1.9 *West Mesa Monitoring Wells*

For discussion purposes, the West Mesas consist of three general areas. These areas include: (1) the Northwest Mesa, which generally encompasses the Albuquerque volcanoes, Double Eagle airport, and points north and west of those locations; (2) The West Mesa, which includes the area between approximately 1 mile north of I-40 and as far south of Southwest Rd.; and (3) the Southwest Mesa, which is bounded to the north by Southwest Rd and to the south by the Isleta Pueblo boundary. These areas are characterized as open ranchland, with residential and commercial development currently focused in the West Mesa and along the Coors Road and I-40 corridors. Some institutional and industrial development exists (e.g., the Metropolitan Detention Center, Double Eagle Airport, Petroglyphs National Monument), and residential development via master planned communities on the eastern edges and southward from Rio Rancho is occurring.

Bernalillo County maintains and monitors two wells and one piezometer nest on the West Mesas: the Paradise Road well located north of the Double Eagle Airport and on the eastern edge of the City of Albuquerque's soil amendment facility; the 9-Mile Hill well located near the intersection of I-40 and Paseo Del Volcan at the closed County landfill; and the Niese Road piezometer nest located along Niese Road and east of the Southwest Landfill, which is a construction-debris-only facility. The USGS provides continuous water level monitoring at the Niese Road piezometer nest.

The location of the various Bernalillo County wells, the USGS wells, and community supply wells are shown in Figure 3.55.

1.9.1 *USGS West Mesas Monitoring Wells*

The USGS water level monitoring on the West Mesa also includes activities in the Lincoln Middle School piezometer nest (in Rio Rancho), the 98th Street Piezometer nest located east of the 9 Mile Hill Well, and the Westgate Heights nested piezometer located southwest of 98th Street and Sage Rd. Monitoring is also conducted by the USGS in cooperation with the ABCWUA in the Volcano Cliffs, Zamora, College, West Mesa, and Leavitt wellfields.

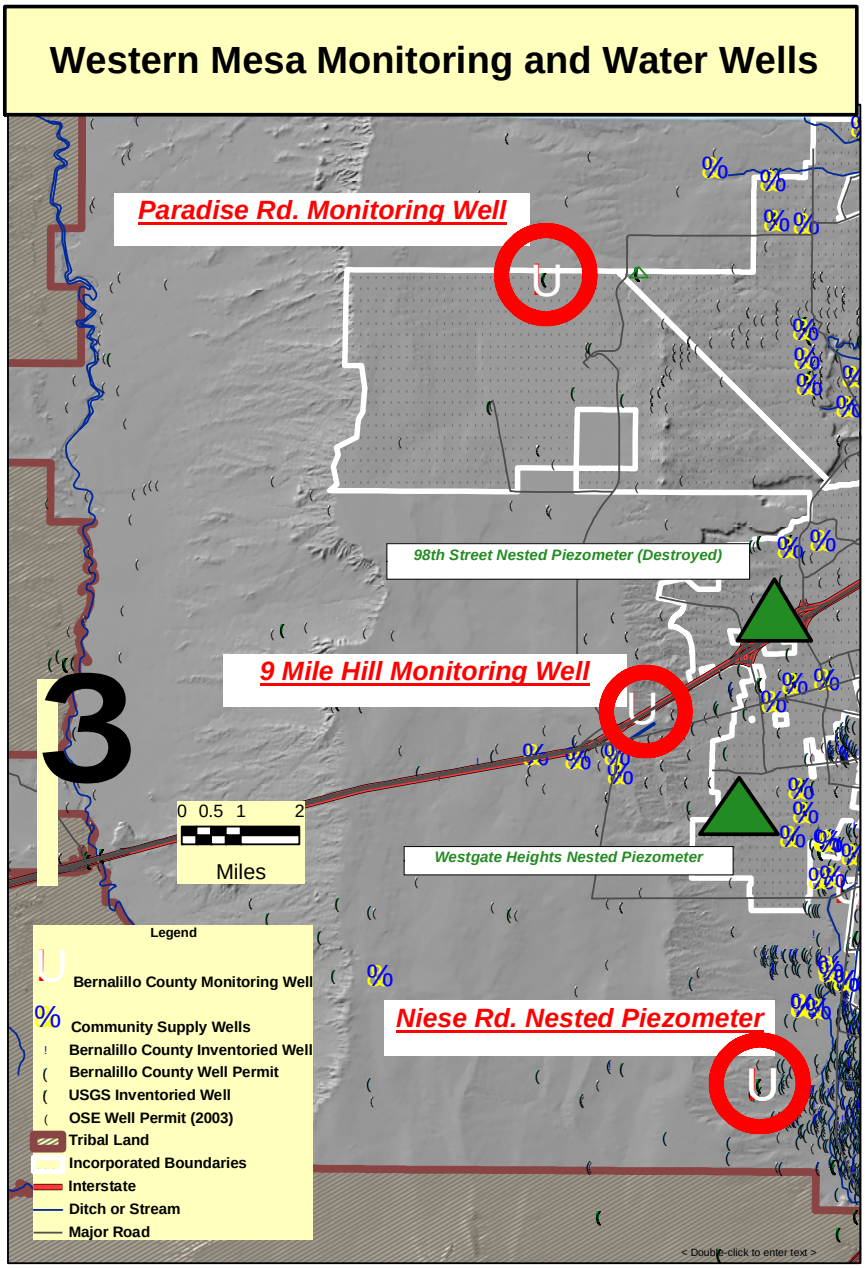
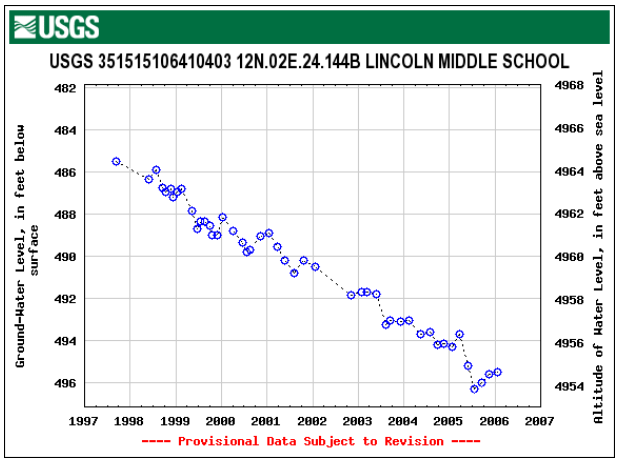


Figure 3.55 West Mesa Monitoring and Water Wells

1.9.1.1 Water Levels in the West Mesas

Figures 3.56 and 3.57 provide the summary hydrographs for the USGS-monitored locations on the Northwest Mesa. The USGS maintains a nested piezometer at the Lincoln Middle School located in Sandoval County, approximately 11 miles northeast of the Paradise Road Well. Water levels in the uppermost and lowermost piezometers indicate consistent declines in water levels since 1997, when monitoring began. Water levels in the uppermost aquifer (595 ft.) have declined approximately 11 feet during that period, or approximately 1.2 ft/yr. A similar decline is seen in the deepest piezometer (1,260 ft.). These declines are likely due to continued and expanding groundwater withdrawals used to support development of Rio Rancho. The intermediate piezometer (890 ft.) shows slightly less decline, approximately 8 feet in 9 years, or about 0.9 ft/yr. The graphs are somewhat misleading due to the choice of scales needed to represent an anomalous reading recorded in 2004. The relative potentiometric elevations indicate flow from the uppermost and lowermost zones into the intermediate zone. The difference in decline rate is due to flow into the intermediate layer. Flow occurs at the expense of water levels in the overlying and underlying portions of the aquifer.

The 98th Street piezometer nest was located approximately 2.5 miles northeast of the 9 Mile Hill well monitored by Bernalillo County. This piezometer nests consisted of four wells. The shallowest of the wells (438 ft.) indicated continual decline in water levels since monitoring began in 1997, though the decline totals less than 3.5 feet, or an average rate of 0.4 ft/yr. It is likely that the decline is due to a general lack of precipitation over that period coupled with nearby municipal pumping. Each of the deeper wells (749 ft., 1,112 ft., 1,554 ft.) at that location showed a general decline from 1997 to about 2002. The total decline ranged from 7 feet to 12 feet deepening on depth. Since 2002, water levels have risen back to 1997 levels. The water levels in the deep piezometer demonstrate seasonal pumping effects of 8 to 10 feet from winter to summer prior to 2002, and approximately 4 to 6 feet since. The 98th Street piezometer nest was lost to development in 2005 and is no longer in service.

<table>
<tr>
<td> 
</td>
<td>Well Information

Land Surface Elevation:
5,450 ft amsl.

Depth of Well: 595 ft</td>
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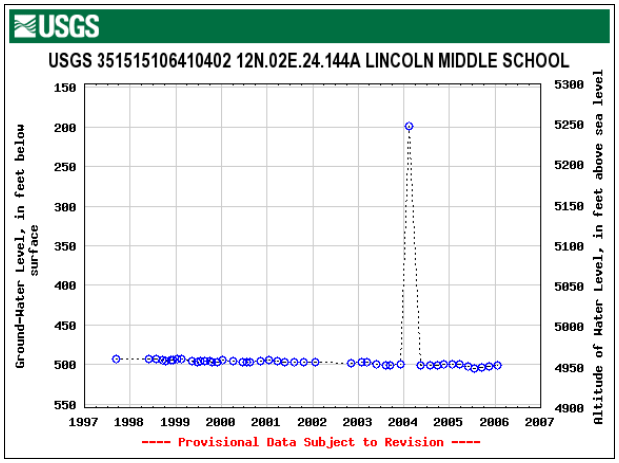
<td> 
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<td>Well Information

Land Surface Elevation:
5,450 ft amsl.

Depth of Well: 835 ft.</td>
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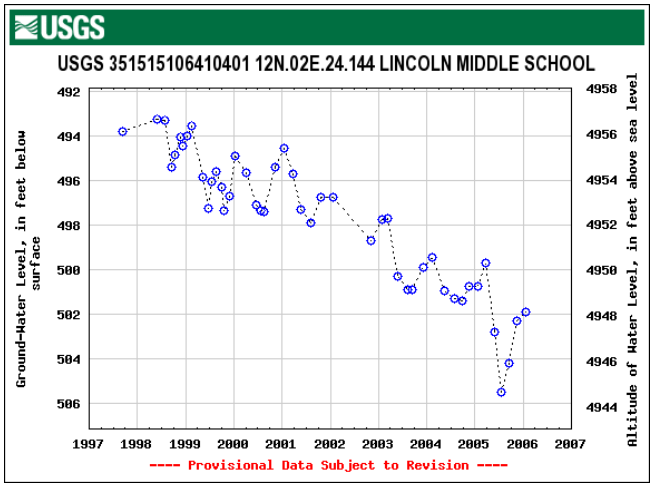
<td> 
</td>
<td>Well Information

Land Surface Elevation:
5,450 ft amsl.

Depth of Well: 1,260 ft</td>
</tr>
</table>

Figure 3.56 Water Levels in the Lincoln Middle School Nested Piezometer

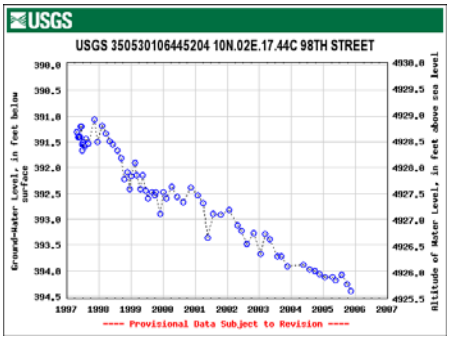
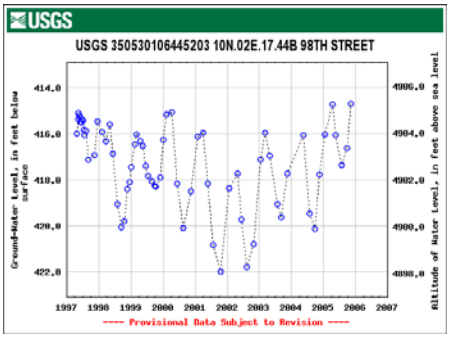
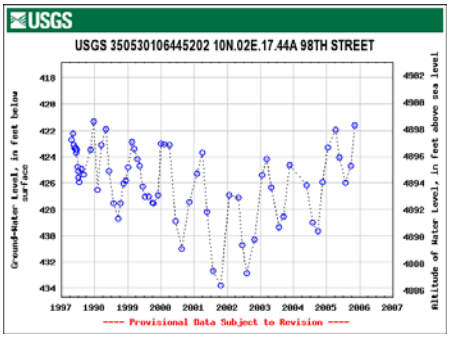
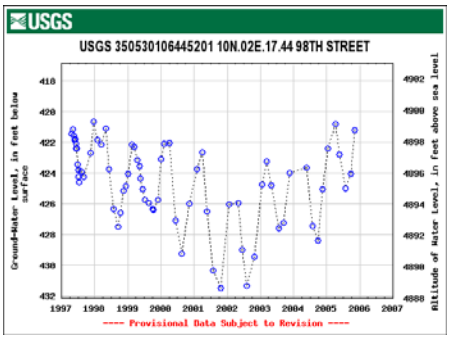
	**Well Information** Land Surface Elevation: 5,320 ft amsl. Depth of Well: 438 ft
	**Well Information** Land Surface Elevation: 5,320 ft amsl. Depth of Well: 749 ft.
	**Well Information** Land Surface Elevation: 5,320 ft amsl. Depth of Well: 1,112 ft
	**Well Information** Land Surface Elevation: 5,320 ft amsl. Depth of Well: 1,554 ft

Figure 3.57 Water Levels in the 98th Street Nested Piezometer

ABCWUA pumping records were provided courtesy of the USGS and annual total pumping by wellfield are shown in Figure 3.58. Figure 3.59 shows that pumping in the College and West Mesa wellfields, which are the wellfields closest to the 98th Street piezometer nest, were significantly reduced in 1987, with combined pumping being least from 1991 to 1992. The resurgence in pumping from the West Mesa wellfield from 1992 to 1998 is evidenced by the declining levels in the 98th Street deep piezometers though 2000. A reduction in pumping is again seen beginning in 1998, with additional reductions from the College wellfield starting in 2002. These reductions are evidenced as rises in water levels in the 98th street piezometers (Figure 3.56) beginning in 2000 and continuing through the present.

