43	0.19	0.63	1	3.7
March-------	57.1	25.6	41.3	75	9	107	0.73	0.20	1.13	2	2.4
April-------	65.9	31.3	48.6	82	14	275	0.63	0.08	1.13	1	1.3
May---------	75.3	40.0	57.6	89	23	547	0.78	0.09	1.51	2	0.4
June--------	86.3	49.0	67.6	98	32	814	0.59	0.05	1.05	1	0.0
July--------	88.9	55.5	72.2	99	38	993	1.56	0.78	2.27	4	0.0
August------	85.9	54.4	70.1	96	42	932	1.86	0.85	2.77	5	0.0
September---	79.1	46.8	63.0	92	30	685	1.29	0.48	2.11	3	0.0
October-----	67.5	35.1	51.3	83	15	359	1.07	0.19	1.83	3	0.6
November----	52.5	23.7	38.1	71	2	67	0.78	0.26	1.23	2	2.3
December----	43.3	16.2	29.8	61	-6	4	0.47	0.06	0.83	1	4.1
Yearly:											
Average---	66.0	34.5	50.2	---	---	---	---	---	---	---	---
Extreme---	101	-33	---	99	-14	---	---	---	---	---	---
Total-----	---	---	---	---	---	4808	10.80	8.63	12.87	27	20.5

Table 1.--Temperature and precipitation--continued

(Recorded in the period 1971-2000 at Wolf Canyon, NM #9820)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have: Maximum temperature higher than--	2 years in 10 will have: Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	oF	oF	oF	oF	oF	Units	In.	In.	In.		In.
January-----	37.5	7.6	22.5	55	-18	0	2.03	0.59	3.52	5	26.6
February----	40.2	11.1	25.7	57	-15	0	1.57	0.78	2.33	4	21.8
March-------	45.7	17.3	31.5	62	-5	6	2.13	0.80	3.44	5	24.8
April-------	53.7	22.7	38.2	70	3	50	1.39	0.36	2.40	3	13.0
May---------	62.9	28.9	45.9	77	16	194	1.40	0.49	2.30	4	3.3
June--------	73.2	35.1	54.2	85	22	421	1.21	0.23	2.00	3	0.0
July--------	75.7	41.7	58.7	86	30	577	3.17	1.97	4.37	8	0.0
August------	72.8	41.6	57.2	82	31	527	3.85	2.47	5.02	8	0.0
September---	67.4	35.0	51.2	80	20	336	2.12	1.10	3.02	4	0.2
October-----	57.6	25.6	41.6	73	9	101	2.03	0.76	3.14	4	4.5
November----	44.8	16.1	30.5	64	-9	5	1.83	0.81	2.77	4	14.7
December----	38.4	9.2	23.8	56	-15	0	1.55	0.57	2.32	4	19.1
Yearly:											
Average---	55.8	24.3	40.1	---	---	---	---	---	---	---	---
Extreme---	89	-36	---	86	-21	---	---	---	---	---	---
Total-----	---	---	---	---	---	2218	24.28	20.06	28.03	56	128.1

Table 2.--Freeze dates in spring and fall

(Recorded in the period 1971-2000 at Cuba, NM #2241)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 31	June 18	June 29
2 years in 10 later than--	May 25	June 12	June 25
5 years in 10 later than--	May 13	June 2	June 15
First freezing temperature in fall:			
1 year in 10 earlier than--	September 19	September 14	August 30
2 years in 10 earlier than--	September 24	September 18	September 4
5 years in 10 earlier than--	October 3	September 26	September 15

Table 2.--Freeze dates in spring and fall--continued

(Recorded in the period 1971-2000 at Jemez Springs, NM #4369)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
1 year in 10 later than--	April 20	May 6	May 19
2 years in 10 later than--	April 15	April 30	May 15
5 years in 10 later than--	April 5	April 19	May 6
First freezing temperature in fall:			
1 year in 10 earlier than--	October 21	October 4	September 26
2 years in 10 earlier than--	October 26	October 10	October 1
5 years in 10 earlier than--	November 5	October 22	October 10

Table 2.--Freeze dates in spring and fall--continued

(Recorded in the period 1971-2000 at Torreon Navajo Mission, NM #9031)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 13	May 19	June 4
2 years in 10 later than--	May 6	May 13	May 29
5 years in 10 later than--	April 23	May 4	May 18
First freezing temperature in fall:			
1 year in 10 earlier than--	October 8	September 28	September 20
2 years in 10 earlier than--	October 14	October 4	September 25
5 years in 10 earlier than--	October 24	October 15	October 5

Table 2.--Freeze dates in spring and fall--continued

(Recorded in the period 1971-2000 at Wolf Canyon, NM #9820)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	June 14	June 28	July 10
2 years in 10 later than--	June 7	June 22	July 5
5 years in 10 later than--	May 24	June 12	June 26
First freezing temperature in fall:			
1 year in 10 earlier than--	September 13	September 5	August 15
2 years in 10 earlier than--	September 19	September 10	August 22
5 years in 10 earlier than--	September 29	September 18	September 3

Table 3.--Growing season

(Recorded for the period 1971-2000 at Cuba, NM #2241)

Probability	Daily minimum temperature		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 oF
	Days	Days	Days
9 years in 10	117	97	70
8 years in 10	125	103	77
5 years in 10	141	116	92
2 years in 10	156	128	106
1 year in 10	165	134	114

Table 3.--Growing season--continued

(Recorded for the period 1971-2000 at Jemez Springs, NM #4369)

Probability	Daily minimum temperature		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 oF
	Days	Days	Days
9 years in 10	187	153	136
8 years in 10	196	164	143
5 years in 10	213	186	156
2 years in 10	230	207	169
1 year in 10	239	218	176

Table 3.--Growing season--continued

(Recorded for the period 1971-2000 at Torreon Navajo Mission, NM #9031)

Probability	Daily minimum temperature		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 oF
	Days	Days	Days
9 years in 10	159	139	117
8 years in 10	167	147	124
5 years in 10	183	163	139
2 years in 10	199	180	154
1 year in 10	208	188	162

Table 3.--Growing season--continued

(Recorded for the period 1971-2000 at Wolf Canyon, NM #9820)

Probability	Daily minimum temperature		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 oF
	Days	Days	Days
9 years in 10	97	76	44
8 years in 10	107	83	52
5 years in 10	127	98	69
2 years in 10	146	112	86
1 year in 10	157	120	95

Table 4.--Acreage and proportionate extent of the soils

Map symbol	Soil name	Los Alamos County	Rio Arriba County	Sandoval County	Total	
					Area	Extent
		Acres	Acres	Acres	Acres	Pct.
1	Silver-Clovis loams, 1 to 7 percent slopes	---	---	10,489	10,489	0.7
2	Clovis-Prieta-Silver association, 3 to 15 percent slopes	---	---	9,027	9,027	0.6
3	Montecito-Orejas complex, 1 to 7 percent slopes	---	---	5,000	5,000	0.3
4	Montecito complex, 3 to 30 percent slopes	---	---	22,532	22,532	1.5
10	Trail silty clay loam, 0 to 1 percent slopes	---	---	757	757	*
11	Trail fine sandy loam, 0 to 1 percent slopes	---	---	1,994	1,994	0.1
13	Sandoval-Querencia association, 2 to 7 percent slopes	---	---	11,436	11,436	0.8
15	Camino-Sandoval complex, 1 to 8 percent slopes	---	---	17,038	17,038	1.1
16	Rock outcrop-Prieta complex, 3 to 15 percent slopes	1,039	---	155	1,194	*
17	Vessilla-Menefee-Rock outcrop complex, 3 to 15 percent slopes	---	---	30,571	30,571	2.0
18	Sparham clay, 0 to 3 percent slopes	---	---	2,927	2,927	0.2
20	Gilco clay loam, 0 to 1 percent slopes	---	---	1,111	1,111	*
21	Rock outcrop-Hackroy complex, 1 to 8 percent slopes	2,907	---	8,060	10,967	0.7
22	Aga silty clay loam, 0 to 1 percent slopes	---	---	531	531	*
23	Hickman clay loam, 1 to 3 percent slopes	---	---	3,263	3,263	0.2
24	Orlie-Sparham association, 0 to 5 percent slopes	---	---	22,785	22,785	1.5
25	Gilco loam, 0 to 1 percent slopes	---	---	3,601	3,601	0.2
26	Orlie loam, 0 to 8 percent slopes	---	---	4,577	4,577	0.3
27	Aga loam, 0 to 1 percent slopes	---	---	1,950	1,950	0.1
29	Trail loamy sand, 0 to 1 percent slopes	---	---	925	925	*
31	Riverwash	---	---	9,415	9,415	0.6
33	Pits	---	---	1,310	1,310	*
34	Ildefonso-Witt association, 1 to 8 percent slopes	---	---	10,220	10,220	0.7
41	Dune land	---	---	792	792	*
47	Cascajo very gravelly sandy loam, 12 to 30 percent slopes	---	---	9,700	9,700	0.6
51	Sparham clay loam, 0 to 1 percent slopes	---	---	871	871	*
52	Totavi loamy sand, 0 to 5 percent slopes	2,422	---	2,885	5,307	0.4
53	Witt-Harvey association, 1 to 7 percent slopes	---	---	18,540	18,540	1.2
54	Harvey-Cascajo association, 5 to 15 percent slopes	---	---	33,134	33,134	2.2
55	La Fonda loam, 1 to 5 percent slopes	---	---	4,734	4,734	0.3
56	Ildefonso cobbly loam, 15 to 35 percent slopes	---	---	12,889	12,889	0.9
57	Badland	---	32	17,590	17,622	1.2
58	Deama-Elpedro association, 5 to 30 percent slopes	---	---	2,525	2,525	0.2

Table 4.--Acreage and proportionate extent of the soils--continued

Map symbol	Soil name	Los Alamos County	Rio Arriba County	Sandoval County	Total	
					Area	Extent
		Acres	Acres	Acres	Acres	Pct.
59	Harvey-Ildefonso-La Fonda association, 3 to 15 percent slopes	---	---	7,884	7,884	0.5
63	Placitas gravelly loam, 8 to 40 percent slopes	---	---	8,545	8,545	0.6
64	Skyvillage-Ildefonso association, 8 to 40 percent slopes	---	---	3,604	3,604	0.2
65	Ildefonso-Harvey association, 10 to 35 percent slopes	---	---	12,168	12,168	0.8
66	Zia sandy loam, 3 to 6 percent slopes	---	---	16,387	16,387	1.1
67	Sandoval-Poley complex, 3 to 30 percent slopes	---	---	24,938	24,938	1.7
68	Penistaja-Querencia complex, 2 to 7 percent slopes	---	---	10,942	10,942	0.7
71	Palon cobbly sandy loam, 15 to 35 percent slopes	---	324	3,041	3,365	0.2
72	Palon very cobbly sandy loam, 35 to 65 percent slopes	---	---	6,267	6,267	0.4
74	Origo-Pavo association, 5 to 35 percent slopes	---	41	7,713	7,754	0.5
75	Origo very cobbly sandy loam, 35 to 65 percent slopes	---	112	5,576	5,688	0.4
82	Calaveras loam, 15 to 35 percent slopes	782	---	6,872	7,654	0.5
83	Calaveras-Rubble land association, 35 to 60 percent slopes	683	616	9,769	11,068	0.7
85	Redondo coarse sandy loam, 15 to 35 percent slopes	---	1,366	5,260	6,626	0.4
86	Redondo cobbly coarse sandy loam, 35 to 80 percent slopes	---	583	9,245	9,828	0.7
87	Redondo-Rubble land association, 35 to 80 percent slopes	---	---	6,569	6,569	0.4
88	Totavi-Jemez-Rock outcrop association, 0 to 15 percent slopes	---	---	3,037	3,037	0.2
91	Zia sandy loam, 1 to 3 percent slopes	---	---	2,157	2,157	0.1
92	Galisteo silty clay loam, moderately saline, sodic, 0 to 1 percent slopes	---	---	611	611	*
93	Zia loamy sand, 1 to 4 percent slopes	---	---	449	449	*
95	El Rancho loam, 0 to 2 percent slopes	---	---	1,025	1,025	*
97	El Rancho clay loam, 0 to 2 percent slopes	---	---	726	726	*
100	Orejas-Rock outcrop complex, 15 to 40 percent slopes	---	---	8,199	8,199	0.5
101	Blancot-Lybrook association, 0 to 8 percent slopes	---	---	4,207	4,207	0.3
102	Sparham clay loam, 1 to 3 percent slopes	---	---	3,955	3,955	0.3
104	Cochiti-Montecito association, 1 to 30 percent slopes	---	---	8,422	8,422	0.6

Table 4.--Acreage and proportionate extent of the soils--continued

Map symbol	Soil name	Los Alamos County	Rio Arriba County	Sandoval County	Total	
					Area	Extent
		Acres	Acres	Acres	Acres	Pct.
105	Badland-Menefee complex, 15 to 35 percent slopes	---	---	3,210	3,210	0.2
106	Stumble association, 1 to 40 percent slopes	---	---	4,110	4,110	0.3
108	Embudo gravelly sandy loam, 1 to 15 percent slopes	---	---	2,897	2,897	0.2
109	Embudo-Tijeras association, 1 to 9 percent slopes	---	---	1,582	1,582	0.1
110	Rock outcrop-Saido complex, 5 to 40 percent slopes	---	---	12,327	12,327	0.8
111	Rock outcrop-Zia complex, 8 to 25 percent slopes	---	---	26,249	26,249	1.8
112	Tijeras gravelly fine sandy loam, 1 to 5 percent slopes	---	---	1,396	1,396	*
114	Zia-San Mateo association, 0 to 9 percent slopes	---	---	8,577	8,577	0.6
120	Pinavetes loamy sand, 3 to 5 percent slopes	---	---	24,241	24,241	1.6
124	Rock outcrop	6,717	---	24,005	30,722	2.1
129	Menefee clay loam, 5 to 35 percent slopes	---	---	9,783	9,783	0.7
130	Pinavetes-Galisteo, moderately saline, sodic, association, 0 to 5 percent slopes	---	---	3,355	3,355	0.2
142	Grieta fine sandy loam, 1 to 4 percent slopes	---	---	22,273	22,273	1.5
143	Clovis fine sandy loam, 1 to 4 percent slopes	---	---	25,914	25,914	1.7
145	Grieta-Sheppard loamy fine sands, 2 to 9 percent slopes	---	---	23,425	23,425	1.6
146	Sedmar loamy sand, 1 to 15 percent slopes	---	---	4,934	4,934	0.3
150	Doakum-Betonnie fine sandy loams, 0 to 8 percent slopes	---	---	18,541	18,541	1.2
162	Hackroy-Nyjack association, 1 to 5 percent slopes	1,442	---	1,983	3,425	0.2
163	Jemez loam, 1 to 15 percent slopes	1,143	---	---	1,143	*
170	San Mateo loam, 0 to 3 percent slopes	---	---	21,186	21,186	1.4
180	Councelor-Eslendo-Mespun complex, 5 to 30 percent slopes	---	---	7,491	7,491	0.5
183	Sheppard loamy fine sand, 8 to 15 percent slopes	---	---	8,866	8,866	0.6
185	Frijoles very fine sandy loam, 1 to 8 percent slopes	877	---	1,440	2,317	0.2
190	Zia-Skyvillage-Rock outcrop complex, 5 to 40 percent slopes	---	---	64,749	64,749	4.3
191	Sheppard loamy fine sand, 3 to 8 percent slopes	---	---	23,005	23,005	1.5
200	Sedillo very cobbly sandy loam, 5 to 25 percent slopes, stony	---	---	1,511	1,511	0.1
201	Rock outcrop-Sedgran association, 25 to 55 percent slopes	---	---	1,035	1,035	*
206	Pinitos loam, 1 to 15 percent slopes	---	---	10,400	10,400	0.7