The USGS hydrographs for College 1 and College 2 (Figure 3.60) indicate that data have been collected somewhat sporadically and trends are not clearly indicated. Based on the available data, it appears that declines have occurred in both wells. In College 1, water levels in the winter of 1997 were at a depth of 434 feet, while in winter 2006, the water level was measured at approximately 445 feet, suggesting a net decline of 11 feet, or an average decline rate of 1.1 ft/yr. Data presented for College 2 suggest that water levels have stabilized since about 1997. Figure 3.60 provides a comparison of pumping from the College 1 and College 2 wells. Although overall pumping has decreased since 1997, the decrease has come from reduced pumping only in College 2. Thus, water levels in College 1 are expected to continue to decline, while levels in College 2 stabilize.

Hydrographs for other West Mesa pumping wells (Figure 3.61) are also available, but recorded data are sporadic. Water levels in the Volcano Cliffs Well 1 suggest a continual decline since monitoring was initiated in 1970. Total decline over the 36-year period is approximately 110 feet, or an average rate of 3 ft/yr. The Zamora Well 1, located east of the Volcano Cliffs well field, shows a total decline of 36 feet over a 13-year period, or an average rate of 2.7 ft/yr. These declines are consistent with reduction of pumping from the Volcano Cliffs field starting in 1997 but with increased pumping in the Zamora well field to compensate for the reduction (see Figure 3.58). There has been no net recovery in water levels.

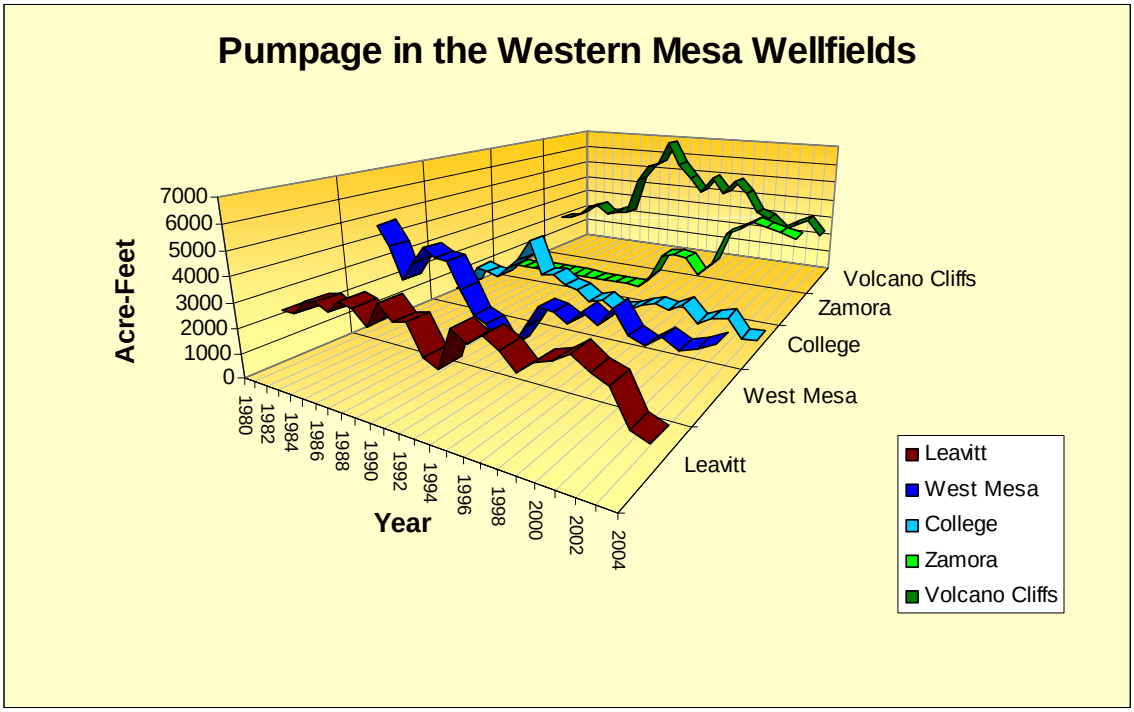


Figure 3.58 Pumping History for the West Mesa Well Fields

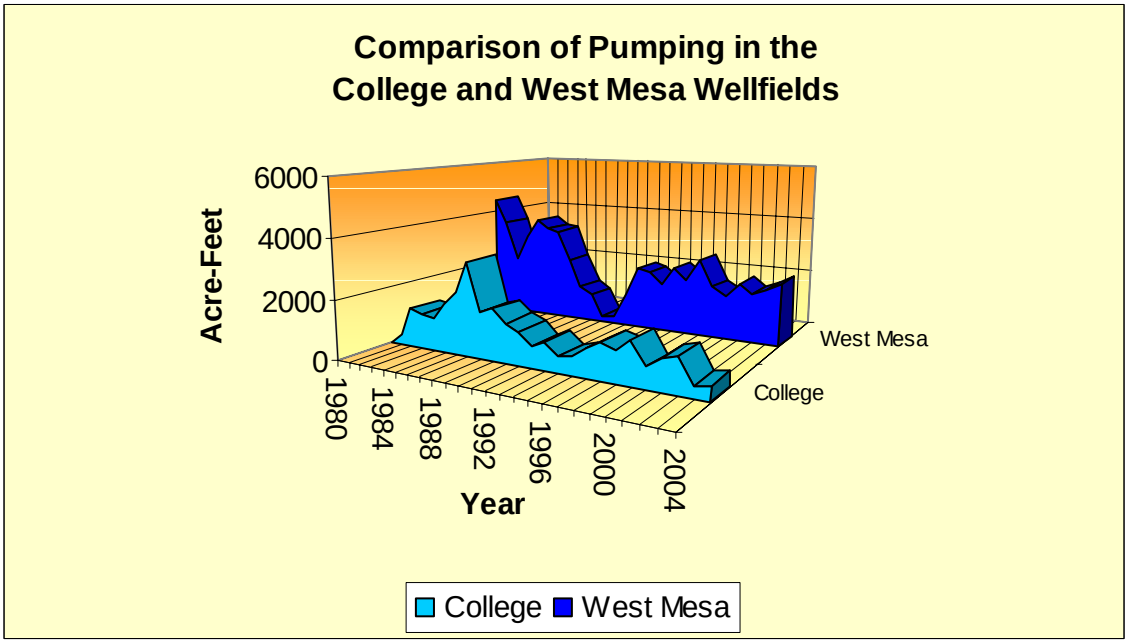
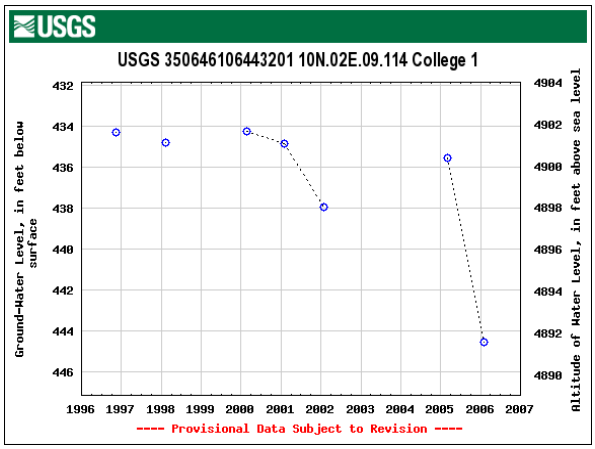


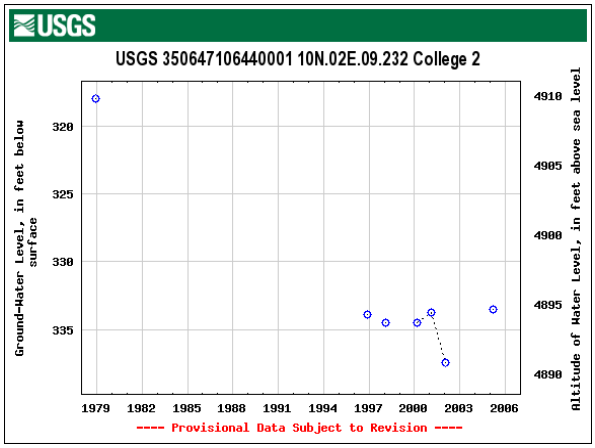
Figure 3.59 Comparison of the Pumping in the College and West Mesa Well Fields



Well Information

Land Surface Elevation:
5,336 ft amsl.

Depth of Well: 1,662 ft



Well Information

Land Surface Elevation:
5,336 ft amsl.

Depth of Well: 1,647 ft

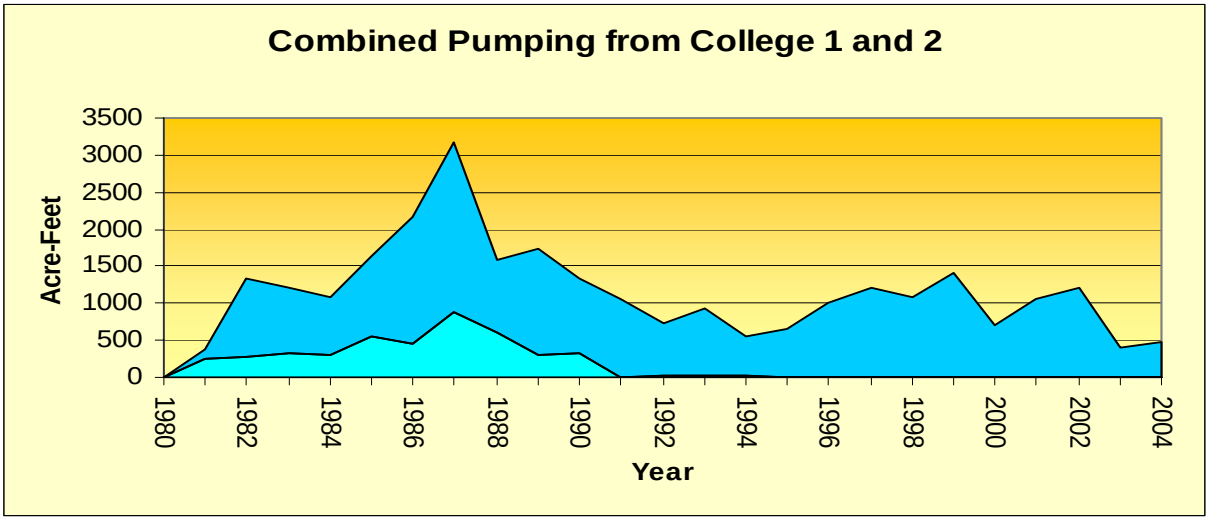
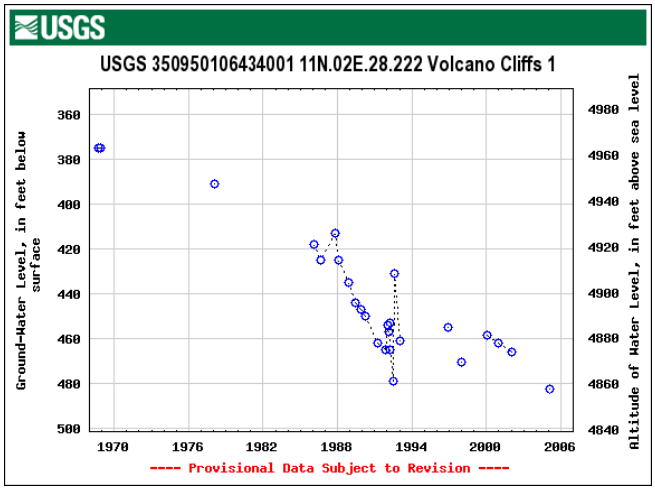


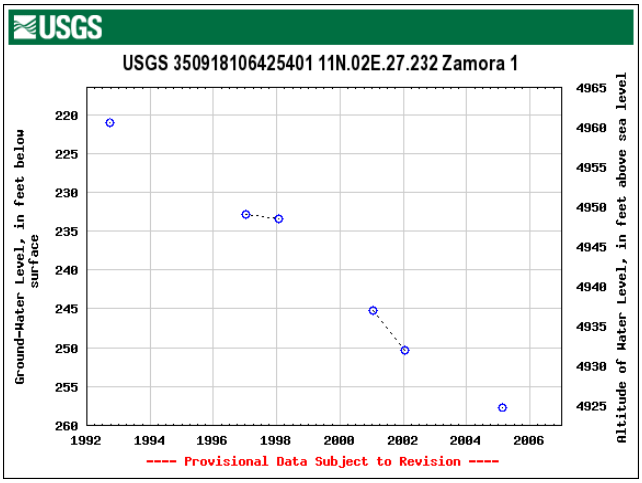
Figure 3.60 Water Levels and Pumping in College 1 and 2



Well Information

Land Surface Elevation:
5,339 ft amsl.

Depth of Well: 1,080 ft



Well Information

Land Surface Elevation:
5,182 ft amsl.

Depth of Well: 970 ft.

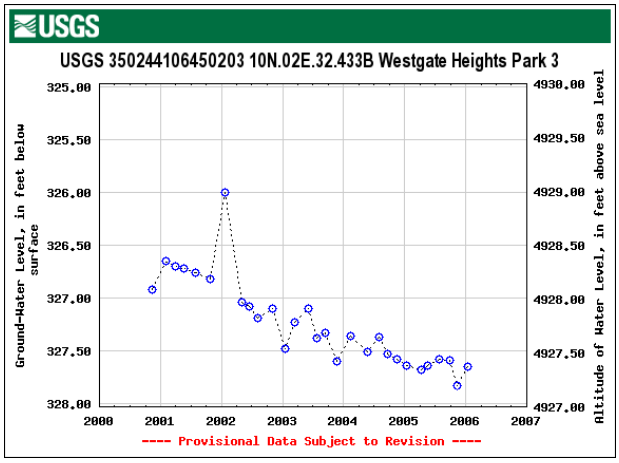
Figure 3.61 Water Levels in Volcano Cliffs and Zamora Well Fields

The USGS also maintains a piezometer nest in the Westgate Heights Park. The piezometer nest is located approximately 1.5 miles southeast of the Don well field, two miles southwest of the West Mesa well field, and 1.25 miles west of the Leavitt well field. The hydrographs for the Westgate Heights piezometers are of similar character to those of the 98th Street piezometers and are provided as Figure 3.62. The shallowest piezometer (370 ft.) shows a decline of approximately 1 foot over a 5-year period, or an average rate of 0.2 ft/yr. This decline is likely due to natural, drought-related causes as there are no nearby shallow wells, although some portion of the decline may be attributable to municipal pumping. In contrast, the intermediate (749 ft. and 1,112 ft.) and deep (1,554 ft.) piezometers show a net increase in water levels of approximately 11 feet since mid-2000. Seasonal fluctuations are seen in the intermediate and deep wells, with seasonal change typically being approximately 6 feet. The cause of the recovering water levels is likely reduced municipal pumping in the nearby Leavitt well field.

Water level data for Leavitt 2 are only available sporadically, but indicate an approximately 4-foot rise in water levels since 2000 consistent with water level changes in the Westgate Heights deep piezometers. Figure 3.63 provides the pumping history of the West Mesa and Leavitt well fields, the two fields closest to the Westgate Heights piezometers. The graph shows that pumping in the Leavitt well field peaked in 2000 and has been reduced since that time; whereas, pumping from the West Mesa well field has remained consistent or risen only slightly. Consequently, the trends in the Westgate Heights piezometers appear to be driven by the changes in the Leavitt well field pumping.

1.9.1.2 Water Quality in the West Mesa

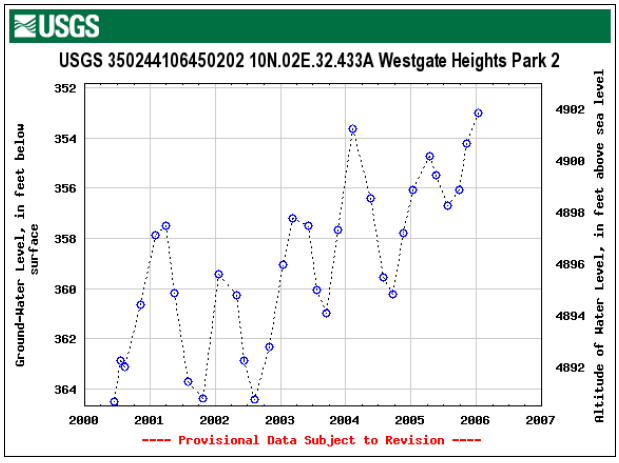
Water quality samples have been collected throughout the West Mesas and analyzed by the USGS through cooperative agreements with the CABQ and Bernalillo County. Water quality data for the Volcano Cliffs, College, West Mesa and Leavitt well fields has been provided by CABQ and is summarized below. Data for individual well locations and the USGS-monitored piezometer nests was taken from the on-line USGS database. Bernalillo County has collected samples and provided analysis for three sampling locations: Paradise Road, 9 Mile Hill, and the Niese Road piezometer nest.



Well Information

Land Surface Elevation:
5,255 ft amsl.

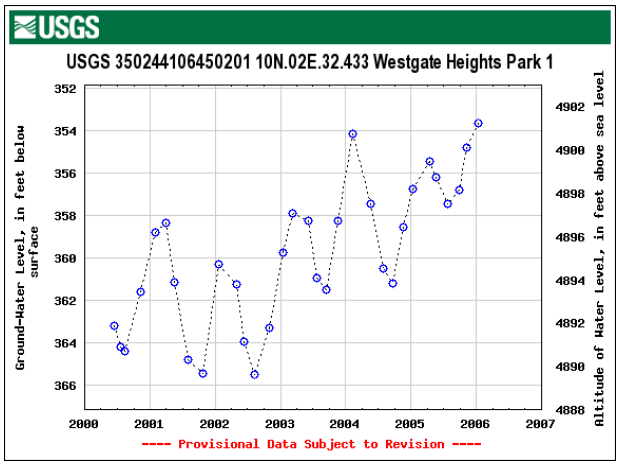
Depth of Well: 370 ft.



Well Information

Land Surface Elevation:
5,255 ft amsl.

Depth of Well: 868 ft

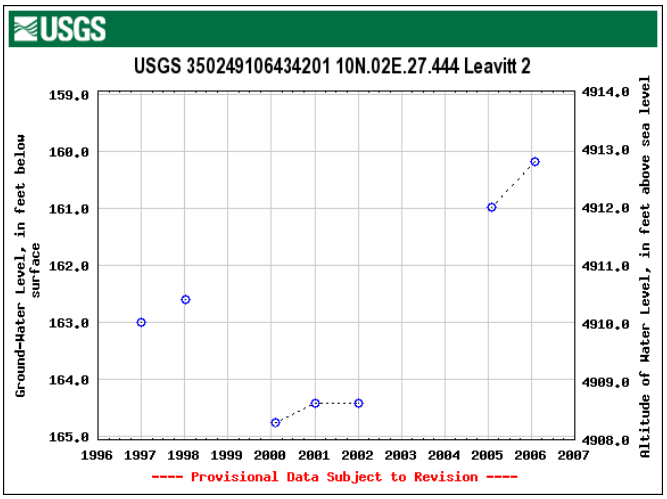


Well Information

Land Surface Elevation:
5,255t amsl.

Depth of Well: 1.290 ft

Figure 3.62 Water Levels in the Westgate Heights Nested Piezometer



Well Information

Land Surface Elevation:
5,073 ft amsl

Depth of Well: 1,133 ft

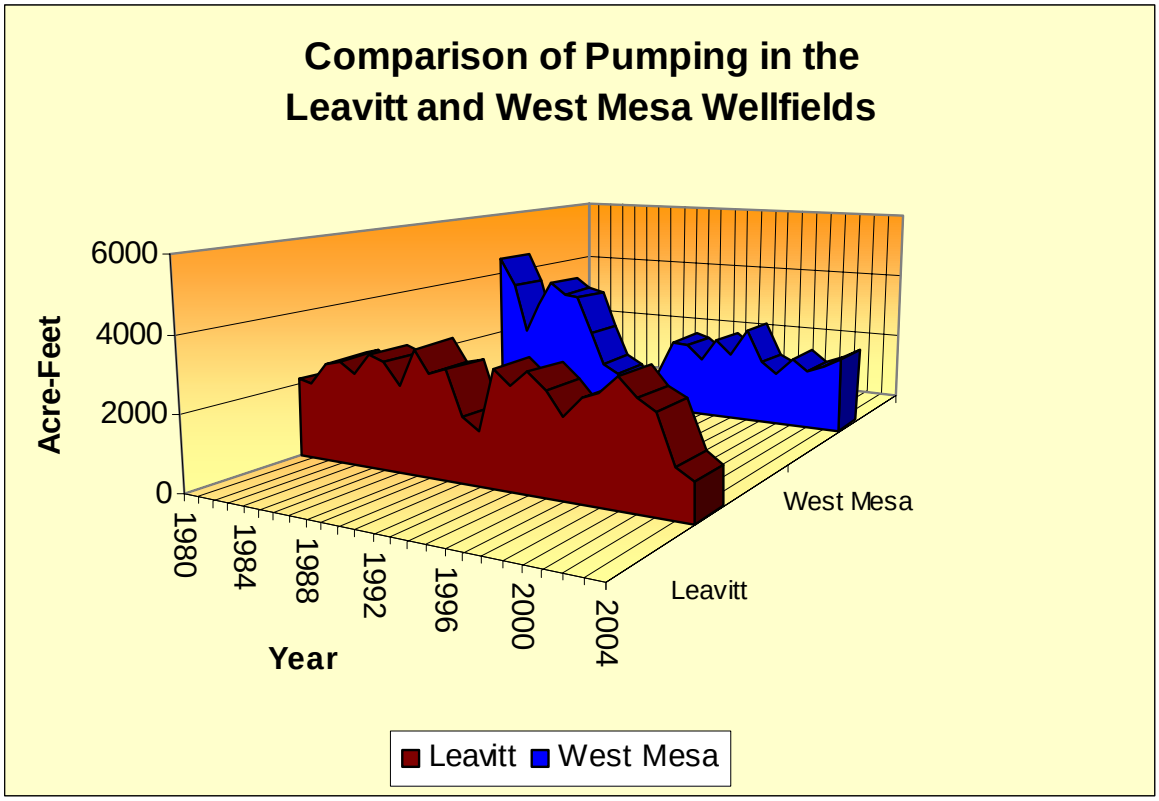


Figure 3.63 Water Level Rise and Decreased Pumping in the Leavitt Well Field

Figures 3.64 through 3.66 present a Piper Plot and a statistical summary for the metals and inorganic concentrations for water samples taken from the Northwest Mesa, the West Mesa, and the Southwest Mesa. These plots only reflect the results of on-going groundwater monitoring of fresh water supply from the aquifer. The non-Bernalillo County samples shown on the Piper Plot are either mean values based on the period of record (i.e. designated as "stat") or are the most currently available sample. The available data for the Westgate Heights nested piezometer was included in the summaries for both the West Mesa and Southwest Mesa because it is located on the boundary between the two areas.

The Piper plots for the three subareas generally plot to the lower right hand side of the center diamond, indicating a predominantly sodium and bicarbonate composition. Increased concentrations of sulfate may be present in some individual samples from time to time, but chloride concentrations typically remain low. The Piper Plots for the West Mesa, particularly the intermediate and deep piezometers, generally overlap or fall within the plot area for samples taken from the South Valley. This is consistent with the generally held model of water moving from the West Mesa towards the east and southeast toward the Rio Grande and areas of municipal pumping. It also reflects the similarity in formations and resulting geochemistry.

The plots for the available sample from the 9 Mile Hill well and the shallowest of the Niese Road piezometers plot at the center of the diagram, similar to the plots for the monitored locations in the Far Northeast Heights and the North Valley. This is likely due to the wells screening upper portions of the formation and the effect of direct recharge by precipitation and subsequent changes in groundwater chemistry as the groundwater moves to greater depths.

Available data on primary and secondary metals is limited for the non-municipal well locations. The available data indicate that arsenic is a problem throughout the West Mesa and aluminum, iron, and manganese can be problematic. Total dissolved solids may also exceed the secondary standard. The statistical summations for inorganic constituents indicate that there are few, if any, concerns with exceedances for chloride or sulfate in any of the three subareas. These parameters are likely to be of concern at depths greater (i.e., > 1,500 ft.) than those represented in the statistical analysis.