Table 4.--Acreage and proportionate extent of the soils--continued

Map symbol	Soil name	Los Alamos County	Rio Arriba County	Sandoval County	Total	
					Area	Extent
		Acres	Acres	Acres	Acres	Pct.
207	Penistaja-Zia complex, 1 to 8 percent slopes-	---	---	3,665	3,665	0.2
208	Sedillo very gravelly fine sandy loam, 25 to 55 percent slopes	---	---	12,969	12,969	0.9
210	Ildefonso very stony loam, 25 to 70 percent slopes, rubbly	---	---	5,794	5,794	0.4
211	Zia-Clovis association, 2 to 10 percent slopes	---	---	35,490	35,490	2.4
213	Pinavetes-Rock outcrop complex, 15 to 35 percent slopes	---	---	31,747	31,747	2.1
215	Ess-Rock outcrop complex, 5 to 45 percent slopes	---	---	1,867	1,867	0.1
217	Witt loam, 1 to 8 percent slopes	---	---	9,158	9,158	0.6
218	Ildefonso very cobbly loam, 1 to 15 percent slopes	---	---	10,976	10,976	0.7
220	Rock outcrop-Vessilla-Menefee complex, 30 to 40 percent slopes	---	---	2,390	2,390	0.2
226	Galisteo loam, moderately saline, sodic, 1 to 3 percent slopes	---	---	3,529	3,529	0.2
227	Hagerman-Bond association, 1 to 8 percent slopes	---	---	2,585	2,585	0.2
228	Winona very channery fine sandy loam, 8 to 25 percent slopes	---	---	905	905	*
230	Skyvillage-Sandoval-Rock outcrop complex, 3 to 20 percent slopes	---	---	20,241	20,241	1.4
231	Querencia loam, 1 to 8 percent slopes	---	---	22,450	22,450	1.5
234	Querencia-Zia complex, 2 to 8 percent slopes-	---	---	22,125	22,125	1.5
235	Sandoval fine sandy loam, 3 to 15 percent slopes	---	---	56,947	56,947	3.8
236	Sparank clay loam, moderately saline, sodic, 0 to 1 percent slopes	---	---	18,728	18,728	1.3
237	Sparank silty clay loam, 0 to 3 percent slopes	---	---	12,797	12,797	0.9
240	Penistaja-Hagerman association, 1 to 5 percent slopes	1,220	---	13,547	14,767	1.0
250	Pinavetes loamy fine sand, 5 to 15 percent slopes	---	---	4,970	4,970	0.3
262	Pastura loam, 1 to 4 percent slopes	---	---	800	800	*
270	Blancot-Councelor-Tsosie association, 0 to 5 percent slopes	---	---	59,888	59,888	4.0
281	Carjo loam, 1 to 9 percent slopes	4,140	---	---	4,140	0.3
282	Tocal very fine sandy loam, 3 to 8 percent slopes	620	---	2,017	2,637	0.2
283	Mirand-Alanos complex, 5 to 40 percent slopes	725	---	4,819	5,544	0.4
290	Alanos-Rock outcrop complex, 20 to 40 percent slopes	196	---	---	196	*
300	Waumac-Bamac association, 1 to 7 percent slopes	---	---	11,926	11,926	0.8

Table 4.--Acreage and proportionate extent of the soils--continued

Map symbol	Soil name	Los Alamos County	Rio Arriba County	Sandoval County	Total	
					Area	Extent
		Acres	Acres	Acres	Acres	Pct.
301	Vastine-Jarola silt loams, 0 to 5 percent slopes	---	---	5,650	5,650	0.4
302	Tranquilar-Jarmillo complex, 1 to 8 percent slopes	---	---	7,970	7,970	0.5
304	Cosey-Jarmillo association, 2 to 20 percent slopes	---	---	8,805	8,805	0.6
307	Flugle-Waumac complex, 1 to 8 percent slopes	---	---	10,085	10,085	0.7
308	Cajete gravelly loam, 0 to 8 percent slopes	---	---	1,652	1,652	0.1
311	Cosey-Tranquilar-Calaveras association, 5 to 20 percent slopes	---	---	4,086	4,086	0.3
312	Royosa sand, 1 to 8 percent slopes	---	---	10,273	10,273	0.7
314	Fragua-Waumac-Royosa complex, 1 to 8 percent slopes	---	---	14,200	14,200	0.9
317	Elpedro loam, 1 to 8 percent slopes	---	---	9,095	9,095	0.6
319	Bamac-Rock outcrop complex, 15 to 55 percent slopes	---	---	7,489	7,489	0.5
320	Sparham silt loam, 0 to 3 percent slopes	---	---	4,202	4,202	0.3
321	Waumac-Royosa association, 1 to 15 percent slopes	---	---	4,265	4,265	0.3
322	Fragua very cobbly fine sandy loam, 15 to 70 percent slopes	---	---	11,873	11,873	0.8
324	Rock outcrop-Atarque-Menefee complex, 5 to 25 percent slopes	---	---	7,190	7,190	0.5
325	Rock outcrop-Vessilla-Espiritu complex, 25 to 65 percent slopes	---	---	3,724	3,724	0.2
342	Waumac-Vessilla-Rock outcrop complex, 5 to 40 percent slopes	---	---	3,887	3,887	0.3
345	Espiritu-Bamac association, 15 to 55 percent slopes	---	---	20,283	20,283	1.4
346	Espiritu, cobbly-Bamac association, 15 to 40 percent slopes	---	---	8,824	8,824	0.6
348	Wauquie-Rock outcrop complex, 25 to 45 percent slopes	---	---	5,575	5,575	0.4
353	Cochiti-Espiritu association, 15 to 55 percent slopes	---	---	11,691	11,691	0.8
354	Waumac Variant very gravelly sandy loam, 1 to 15 percent slopes	---	---	646	646	*
358	Deama-Elpedro-Rock outcrop complex, 10 to 55 percent slopes	---	---	5,329	5,329	0.4
396	Atarque-Menefee-Rock outcrop complex, 25 to 45 percent slopes	---	---	5,797	5,797	0.4
397	Rock outcrop-Cucho-Vessilla complex, 25 to 70 percent slopes	---	---	3,837	3,837	0.3
398	Espiritu-Cucho association, 8 to 55 percent slopes	---	---	2,342	2,342	0.2
399	Cucho-Teco complex, 8 to 40 percent slopes	---	---	2,921	2,921	0.2
405	Charo complex, 1 to 5 percent slopes	---	---	1,785	1,785	0.1

Table 4.--Acreage and proportionate extent of the soils--continued

Map symbol	Soil name	Los Alamos County	Rio Arriba County	Sandoval County	Total	
					Area	Extent
		Acres	Acres	Acres	Acres	Pct.
409	Santa Fe very gravelly sandy loam, 15 to 40 percent slopes, stony	---	---	3,447	3,447	0.2
410	Zia loam, 0 to 1 percent slopes	---	---	1,082	1,082	*
414	Wauquie very gravelly fine sandy loam, 8 to 25 percent slopes	---	---	3,191	3,191	0.2
417	Jocity loam, 0 to 2 percent slopes	---	---	994	994	*
418	Jocity clay loam, 0 to 2 percent slopes	---	---	2,213	2,213	0.1
419	Santa Fe-Wauquie-Rock outcrop complex, 25 to 70 percent slopes	---	---	4,684	4,684	0.3
420	Pinavetes loamy sand, 1 to 3 percent slopes	---	---	570	570	*
421	Gilco loam, moderately saline, sodic, 0 to 1 percent slopes	---	---	277	277	*
422	Vessilla-Menefee-Orlie association, 0 to 30 percent slopes	---	77	26,463	26,540	1.8
423	Gilco loam, 1 to 4 percent slopes	---	---	1,446	1,446	*
426	Aga loam, moderately saline, sodic, 0 to 1 percent slopes	---	---	239	239	*
427	Aga loam, 1 to 3 percent slopes	---	---	733	733	*
428	Aga loam, moderately saline, sodic, 1 to 3 percent slopes	---	---	527	527	*
430	Trail loam, 1 to 3 percent slopes	---	---	929	929	*
431	Trail loamy sand, 1 to 4 percent slopes	---	---	1,401	1,401	*
433	Peralta loam, 0 to 1 percent slopes	---	---	745	745	*
434	Peralta loam, 1 to 3 percent slopes	---	---	503	503	*
437	Peralta loam, moderately saline, sodic, 1 to 3 percent slopes	---	---	1,689	1,689	0.1
500	Rock outcrop-Osha-Rubble land complex, 40 to 70 percent slopes	---	---	2,686	2,686	0.2
503	Cajete-Cypher association, 8 to 50 percent slopes	1,668	---	4,046	5,714	0.4
504	Orejas-Guaje complex, 1 to 15 percent slopes	---	---	8,858	8,858	0.6
600	Rock outcrop-Cypher complex, 35 to 60 percent slopes	---	---	2,045	2,045	0.1
601	Laventana gravelly sandy loam, 3 to 15 percent slopes	---	---	587	587	*
603	Laventana-Mirand very cobbly loams, 15 to 55 percent slopes	---	---	4,185	4,185	0.3
604	Cypher-Mirand complex, 15 to 55 percent slopes	---	---	1,523	1,523	0.1
608	Osha association, 3 to 55 percent slopes	---	---	3,909	3,909	0.3
823	Gilco loam, 1 to 4 percent slopes, unprotected	---	---	1,222	1,222	*
827	Aga loam, 1 to 3 percent slopes, unprotected	---	---	1,445	1,445	*
830	Trail loam, 1 to 3 percent slopes, unprotected	---	---	857	857	*
831	Trail loamy sand, 1 to 3 percent slopes, unprotected	---	---	1,905	1,905	0.1

Table 4.--Acreage and proportionate extent of the soils--continued

Map symbol	Soil name	Los Alamos County	Rio Arriba County	Sandoval County	Total	
					Area	Extent
		Acres	Acres	Acres	Acres	Pct.
835	Peralta loam, 1 to 3 percent slopes, unprotected	---	---	2,205	2,205	0.1
842	Peralta clay loam, moderately saline, sodic, 0 to 2 percent slopes, unprotected	---	---	511	511	*
850	Water	4	---	3,392	3,396	0.2
DAM	Dam	---	---	466	466	*
	Total	26,585	3,151	1,466,168	1,495,904	100.0

* Less than 0.1 percent.

Table 5.--Irrigated and nonirrigated yields by map unit component

(Yields in the "N" columns are for nonirrigated areas; those in the "I" columns are for irrigated areas. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
1:								
Silver	6e	4e	---	---	---	---	---	---
Clovis	6c	---	---	---	---	---	---	---
2:								
Clovis	6c	---	---	---	---	---	---	---
Prieta	7s	---	---	---	---	---	---	---
Silver	6e	---	---	---	---	---	---	---
3:								
Montecito	6e	---	---	---	---	---	---	---
Orejas	7s	---	---	---	---	---	---	---
4:								
Montecito	6e	---	---	---	---	---	---	---
Montecito, bouldery	7s	---	---	---	---	---	---	---
10:								
Trail	7s	4e	---	6.00	---	---	---	12.00
11:								
Trail	7s	4e	---	6.00	---	---	---	12.00
13:								
Sandoval	7s	---	---	---	---	---	---	---
Querencia	6c	---	---	---	---	---	---	---
15:								
Camino	6c	---	---	---	---	---	---	---
Sandoval	7s	---	---	---	---	---	---	---
16:								
Rock outcrop	8s	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
16:								
Prieta	7s	---	---	---	---	---	---	---
17:								
Vessilla	7s	---	---	---	---	---	---	---
Menefee	7s	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
18:								
Sparham	6c	3s	---	1.50	---	---	---	---
20:								
Gilco	7c	2e	---	7.50	---	6.00	---	15.00
21:								
Rock outcrop	8s	---	---	---	---	---	---	---
Hackroy	7s	---	---	---	---	---	---	---
22:								
Aga	7c	2s	---	7.00	---	---	---	14.00
23:								
Hickman	6c	3e	---	2.00	---	---	---	6.00
24:								
Orlie	6c	---	---	---	---	---	---	---
Sparham	6c	3s	---	1.50	---	---	---	---
25:								
Gilco	7e	2e	---	7.50	---	6.00	---	15.00
26:								
Orlie	6c	---	---	---	---	---	---	---
27:								
Aga	7c	2s	---	7.00	---	---	---	14.00
29:								
Trail	7s	4s	---	4.00	---	---	---	8.00
31:								
Riverwash	8w	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
33:								
Pits	8s	---	---	---	---	---	---	---
34:								
Ildefonso	7s	---	---	---	---	---	---	---
Witt	6e	---	---	---	---	---	---	---
41:								
Dune land	8e	---	---	---	---	---	---	---
47:								
Cascajo	7e	---	---	---	---	---	---	---
51:								
Sparham	6c	3e	---	3.50	---	3.00	---	9.00
52:								
Totavi	4s	---	---	---	---	---	---	---
53:								
Witt	6e	---	---	---	---	---	---	---
Harvey	7e	---	---	---	---	---	---	---
54:								
Harvey	7e	---	---	---	---	---	---	---
Cascajo	7s	---	---	---	---	---	---	---
55:								
La Fonda	6c	---	---	---	---	---	---	---
56:								
Ildefonso	7e	---	---	---	---	---	---	---
57:								
Badland	8	---	---	---	---	---	---	---
58:								
Deama	7e	---	---	---	---	---	---	---
Elpedro	6e	---	---	---	---	---	---	---
59:								
Harvey	7e	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
59:								
Ildefonso	7s	---	---	---	---	---	---	---
La Fonda	6c	---	---	---	---	---	---	---
63:								
Placitas	7e	---	---	---	---	---	---	---
64:								
Skyvillage	7s	---	---	---	---	---	---	---
Ildefonso	6e	---	---	---	---	---	---	---
65:								
Ildefonso	6e	---	---	---	---	---	---	---
Harvey	7e	---	---	---	---	---	---	---
66:								
Zia	6c	---	---	---	---	---	---	---
67:								
Sandoval	7s	---	---	---	---	---	---	---
Poley	6e	---	---	---	---	---	---	---
68:								
Penistaja	6e	---	---	---	---	---	---	---
Querencia	6c	---	---	---	---	---	---	---
71:								
Palon	7c	---	---	---	---	---	---	---
72:								
Palon	7c	---	---	---	---	---	---	---
74:								
Origo	7s	---	---	---	---	---	---	---
Pavo	7c	---	---	---	---	---	---	---
75:								
Origo	7e	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
82:								
Calaveras	7c	---	---	---	---	---	---	---
83:								
Calaveras	7e	---	---	---	---	---	---	---
Rubble land	8s	---	---	---	---	---	---	---
85:								
Redondo	7c	---	---	---	---	---	---	---
86:								
Redondo	7c	---	---	---	---	---	---	---
87:								
Redondo	7e	---	---	---	---	---	---	---
Rubble land	8s	---	---	---	---	---	---	---
88:								
Totavi	6s	---	---	---	---	---	---	---
Jemez	7c	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
91:								
Zia	6c	2e	---	6.00	---	5.00	---	8.00
92:								
Galisteo, moderately saline, sodic	6c	4s	---	---	---	---	---	---
93:								
Zia	6c	2e	---	6.00	---	5.00	---	12.00
95:								
El Rancho	6c	2e	---	7.00	---	---	---	14.00
97:								
El Rancho	6c	2e	---	7.00	---	---	---	14.00
100:								
Orejas	7s	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
101:								
Blancot	6c	---	---	---	---	---	---	---
Lybrook	7s	---	---	---	---	---	---	---
102:								
Sparham	6c	3s	---	1.50	---	---	---	6.00
104:								
Cochiti	6e	---	---	---	---	---	---	---
Montecito	6e	---	---	---	---	---	---	---
105:								
Badland	8	---	---	---	---	---	---	---
Menefee	7e	---	---	---	---	---	---	---
106:								
Stumble	7c	---	---	---	---	---	---	---
Stumble, sandy	7c	---	---	---	---	---	---	---
108:								
Embudo	7c	---	---	---	---	---	---	---
109:								
Embudo	7e	---	---	---	---	---	---	---
Tijeras	7c	---	---	---	---	---	---	---
110:								
Rock outcrop	8s	---	---	---	---	---	---	---
Saido	7e	---	---	---	---	---	---	---
111:								
Rock outcrop	8s	---	---	---	---	---	---	---
Zia	6e	---	---	---	---	---	---	---
112:								
Tijeras	7c	---	---	---	---	---	---	---
114:								
San Mateo	6e	2e	---	5.00	---	---	---	13.00

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
114:								
Zia	6c	---	---	---	---	---	---	---
120:								
Pinavetes	6e	---	---	---	---	---	---	---
124:								
Rock outcrop	8s	---	---	---	---	---	---	---
129:								
Menefee	7e	---	---	---	---	---	---	---
130:								
Pinavetes	6e	---	---	---	---	---	---	---
Galisteo, moderately saline, sodic	6c	---	---	---	---	---	---	---
142:								
Grieta	7e	---	---	---	---	---	---	---
143:								
Clovis	6c	---	---	---	---	---	---	---
145:								
Grieta	7e	---	---	---	---	---	---	---
Sheppard	7s	---	---	---	---	---	---	---
146:								
Sedmar	7c	---	---	---	---	---	---	---
150:								
Doakum	6c	---	---	---	---	---	---	---
Betonnie	6c	---	---	---	---	---	---	---
162:								
Hackroy	7s	---	---	---	---	---	---	---
Nyjack	6c	---	---	---	---	---	---	---
163:								
Jemez	7c	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
170:								
San Mateo	6e	2e	---	5.00	---	---	---	10.00
180:								
Councelor	6c	---	---	---	---	---	---	---
Eslendo	7e	---	---	---	---	---	---	---
Mespun	7s	---	---	---	---	---	---	---
183:								
Sheppard	7s	---	---	---	---	---	---	---
185:								
Frijoles	6e	---	---	---	---	---	---	---
190:								
Zia	6c	---	---	---	---	---	---	---
Skyvillage	7s	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
191:								
Sheppard	7s	---	---	---	---	---	---	---
200:								
Sedillo	7s	---	---	---	---	---	---	---
201:								
Rock outcrop	8s	---	---	---	---	---	---	---
Sedgran	7e	---	---	---	---	---	---	---
206:								
Pinitos	7c	---	---	---	---	---	---	---
207:								
Penistaja	6c	---	---	---	---	---	---	---
Zia	6c	3e	---	6.00	---	5.00	---	8.00
208:								
Sedillo	7e	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
210:								
Ildefonso	7e	---	---	---	---	---	---	---
211:								
Zia	6c	---	---	---	---	---	---	---
Clovis	6c	---	---	---	---	---	---	---
213:								
Pinavetes	6e	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
215:								
Ess	7c	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
217:								
Witt	6e	---	---	---	---	---	---	---
218:								
Ildefonso	7s	---	---	---	---	---	---	---
220:								
Rock outcrop	8s	---	---	---	---	---	---	---
Vessilla	7e	---	---	---	---	---	---	---
Menefee	7e	---	---	---	---	---	---	---
226:								
Galisteo, moderately saline, sodic	6c	---	---	---	---	---	---	---
227:								
Hagerman	6c	---	---	---	---	---	---	---
Bond	6c	---	---	---	---	---	---	---
228:								
Winona	7e	---	---	---	---	---	---	---
230:								
Skyvillage	7s	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
230:								
Sandoval	7s	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
231:								
Querencia	6c	---	---	---	---	---	---	---
234:								
Querencia	6c	---	---	---	---	---	---	---
Zia	6c	---	---	---	---	---	---	---
235:								
Sandoval	7s	---	---	---	---	---	---	---
236:								
Sparank, moderately saline, sodic	7s	---	---	---	---	---	---	---
237:								
Sparank	6c	2e	---	5.00	---	---	---	10.00
240:								
Penistaja	6c	---	---	---	---	---	---	---
Hagerman	6c	---	---	---	---	---	---	---
250:								
Pinavetes	6e	---	---	---	---	---	---	---
262:								
Pastura	7s	---	---	---	---	---	---	---
270:								
Blancot	6c	---	---	---	---	---	---	---
Councelor	6c	---	---	---	---	---	---	---
Tsosie	6c	---	---	---	---	---	---	---
281:								
Carjo	5c	---	---	---	---	---	---	---
282:								
Tocal	7s	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
283:								
Mirand	7c	---	---	---	---	---	---	---
Alanos	7c	---	---	---	---	---	---	---
290:								
Alanos	7c	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
300:								
Waumac	6s	---	---	---	---	---	---	---
Bamac	6e	---	---	---	---	---	---	---
301:								
Vastine	7c	---	---	---	---	---	---	---
Jarola	7c	---	---	---	---	---	---	---
302:								
Tranquilar	7c	---	---	---	---	---	---	---
Jarmillo	7c	---	---	---	---	---	---	---
304:								
Cosey	7c	---	---	---	---	---	---	---
Jarmillo	7c	---	---	---	---	---	---	---
307:								
Flugle	6c	---	---	---	---	---	---	---
Waumac	6s	---	---	---	---	---	---	---
308:								
Cajete	7c	---	---	---	---	---	---	---
311:								
Cosey	7c	---	---	---	---	---	---	---
Tranquilar	7c	---	---	---	---	---	---	---
Calaveras	7c	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
312:								
Royosa	6e	---	---	---	---	---	---	---
314:								
Fragua	6c	---	---	---	---	---	---	---
Waumac	6s	---	---	---	---	---	---	---
Royosa	6e	---	---	---	---	---	---	---
317:								
Elpedro	6e	---	---	---	---	---	---	---
319:								
Bamac	7e	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
320:								
Sparham	6c	3s	---	1.50	---	---	---	---
321:								
Waumac	6s	---	---	---	---	---	---	---
Royosa	6e	---	---	---	---	---	---	---
322:								
Fragua	6e	---	---	---	---	---	---	---
324:								
Rock outcrop	8s	---	---	---	---	---	---	---
Atarque	7s	---	---	---	---	---	---	---
Menefee	7e	---	---	---	---	---	---	---
325:								
Rock outcrop	8s	---	---	---	---	---	---	---
Espiritu	7e	---	---	---	---	---	---	---
Vessilla	7e	---	---	---	---	---	---	---
342:								
Waumac	6s	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
342:								
Vessilla	7s	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
345:								
Espiritu	7e	---	---	---	---	---	---	---
Bamac	7e	---	---	---	---	---	---	---
346:								
Espiritu, cobbly	6e	---	---	---	---	---	---	---
Bamac	6e	---	---	---	---	---	---	---
348:								
Wauquie	7s	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
353:								
Cochiti	6e	---	---	---	---	---	---	---
Espiritu	7e	---	---	---	---	---	---	---
354:								
Waumac Variant	7s	---	---	---	---	---	---	---
358:								
Deama	7e	---	---	---	---	---	---	---
Elpedro	7e	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
396:								
Atarque	7e	---	---	---	---	---	---	---
Menefee	7s	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
397:								
Rock outcrop	8s	---	---	---	---	---	---	---
Cucho	7e	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
397:								
Vessilla	7e	---	---	---	---	---	---	---
398:								
Espiritu	7e	---	---	---	---	---	---	---
Cucho	7e	---	---	---	---	---	---	---
399:								
Cucho	6e	---	---	---	---	---	---	---
Teco	6e	---	---	---	---	---	---	---
405:								
Charo	7c	---	---	---	---	---	---	---
Charo, noncobbly	7c	---	---	---	---	---	---	---
409:								
Santa Fe	7s	---	---	---	---	---	---	---
410:								
Zia	6c	3e	---	7.50	---	6.00	---	15.00
414:								
Wauquie	7s	---	---	---	---	---	---	---
417:								
Jocity	7c	2e	---	6.00	---	---	---	12.00
418:								
Jocity	7c	2e	---	6.00	---	---	---	12.00
419:								
Santa Fe	7e	---	---	---	---	---	---	---
Wauquie	7e	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---
420:								
Pinavetes	6c	3s	---	6.00	---	4.00	---	8.00
421:								
Gilco, moderately saline, sodic	7c	4s	---	4.00	---	3.00	---	8.00

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
422:								
Vessilla	7s	---	---	---	---	---	---	---
Menefee	7s	---	---	---	---	---	---	---
Orlie	6c	---	---	---	---	---	---	---
423:								
Gilco	7e	4e	---	6.00	---	5.00	---	12.00
426:								
Aga, moderately saline, sodic	7c	4s	---	3.00	---	---	---	6.00
427:								
Aga	7c	2e	---	4.50	---	---	---	9.00
428:								
Aga, moderately saline, sodic	7c	4s	---	3.00	---	---	---	6.00
430:								
Trail	7s	4e	---	7.00	---	4.50	---	14.00
431:								
Trail	7s	4e	---	7.00	---	4.50	---	14.00
433:								
Peralta	7c	3e	---	5.00	---	---	---	10.00
434:								
Peralta	7c	3e	---	5.00	---	---	---	10.00
437:								
Peralta, moderately saline, sodic	7s	4s	---	4.00	---	---	---	10.00
500:								
Rock outcrop	8s	---	---	---	---	---	---	---
Osha	7c	---	---	---	---	---	---	---
Rubble land	8s	---	---	---	---	---	---	---
503:								
Cajete	7c	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
503:								
Cypher	7c	---	---	---	---	---	---	---
504:								
Orejas	7s	---	---	---	---	---	---	---
Guaje	6s	---	---	---	---	---	---	---
600:								
Rock outcrop	8s	---	---	---	---	---	---	---
Cypher	7c	---	---	---	---	---	---	---
601:								
Laventana	7c	---	---	---	---	---	---	---
603:								
Laventana	7c	---	---	---	---	---	---	---
Mirand	7c	---	---	---	---	---	---	---
604:								
Cypher	7c	---	---	---	---	---	---	---
Mirand	7c	---	---	---	---	---	---	---
608:								
Osha, steep	7c	---	---	---	---	---	---	---
Osha	7c	---	---	---	---	---	---	---
823:								
Gilco, unprotected	7e	4e	---	6.00	---	5.00	---	10.00
827:								
Aga, unprotected	7c	2e	---	---	---	---	---	---
830:								
Trail, unprotected	7s	4e	---	7.00	---	4.50	---	14.00
831:								
Trail, unprotected	7s	4s	---	4.00	---	---	---	6.00
835:								
Peralta, unprotected	7c	---	---	---	---	---	---	---

Table 5.--Irrigated and nonirrigated yields by map unit component

Map symbol and soil name	Land capability		Alfalfa hay		Sweet corn		Pasture	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM
842: Peralta, moderately saline, sodic, unprotected	7s	4s	---	4.00	---	---	---	11.00
850: Water	---	---	---	---	---	---	---	---
DAM: Dam	---	---	---	---	---	---	---	---

Table 6.--Prime and other important farmland

(Only the soils considered prime or important farmland are listed. Urban or built-up areas of the soils listed are not considered prime or important farmland. If a soil is prime or important farmland only under certain conditions, the conditions are specified in parentheses after the soil name.)

Map symbol	Map unit name /	Farmland Classification
20	Gilco clay loam, 0 to 1 percent slopes	Prime farmland if irrigated
22	Aga silty clay loam, 0 to 1 percent slopes	Prime farmland if irrigated
25	Gilco loam, 0 to 1 percent slopes	Prime farmland if irrigated
27	Aga loam, 0 to 1 percent slopes	Prime farmland if irrigated
91	Zia sandy loam, 1 to 3 percent slopes	Prime farmland if irrigated
95	El Rancho loam, 0 to 2 percent slopes	Prime farmland if irrigated
97	El Rancho clay loam, 0 to 2 percent slopes	Prime farmland if irrigated
410	Zia loam, 0 to 1 percent slopes	Prime farmland if irrigated
417	Jocity loam, 0 to 2 percent slopes	Prime farmland if irrigated
418	Jocity clay loam, 0 to 2 percent slopes	Prime farmland if irrigated
433	Peralta loam, 0 to 1 percent slopes	Prime farmland if irrigated

Table 7.--Rangeland productivity

(Only the soils that support rangeland vegetation suitable for grazing are rated.)

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
1:				
Silver	Loamy	950	663	375
Clovis	Loamy	950	663	375
2:				
Clovis	Loamy	950	663	375
Prieta	Malpais	1,100	763	425
Silver	Loamy	950	663	375
3:				
Montecito	---	---	---	---
Orejas	---	---	---	---
4:				
Montecito	---	---	---	---
Montecito, bouldery	---	---	---	---
10:				
Trail	Bottomland	4,000	2,400	800
11:				
Trail	Bottomland	4,000	2,400	800
13:				
Sandoval	Shallow	850	575	300
Querencia	Loamy	950	663	375
15:				
Camino	Clayey	1,200	1,000	800
Sandoval	Shallow	850	575	300
16:				
Rock outcrop	---	---	---	---
Prieta	Malpais	1,100	763	425

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
17:				
Vessilla	---	---	---	---
Menefee	---	---	---	---
Rock outcrop	---	---	---	---
18:				
Sparham	Clayey	1,200	800	600
20:				
Gilco	Bottomland	4,000	2,400	800
21:				
Rock outcrop	---	---	---	---
Hackroy	---	---	---	---
22:				
Aga	Bottomland	4,000	2,400	800
23:				
Hickman	Swale	1,700	1,300	800
24:				
Orlie	Loamy	1,100	750	600
Sparham	Clayey	1,200	800	600
25:				
Gilco	Bottomland	4,000	2,400	800
26:				
Orlie	Loamy	1,100	750	600
27:				
Aga	Bottomland	4,000	2,400	800
29:				
Trail	Deep Sand	4,000	2,400	800
31:				
Riverwash	---	---	---	---
33:				
Pits	---	---	---	---

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
34:				
Ildefonso	Limy	950	675	375
Witt	Loamy	950	663	375
41:				
Dune land	---	---	---	---
47:				
Cascajo	Gravelly	900	650	375
51:				
Sparham	Clayey	4,000	2,400	800
52:				
Totavi	---	---	---	---
53:				
Witt	Loamy	1,500	950	400
Harvey	Limy	1,500	950	400
54:				
Harvey	Limy	1,500	1,000	400
Cascajo	Gravelly	1,100	1,000	400
55:				
La Fonda	Loamy	1,500	950	400
56:				
Ildefonso	Breaks	1,300	800	300
57:				
Badland	---	---	---	---
58:				
Deama	---	---	---	---
Elpedro	---	---	---	---
59:				
Harvey	Limy	1,500	950	400
Ildefonso	Breaks	1,300	800	300

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
59:				
La Fonda	Loamy	1,500	950	400
63:				
Placitas	Gravelly	1,100	750	400
64:				
Skyvillage	Shallow Sandstone	700	575	275
Ildefonso	Breaks	1,300	800	300
65:				
Ildefonso	Breaks	1,300	800	300
Harvey	Limy	1,500	950	400
66:				
Zia	Sandy	850	500	325
67:				
Sandoval	Shallow	850	525	300
Poley	Foothills	750	550	375
68:				
Penistaja	Loamy	950	663	375
Querencia	Loamy	950	663	375
71:				
Palon	---	---	---	---
72:				
Palon	---	---	---	---
74:				
Origo	---	---	---	---
Pavo	Mountain Loam	1,400	1,150	900
75:				
Origo	---	---	---	---
82:				
Calaveras	---	---	---	---

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
83:				
Calaveras	---	---	---	---
Rubble land	---	---	---	---
85:				
Redondo	---	---	---	---
86:				
Redondo	---	---	---	---
87:				
Redondo	---	---	---	---
Rubble land	---	---	---	---
88:				
Totavi	---	---	---	---
Jemez	---	---	---	---
Rock outcrop	---	---	---	---
91:				
Zia	Sandy	860	575	325
92:				
Galisteo, moderately saline, sodic	Salty Bottomland	1,500	1,050	600
93:				
Zia	Sandy	860	550	325
95:				
El Rancho	Loamy	950	663	375
97:				
El Rancho	Loamy	950	663	375
100:				
Orejas	---	---	---	---
Rock outcrop	---	---	---	---
101:				
Blancot	Loamy	800	550	300

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
101:				
Lybrook	Salt Flats	700	500	300
102:				
Sparham	Bottomland	4,000	2,400	800
104:				
Cochiti	---	---	---	---
Montecito	---	---	---	---
105:				
Badland	---	---	---	---
Menefee	---	---	---	---
106:				
Stumble	Gravelly Sand	600	400	300
Stumble, sandy	Deep Sand	900	800	400
108:				
Embudo	Sandy	900	650	400
109:				
Embudo	Sandy	900	650	400
Tijeras	Sandy	900	650	400
110:				
Rock outcrop	---	---	---	---
Saido	Gyp Upland	750	475	200
111:				
Rock outcrop	---	---	---	---
Zia	Foothills	750	650	375
112:				
Tijeras	Sandy	900	650	400
114:				
San Mateo	Swale	1,350	1,050	600
Zia	Sandy	950	675	375

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
120:				
Pinavetes	Deep Sand	900	600	275
124:				
Rock outcrop	---	---	---	---
129:				
Menefee	---	---	---	---
130:				
Pinavetes	Deep Sand	900	600	275
Galisteo, moderately saline, sodic	Salty Bottomland	1,500	1,050	600
142:				
Grieta	Loamy	950	663	375
143:				
Clovis	Loamy	950	663	375
145:				
Grieta	Loamy	950	663	375
Sheppard	Deep Sand	900	600	300
146:				
Sedmar	---	---	---	---
150:				
Doakum	Loamy	800	550	300
Betonnie	Sandy	900	600	300
162:				
Hackroy	---	---	---	---
Nyjack	---	---	---	---
163:				
Jemez	---	---	---	---
170:				
San Mateo	Swale	1,350	975	600
180:				
Councelor	Sandy	900	600	300