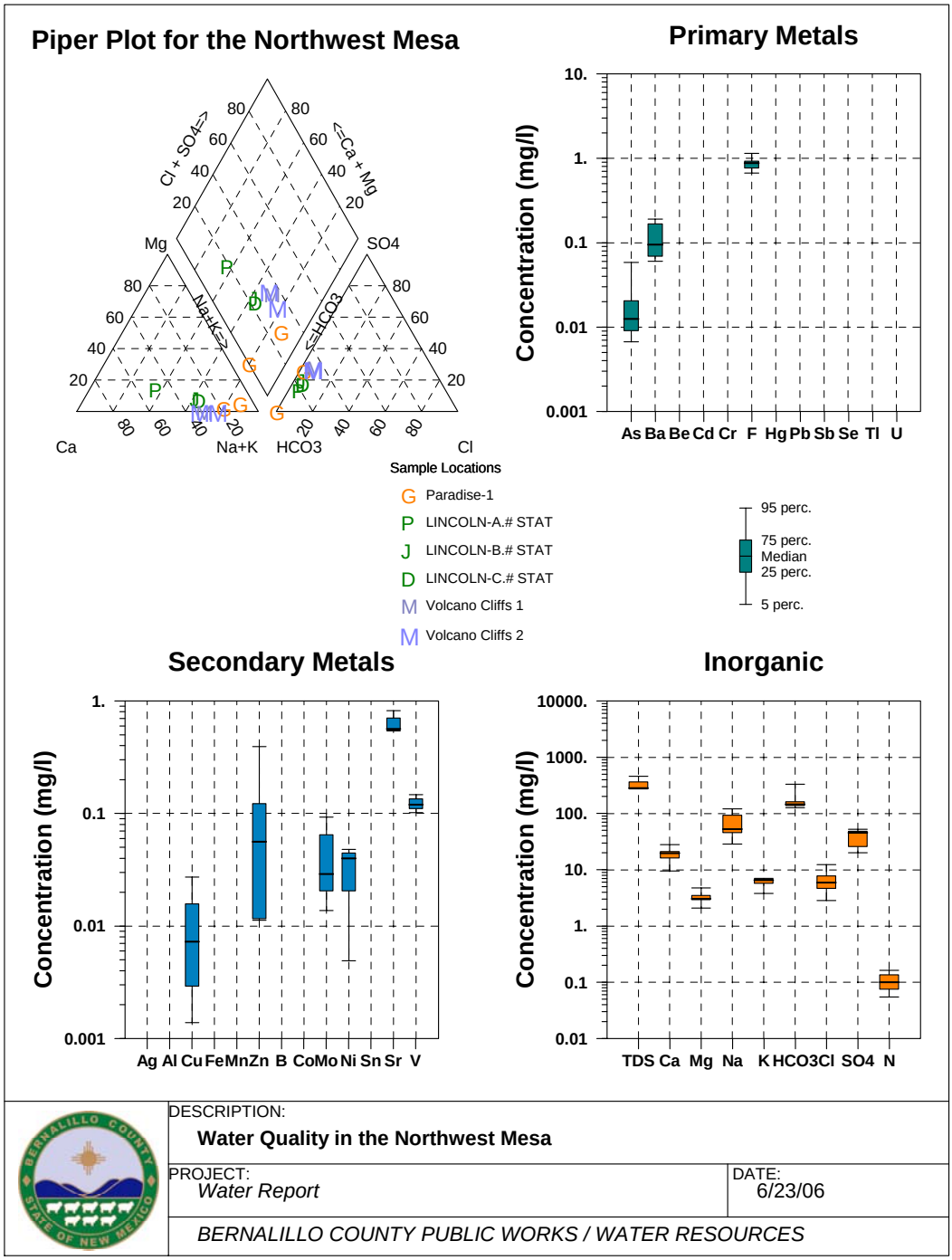


Figure 3.64 Water Quality in the Northwest Mesa

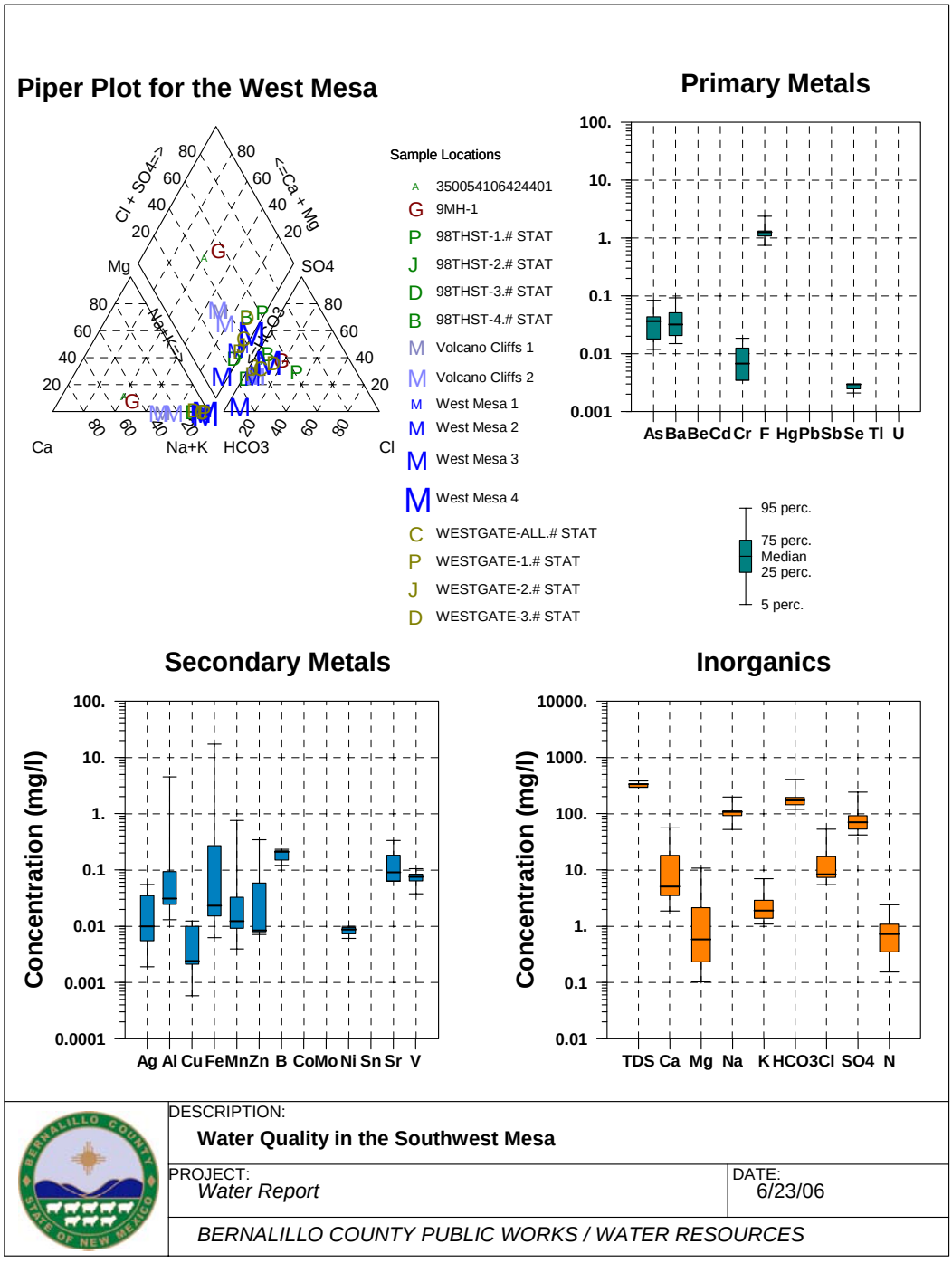


Figure 3.65 Water Quality in the West Mesa

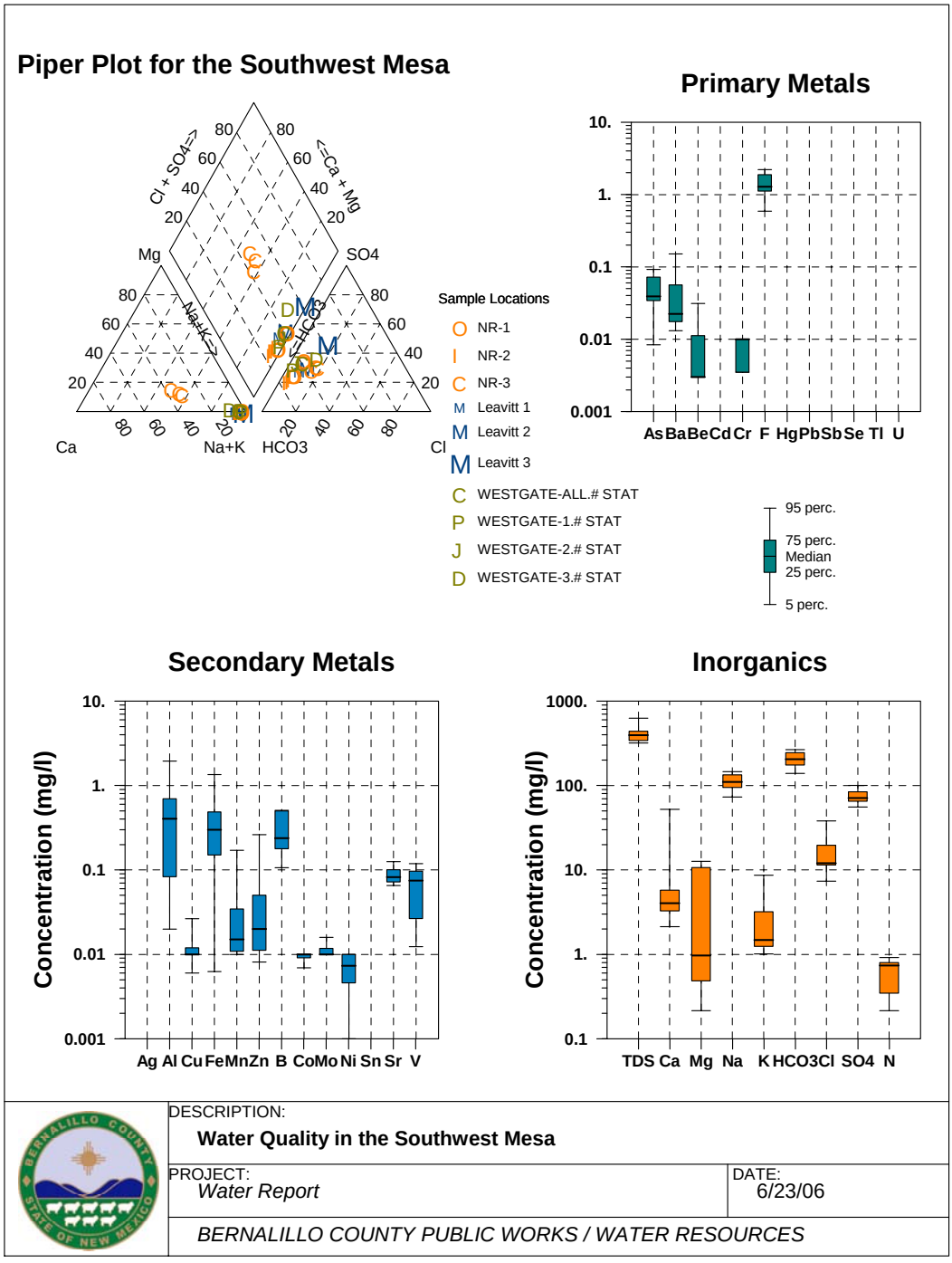


Figure 3.66 Water Quality in the Southwest Mesa

Table 3.13 provides a summary of the drinking water standards by each of the three West Mesa subareas. The table indicates the respective standard, the number of samples used for the analysis, the percent of those samples exceeding the standard, and the maximum and mean values used in the summation. The available data for the Westgate Heights piezometers was included in the summaries for both the West Mesa and Southwest Mesa because they are located on the boundary between the two areas. This results in a slight upward bias (about 10 percent) in the stated number of samples exceeding the arsenic standard for the Southwest Mesa.

Table 3.13 Exceedances of EPA Drinking Water Standards – West Mesa

Parameter	Primary Standard	Secondary Standard	Total Number of Samples	Percent of Samples Exceeding Standard	Maximum Concentration (mg/L)	Mean Concentration (mg/L)
Northwest Mesa						
Arsenic	0.010		6	35	0.07	0.02
Aluminum		0.05	6	35	9.2	2.9
Iron		0.3	6	35	8.6	2.7
Manganese		0.5	6	35	0.17	0.04
West Mesa						
Arsenic	0.010		42	96	0.11	0.03
Total Dissolved Solids		500	32	28	1069	474
Aluminum		0.05	36	23	5	0.037
Iron		0.3	34	8	24	1.3
Manganese		0.5	34	8	1.5	0.06
Southwest Mesa						
Arsenic	0.010		22	55	0.11	0.029
Total Dissolved Solids		500	20	10	650	407
Aluminum		0.05	20	30	2	0.38
Iron		0.3	6	30	1.5	0.25
Manganese		0.5	6	10	0.18	0.025

The presence of arsenic in the West Mesa area has resulted in the ABCWUA's intentional shifting of pumping away from the western well fields with the intent of achieving compliance with drinking water standards. With regard to other secondary and trace metals, concentrations for strontium and vanadium from Northwest Mesa samples are, at times, elevated compared to other groundwater in the Albuquerque area. Strontium is sometimes detected at low concentrations in samples from the Southwest Mesa as well. There are no drinking water standards for strontium or vanadium. The presence of these elements is expected as the geologic source materials yielding elevated arsenic concentrations are also a likely source of other trace metals.

1.9.2 *Paradise Road Well*

The Paradise Road well was drilled in 2001 to assess aquifer conditions on the West Mesa near the Double Eagle 2 Airport and to collect deep aquifer water quality, specifically arsenic concentrations. The well is located within the eastern boundary of the City of Albuquerque's Soil Amendment Facility, north of Double Eagle 2 Airport and west of Paseo Del Vulcan (see Figure 3.53). As shown in Table 3.14, the total well depth is 1,742 feet and depth to water is approximately 900 ft. Samples from this well are taken from a depth of approximately 900 feet due to limitations of available pumping equipment. A well construction diagram is provided as Figure 3.67.

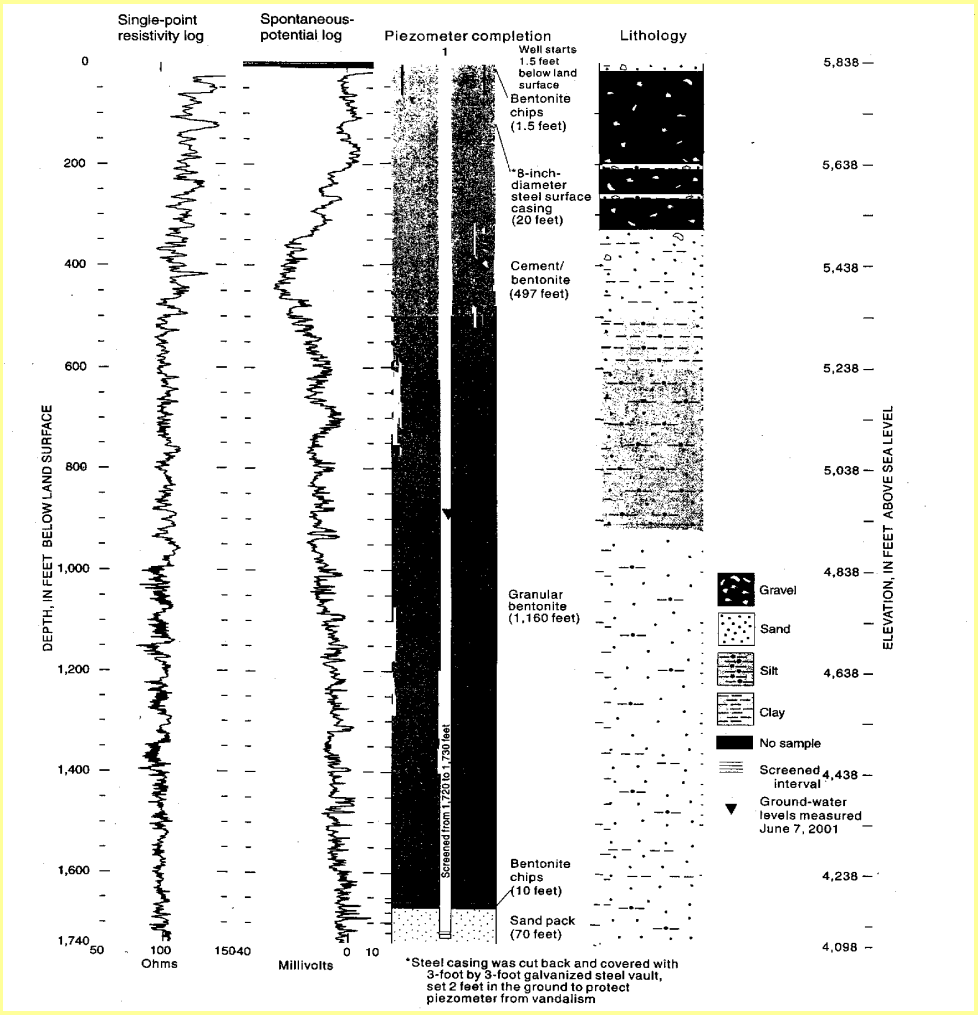
Surface deposits at the well location are mapped as eolian deposits, while the well is completed in the upper portions of the underlying Santa Fe Group Aquifer. The geologic setting is shown in Figure 3.68

1.9.2.1 Water Levels in the Paradise Road Well

Water Levels in the Paradise Road are routinely hand measured by the USGS, and a hydrograph taken from the USGS website (USGS Ground water for New Mexico: Water Levels) is provided in Figure 3.69. The data are a combination of the USGS recorded data and hand measurements collected by Bernalillo County as part of the annual sampling effort. The plot indicates that water levels have declined approximately 1 to 2 feet since monitoring was initiated in 2001.