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
180:				
Eslendo	Shallow	500	300	150
Mespun	Deep Sand	800	525	250
183:				
Sheppard	Deep Sand	900	600	300
185:				
Frijoles	---	---	---	---
190:				
Zia	Sandy	750	650	500
Skyvillage	Shallow Sandstone	700	500	275
Rock outcrop	---	---	---	---
191:				
Sheppard	Deep Sand	900	600	300
200:				
Sedillo	Gravelly	900	625	350
201:				
Rock outcrop	---	---	---	---
Sedgran	Hills	750	600	350
206:				
Pinitos	---	---	---	---
207:				
Penistaja	Loamy	950	663	375
Zia	Loamy	950	650	375
208:				
Sedillo	Gravelly	750	575	375
210:				
Ildefonso	Limy	900	625	375
211:				
Zia	Sandy	860	525	325

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
211:				
Clovis	Loamy	950	663	375
213:				
Pinavetes	Deep Sand	900	600	300
Rock outcrop	---	---	---	---
215:				
Ess	Subalpine Grassland	1,800	1,500	1,200
Rock outcrop	---	---	---	---
217:				
Witt	Loamy	950	663	375
218:				
Ildefonso	Limy	950	625	375
220:				
Rock outcrop	---	---	---	---
Vessilla	---	---	---	---
Menefee	---	---	---	---
226:				
Galisteo, moderately saline, sodic	Salty Bottomland	1,500	1,050	600
227:				
Hagerman	Loamy	950	663	375
Bond	Shallow Sandstone	700	500	275
228:				
Winona	Shallow Sandstone	850	575	300
230:				
Skyvillage	Shallow Sandstone	700	500	275
Sandoval	Shallow	850	575	300
Rock outcrop	---	---	---	---
231:				
Querencia	Loamy	950	663	375

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
234:				
Querencia	Loamy	950	663	375
Zia	Sandy	860	600	325
235:				
Sandoval	Shallow	850	575	300
236:				
Sparank, moderately saline, sodic-	Salty Bottomland	1,500	1,000	550
237:				
Sparank	Clayey Bottomland	3,200	2,250	1,250
240:				
Penistaja	Loamy	950	663	375
Hagerman	Loamy	950	663	375
250:				
Pinavetes	Deep Sand	900	600	275
262:				
Pastura	Shallow Limy Savannah	900	800	450
270:				
Blancot	Loamy	800	550	300
Councelor	Sandy	900	600	300
Tsosie	Salt Flats	700	500	300
281:				
Carjo	---	---	---	---
282:				
Tocal	---	---	---	---
283:				
Mirand	---	---	---	---
Alanos	---	---	---	---
290:				
Alanos	---	---	---	---

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
290:				
Rock outcrop	---	---	---	---
300:				
Waumac	Sandy	860	600	325
Bamac	Foothills	860	600	325
301:				
Vastine	Mountain Loam	1,400	1,150	900
Jarola	Mountain Meadow	1,400	1,150	900
302:				
Tranquilar	Mountain Grassland	2,000	1,400	1,000
Jarmillo	Mountain Loam	1,400	1,100	800
304:				
Cosey	Mountain Loam	1,400	1,100	800
Jarmillo	Mountain Loam	1,400	1,100	800
307:				
Flugle	Savannah	875	550	300
Waumac	Sandy	860	600	325
308:				
Cajete	Mountain Grassland	2,000	1,400	1,000
311:				
Cosey	Mountain Loam	1,400	1,100	800
Tranquilar	Mountain Grassland	2,000	1,400	1,000
Calaveras	---	---	---	---
312:				
Royosa	Deep Sand	900	600	275
314:				
Fragua	Foothills	900	600	300
Waumac	Sandy	900	600	300

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
314:				
Royosa	Deep Sand	900	600	275
317:				
Elpedro	---	---	---	---
319:				
Bamac	Foothills	750	500	375
Rock outcrop	---	---	---	---
320:				
Sparham	Clayey	1,200	800	600
321:				
Waumac	Sandy	900	600	300
Royosa	Deep Sand	900	600	275
322:				
Fragua	Foothills	---	---	---
324:				
Rock outcrop	---	---	---	---
Atarque	Shallow Sandstone	700	475	275
Menefee	Shallow	850	575	300
325:				
Rock outcrop	---	---	---	---
Espiritu	Foothills	---	---	---
Vessilla	---	---	---	---
342:				
Waumac	Sandy	900	600	300
Vessilla	---	750	525	300
Rock outcrop	---	---	---	---
345:				
Espiritu	Foothills	750	575	375

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
345:				
Bamac	Foothills	750	575	375
346:				
Espiritu, cobbly	Foothills	---	---	---
Bamac	Foothills	---	---	---
348:				
Wauquie	---	---	---	---
Rock outcrop	---	---	---	---
353:				
Cochiti	---	---	---	---
Espiritu	Foothills	---	---	---
354:				
Waumac Variant	---	---	---	---
358:				
Deama	---	---	---	---
Elpedro	---	---	---	---
Rock outcrop	---	---	---	---
396:				
Atarque	Shallow Sandstone	---	---	---
Menefee	---	---	---	---
Rock outcrop	---	---	---	---
397:				
Rock outcrop	---	---	---	---
Cucho	---	---	---	---
Vessilla	---	---	---	---
398:				
Espiritu	Foothills	750	525	375
Cucho	---	---	---	---

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
399:				
Cucho	---	---	---	---
Teco	Clayey	800	525	250
405:				
Charo	---	---	---	---
Charo, noncobbly	Mountain Grassland	2,000	1,400	1,000
409:				
Santa Fe	---	---	---	---
410:				
Zia	Loamy	950	625	375
414:				
Wauquie	---	---	---	---
417:				
Jocity	Bottomland	4,000	2,400	800
418:				
Jocity	Bottomland	4,000	2,400	800
419:				
Santa Fe	---	---	---	---
Wauquie	---	---	---	---
Rock outcrop	---	---	---	---
420:				
Pinavetes	Deep Sand	900	600	275
421:				
Gilco, moderately saline, sodic	Salty Bottomland	600	400	200
422:				
Vessilla	---	---	---	---
Menefee	---	---	---	---
Orlie	Loamy	1,100	850	600

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
423:				
Gilco	Bottomland	4,000	2,400	800
426:				
Aga, moderately saline, sodic	Bottomland	4,000	2,400	800
427:				
Aga	Bottomland	4,000	2,400	800
428:				
Aga, moderately saline, sodic	Salty Bottomland	2,000	1,500	1,000
430:				
Trail	Bottomland	4,000	2,400	800
431:				
Trail	Deep Sand	4,000	2,400	800
433:				
Peralta	Bottomland	4,000	2,400	800
434:				
Peralta	Bottomland	4,000	2,400	800
437:				
Peralta, moderately saline, sodic	Salty Bottomland	900	600	300
500:				
Rock outcrop	---	---	---	---
Osha	---	---	---	---
Rubble land	---	---	---	---
503:				
Cajete	---	---	---	---
Cypher	---	---	---	---
504:				
Orejas	---	---	---	---
Guaje	---	---	---	---
600:				
Rock outcrop	---	---	---	---

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
600:				
Cypher	---	---	---	---
601:				
Laventana	---	---	---	---
603:				
Laventana	---	---	---	---
Mirand	---	---	---	---
604:				
Cypher	---	---	---	---
Mirand	---	---	---	---
608:				
Osha, steep	---	---	---	---
Osha	---	---	---	---
823:				
Gilco, unprotected	Bottomland	4,000	2,400	800
827:				
Aga, unprotected	Bottomland	4,000	2,400	800
830:				
Trail, unprotected	Bottomland	4,000	2,400	800
831:				
Trail, unprotected	Bottomland	4,000	2,400	800
835:				
Peralta, unprotected	Bottomland	4,000	2,400	800
842:				
Peralta, moderately saline, sodic, unprotected	Salty Bottomland	900	600	300
850:				
Water	---	---	---	---

Table 7.--Rangeland productivity--continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb./acre	Lb./acre	Lb./acre
DAM:				
Dam	---	---	---	---

Table 8.--Forestland productivity

Only those map units which produce harvestable timber are shown

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
52:				
Totavi	oneseed juniper	---	0	ponderosa pine
	ponderosa pine	75	57	
	Utah juniper	---	0	
71:				
Palon	Douglas-fir	71	0	Douglas-fir, ponderosa pine, white fir
	ponderosa pine	79	72	
	white fir	---	0	
72:				
Palon	Douglas-fir	65	0	Douglas-fir, ponderosa pine, white fir
	ponderosa pine	62	43	
	white fir	---	0	
74:				
Origo	Douglas-fir	66	57	Douglas-fir, white fir
	limber pine	---	0	
	quaking aspen	---	0	
	white fir	---	0	
Pavo	---	---	---	---
75:				
Origo	Douglas-fir	66	57	Douglas-fir, Engelmann spruce, white fir
	Engelmann spruce	79	72	
	white fir	---	0	
82:				
Calaveras	Douglas-fir	71	57	ponderosa pine
	limber pine	---	0	
	ponderosa pine	---	0	
	white fir	---	0	
83:				
Calaveras	Douglas-fir	77	57	ponderosa pine
	limber pine	---	0	
	ponderosa pine	---	0	
	white fir	---	0	
Rubble land	---	---	---	---
85:				
Redondo	Engelmann spruce	68	57	Engelmann spruce
86:				
Redondo	Engelmann spruce	74	72	Engelmann spruce
87:				
Redondo	Engelmann spruce	74	72	Engelmann spruce
Rubble land	---	---	---	---
88:				
Totavi	oneseed juniper	---	0	ponderosa pine
	ponderosa pine	75	57	

Table 8.--Forestland productivity--continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
88:				
Jemez	Douglas-fir	74	0	Douglas-fir,
	ponderosa pine	74	57	ponderosa pine,
	white fir	---	0	white fir
Rock outcrop	---	---	---	---
146:				
Sedmar	Gambel oak	---	0	ponderosa pine
	ponderosa pine	52	43	
162:				
Hackroy	oneseed juniper	---	0	oneseed juniper,
	twoneedle pinyon	20	0	twoneedle pinyon
Nyjack	oneseed juniper	---	0	ponderosa pine
	ponderosa pine	60	43	
	twoneedle pinyon	---	0	
163:				
Jemez	Douglas-fir	74	0	Douglas-fir,
	ponderosa pine	74	57	ponderosa pine,
	white fir	---	0	white fir
281:				
Carjo	ponderosa pine	52	43	ponderosa pine
282:				
Tocal	Douglas-fir	---	0	ponderosa pine
	ponderosa pine	58	43	
	white fir	---	0	
283:				
Mirand	ponderosa pine	57	43	ponderosa pine
Alanos	Douglas-fir	---	0	Douglas-fir,
	ponderosa pine	65	57	ponderosa pine
290:				
Alanos	Douglas-fir	---	0	Douglas-fir,
	ponderosa pine	65	57	ponderosa pine
Rock outcrop	---	---	---	---
311:				
Cosey	---	---	---	---
Tranquilar	---	---	---	---
Calaveras	Douglas-fir	71	57	ponderosa pine
	limber pine	---	0	
	ponderosa pine	---	0	
	white fir	---	0	
405:				
Charo	ponderosa pine	66	57	ponderosa pine
	Rocky Mountain juniper	---	0	
	twoneedle pinyon	---	0	

Table 8.--Forestland productivity--continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
405:				
Charo, noncobbly	---	---	---	---
500:				
Rock outcrop	---	---	---	---
Osha	ponderosa pine	48	29	ponderosa pine
Rubble land	---	---	---	---
503:				
Cajete	ponderosa pine	53	43	ponderosa pine
Cypher	ponderosa pine	50	43	ponderosa pine
600:				
Rock outcrop	---	---	---	---
Cypher	ponderosa pine	45	29	ponderosa pine
601:				
Laventana	ponderosa pine	74	57	ponderosa pine
603:				
Laventana	ponderosa pine	55	43	ponderosa pine
Mirand	ponderosa pine	76	57	ponderosa pine
604:				
Cypher	ponderosa pine	46	29	ponderosa pine
Mirand	ponderosa pine	76	57	ponderosa pine
608:				
Osha, steep	ponderosa pine	52	43	ponderosa pine
Osha	ponderosa pine	64	43	ponderosa pine

Table 9A.--Camp areas, picnic areas, and playgrounds

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Silver	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.50
						Dusty	0.50
Clovis	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.50
						Dusty	0.50
2:							
Clovis	35	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Slope	1.00
						Dusty	0.50
Prieta	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Dusty	0.50	Dusty	0.50	Gravel content	1.00
		Slow water movement	0.21	Slow water movement	0.21	Large stones content	1.00
		Large stones content	0.18	Large stones content	0.18	Slope	1.00
		Gravel content	0.08	Gravel content	0.08	Dusty	0.50
Silver	20	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Slope	1.00
						Dusty	0.50
3:							
Montecito	60	Not limited		Not limited		Somewhat limited	
						Slope	0.50
						Large stones content	0.01

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
3:							
Orejas	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Large stones content	0.02	Large stones content	0.02	Large stones content	0.99
						Gravel content	0.86
						Slope	0.50
4:							
Montecito	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Large stones content	0.01
Montecito, bouldery-	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Large stones content	1.00
		Large stones content	0.68	Large stones content	0.68	Slope	1.00
		Dusty	0.50	Dusty	0.50	Gravel content	1.00
		Gravel content	0.05	Gravel content	0.05	Dusty	0.50
10:							
Trail	85	Very limited		Not limited		Not limited	
		Flooding	1.00				
11:							
Trail	85	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
13:							
Sandoval	65	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	0.88
Querencia	20	Not limited		Not limited		Somewhat limited	
						Slope	0.88

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
15:							
Camino	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.41	Slow water movement	0.41	Slope	0.50
						Slow water movement	0.41
Sandoval	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	0.88
16:							
Rock outcrop	50	Not rated		Not rated		Not rated	
Prieta	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Large stones content	1.00	Large stones content	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50	Large stones content	1.00
		Slow water movement	0.21	Slow water movement	0.21	Gravel content	0.56
		Slope	0.04	Slope	0.04	Dusty	0.50
17:							
Vessilla	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.04	Slope	0.04	Slope	1.00
Menefee	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.04	Slope	0.04	Slope	1.00
Rock outcrop	20	Not rated		Not rated		Not rated	
18:							
Sparham	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00	Too clayey	0.50	Flooding	0.60
		Too clayey	0.50			Too clayey	0.50

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
20:							
Gilco	85	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Gravel content	0.04
21:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Hackroy	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slow water movement	0.41	Slow water movement	0.41	Slope	0.88
						Slow water movement	0.41
22:							
Aga	85	Very limited		Not limited		Not limited	
		Flooding	1.00				
23:							
Hickman	85	Very limited		Not limited		Not limited	
		Flooding	1.00				
24:							
Orlie	45	Not limited		Not limited		Somewhat limited	
						Slope	0.12
						Gravel content	0.08
Sparham	35	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00	Too clayey	0.50	Flooding	0.60
		Too clayey	0.50	Slow water movement	0.41	Too clayey	0.50
		Slow water movement	0.41			Slow water movement	0.41
						Gravel content	0.04
25:							
Gilco	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50				

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
26:							
Orlie	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.50
						Dusty	0.50
27:							
Aga	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50				
29:							
Trail	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.81	Too sandy	0.81
		Too sandy	0.81				
31:							
Riverwash	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Too sandy	1.00	Too sandy	1.00
		Too sandy	1.00	Flooding	0.40	Flooding	1.00
						Gravel content	0.21
33:							
Pits	100	Not rated		Not rated		Not rated	
34:							
Ildefonso	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Gravel content	0.99
						Large stones content	0.92
						Slope	0.88
						Dusty	0.50
Witt	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
						Slope	0.12
41:							
Dune land	100	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Too sandy	1.00
		Slope	0.16	Slope	0.16	Slope	1.00

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
47:							
Cascajo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.98	Gravel content	0.98	Slope	1.00
						Large stones content	0.61
51:							
Sparham	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00	Slow water movement	0.41	Flooding	0.60
		Slow water movement	0.41	Salinity	0.13	Slow water movement	0.41
		Salinity	0.13			Salinity	0.13
52:							
Totavi	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.81	Too sandy	0.81
		Too sandy	0.81			Slope	0.12
53:							
Witt	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.50
						Dusty	0.50
Harvey	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.50
						Dusty	0.50
54:							
Harvey	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	Slope	0.16	Slope	1.00
		Too sandy	0.01	Too sandy	0.01	Too sandy	0.01
Cascajo	40	Somewhat limited		Somewhat limited		Very limited	
		Gravel content	0.71	Gravel content	0.71	Gravel content	1.00
		Slope	0.16	Slope	0.16	Slope	1.00
						Large stones content	0.08