Table 3.14 Bernalillo County Regional Monitoring Well Network – Paradise Road Well

Well	Well Type	Well / Hole Depth (ft)	Screen Settings (ft)
Paradise Boulevard (Paradise Road)	Single	1,742	1,720 – 1,730



(Taken from USGS OFR 03-290, Figure 23O)

Figure 3.67 Paradise Road Well Construction Log

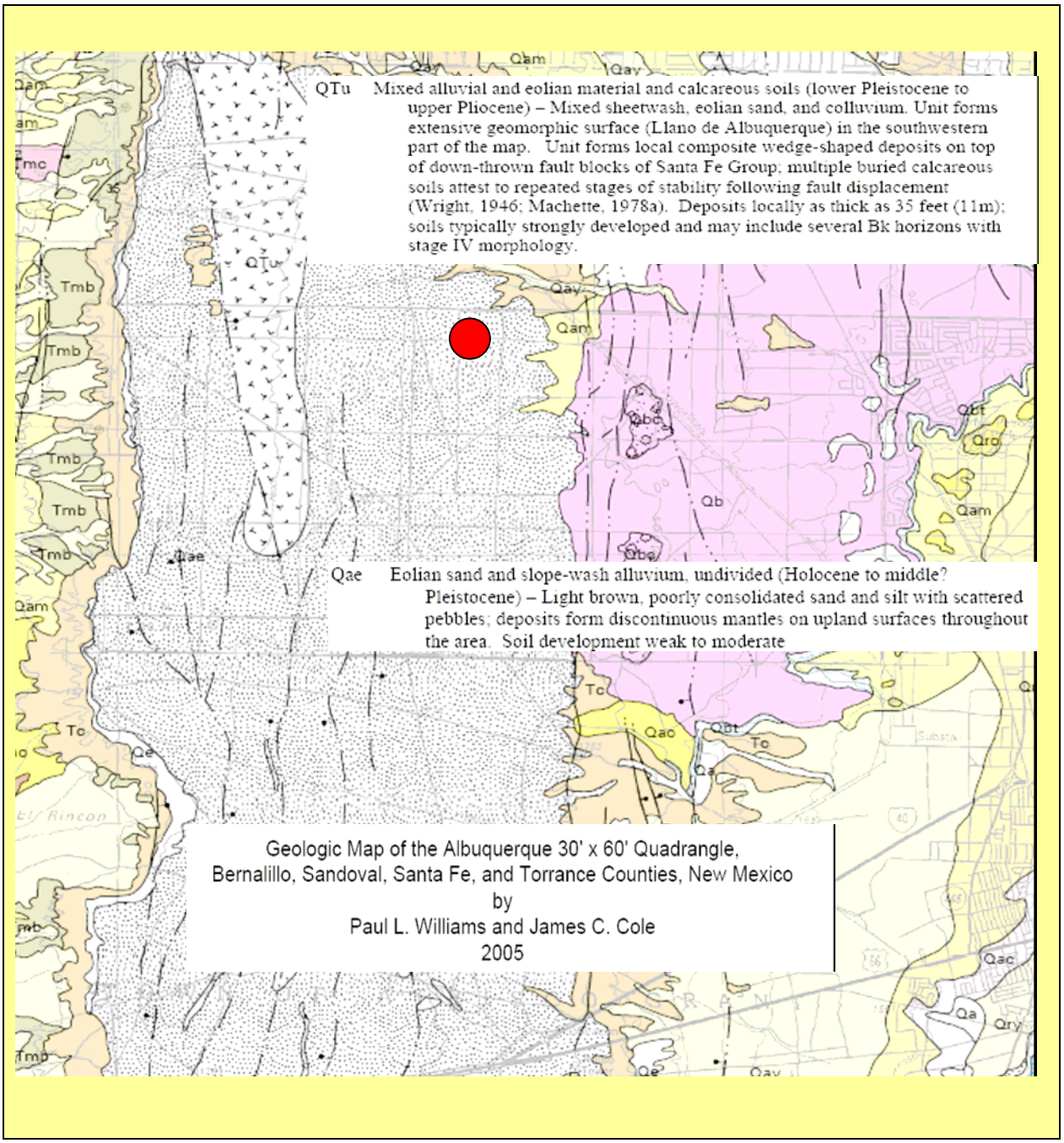
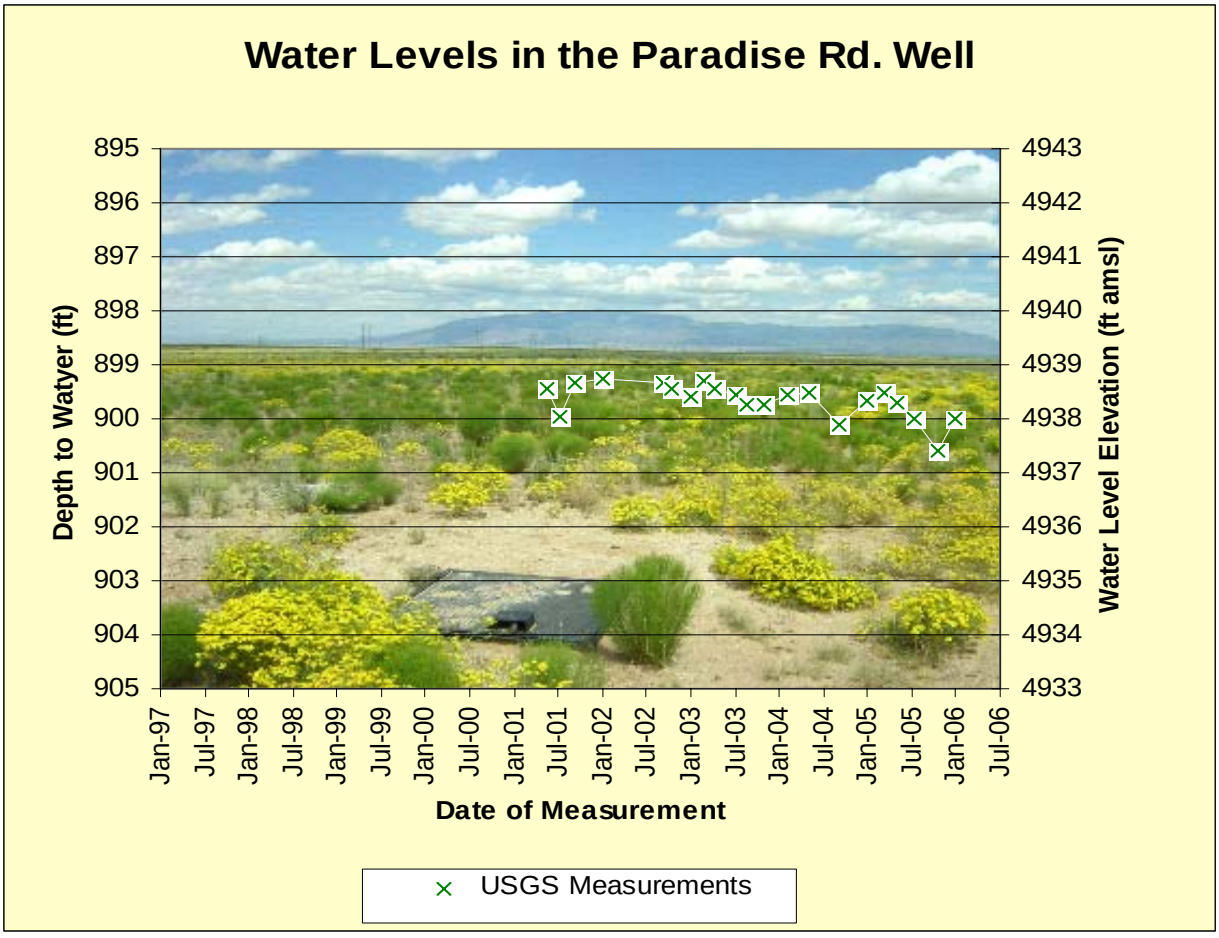


Figure 3.68 Geologic Setting of the Paradise Road Monitoring Well



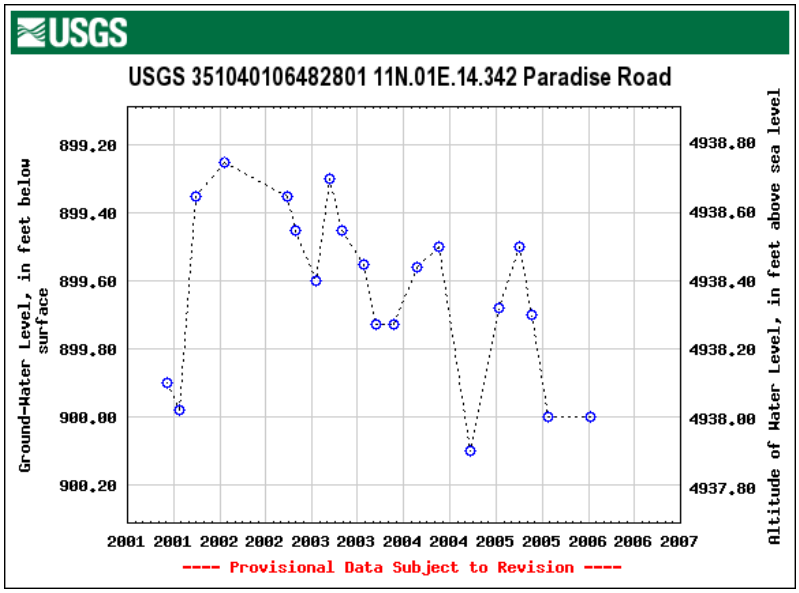


Figure 3.69 Water Levels in the Paradise Road Well

The water level decline shown in Figure 3.69 is likely due primarily to naturally occurring decline due to drought conditions, as there is no nearby municipal pumping in the area. The record low water level (900.59 feet below ground surface) was recorded by Bernalillo County in October 2005. A subsequent USGS measurement data in early 2006 indicates a one-half foot rise back to 900.00 feet.

1.9.2.2 Water Quality in the Paradise Road Well

Figure 3.70 provides a time series plot for the inorganic parameters measured in samples from the Paradise Road well. Only three samples have been collected in the well since its installation in 2001, so observed trends cannot be shown to be statistically significant.

The available data suggests that total dissolved solids concentrations have decreased significantly, with the primary decrease occurring in the bicarbonate concentrations and some minor decrease in sodium and chloride. There has been a minor increase in sulfate concentrations. Whether the changes are temporal or an artifact of increased well purging and use is unknown at this time.

The pie plot shown in the figure is for the latest collected from the well in the fall of 2005. The composition of the sample is typical of deeper portions of the aquifer under the West Mesa, with composition dominated by sodium and bicarbonate and with sulfate typically in slightly greater predominance than chloride.

Analyses have indicated that the arsenic concentration (0.037 to 0.030 mg/L) is in excess of the primary drinking water standard (0.1 mg/L). Additionally, chromium (0.770 mg/L) and beryllium (0.50 mg/L) are in excess of their respective standards (0.1 and 0.004 mg/L). The presence of elevated trace metals is consistent with the volcanic origins of the sediments comprising the Santa Fe Group aquifer.