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
55:							
La Fonda	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
						Slope	0.12
56:							
Ildefonso	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50	Gravel content	0.97
						Large stones content	0.84
						Dusty	0.50
57:							
Badland	90	Not rated		Not rated		Not rated	
58:							
Deama	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Large stones content	1.00	Large stones content	1.00	Large stones content	1.00
		Gravel content	0.03	Gravel content	0.03	Gravel content	1.00
		Large stones content	0.02	Large stones content	0.02	Large stones content	0.99
Elpedro	35	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Slope	1.00
		Slope	0.04	Slope	0.04	Dusty	0.50
59:							
Harvey	35	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Slope	1.00
						Dusty	0.50
Ildefonso	35	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Slope	1.00
		Slope	0.37	Slope	0.37	Dusty	0.50
						Gravel content	0.11
						Large stones content	0.08

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
59:							
La Fonda	15	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.88
						Dusty	0.50
63:							
Placitas	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50	Gravel content	1.00
		Gravel content	0.08	Gravel content	0.08	Depth to bedrock	0.71
						Dusty	0.50
64:							
Skyvillage	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
Ildefonso	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	0.76	Large stones content	0.76	Gravel content	1.00
		Gravel content	0.11	Gravel content	0.11	Large stones content	0.76
						Large stones content	0.05
65:							
Ildefonso	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.99	Gravel content	0.99	Slope	1.00
		Large stones content	0.76	Large stones content	0.76	Large stones content	0.76
						Large stones content	0.32
Harvey	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
66:							
Zia	85	Not limited		Not limited		Somewhat limited	
						Slope	0.88

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
67:							
Sandoval	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
Poley	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.75	Gravel content	0.75	Slope	1.00
		Dusty	0.50	Dusty	0.50	Large stones content	0.92
						Dusty	0.50
68:							
Penistaja	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.79	Too sandy	0.79	Slope	0.88
						Too sandy	0.79
Querencia	35	Not limited		Not limited		Somewhat limited	
						Slope	0.88
71:							
Palon	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Gravel content	0.99
						Large stones content	0.46
72:							
Palon	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
74:							
Origo	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Gravel content	0.45	Gravel content	0.45	Gravel content	1.00
						Large stones content	0.08
Pavo	25	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
75:							
Origo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
82:							
Calaveras	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Gravel content	0.01
83:							
Calaveras	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Rubble land	20	Not rated		Not rated		Not rated	
85:							
Redondo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
86:							
Redondo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Gravel content	0.78
						Large stones content	0.20
87:							
Redondo	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Gravel content	0.49
						Large stones content	0.20
Rubble land	25	Not rated		Not rated		Not rated	
88:							
Totavi	45	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Slope	0.12
						Gravel content	0.04

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
88:							
Jemez	30	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.21	Slow water movement	0.21	Slope	1.00
		Slope	0.16	Slope	0.16	Depth to bedrock	0.71
						Slow water movement	0.21
Rock outcrop	15	Not rated		Not rated		Not rated	
91:							
Zia	85	Not limited		Not limited		Not limited	
92:							
Galisteo, moderately saline, sodic	85	Very limited		Very limited		Very limited	
		Salinity	1.00	Salinity	1.00	Salinity	1.00
		Slow water movement	0.41	Slow water movement	0.41	Slow water movement	0.41
93:							
Zia	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.81	Too sandy	0.81	Too sandy	0.81
						Slope	0.12
95:							
El Rancho	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
97:							
El Rancho	85	Not limited		Not limited		Not limited	
100:							
Orejas	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Large stones content	0.18	Large stones content	0.18	Large stones content	1.00
						Gravel content	0.99
Rock outcrop	40	Not rated		Not rated		Not rated	

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
101:							
Blancot	55	Not limited		Not limited		Somewhat limited	
						Slope	0.88
Lybrook	25	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
102:							
Sparham	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00			Flooding	0.60
						Gravel content	0.04
104:							
Cochiti	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50	Gravel content	0.68
		Slow water movement	0.41	Slow water movement	0.41	Dusty	0.50
						Slow water movement	0.41
						Large stones content	0.01
Montecito	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
						Slope	0.12
105:							
Badland	50	Not rated		Not rated		Not rated	
Menefee	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
106:							
Stumble	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.92	Gravel content	0.92	Slope	1.00

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
106:							
Stumble, sandy------	30	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Too sandy	0.79	Gravel content	1.00
		Too sandy	0.79	Gravel content	0.03	Slope	1.00
		Gravel content	0.03			Too sandy	0.79
108:							
Embudo--------------	85	Somewhat limited		Somewhat limited		Very limited	
		Gravel content	0.01	Gravel content	0.01	Gravel content	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
109:							
Embudo--------------	50	Not limited		Not limited		Very limited	
						Slope	1.00
						Gravel content	0.78
Tijeras-------------	35	Not limited		Not limited		Somewhat limited	
						Gravel content	0.78
						Slope	0.50
110:							
Rock outcrop--------	45	Not rated		Not rated		Not rated	
Saido---------------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
		Salinity	0.13	Salinity	0.13	Salinity	0.13
111:							
Rock outcrop--------	50	Not rated		Not rated		Not rated	
Zia-----------------	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
112:							
Tijeras-------------	85	Not limited		Not limited		Somewhat limited	
						Gravel content	0.85
						Slope	0.12
						Large stones content	0.01

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
114:							
San Mateo	40	Very limited		Not limited		Not limited	
		Flooding	1.00				
Zia	40	Not limited		Not limited		Somewhat limited	
						Slope	0.88
120:							
Pinavetes	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.81	Too sandy	0.81	Too sandy	0.81
						Slope	0.50
124:							
Rock outcrop	90	Not rated		Not rated		Not rated	
129:							
Menefee	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
130:							
Pinavetes	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.81	Too sandy	0.81	Too sandy	0.81
						Slope	0.12
Galisteo, moderately saline, sodic	40	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Salinity	1.00	Salinity	1.00	Salinity	1.00
		Flooding	1.00	Slow water movement	0.41	Slow water movement	0.41
		Slow water movement	0.41				
142:							
Grieta	85	Not limited		Not limited		Somewhat limited	
						Slope	0.12
143:							
Clovis	85	Not limited		Not limited		Somewhat limited	
						Slope	0.12

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
145:							
Grieta	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.79	Too sandy	0.79	Too sandy	0.79
						Slope	0.50
Sheppard	40	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.79	Too sandy	0.79	Slope	1.00
						Too sandy	0.79
146:							
Sedmar	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too sandy	0.81	Too sandy	0.81	Slope	1.00
		Slope	0.01	Slope	0.01	Too sandy	0.81
150:							
Doakum	55	Not limited		Not limited		Somewhat limited	
						Slope	0.12
Betonnie	35	Not limited		Not limited		Very limited	
						Slope	1.00
						Gravel content	0.08
162:							
Hackroy	45	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slow water movement	0.41	Slow water movement	0.41	Slow water movement	0.41
						Slope	0.12
Nyjack	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
						Slope	0.12
						Depth to bedrock	0.01
163:							
Jemez	85	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.21	Slow water movement	0.21	Slope	1.00
		Slope	0.01	Slope	0.01	Slow water movement	0.21
						Depth to bedrock	0.01

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
170:							
San Mateo	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50				
180:							
Councelor	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Eslendo	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Mespun	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too sandy	0.31	Too sandy	0.31	Too sandy	0.31
183:							
Sheppard	85	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.79	Too sandy	0.79	Slope	1.00
		Slope	0.63	Slope	0.63	Too sandy	0.79
185:							
Frijoles	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.88
						Dusty	0.50
190:							
Zia	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00
Skyvillage	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Rock outcrop	15	Not rated		Not rated		Not rated	
191:							
Sheppard	85	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.79	Too sandy	0.79	Slope	1.00
						Too sandy	0.79

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
200:							
Sedillo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.06	Gravel content	0.06	Slope	1.00
						Large stones content	0.74
201:							
Rock outcrop	55	Not rated		Not rated		Not rated	
Sedgran	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Gravel content	1.00	Gravel content	1.00	Depth to bedrock	1.00
		Too sandy	0.70	Too sandy	0.70	Too sandy	0.70
						Large stones content	0.68
206:							
Pinitos	85	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Slope	1.00
						Dusty	0.50
207:							
Penistaja	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
						Slope	0.12
Zia	25	Not limited		Not limited		Somewhat limited	
						Slope	0.88
208:							
Sedillo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	1.00	Gravel content	1.00	Slope	1.00

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
210:							
Ildefonso	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Large stones content	1.00
		Dusty	0.50	Dusty	0.50	Slope	1.00
		Large stones content	0.32	Large stones content	0.32	Gravel content	1.00
		Gravel content	0.09	Gravel content	0.09	Dusty	0.50
211:							
Zia	45	Not limited		Not limited		Very limited	
						Slope	1.00
Clovis	30	Not limited		Not limited		Somewhat limited	
						Slope	0.88
213:							
Pinavetes	55	Very limited		Very limited		Very limited	
		Slope	1.00	Too sandy	1.00	Slope	1.00
		Too sandy	1.00	Slope	1.00	Too sandy	1.00
Rock outcrop	30	Not rated		Not rated		Not rated	
215:							
Ess	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	0.18	Large stones content	0.18	Gravel content	1.00
		Gravel content	0.08	Gravel content	0.08	Large stones content	1.00
Rock outcrop	30	Not rated		Not rated		Not rated	
217:							
Witt	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.88
						Dusty	0.50

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
218:							
Ildefonso	85	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Large stones content	1.00
		Large stones content	0.18	Large stones content	0.18	Gravel content	1.00
		Gravel content	0.01	Gravel content	0.01	Slope	1.00
		Slope	0.01	Slope	0.01	Dusty	0.50
220:							
Rock outcrop	40	Not rated		Not rated		Not rated	
Vessilla	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Large stones content	0.01
Menefee	20	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
226:							
Galisteo, moderately saline, sodic	85	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Salinity	1.00	Salinity	1.00	Salinity	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
227:							
Hagerman	65	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.16
						Slope	0.12
Bond	20	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too sandy	0.31	Too sandy	0.31	Slope	0.88
						Too sandy	0.31
						Large stones content	0.01

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
228:							
Winona	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Gravel content	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Gravel content	0.96	Gravel content	0.96	Depth to bedrock	1.00
						Large stones content	0.32
230:							
Skyvillage	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Slope	1.00
Sandoval	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Slope	1.00
Rock outcrop	20	Not rated		Not rated		Not rated	
231:							
Querencia	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.88
						Dusty	0.50
234:							
Querencia	60	Not limited		Not limited		Somewhat limited	
						Slope	0.88
Zia	20	Not limited		Not limited		Somewhat limited	
						Slope	0.88
235:							
Sandoval	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.04	Slope	0.04	Slope	1.00

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
236:							
Sparank, moderately saline, sodic------	85	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Salinity	1.00	Salinity	1.00	Salinity	1.00
		Flooding	1.00	Slow water movement	0.41	Flooding	0.60
		Slow water movement	0.41			Slow water movement	0.41
237:							
Sparank----------	85	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
240:							
Penistaja----------	45	Not limited		Not limited		Somewhat limited	
						Slope	0.12
Hagerman----------	35	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.90
						Slope	0.12
250:							
Pinavetes----------	90	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.79	Too sandy	0.79	Slope	1.00
		Slope	0.16	Slope	0.16	Too sandy	0.79
262:							
Pastura----------	90	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
						Slope	0.12
270:							
Blancot----------	40	Not limited		Not limited		Somewhat limited	
						Slope	0.50
Councelor----------	30	Not limited		Not limited		Not limited	
Tsosie----------	25	Somewhat limited		Somewhat limited		Somewhat limited	
		Salinity	0.50	Salinity	0.50	Salinity	0.50

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
281:							
Carjo	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.96	Slow water movement	0.96	Slow water movement	0.96
						Slope	0.88
						Depth to bedrock	0.84
282:							
Tocal	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slow water movement	0.96	Slow water movement	0.96	Slope	1.00
						Slow water movement	0.96
283:							
Mirand	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Slow water movement	0.21	Slow water movement	0.21	Slow water movement	0.21
Alanos	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Slow water movement	0.96	Slow water movement	0.96	Gravel content	1.00
		Gravel content	0.01	Gravel content	0.01	Slow water movement	0.96
						Large stones content	0.88
290:							
Alanos	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Slow water movement	0.96	Slow water movement	0.96	Slow water movement	0.96
Rock outcrop	30	Not rated		Not rated		Not rated	
300:							
Waumac	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.81	Too sandy	0.81	Too sandy	0.81
						Slope	0.50

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
300:							
Bamac	35	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.81	Too sandy	0.81	Gravel content	1.00
		Gravel content	0.22	Gravel content	0.22	Too sandy	0.81
						Slope	0.50
						Large stones content	0.01
301:							
Vastine	45	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Depth to saturated zone	0.19	Depth to saturated zone	0.39
		Depth to saturated zone	0.39				
Jarola	40	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Slow water movement	0.21	Depth to saturated zone	0.39
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Slow water movement	0.21
		Slow water movement	0.21			Slope	0.12
302:							
Tranquilar	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.96	Slow water movement	0.96	Slow water movement	0.96
						Slope	0.88
Jarmillo	30	Not limited		Not limited		Somewhat limited	
						Slope	0.88
304:							
Cosey	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
		Slow water movement	0.21	Slow water movement	0.21	Slow water movement	0.21
Jarmillo	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
307:							
Flugle	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
						Slope	0.12
Waumac	25	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.81	Too sandy	0.81	Slope	0.88
						Too sandy	0.81
308:							
Cajete	85	Not limited		Not limited		Somewhat limited	
						Gravel content	0.78
						Slope	0.50
311:							
Cosey	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00
		Slow water movement	0.21	Slow water movement	0.21	Slow water movement	0.21
						Large stones content	0.01
Tranquilar	30	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.96	Slow water movement	0.96	Slope	1.00
						Slow water movement	0.96
Calaveras	25	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00
312:							
Royosa	90	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Too sandy	1.00
						Slope	0.88
314:							
Fragua	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.76	Too sandy	0.76	Slope	0.88
						Too sandy	0.76

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
314:							
Waumac	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.79	Too sandy	0.79	Slope	0.88
						Too sandy	0.79
Royosa	25	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Too sandy	1.00
						Slope	0.88
317:							
Elpedro	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.88
						Dusty	0.50
319:							
Bamac	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	1.00	Gravel content	1.00	Slope	1.00
		Too sandy	0.81	Too sandy	0.81	Too sandy	0.81
Rock outcrop	25	Not rated		Not rated		Not rated	
320:							
Sparham	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00	Slow water movement	0.41	Flooding	0.60
		Slow water movement	0.41			Slow water movement	0.41
321:							
Waumac	60	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.79	Too sandy	0.79	Slope	1.00
		Slope	0.01	Slope	0.01	Too sandy	0.79
Royosa	30	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Too sandy	1.00
						Slope	0.88

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
322:							
Fragua	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Gravel content	0.13	Gravel content	0.13	Gravel content	1.00
		Large stones content	0.02	Large stones content	0.02	Large stones content	0.99
		Too sandy	0.01	Too sandy	0.01	Too sandy	0.01
324:							
Rock outcrop	30	Not rated		Not rated		Not rated	
Atarque	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Menefee	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
						Gravel content	0.44
325:							
Rock outcrop	35	Not rated		Not rated		Not rated	
Espiritu	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.45	Gravel content	0.45	Slope	1.00
						Large stones content	0.16
Vessilla	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Gravel content	0.54	Gravel content	0.54	Depth to bedrock	1.00
						Large stones content	0.01
342:							
Waumac	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00
		Too sandy	0.79	Too sandy	0.79	Too sandy	0.79

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
342:							
Vessilla----------	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
						Gravel content	0.01
Rock outcrop--------	20	Not rated		Not rated		Not rated	
345:							
Espiritu----------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Gravel content	0.38	Gravel content	0.38	Gravel content	1.00
						Large stones content	0.08
Bamac----------	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	1.00	Gravel content	1.00	Slope	1.00
		Too sandy	0.81	Too sandy	0.81	Too sandy	0.81
						Large stones content	0.01
346:							
Espiritu, cobbly----	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Large stones content	1.00
		Large stones content	0.96	Large stones content	0.96	Slope	1.00
						Gravel content	0.99
Bamac----------	20	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	1.00	Gravel content	1.00	Slope	1.00
		Too sandy	0.81	Too sandy	0.81	Too sandy	0.81
348:							
Wauquie----------	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.99	Gravel content	0.99	Slope	1.00
						Large stones content	0.68

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
348:							
Rock outcrop--------	20	Not rated		Not rated		Not rated	
353:							
Cochiti-------------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	1.00	Gravel content	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50	Large stones content	0.95
		Large stones content	0.01	Large stones content	0.01	Dusty	0.50
Espiritu------------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50	Gravel content	1.00
		Gravel content	0.33	Gravel content	0.33	Dusty	0.50
						Large stones content	0.16
354:							
Waumac Variant------	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Gravel content	1.00
		Gravel content	1.00	Gravel content	1.00	Depth to bedrock	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
358:							
Deama---------------	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Gravel content	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Gravel content	0.98	Gravel content	0.98	Depth to bedrock	1.00
						Large stones content	0.20
Elpedro-------------	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.78	Gravel content	0.78	Slope	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
Rock outcrop--------	25	Not rated		Not rated		Not rated	

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
396:							
Atarque	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Gravel content	1.00	Gravel content	1.00	Depth to bedrock	1.00
						Large stones content	0.32
Menefee	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Gravel content	0.89
Rock outcrop	25	Not rated		Not rated		Not rated	
397:							
Rock outcrop	30	Not rated		Not rated		Not rated	
Cucho	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.92	Gravel content	0.92	Slope	1.00
						Depth to bedrock	0.03
Vessilla	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Gravel content	0.01	Gravel content	0.01	Gravel content	1.00
398:							
Espiritu	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.38	Gravel content	0.38	Slope	1.00
						Large stones content	0.08
Cucho	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.99	Gravel content	0.99	Slope	1.00
						Depth to bedrock	0.03

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
399:							
Cucho	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.99	Gravel content	0.99	Slope	1.00
						Depth to bedrock	0.03
Teco	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Slow water movement	0.41	Slow water movement	0.41	Gravel content	1.00
		Gravel content	0.03	Gravel content	0.03	Large stones content	0.68
						Slow water movement	0.41
405:							
Charo	50	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.96	Slow water movement	0.96	Gravel content	1.00
		Large stones content	0.76	Large stones content	0.76	Slow water movement	0.96
		Gravel content	0.01	Gravel content	0.01	Large stones content	0.76
						Depth to bedrock	0.65
						Large stones content	0.46
Charo, noncobbly	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Slow water movement	0.96	Slow water movement	0.96	Slow water movement	0.96
						Large stones content	0.01
						Gravel content	0.01
409:							
Santa Fe	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Gravel content	0.83	Gravel content	0.83	Depth to bedrock	1.00
						Large stones content	0.01

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
410:							
Zia	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
414:							
Wauquie	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Gravel content	0.18	Gravel content	0.18	Gravel content	1.00
						Large stones content	0.16
417:							
Jocity	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50				
418:							
Jocity	85	Very limited		Not limited		Not limited	
		Flooding	1.00				
419:							
Santa Fe	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Gravel content	0.61	Gravel content	0.61	Depth to bedrock	1.00
		Large stones content	0.12	Large stones content	0.12	Large stones content	1.00
Wauquie	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	1.00	Gravel content	1.00	Slope	1.00
		Large stones content	0.02	Large stones content	0.02	Large stones content	0.99
Rock outcrop	20	Not rated		Not rated		Not rated	
420:							
Pinavetes	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.81	Too sandy	0.81	Too sandy	0.81

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
421:							
Gilco, moderately saline, sodic------	90	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Salinity	1.00	Salinity	1.00	Salinity	1.00
		Flooding	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50				
422:							
Vessilla----------	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
						Large stones content	0.01
Menefee----------	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	1.00
Orlie----------	25	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.50
						Dusty	0.50
423:							
Gilco----------	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50			Slope	0.12
						Gravel content	0.04
426:							
Aga, moderately saline, sodic------	85	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Salinity	1.00	Salinity	1.00	Salinity	1.00
		Flooding	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50				
427:							
Aga----------	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50				

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
428:							
Aga, moderately saline, sodic------	85	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Salinity	1.00	Salinity	1.00	Salinity	1.00
		Flooding	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50				
430:							
Trail----------	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50				
431:							
Trail----------	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.81	Too sandy	0.81
		Too sandy	0.81				
433:							
Peralta----------	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Salinity	0.50	Salinity	0.50
		Salinity	0.50				
434:							
Peralta----------	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Salinity	0.50	Salinity	0.50
		Salinity	0.50				
437:							
Peralta, moderately saline, sodic------	85	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Salinity	1.00	Salinity	1.00	Salinity	1.00
		Flooding	1.00				
500:							
Rock outcrop--------	40	Not rated		Not rated		Not rated	
Osha----------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.42	Gravel content	0.42	Slope	1.00
Rubble land---------	20	Not rated		Not rated		Not rated	

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
503:							
Cajete	65	Very limited		Very limited		Very limited	
		Gravel content	1.00	Gravel content	1.00	Gravel content	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Cypher	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Gravel content	0.96	Gravel content	0.96	Depth to bedrock	1.00
						Large stones content	0.32
504:							
Orejas	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.16	Slope	0.16	Slope	1.00
		Large stones content	0.12	Large stones content	0.12	Large stones content	1.00
						Gravel content	0.97
Guaje	35	Not limited		Not limited		Somewhat limited	
						Slope	0.88
						Gravel content	0.78
600:							
Rock outcrop	50	Not rated		Not rated		Not rated	
Cypher	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Large stones content	0.35	Large stones content	0.35	Large stones content	1.00
		Gravel content	0.01	Gravel content	0.01	Gravel content	1.00
601:							
Laventana	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
						Gravel content	0.94
603:							
Laventana	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
603:							
Mirand	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Slow water movement	0.96	Slow water movement	0.96	Slope	1.00
		Gravel content	0.36	Gravel content	0.36	Slow water movement	0.96
						Large stones content	0.46
604:							
Cypher	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Mirand	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Slow water movement	0.96	Slow water movement	0.96	Slope	1.00
		Gravel content	0.28	Gravel content	0.28	Slow water movement	0.96
						Large stones content	0.38
608:							
Osha, steep	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Gravel content	0.78
Osha	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.01	Gravel content	0.01	Slope	1.00
823:							
Gilco, unprotected	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50			Slope	0.12
						Gravel content	0.04
827:							
Aga, unprotected	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50				

Table 9A.--Camp areas, picnic areas, and playgrounds--continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
830:							
Trail, unprotected--	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50				
831:							
Trail, unprotected--	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.81	Too sandy	0.81
		Too sandy	0.81				
835:							
Peralta, unprotected	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Salinity	0.50	Flooding	0.60
		Salinity	0.50			Salinity	0.50
842:							
Peralta, moderately saline, sodic, unprotected--------	85	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Salinity	1.00	Salinity	1.00	Salinity	1.00
		Flooding	1.00				
850:							
Water----------	95	Not rated		Not rated		Not rated	
DAM:							
Dam----------	100	Not rated		Not rated		Not rated	

Table 9B.--Paths, trails, and golf fairways

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Silver	55	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
Clovis	35	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
2:							
Clovis	35	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
Prieta	35	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Depth to bedrock	1.00
		Large stones content	0.18	Large stones content	0.18	Droughty	1.00
						Large stones content	1.00
						Gravel content	0.08
						Slope	0.04
Silver	20	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
3:							
Montecito	60	Not limited		Not limited		Somewhat limited	
						Large stones content	0.01
Orejas	30	Somewhat limited		Somewhat limited		Very limited	
		Large stones content	0.02	Large stones content	0.02	Depth to bedrock	1.00
						Droughty	1.00
						Large stones content	0.99

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4:							
Montecito----------	45	Somewhat limited		Not limited		Very limited	
		Slope	0.08			Slope	1.00
						Large stones content	0.01
Montecito, bouldery-	35	Somewhat limited		Somewhat limited		Very limited	
		Large stones content	0.68	Large stones content	0.68	Large stones content	1.00
		Dusty	0.50	Dusty	0.50	Slope	1.00
		Slope	0.08			Gravel content	0.05
10:							
Trail---------------	85	Not limited		Not limited		Somewhat limited	
						Droughty	0.27
11:							
Trail---------------	85	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
						Droughty	0.08
13:							
Sandoval------------	65	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.59
Querencia----------	20	Not limited		Not limited		Not limited	
15:							
Camino--------------	40	Not limited		Not limited		Not limited	
Sandoval------------	35	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.25
16:							
Prieta--------------	30	Very limited		Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00	Depth to bedrock	1.00
		Dusty	0.50	Dusty	0.50	Droughty	0.99
						Large stones content	0.08
						Slope	0.04

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
17:							
Vessilla	35	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	1.00
						Slope	0.04
Menefee	25	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.99
						Slope	0.04
18:							
Sparham	85	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Sodium content	1.00
						Flooding	0.60
20:							
Gilco	85	Not limited		Not limited		Not limited	
21:							
Hackroy	25	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	1.00
22:							
Aga	85	Not limited		Not limited		Not limited	
23:							
Hickman	85	Not limited		Not limited		Not limited	
24:							
Orlie	45	Not limited		Not limited		Not limited	
Sparham	35	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Sodium content	1.00
						Flooding	0.60
25:							
Gilco	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
26:							
Orlie	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
27:							
Aga	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
29:							
Trail	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.81	Too sandy	0.81	Droughty	0.69
34:							
Ildefonso	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Large stones content	0.92
						Droughty	0.07
Witt	30	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
47:							
Cascajo	85	Somewhat limited		Not limited		Very limited	
		Slope	0.68			Droughty	1.00
						Slope	1.00
						Gravel content	0.98
						Large stones content	0.61
51:							
Sparham	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Sodium content	1.00
						Flooding	0.60
						Salinity	0.13
52:							
Totavi	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.81	Too sandy	0.81	Droughty	0.69

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
53:							
Witt----------------	55	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
Harvey--------------	30	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
54:							
Harvey--------------	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.01	Too sandy	0.01	Slope	0.16
Cascajo-------------	40	Not limited		Not limited		Very limited	
						Droughty	1.00
						Gravel content	0.71
						Slope	0.16
						Large stones content	0.08
55:							
La Fonda------------	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
56:							
Ildefonso-----------	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Dusty	0.50	Slope	1.00
		Dusty	0.50			Large stones content	0.84
						Droughty	0.01
58:							
Deama---------------	45	Very limited		Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00	Depth to bedrock	1.00
		Slope	0.92	Large stones content	0.02	Slope	1.00
		Large stones content	0.02			Droughty	1.00
						Carbonate content	1.00
						Large stones content	0.99

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
58:							
Elpedro	35	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.04
		Dusty	0.50	Dusty	0.50		
59:							
Harvey	35	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
Ildefonso	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Droughty	0.65
						Slope	0.37
						Large stones content	0.08
La Fonda	15	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
63:							
Placitas	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.98	Dusty	0.50	Droughty	1.00
		Dusty	0.50			Slope	1.00
						Depth to bedrock	0.71
						Gravel content	0.08
64:							
Skyvillage	40	Somewhat limited		Not limited		Very limited	
		Slope	0.08			Depth to bedrock	1.00
						Slope	1.00
						Droughty	0.91
Ildefonso	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.98	Large stones content	0.76	Slope	1.00
		Large stones content	0.76			Droughty	0.88
						Gravel content	0.11
						Large stones content	0.05

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
65:							
Ildefonso	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.92	Large stones content	0.76	Slope	1.00
		Large stones content	0.76			Gravel content	0.99
						Droughty	0.92
						Large stones content	0.32
Harvey	30	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.84
		Dusty	0.50	Dusty	0.50		
66:							
Zia	85	Not limited		Not limited		Not limited	
67:							
Sandoval	40	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Depth to bedrock	1.00
		Dusty	0.50	Dusty	0.50	Slope	1.00
		Slope	0.08			Droughty	0.98
Poley	35	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Slope	1.00
						Large stones content	0.92
						Gravel content	0.75
68:							
Penistaja	45	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.79	Too sandy	0.79		
Querencia	35	Not limited		Not limited		Not limited	
71:							
Palon	85	Very limited		Not limited		Very limited	
		Slope	1.00			Slope	1.00
						Droughty	0.98
						Large stones content	0.46

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
72:							
Palon	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Droughty	0.99
74:							
Origo	50	Very limited		Not limited		Very limited	
		Slope	1.00			Slope	1.00
						Droughty	1.00
						Gravel content	0.45
						Large stones content	0.08
Pavo	25	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.84
75:							
Origo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Droughty	0.77
82:							
Calaveras	85	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	1.00			Droughty	0.64
83:							
Calaveras	60	Very limited		Very limited		Very limited	
		Slope	1.00	Water erosion	1.00	Slope	1.00
		Water erosion	1.00	Slope	1.00	Droughty	0.56
85:							
Redondo	85	Very limited		Not limited		Very limited	
		Slope	1.00			Slope	1.00
						Droughty	0.06
86:							
Redondo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Droughty	1.00
						Large stones content	0.20

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
87:							
Redondo	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Droughty	0.91
						Large stones content	0.20
88:							
Totavi	45	Not limited		Not limited		Somewhat limited	
						Droughty	0.20
Jemez	30	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Depth to bedrock	0.71
						Slope	0.16
91:							
Zia	85	Not limited		Not limited		Not limited	
92:							
Galisteo, moderately saline, sodic	85	Not limited		Not limited		Very limited	
						Salinity	1.00
93:							
Zia	85	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.81	Too sandy	0.81		
95:							
El Rancho	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
97:							
El Rancho	85	Not limited		Not limited		Not limited	
100:							
Orejas	40	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Large stones content	0.18	Depth to bedrock	1.00
		Large stones content	0.18	Slope	0.08	Slope	1.00
						Droughty	1.00
						Large stones content	1.00

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
101:							
Blancot	55	Not limited		Not limited		Not limited	
Lybrook	25	Not limited		Not limited		Very limited	
						Sodium content	1.00
102:							
Sparham	85	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Flooding	0.60
104:							
Cochiti	50	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Slope	1.00
		Slope	0.08			Droughty	0.07
						Large stones content	0.01
Montecito	30	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
105:							
Menefee	30	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Depth to bedrock	1.00
		Slope	1.00			Slope	1.00
						Droughty	1.00
106:							
Stumble	50	Very limited		Not limited		Very limited	
		Slope	1.00			Slope	1.00
						Droughty	0.98
						Gravel content	0.92
Stumble, sandy	30	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.79	Too sandy	0.79	Droughty	1.00
						Gravel content	0.03
108:							
Embudo	85	Not limited		Not limited		Somewhat limited	
						Gravel content	0.01
						Slope	0.01

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
109:							
Embudo	50	Not limited		Not limited		Somewhat limited	
						Droughty	0.50
Tijeras	35	Not limited		Not limited		Somewhat limited	
						Droughty	0.01
110:							
Saido	40	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	0.92	Dusty	0.50	Salinity	0.13
		Dusty	0.50				
111:							
Zia	35	Somewhat limited		Not limited		Very limited	
		Slope	0.08			Slope	1.00
112:							
Tijeras	85	Not limited		Not limited		Somewhat limited	
						Large stones content	0.01
114:							
San Mateo	40	Not limited		Not limited		Not limited	
Zia	40	Not limited		Not limited		Not limited	
120:							
Pinavetes	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.81	Too sandy	0.81	Droughty	0.99
129:							
Menefee	85	Somewhat limited		Not limited		Very limited	
		Slope	0.50			Depth to bedrock	1.00
						Slope	1.00
						Droughty	0.17
130:							
Pinavetes	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.81	Too sandy	0.81	Droughty	0.69

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
130:							
Galisteo, moderately saline, sodic	40	Not limited		Not limited		Very limited	
						Salinity	1.00
						Sodium content	1.00
142:							
Grieta	85	Not limited		Not limited		Not limited	
143:							
Clovis	85	Not limited		Not limited		Not limited	
145:							
Grieta	55	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.79	Too sandy	0.79		
Sheppard	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.79	Too sandy	0.79	Droughty	0.09
146:							
Sedmar	85	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.81	Too sandy	0.81	Depth to bedrock	1.00
						Droughty	1.00
						Slope	0.01
150:							
Doakum	55	Not limited		Not limited		Not limited	
Betonnie	35	Not limited		Not limited		Not limited	
162:							
Hackroy	45	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	1.00
Nyjack	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Depth to bedrock	0.01
163:							
Jemez	85	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.01
						Slope	0.01