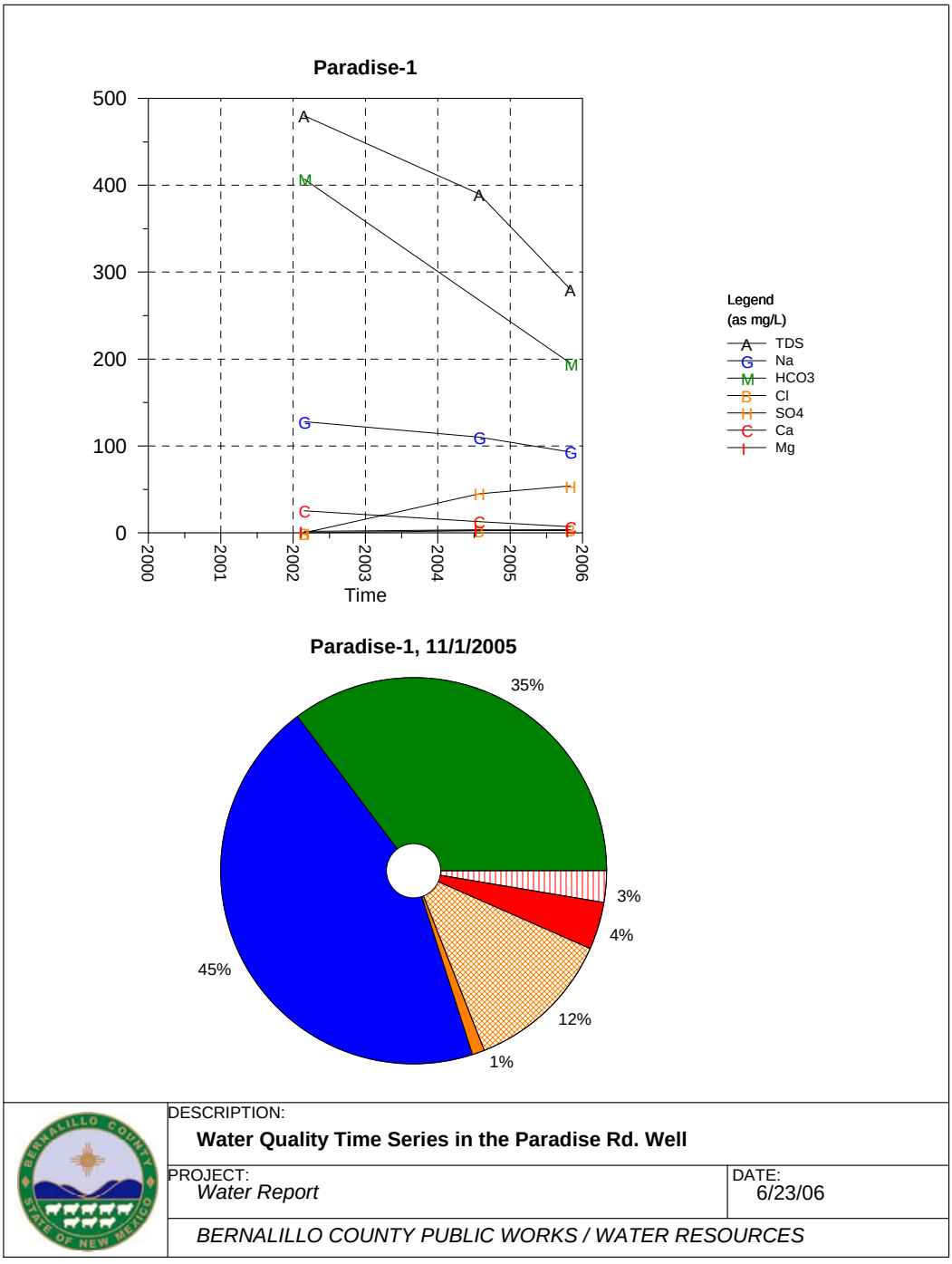


Figure 3.70 Time Series Plot for the Paradise Road Well

Aluminum concentrations have ranged from non-detect to as great as 9.2 mg/L, which exceeds the secondary standard of 0.2 mg/L. Likewise, iron concentrations reported as 8.6 mg/l exceed the secondary standard for iron (0.3 mg/L) by an order of magnitude, and manganese concentrations (0.17 to 0.92 mg/L) exceed the standard of 0.05 mg/L. Part of the exceedance may be a difference in filtering and acidification of the samples.

No organic compounds have been detected in concentrations in excess of drinking water standards in the Paradise Road Well. Given its remote location, no organic contamination is suspected, as there are no known or suspected sources for those types of contaminants. In the initial sample in 2002, phthalate compounds were detected at low concentrations and are attributed to laboratory contamination. Likewise, the 2002 sample was reported as containing a methylphenolic compound at a concentration two times the detection limit. There has been no repeat occurrence of this compound in subsequent samples. Laboratory contamination of the sample is suspected, though the reported compound is not typically identified as such.

1.9.3 *9 Mile Hill Well 1*

The 9-Mile Hill Landfill well was drilled in 2003 to collect water quality data to determine if the closed landfill has had an adverse affect on ground-water quality and to provide for on-going water quality monitoring in accord with the GPPAP goals and objectives. The well is located east of the I-40 / Paseo del Volcan interchanges (see Figure 3.53). The well was drilled to the top of the uppermost water-bearing zone and, as shown in Table 3.15, was completed to a depth of 750 feet. Figure 3.71 provides a well construction diagram and previously unpublished driller's log for the well.

Figure 3.72 provides the surface geology map and the location of other nearby monitoring and ABCWUA production well. The monitoring well is completed in the Santa Fe Group aquifer, a sedimentary aquifer similar to the aquifer found in the Middle Rio Grande, but much older in age and much finer grained. The sedimentary aquifer contains sediment originating from the Jemez area and Valles Caldera, an origin with higher arsenic- and trace metal- bearing rocks.

Table 3.15 Bernalillo County Regional Monitoring Well Network – 9 Mile Hill Well

Well	Well Type	Well / Hole Depth (ft)	Screen Settings (ft)
9-Mile Hill (9MH)	Single	750	710-740

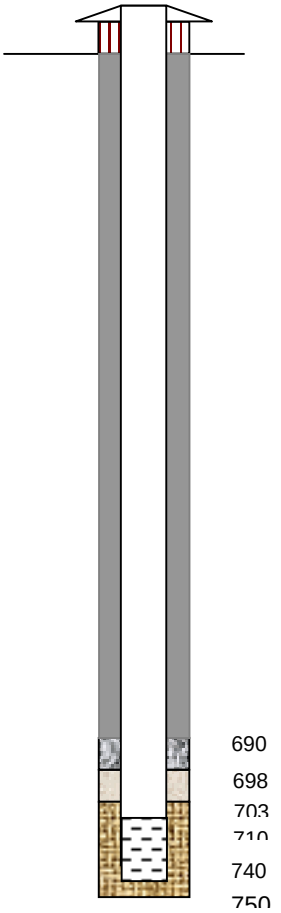
ERROR! BOOKMARK NOT DEFINI 	Materials and Dimensions Flush mount completion with 3ft pad 8-inch diameter surface casing to 20 ft. 8-inch diameter borehole 4-inch diameter Sch 40 PVC casing Cement Grout Bentonite Pellet Seal 20/40 Fine Sand Seal 10/20 Gravel Pack 4-inch diameter Sch 80 PVC 0.20 slotted screen	Drillers Log 0 -1 Top sand 1 - 14 Concrete, asphalt, steel bands 14 - 16 Sandy clay 16 – 25 Trash 25-27 Coarse Sand with small gravel and trash 27-124 Medium to small gravels with coarse sand 124 – 174 Silty tan clay with medium sand 174-191 Medium to coarse sand 191-222 Medium to coarse sand with small gravels 222-243 Medium to coarse sand 243-260 Medium to coarse sand with silty tan clay 260-283 Medium to coarse sand with small gravel 283-365 Medium sand 365-383 Medium to coarse sand with small gravels 383-750 Light brown clay with silty, fine sand layers

Figure 3.71 9 Mile Hill Well Construction and Driller's Log

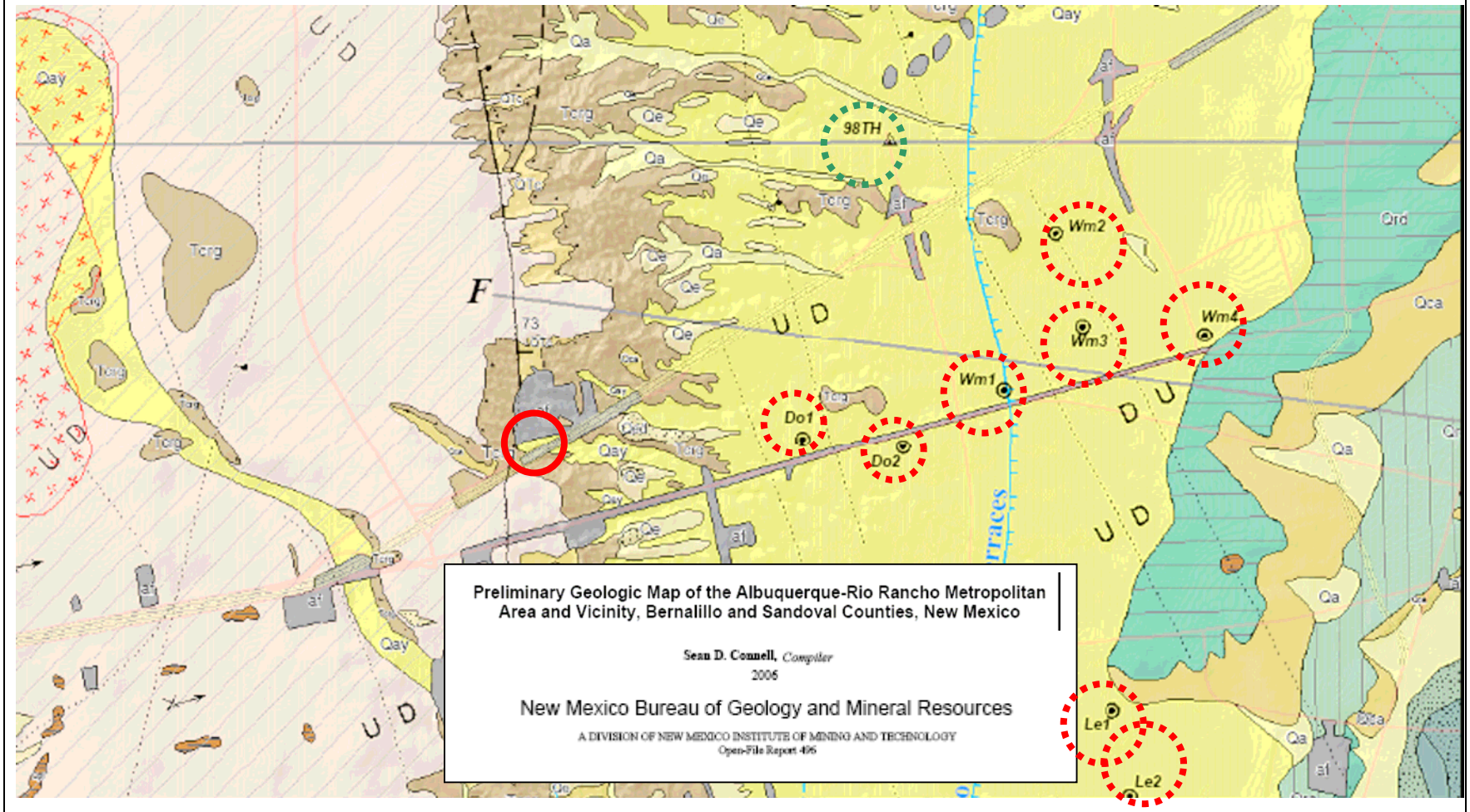


Figure 3.72 9-Mile Hill Monitoring Well Location and Nearby Well Fields

The well is located just east and on the downthrown side of a deep fault structures (e.g., the County Dump Fault) The deep fault structures have the ability of transmitting deeper water with higher arsenic and trace metal concentrations, and increases the probability for detected increased arsenic and trace metal concentrations.

1.9.3.1 Water Levels in the 9 Mile Hill Well

Due to the location of the 98th Street nested piezometer to the east, and its closer proximity to the ABCWUA well fields, water levels have not been measured at consistent intervals, and only four hand measurements have been taken in the well as shown in Figure 3.73. No field documentation for the initial measurements was available, whereas the last three measurements have been measured by the author and are known to be reliable.

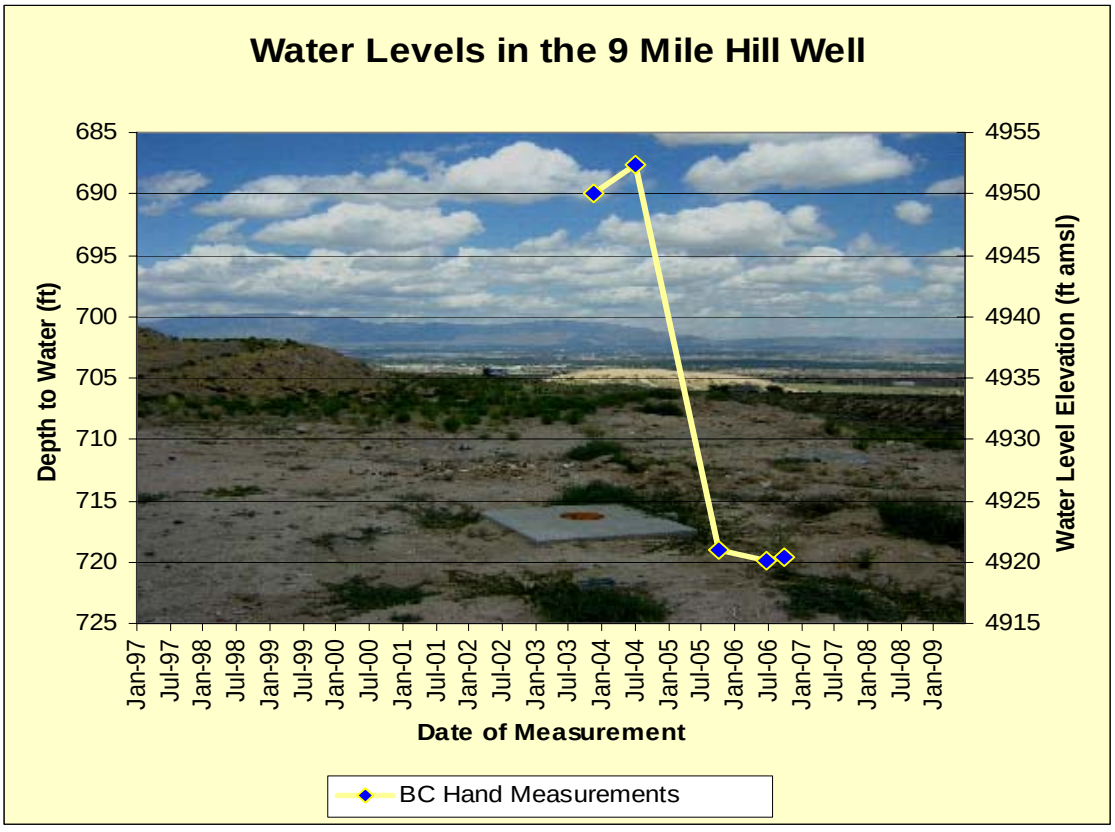


Figure 3.73 Water Levels in the 9 Mile Hill Well

The available data suggest a significant drop in water levels (over 30 feet) in a little over one year's time. Given that no such declines are seen in the 98th Street piezometer nest or in the well fields, the accuracy of the measurements is in question. Additional measurements confirm that a depth to water of approximately 719 feet is correct. With the destruction of the 98th Street nest, increased monitoring of this well is justified. The USGS does not currently monitor water levels at this location.