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Paths and trails: Value	Off-road motorcycle trails: Rating class and limiting features	Off-road motorcycle trails: Value	Golf fairways: Rating class and limiting features	Golf fairways: Value
170:							
San Mateo-----------	85	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Sodium content	1.00
180:							
Councelor-----------	40	Somewhat limited		Not limited		Very limited	
		Slope	0.18			Slope	1.00
Eslendo-------------	30	Somewhat limited		Not limited		Very limited	
		Slope	0.18			Depth to bedrock	1.00
						Slope	1.00
						Droughty	0.99
Mespun--------------	25	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.31	Too sandy	0.31	Slope	1.00
		Slope	0.18			Droughty	0.29
183:							
Sheppard------------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.79	Too sandy	0.79	Slope	0.63
						Droughty	0.09
185:							
Frijoles------------	90	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Droughty	1.00
190:							
Zia-----------------	35	Not limited		Not limited		Somewhat limited	
						Slope	0.84
Skyvillage----------	25	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to bedrock	1.00
						Slope	1.00
						Droughty	0.96
191:							
Sheppard------------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.79	Too sandy	0.79	Droughty	0.09

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
200:							
Sedillo	85	Not limited		Not limited		Very limited	
						Droughty	1.00
						Slope	1.00
						Large stones content	0.74
						Gravel content	0.06
201:							
Sedgran	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Too sandy	0.70	Too sandy	0.70	Slope	1.00
						Droughty	1.00
						Gravel content	1.00
						Large stones content	0.68
206:							
Pinitos	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
207:							
Penistaja	60	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
Zia	25	Not limited		Not limited		Not limited	
208:							
Sedillo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Gravel content	1.00
						Droughty	0.89
210:							
Ildefonso	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50	Large stones content	1.00
		Large stones content	0.32	Large stones content	0.32	Droughty	0.34
						Gravel content	0.09

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
211:							
Zia	45	Not limited		Not limited		Not limited	
Clovis	30	Not limited		Not limited		Not limited	
213:							
Pinavetes	55	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Slope	1.00
		Slope	1.00			Droughty	1.00
						Too sandy	0.50
215:							
Ess	60	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Large stones content	0.18	Large stones content	1.00
		Large stones content	0.18			Slope	1.00
						Droughty	0.65
						Gravel content	0.08
217:							
Witt	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
218:							
Ildefonso	85	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Large stones content	1.00
		Large stones content	0.18	Large stones content	0.18	Droughty	0.80
						Gravel content	0.01
						Slope	0.01
220:							
Vessilla	30	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.78	Depth to bedrock	1.00
						Slope	1.00
						Droughty	1.00
						Large stones content	0.01

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
220:							
Menefee	20	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.78	Depth to bedrock	1.00
						Slope	1.00
						Droughty	0.99
226:							
Galisteo, moderately saline, sodic	85	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Salinity	1.00
						Sodium content	1.00
227:							
Hagerman	65	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.16
Bond	20	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.31	Too sandy	0.31	Depth to bedrock	1.00
						Droughty	1.00
						Large stones content	0.01
228:							
Winona	85	Somewhat limited		Not limited		Very limited	
		Slope	0.08			Depth to bedrock	1.00
						Droughty	1.00
						Slope	1.00
						Carbonate content	1.00
						Gravel content	0.96
230:							
Skyvillage	35	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	1.00
						Slope	0.63
Sandoval	25	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.99
						Slope	0.63

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Paths and trails: Value	Off-road motorcycle trails: Rating class and limiting features	Off-road motorcycle trails: Value	Golf fairways: Rating class and limiting features	Golf fairways: Value
231:							
Querencia-----------	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
234:							
Querencia-----------	60	Not limited		Not limited		Not limited	
Zia-----------------	20	Not limited		Not limited		Not limited	
235:							
Sandoval------------	85	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.05
						Slope	0.04
236:							
Sparank, moderately saline, sodic------	85	Not limited		Not limited		Very limited	
						Salinity	1.00
						Sodium content	1.00
						Flooding	0.60
237:							
Sparank-------------	85	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
240:							
Penistaja-----------	45	Not limited		Not limited		Not limited	
Hagerman------------	35	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.90
250:							
Pinavetes-----------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.79	Too sandy	0.79	Droughty	0.63
						Slope	0.16
262:							
Pastura-------------	90	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Depth to cemented pan	1.00
						Droughty	1.00

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
270:							
Blancot	40	Not limited		Not limited		Not limited	
Councelor	30	Not limited		Not limited		Not limited	
Tsosie	25	Not limited		Not limited		Somewhat limited	
						Salinity	0.50
281:							
Carjo	90	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.84
282:							
Tocal	85	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.87
283:							
Mirand	45	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	0.18				
Alanos	30	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Slope	1.00
						Large stones content	0.88
						Droughty	0.38
						Gravel content	0.01
290:							
Alanos	50	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	1.00	Slope	0.22	Droughty	0.21
300:							
Waumac	50	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.81	Too sandy	0.81		
Bamac	35	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.81	Too sandy	0.81	Droughty	1.00
						Gravel content	0.22
						Large stones content	0.01

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
301:							
Vastine	45	Not limited		Not limited		Somewhat limited Depth to saturated zone	0.19
Jarola	40	Not limited		Not limited		Somewhat limited Depth to saturated zone	0.19
302:							
Tranquilar	50	Not limited		Not limited		Not limited	
Jarmillo	30	Not limited		Not limited		Not limited	
304:							
Cosey	45	Very limited Water erosion	1.00	Very limited Water erosion	1.00	Somewhat limited Slope	0.37
Jarmillo	40	Very limited Water erosion	1.00	Very limited Water erosion	1.00	Somewhat limited Slope	0.37
307:							
Flugle	60	Somewhat limited Dusty	0.50	Somewhat limited Dusty	0.50	Not limited	
Waumac	25	Somewhat limited Too sandy	0.81	Somewhat limited Too sandy	0.81	Not limited	
308:							
Cajete	85	Not limited		Not limited		Somewhat limited Droughty	0.20
311:							
Cosey	35	Very limited Water erosion	1.00	Very limited Water erosion	1.00	Somewhat limited Slope Large stones content	0.84 0.01
Tranquilar	30	Not limited		Not limited		Not limited	
Calaveras	25	Very limited Water erosion	1.00	Very limited Water erosion	1.00	Somewhat limited Slope	0.84

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
312:							
Royosa	90	Very limited		Very limited		Somewhat limited	
		Too sandy	1.00	Too sandy	1.00	Droughty	0.95
						Too sandy	0.50
314:							
Fragua	40	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.76	Too sandy	0.76		
Waumac	30	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.79	Too sandy	0.79		
Royosa	25	Very limited		Very limited		Somewhat limited	
		Too sandy	1.00	Too sandy	1.00	Droughty	0.92
317:							
Elpedro	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
319:							
Bamac	60	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Too sandy	0.81	Slope	1.00
		Too sandy	0.81	Slope	0.78	Droughty	1.00
						Gravel content	1.00
320:							
Sparham	85	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Flooding	0.60
321:							
Waumac	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.79	Too sandy	0.79	Slope	0.01
Royosa	30	Very limited		Very limited		Somewhat limited	
		Too sandy	1.00	Too sandy	1.00	Droughty	0.92
322:							
Fragua	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	0.02	Large stones content	0.02	Large stones content	0.99
		Too sandy	0.01	Too sandy	0.01	Gravel content	0.13

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
324:							
Atarque	25	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Slope	1.00
						Droughty	0.99
Menefee	25	Somewhat limited		Not limited		Very limited	
		Slope	0.08			Depth to bedrock	1.00
						Droughty	1.00
						Slope	1.00
325:							
Espiritu	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Gravel content	0.45
						Droughty	0.21
						Large stones content	0.16
Vessilla	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
						Slope	1.00
						Droughty	1.00
						Gravel content	0.54
						Large stones content	0.01
342:							
Waumac	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.79	Too sandy	0.79	Slope	0.84
Vessilla	25	Somewhat limited		Not limited		Very limited	
		Slope	0.92			Depth to bedrock	1.00
						Droughty	1.00
						Slope	1.00
345:							
Espiritu	50	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.78	Slope	1.00
						Droughty	0.47
						Gravel content	0.38
						Large stones content	0.08

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
345:							
Bamac	35	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Too sandy	0.81	Slope	1.00
		Too sandy	0.81	Slope	0.78	Droughty	1.00
						Gravel content	1.00
						Large stones content	0.01
346:							
Espiritu, cobbly	70	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Large stones content	0.96	Slope	1.00
		Large stones content	0.96	Slope	0.08	Large stones content	1.00
						Droughty	0.92
Bamac	20	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Too sandy	0.81	Slope	1.00
		Too sandy	0.81	Slope	0.08	Droughty	1.00
						Gravel content	1.00
348:							
Wauquie	60	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.78	Slope	1.00
						Gravel content	0.99
						Large stones content	0.68
						Droughty	0.58
353:							
Cochiti	50	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Dusty	0.50	Slope	1.00
		Dusty	0.50	Slope	0.08	Gravel content	1.00
		Large stones content	0.01	Large stones content	0.01	Large stones content	0.95
						Droughty	0.66
Espiritu	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50	Droughty	1.00
						Gravel content	0.33
						Large stones content	0.16

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
354:							
Waumac Variant------	85	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	1.00
						Gravel content	1.00
						Slope	0.01
358:							
Deama---------------	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
						Droughty	1.00
						Slope	1.00
						Carbonate content	1.00
						Gravel content	0.98
Elpedro-------------	25	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.56	Slope	1.00
		Dusty	0.50	Dusty	0.50	Gravel content	0.78
396:							
Atarque-------------	30	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.78	Depth to bedrock	1.00
						Slope	1.00
						Gravel content	1.00
						Droughty	0.41
						Large stones content	0.32
Menefee-------------	30	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.78	Depth to bedrock	1.00
						Slope	1.00
						Droughty	0.72
397:							
Cucho---------------	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Gravel content	0.92
						Depth to bedrock	0.03

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
397:							
Vessilla	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
						Slope	1.00
						Droughty	1.00
						Gravel content	0.01
398:							
Espiritu	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.44	Slope	1.00
						Droughty	0.91
						Gravel content	0.38
						Large stones content	0.08
Cucho	35	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.78	Slope	1.00
						Gravel content	0.99
						Depth to bedrock	0.03
399:							
Cucho	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.08	Slope	1.00
						Gravel content	0.99
						Depth to bedrock	0.03
Teco	35	Somewhat limited		Not limited		Very limited	
		Slope	0.98			Slope	1.00
						Large stones content	0.68
						Gravel content	0.03
405:							
Charo	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Large stones content	0.76	Large stones content	0.76	Depth to bedrock	0.65
						Large stones content	0.46
						Gravel content	0.01

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
405:							
Charo, noncobbly----	40	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.01
						Large stones content	0.01
409:							
Santa Fe----------	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.08	Depth to bedrock	1.00
						Slope	1.00
						Droughty	1.00
						Gravel content	0.83
						Large stones content	0.01
410:							
Zia----------	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
414:							
Wauquie----------	85	Somewhat limited		Not limited		Very limited	
		Slope	0.08			Slope	1.00
						Droughty	0.82
						Gravel content	0.18
						Large stones content	0.16
417:							
Jocity----------	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
418:							
Jocity----------	85	Not limited		Not limited		Not limited	
419:							
Santa Fe----------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Large stones content	0.12	Large stones content	0.12	Slope	1.00
						Droughty	1.00
						Large stones content	1.00
						Gravel content	0.61

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
419:							
Wauquie	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	0.02	Large stones content	0.02	Droughty	1.00
						Gravel content	1.00
						Large stones content	0.99
420:							
Pinavetes	85	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.81	Too sandy	0.81	Droughty	1.00
421:							
Gilco, moderately saline, sodic	90	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Salinity	1.00
						Sodium content	1.00
422:							
Vessilla	35	Somewhat limited		Not limited		Very limited	
		Slope	0.18			Depth to bedrock	1.00
						Droughty	1.00
						Slope	1.00
						Large stones content	0.01
Menefee	30	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.99
Orlie	25	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
423:							
Gilco	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
426:							
Aga, moderately saline, sodic	85	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Salinity	1.00
						Sodium content	1.00

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
427:							
Aga	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
428:							
Aga, moderately saline, sodic	85	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Salinity	1.00
						Sodium content	1.00
430:							
Trail	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Droughty	0.08
431:							
Trail	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.81	Too sandy	0.81	Droughty	0.20
433:							
Peralta	85	Not limited		Not limited		Somewhat limited	
						Salinity	0.50
434:							
Peralta	85	Not limited		Not limited		Somewhat limited	
						Salinity	0.50
437:							
Peralta, moderately saline, sodic	85	Not limited		Not limited		Very limited	
						Salinity	1.00
						Sodium content	1.00
500:							
Osha	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Droughty	1.00
						Gravel content	0.42
503:							
Cajete	65	Somewhat limited		Not limited		Very limited	
		Slope	0.32			Gravel content	1.00
						Slope	1.00
						Droughty	0.99

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
503:							
Cypher	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
						Slope	1.00
						Droughty	1.00
						Gravel content	0.96
						Large stones content	0.32
504:							
Orejas	40	Somewhat limited		Somewhat limited		Very limited	
		Large stones content	0.12	Large stones content	0.12	Depth to bedrock	1.00
						Droughty	1.00
						Large stones content	1.00
						Slope	0.16
Guaje	35	Not limited		Not limited		Somewhat limited	
						Droughty	0.99
600:							
Cypher	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Large stones content	0.35	Large stones content	0.35	Slope	1.00
						Droughty	1.00
						Large stones content	1.00
						Gravel content	0.01
601:							
Laventana	85	Not limited		Not limited		Somewhat limited	
						Droughty	0.30
						Slope	0.04
603:							
Laventana	50	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.96	Slope	1.00
						Droughty	0.01

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
603:							
Mirand	35	Somewhat limited		Not limited		Very limited	
		Slope	0.50			Slope	1.00
						Large stones content	0.46
						Gravel content	0.36
604:							
Cypher	55	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to bedrock	1.00
						Slope	1.00
						Droughty	1.00
Mirand	30	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.78	Slope	1.00
						Large stones content	0.38
						Gravel content	0.28
608:							
Osha, steep	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Droughty	1.00
Osha	30	Somewhat limited		Not limited		Very limited	
		Slope	0.32			Droughty	1.00
						Slope	1.00
						Gravel content	0.01
823:							
Gilco, unprotected	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
827:							
Aga, unprotected	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
830:							
Trail, unprotected	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Droughty	0.01

Table 9B.--Paths, trails, and golf fairways--continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
831:							
Trail, unprotected--	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.81	Too sandy	0.81	Droughty	0.87
835:							
Peralta, unprotected	85	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
						Salinity	0.50
842:							
Peralta, moderately saline, sodic, unprotected--------	85	Not limited		Not limited		Very limited	
						Salinity	1.00
						Sodium content	1.00

Table 10A.--Dwellings and small commercial buildings

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Silver	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Clovis	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
2:							
Clovis	35	Not limited		Not limited		Somewhat limited	
						Slope	0.50
Prieta	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Large stones content	0.43	Large stones content	0.43	Shrink-swell	0.50
		Slope	0.04	Slope	0.04	Large stones content	0.43
Silver	20	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.50
						Shrink-swell	0.50
3:							
Montecito	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Orejas	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Large stones content	0.67	Large stones content	0.67	Large stones content	0.67
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4:							
Montecito----------	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Montecito, bouldery-	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
10:							
Trail----------	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.15		
11:							
Trail----------	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.15		
13:							
Sandoval----------	65	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
Querencia----------	20	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
15:							
Camino----------	40	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
Sandoval----------	35	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
16:							
Rock outcrop--------	50	Not rated		Not rated		Not rated	
Prieta--------------	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Large stones content	0.06	Large stones content	0.06	Shrink-swell	0.50
		Slope	0.04	Slope	0.04	Large stones content	0.06
17:							
Vessilla------------	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.04	Slope	0.04	Slope	1.00
Menefee-------------	25	Somewhat limited		Very limited		Very limited	
		Shrink-swell	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.04	Slope	0.04	Shrink-swell	0.50
Rock outcrop--------	20	Not rated		Not rated		Not rated	
18:							
Sparham-------------	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
20:							
Gilco---------------	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.15		
21:							
Rock outcrop--------	60	Not rated		Not rated		Not rated	

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
21:							
Hackroy	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Shrink-swell	1.00	Depth to hard bedrock	1.00
		Shrink-swell	1.00	Depth to hard bedrock	1.00	Shrink-swell	1.00
						Slope	0.12
22:							
Aga	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.47		
23:							
Hickman	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
24:							
Orlie	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Sparham	35	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
25:							
Gilco	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.15		
26:							
Orlie	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
27:							
Aga	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.47		