1.9.3.2 Water Quality in the 9 Mile Hill Well

Installation and monitoring of this well is consistent with the GPPAP implementation adopted by Bernalillo County. The analyses list for the initial sample collected in 2004 included volatile organic compounds, semi-volatile organic compounds, major anions and cations, metals and total dissolved solids. These analyses are consistent with the water quality monitoring requirements set forth by the New Mexico Environment Department Solid Waste Bureau for other landfill facilities. An additional sample was collected in 2005 and on-going annual monitoring of this site is planned.

Figure 3.74 provides a plot of the primary inorganic constituents, none of which appears to be elevated above naturally occurring concentrations. The distribution of anions and cations as shown in the pie plot are typical of groundwater found in the upper saturated portion of the Santa Fe Group aquifer on the West Mesa and is similar to that shown for the shallowest of the Niese Road. piezometers, as will be discussed below.

No primary drinking water standards have been exceeded. The 2004 water quality sample was analyzed specifically for arsenic and the reported arsenic concentration was 0.004 ug/L, substantially less than the arsenic concentrations for the region and less than half of the primary drinking water standard of 0.01 ug/L. Aluminum concentrations appear elevated, with reported concentrations of 3.8 and 5.0 mg/L. Likewise, iron (8.7 to 24.0 mg/L) and manganese (0.068 to 1.5 mg/L) are elevated and all three metals are above their respective secondary drinking water standards. Again, documentation is inadequate to show whether this is due to acidification of samples without prior filtering or whether these are naturally occurring dissolved concentrations.

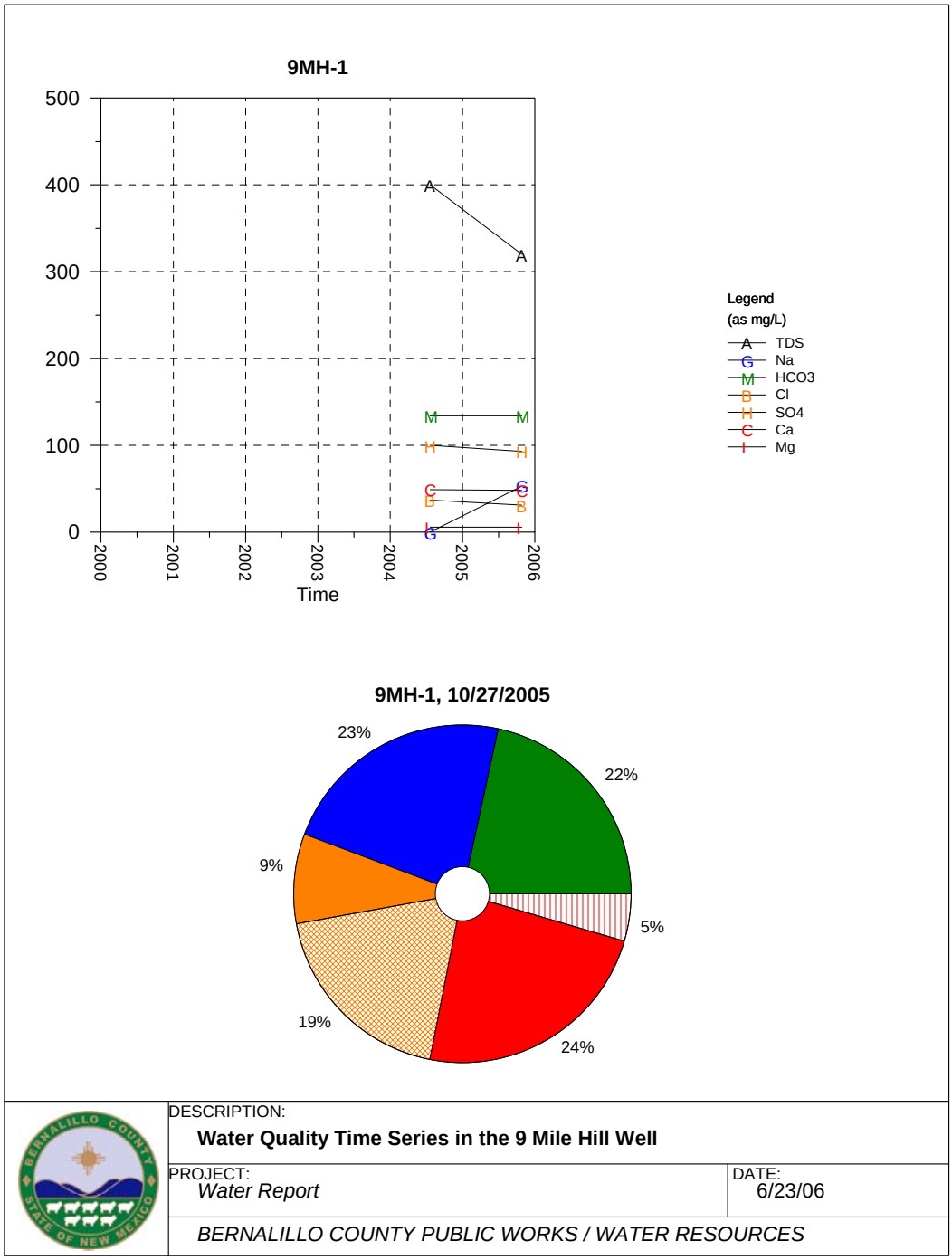


Figure 3.74 Water Quality in the 9 Mile Hill Well

No organic compounds have been detected in the samples, with the exception of benzoic acid. Reported concentrations were 0.59 mg/L in the 2004 sample only, with a detection limit of 0.50 mg/L. This detection is thought to be due to laboratory contamination, though it is not a common laboratory-induced contaminant.

1.9.4 *Niese Road Nested Piezometer*

The Niese Road nested piezometer was drilled in 1999 in cooperation with the City of Albuquerque and the USGS to access water quality from various depths in the aquifer and to assess water quality at various depths west of the South Valley floor. The piezometer is located downgradient, although in excess of one mile to the east, of the Southwest Landfill (see Figure 3.53). Piezometers are screened at depths of 297 ft., 960 ft., and 1,455 ft, as indicated on Table 3.16 and in Figure 3.75

Figure 3.76 shows the geologic setting. The wells are completed at various depths within the Santa Fe Group aquifer. There are no nearby municipal wells, although residences to the east and southeast of the location are supplied by wells pumping from the same aquifer zones. Permits for a community supply well in this general area are in progress.

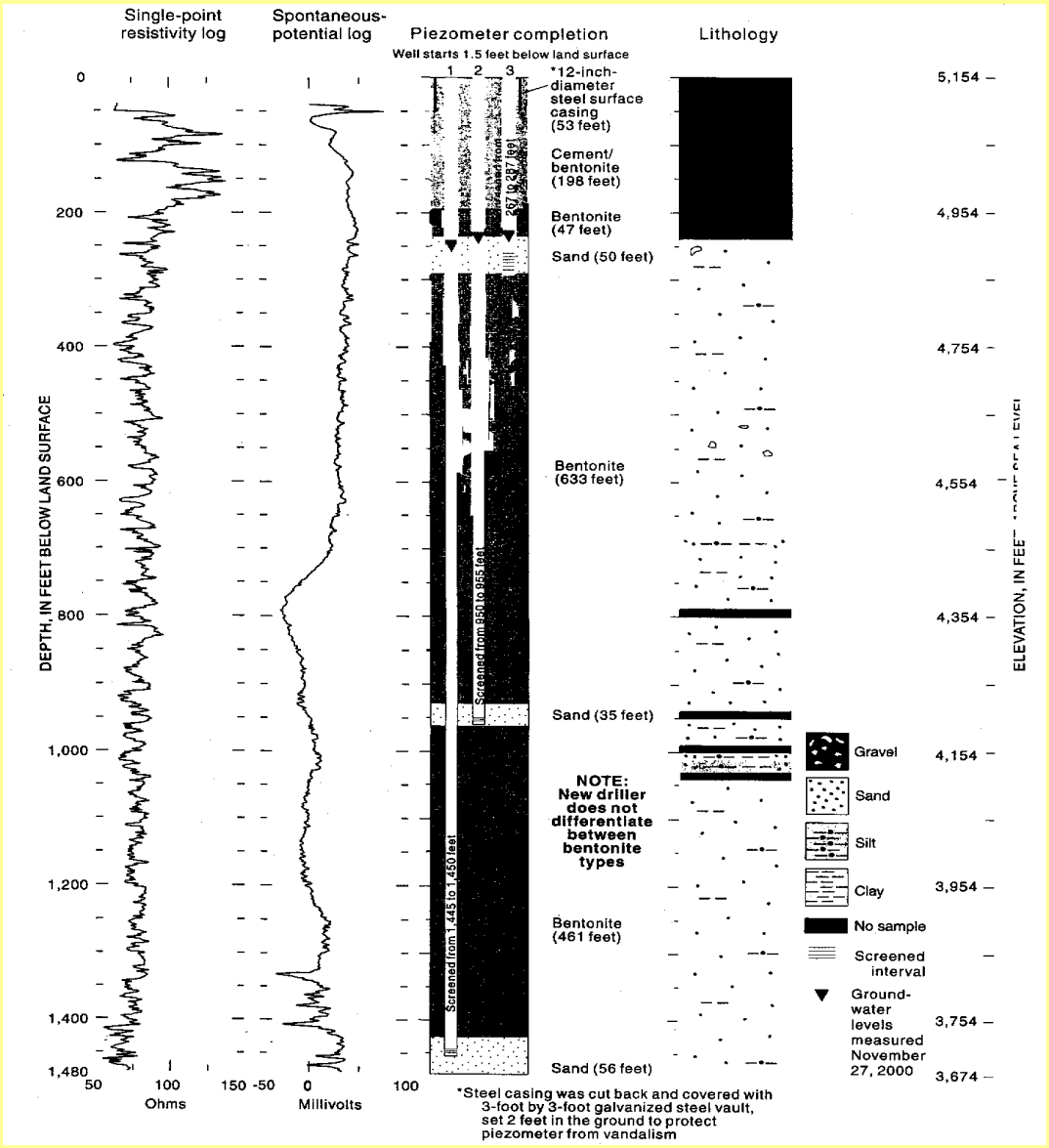
1.9.4.1 Water Levels in the Niese Road Monitoring Well

The USGS provides continuous water levels monitoring in the three Niese Road piezometers using a pressure transducer and data recorder. Hand measurements are taken periodically by the USGS and at least annually by Bernalillo County as part of the regional monitoring program. Figure 3.77 provides a plot of water level data collected from the three Niese Rd piezometers. The measurements are primarily taken from the USGS collected data set. The last measurement shown is a hand measurement collected by Bernalillo County in late 2005.

The depth to water is significantly less than in the Paradise Rd. and 9 Mile Hill wells, primarily due to location. The hydrographs indicate that there has been only minimal change in the shallow and intermediate piezometer water levels since monitoring began in 2000. The water levels indicate that there is a net downward gradient that has remained consistent over the six-year monitoring period. Water levels in the deepest piezometer have increased 2 to 3 feet during that period, indicating likely recharge from the surface to deeper portions of the aquifer.