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
29:							
Trail	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.15		
31:							
Riverwash	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
33:							
Pits	100	Not rated		Not rated		Not rated	
34:							
Ildefonso	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Large stones content	0.70	Large stones content	0.70	Large stones content	0.70
						Slope	0.12
Witt	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
41:							
Dune land	100	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	Slope	0.16	Slope	1.00
47:							
Cascajo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
51:							
Sparham	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	0.50	Shrink-swell	1.00
52:							
Totavi	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
53:							
Witt	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Harvey	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
54:							
Harvey	45	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.16	Slope	0.16	Shrink-swell	0.50
Cascajo	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	Slope	0.16	Slope	1.00
55:							
La Fonda	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
56:							
Ildefonso	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	0.53	Large stones content	0.53	Large stones content	0.53
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
57:							
Badland	90	Not rated		Not rated		Not rated	
58:							
Deama	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
		Large stones content	0.01	Large stones content	0.01	Large stones content	0.01
Elpedro	35	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Slope	0.04	Slope	1.00
		Slope	0.04			Shrink-swell	0.50

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
59:							
Harvey	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.50
						Shrink-swell	0.50
Ildefonso	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
		Large stones content	0.02	Large stones content	0.02	Large stones content	0.02
La Fonda	15	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
63:							
Placitas	85	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to hard bedrock	1.00	Slope	1.00
		Depth to hard bedrock	0.71	Slope	1.00	Depth to hard bedrock	0.71
64:							
Skyvillage	40	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to hard bedrock	1.00
Ildefonso	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
65:							
Ildefonso	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Harvey	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00
		Shrink-swell	0.50			Shrink-swell	0.50
66:							
Zia	85	Not limited		Not limited		Somewhat limited	
						Slope	0.12

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
67:							
Sandoval	40	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Shrink-swell	0.50	Slope	1.00	Slope	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Poley	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50			Shrink-swell	0.50
68:							
Penistaja	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
Querencia	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
71:							
Palon	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	0.05	Large stones content	0.05	Large stones content	0.05
72:							
Palon	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00	Large stones content	1.00
74:							
Origo	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	0.55	Large stones content	0.55	Large stones content	0.55
Pavo	25	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
75:							
Origo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	0.99	Large stones content	0.99	Large stones content	0.99
82:							
Calaveras	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
83:							
Calaveras	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	0.01	Large stones content	0.01	Large stones content	0.01
Rubble land	20	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00	Large stones content	1.00
85:							
Redondo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
86:							
Redondo	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	0.53	Large stones content	0.53	Large stones content	0.53
87:							
Redondo	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Rubble land	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00	Large stones content	1.00
88:							
Totavi	45	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
88:							
Jemez	30	Somewhat limited		Very limited		Very limited	
		Depth to hard bedrock	0.71	Depth to hard bedrock	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Depth to hard bedrock	0.71
		Slope	0.16	Slope	0.16	Shrink-swell	0.50
Rock outcrop	15	Not rated		Not rated		Not rated	
91:							
Zia	85	Not limited		Not limited		Not limited	
92:							
Galisteo, moderately saline, sodic	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
93:							
Zia	85	Not limited		Not limited		Not limited	
95:							
El Rancho	85	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
97:							
El Rancho	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
100:							
Orejas	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Large stones content	0.61	Large stones content	0.61	Large stones content	0.61
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Rock outcrop	40	Not rated		Not rated		Not rated	
101:							
Blancot	55	Not limited		Not limited		Somewhat limited	
						Slope	0.12

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
101:							
Lybrook	25	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
102:							
Sparham	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
104:							
Cochiti	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Montecito	30	Not limited		Not limited		Not limited	
105:							
Badland	50	Not rated		Not rated		Not rated	
Menefee	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Shrink-swell	0.50
106:							
Stumble	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Stumble, sandy	30	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
						Slope	0.50
108:							
Embudo	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
109:							
Embudo	50	Not limited		Not limited		Somewhat limited	
						Slope	0.50
Tijeras	35	Not limited		Not limited		Not limited	

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
110:							
Rock outcrop--------	45	Not rated		Not rated		Not rated	
Saido----------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
111:							
Rock outcrop--------	50	Not rated		Not rated		Not rated	
Zia----------	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
112:							
Tijeras----------	85	Not limited		Not limited		Not limited	
114:							
San Mateo----------	40	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Zia----------	40	Not limited		Not limited		Somewhat limited	
						Slope	0.12
120:							
Pinavetes----------	85	Not limited		Not limited		Not limited	
124:							
Rock outcrop--------	90	Not rated		Not rated		Not rated	
129:							
Menefee----------	85	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Shrink-swell	0.50	Slope	1.00	Slope	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Shrink-swell	0.50
130:							
Pinavetes----------	45	Not limited		Not limited		Not limited	

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
130:							
Galisteo, moderately saline, sodic------	40	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
142:							
Grieta----------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
143:							
Clovis----------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
145:							
Grieta----------	55	Not limited		Not limited		Not limited	
Sheppard----------	40	Not limited		Not limited		Somewhat limited	
						Slope	0.50
146:							
Sedmar----------	85	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
150:							
Doakum----------	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Betonnie----------	35	Not limited		Not limited		Somewhat limited	
						Slope	0.88
162:							
Hackroy----------	45	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Shrink-swell	1.00	Depth to hard bedrock	1.00
		Shrink-swell	1.00	Depth to hard bedrock	1.00	Shrink-swell	1.00
Nyjack----------	40	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.01		

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
163:							
Jemez	85	Somewhat limited		Very limited		Very limited	
		Shrink-swell	0.50	Depth to hard bedrock	1.00	Slope	1.00
		Depth to hard bedrock	0.01	Shrink-swell	0.50	Shrink-swell	0.50
		Slope	0.01	Slope	0.01	Depth to hard bedrock	0.01
170:							
San Mateo	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
180:							
Councelor	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Eslendo	30	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Shrink-swell	0.50	Slope	1.00	Slope	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Mespun	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
183:							
Sheppard	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
185:							
Frijoles	90	Not limited		Not limited		Somewhat limited	
						Slope	0.12
190:							
Zia	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
190:							
Skyvillage----------	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Rock outcrop--------	15	Not rated		Not rated		Not rated	
191:							
Sheppard------------	85	Not limited		Not limited		Somewhat limited	
						Slope	0.50
200:							
Sedillo-------------	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
201:							
Rock outcrop--------	55	Not rated		Not rated		Not rated	
Sedgran-------------	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
206:							
Pinitos-------------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
207:							
Penistaja-----------	60	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
Zia-----------------	25	Not limited		Not limited		Somewhat limited	
						Slope	0.12
208:							
Sedillo-------------	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
210:							
Ildefonso	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	0.97	Large stones content	0.97	Large stones content	0.97
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
211:							
Zia	45	Not limited		Not limited		Somewhat limited	
						Slope	0.50
Clovis	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
213:							
Pinavetes	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Rock outcrop	30	Not rated		Not rated		Not rated	
215:							
Ess	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Large stones content	0.33	Shrink-swell	0.50
		Large stones content	0.33			Large stones content	0.33
Rock outcrop	30	Not rated		Not rated		Not rated	
217:							
Witt	85	Not limited		Not limited		Somewhat limited	
						Slope	0.12
218:							
Ildefonso	85	Somewhat limited		Somewhat limited		Very limited	
		Large stones content	0.71	Large stones content	0.71	Slope	1.00
		Slope	0.01	Slope	0.01	Large stones content	0.71

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
220:							
Rock outcrop--------	40	Not rated		Not rated		Not rated	
Vessilla----------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
Menefee----------	20	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Shrink-swell	0.50
226:							
Galisteo, moderately saline, sodic------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
227:							
Hagerman----------	65	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.50	Depth to hard bedrock	1.00	Shrink-swell	0.50
		Depth to hard bedrock	0.15	Shrink-swell	0.50	Depth to hard bedrock	0.15
Bond----------	20	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
228:							
Winona----------	85	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
230:							
Skyvillage----------	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.63	Slope	0.63	Slope	1.00
Sandoval----------	25	Somewhat limited		Very limited		Very limited	
		Slope	0.63	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Shrink-swell	0.50	Slope	0.63	Slope	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Rock outcrop--------	20	Not rated		Not rated		Not rated	
231:							
Querencia----------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
234:							
Querencia----------	60	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
						Slope	0.12
Zia-----------------	20	Not limited		Not limited		Somewhat limited	
						Slope	0.12
235:							
Sandoval----------	85	Somewhat limited		Very limited		Very limited	
		Shrink-swell	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.04	Slope	0.04	Shrink-swell	0.50
236:							
Sparank, moderately saline, sodic------	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
237:							
Sparank	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
240:							
Penistaja	45	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
Hagerman	35	Somewhat limited		Very limited		Somewhat limited	
		Depth to hard bedrock	0.90	Depth to hard bedrock	1.00	Depth to hard bedrock	0.90
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
250:							
Pinavetes	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	Slope	0.16	Slope	1.00
262:							
Pastura	90	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.50	Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00
		Depth to thin cemented pan	0.50	Shrink-swell	0.50	Shrink-swell	0.50
270:							
Blancot	40	Not limited		Not limited		Not limited	
Councelor	30	Not limited		Not limited		Not limited	
Tsosie	25	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
281:							
Carjo	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Depth to hard bedrock	0.84	Depth to hard bedrock	1.00	Depth to hard bedrock	0.84
						Slope	0.12

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
282:							
Tocal	85	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Slope	0.50
						Shrink-swell	0.50
283:							
Mirand	45	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Alanos	30	Very limited		Very limited		Very limited	
		Slope	1.00	Shrink-swell	1.00	Slope	1.00
		Shrink-swell	0.50	Slope	1.00	Shrink-swell	0.50
290:							
Alanos	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
Rock outcrop	30	Not rated		Not rated		Not rated	
300:							
Waumac	50	Not limited		Not limited		Not limited	
Bamac	35	Not limited		Not limited		Not limited	
301:							
Vastine	45	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.39	Depth to saturated zone	1.00	Depth to saturated zone	0.39
Jarola	40	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	1.00	Shrink-swell	0.50
		Depth to saturated zone	0.39	Shrink-swell	0.50	Depth to saturated zone	0.39

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
302:							
Tranquilar----------	50	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.99	Slope	0.12
Jarmillo----------	30	Not limited		Somewhat limited		Somewhat limited	
				Shrink-swell	0.50	Slope	0.12
304:							
Cosey----------	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Shrink-swell	0.50	Slope	1.00
				Slope	0.37		
Jarmillo----------	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
307:							
Flugle----------	60	Not limited		Not limited		Not limited	
Waumac----------	25	Not limited		Not limited		Somewhat limited	
						Slope	0.12
308:							
Cajete----------	85	Not limited		Not limited		Not limited	
311:							
Cosey----------	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
		Large stones content	0.03	Large stones content	0.03	Large stones content	0.03
Tranquilar----------	30	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.99	Slope	0.88
Calaveras----------	25	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
312:							
Royosa	90	Not limited		Not limited		Somewhat limited	
						Slope	0.12
314:							
Fragua	40	Not limited		Not limited		Somewhat limited	
						Slope	0.12
Waumac	30	Not limited		Not limited		Somewhat limited	
						Slope	0.12
Royosa	25	Not limited		Not limited		Somewhat limited	
						Slope	0.12
317:							
Elpedro	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
319:							
Bamac	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Rock outcrop	25	Not rated		Not rated		Not rated	
320:							
Sparham	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
321:							
Waumac	60	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
Royosa	30	Not limited		Not limited		Somewhat limited	
						Slope	0.12
322:							
Fragua	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
324:							
Rock outcrop	30	Not rated		Not rated		Not rated	

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
324:							
Atarque	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Menefee	25	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Shrink-swell	0.50	Slope	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Shrink-swell	0.50
325:							
Rock outcrop	35	Not rated		Not rated		Not rated	
Espiritu	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Vessilla	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
342:							
Waumac	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00
Vessilla	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Rock outcrop	20	Not rated		Not rated		Not rated	
345:							
Espiritu	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50			Shrink-swell	0.50

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
345:							
Bamac	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
346:							
Espiritu, cobbly	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Large stones content	0.01	Shrink-swell	0.50
		Large stones content	0.01			Large stones content	0.01
Bamac	20	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
348:							
Wauquie	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Rock outcrop	20	Not rated		Not rated		Not rated	
353:							
Cochiti	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Espiritu	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
354:							
Waumac Variant	85	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
358:							
Deama	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
358:							
Elpedro	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Rock outcrop	25	Not rated		Not rated		Not rated	
396:							
Atarque	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Menefee	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Rock outcrop	25	Not rated		Not rated		Not rated	
397:							
Rock outcrop	30	Not rated		Not rated		Not rated	
Cucho	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to soft bedrock	0.03		
Vessilla	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
398:							
Espiritu	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
398:							
Cucho	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to soft bedrock	0.03		
399:							
Cucho	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to soft bedrock	0.03		
Teco	35	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Shrink-swell	1.00
405:							
Charo	50	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Depth to hard bedrock	0.64	Depth to hard bedrock	1.00	Depth to hard bedrock	0.64
Charo, noncobbly	40	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.50	Depth to hard bedrock	1.00	Shrink-swell	0.50
		Depth to hard bedrock	0.01	Shrink-swell	0.50	Depth to hard bedrock	0.01
409:							
Santa Fe	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
410:							
Zia	85	Not limited		Not limited		Not limited	

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
414:							
Wauquie	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50			Shrink-swell	0.50
417:							
Jocity	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to saturated zone	0.15		
418:							
Jocity	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.15	Shrink-swell	0.50
419:							
Santa Fe	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
		Large stones content	0.01	Large stones content	0.01	Large stones content	0.01
Wauquie	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Large stones content	0.08	Large stones content	0.08	Large stones content	0.08
Rock outcrop	20	Not rated		Not rated		Not rated	
420:							
Pinavetes	85	Not limited		Not limited		Not limited	
421:							
Gilco, moderately saline, sodic	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.15		

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
422:							
Vessilla	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Menefee	30	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	0.50	Shrink-swell	0.50	Slope	0.50
						Shrink-swell	0.50
Orlie	25	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
423:							
Gilco	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.15		
426:							
Aga, moderately saline, sodic	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.15		
427:							
Aga	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.47		
428:							
Aga, moderately saline, sodic	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.15		

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
430:							
Trail	85	Very limited Flooding	 1.00	Very limited Flooding	 1.00	Very limited Flooding	 1.00
431:							
Trail	85	Very limited Flooding	 1.00	Very limited Flooding	 1.00	Very limited Flooding	 1.00
433:							
Peralta	85	Very limited Flooding	 1.00	Very limited Flooding Depth to saturated zone	 1.00 0.99	Very limited Flooding	 1.00
434:							
Peralta	85	Very limited Flooding	 1.00	Very limited Flooding Depth to saturated zone	 1.00 0.99	Very limited Flooding	 1.00
437:							
Peralta, moderately saline, sodic	85	Very limited Flooding	 1.00	Very limited Flooding Depth to saturated zone	 1.00 0.99	Very limited Flooding	 1.00
500:							
Rock outcrop	40	Not rated		Not rated		Not rated	
Osha	30	Very limited Slope	 1.00	Very limited Slope Depth to hard bedrock	 1.00 0.93	Very limited Slope	 1.00
Rubble land	20	Very limited Slope Large stones content	 1.00 1.00	Very limited Slope Large stones content	 1.00 1.00	Very limited Slope Large stones content	 1.00 1.00
503:							
Cajete	65	Very limited Slope	 1.00	Very limited Slope	 1.00	Very limited Slope	 1.00

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
503:							
Cypher	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
504:							
Orejas	40	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.16	Slope	0.16	Shrink-swell	0.50
Guaje	35	Not limited		Not limited		Somewhat limited	
						Slope	0.12
600:							
Rock outcrop	50	Not rated		Not rated		Not rated	
Cypher	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
601:							
Laventana	85	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.04	Depth to hard bedrock	0.42	Shrink-swell	0.50
				Slope	0.04		
603:							
Laventana	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to hard bedrock	0.32		
Mirand	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
604:							
Cypher----------	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
Mirand----------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
608:							
Osha, steep------	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Osha----------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
823:							
Gilco, unprotected--	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.15		
827:							
Aga, unprotected----	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.47		
830:							
Trail, unprotected--	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.15		
831:							
Trail, unprotected--	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.15		

Table 10A.--Dwellings and small commercial buildings--continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
835:							
Peralta, unprotected	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.99	Shrink-swell	0.50
				Shrink-swell	0.50		
842:							
Peralta, moderately saline, sodic, unprotected	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.99	Shrink-swell	0.50
				Shrink-swell	0.50		
850:							
Water	95	Not rated		Not rated		Not rated	
DAM:							
Dam	100	Not rated		Not rated		Not rated	