Table 3.16 Bernalillo County Regional Monitoring Well Network – Niese Road

Well	Well Type	Well / Hole Depth (ft)	Screen Settings (ft)
Niese Road	Nested	1,480	
(NR1)	Deep	1,480	1,450-1,455
(NR2)	Middle	1,480	950-955
(NR3)	Shallow	1,480	247-287



(Taken from USGS OFR 03-290, Figure 23N)

Figure 3.75 Niese Road Nested Piezometer Well Construction and Driller's Log

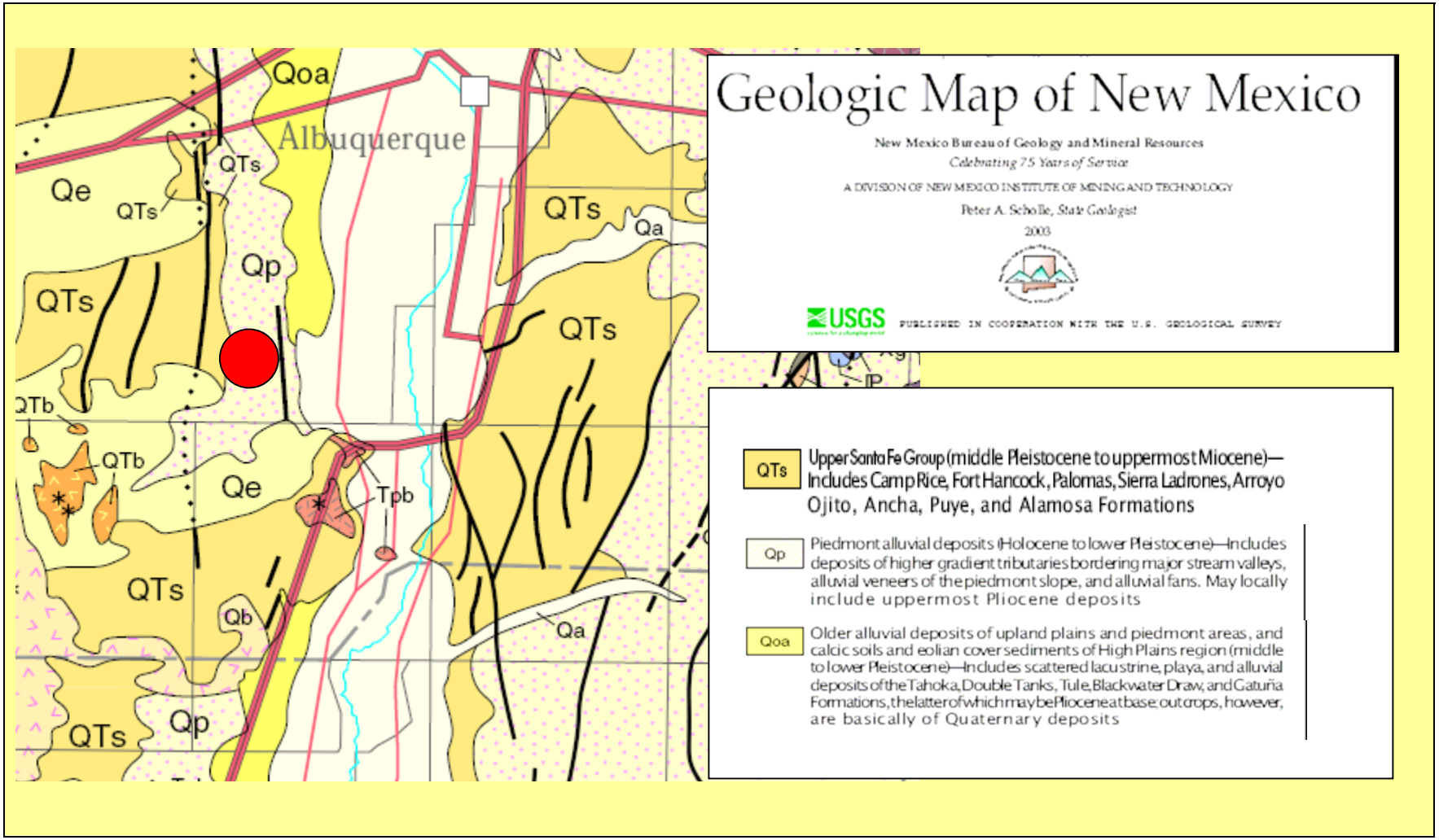


Figure 3.76 Geologic Setting and Well Construction of the Niese Road Nested Piezometer

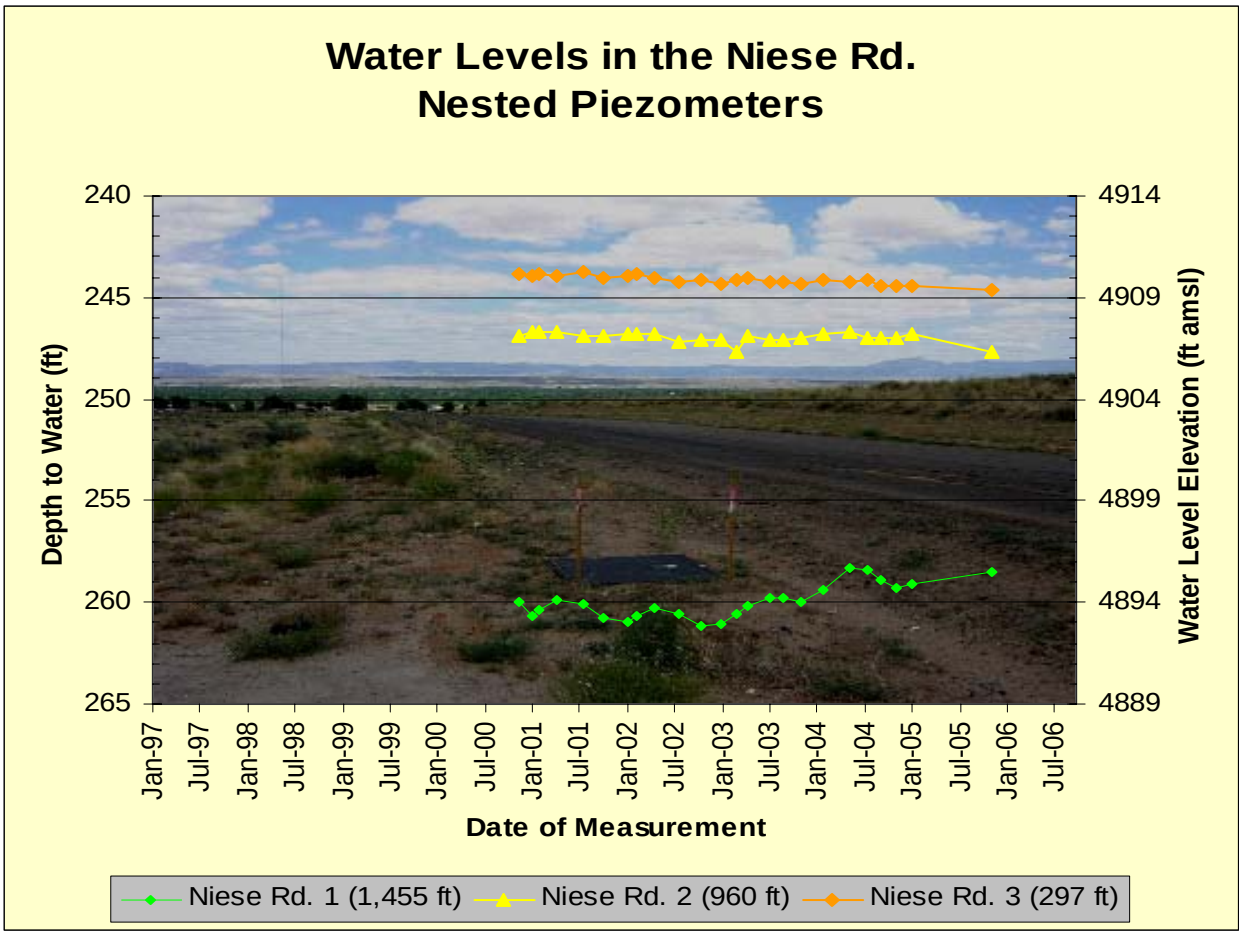


Figure 3.77 Water Levels in the Niese Road Nested Piezometer

1.9.4.2 Water Quality in the Niese Road Piezometers

Figure 3.78 provides a time series plot for inorganic constituents for each of the piezometers as well as pie charts showing the relative predominance of anions and cations. The pie charts show a change in composition with depth. The composition of the sample from the shallow piezometer (NR-3) is similar to that demonstrated by the 9 Mile Hill Well with approximately equal predominance of sodium and calcium and bicarbonate and sulfate. With depth, the water becomes primarily sodium bicarbonate or sodium sulfate in composition. Calcium is reduced with respect to sodium.

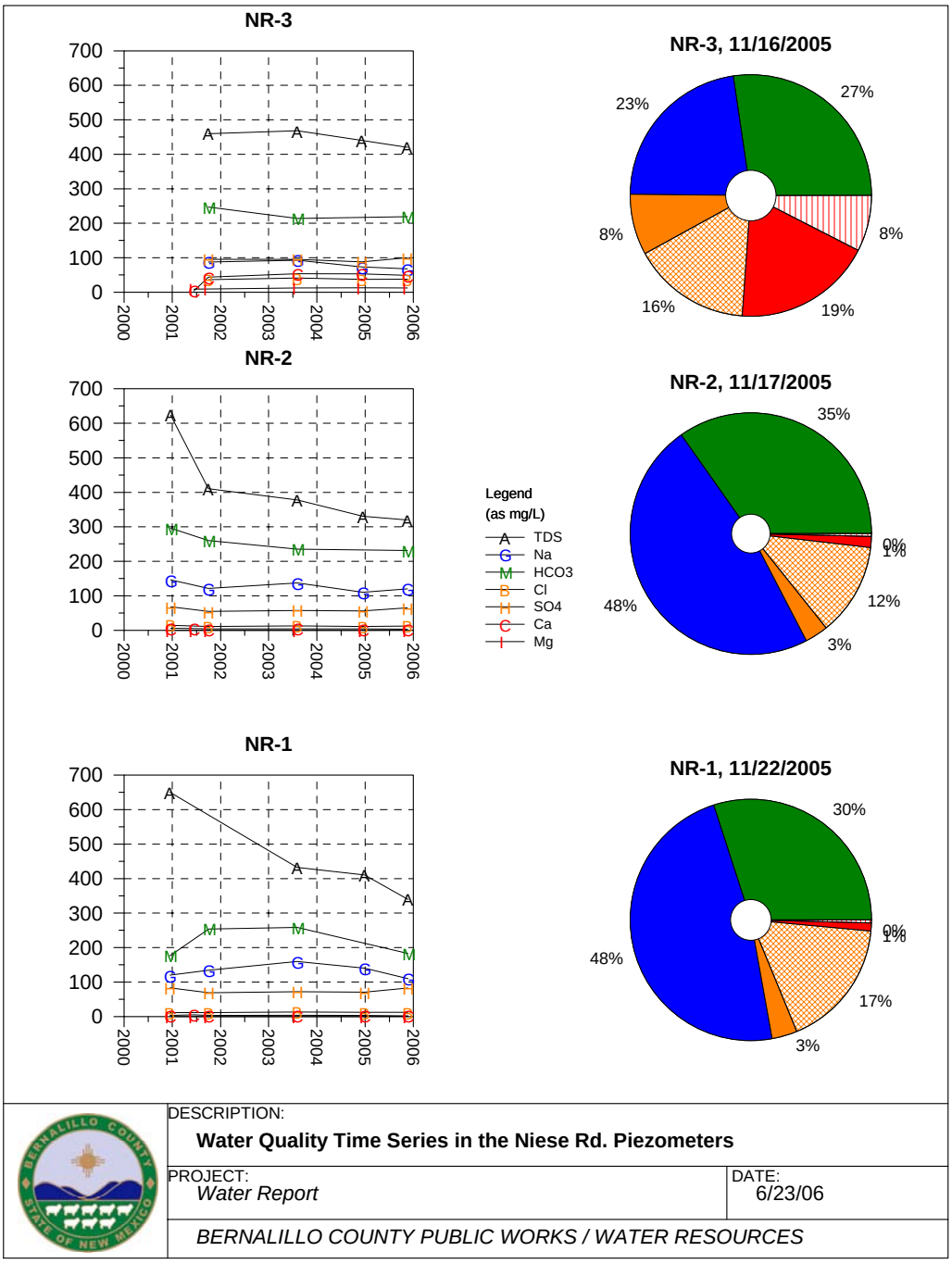


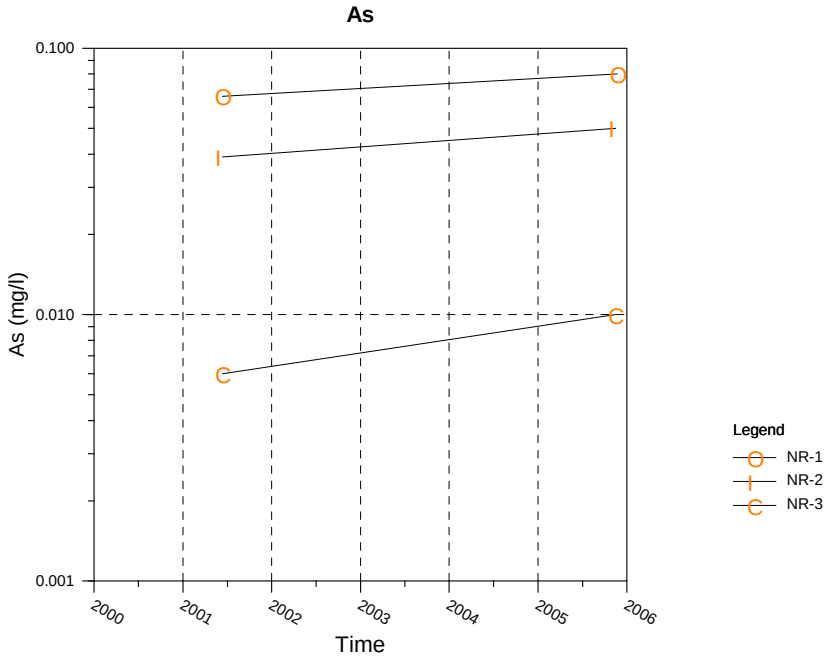
Figure 3.78 Time Series Plots for the Niese Road Nested Piezometer

Arsenic concentrations have been in excess of the primary drinking water standard of 0.10 mg/L in the deep and intermediate well. The reported concentrations are shown in Figure 3.79 for each of the three piezometers There is one instance in the 2000 sample for NR-1 wherein the beryllium concentration (0.036 mg/L) exceeded the primary drinking water standard.

No significant trends in the inorganic data are apparent aside from a minor decrease in total dissolved solids concentrations with time. The decrease in total dissolved solids appears to be due to a general decrease in constituent concentrations. The decrease may be due to repeated sampling of the well through time, with inherent improvement in the representativeness of the collected sample.

Similar to the other West Mesa wells, aluminum, iron, and manganese may at times exceed their respective standards as well. However, the reported concentrations for these three metals are less than 2 mg/L in all instances, which is substantially lower than for the Paradise Rd and 9 Mile Hill wells.

No organic compounds have been detected in the Niese Road wells in excess of drinking water standards, and in most cases have been reported as "not detected". There have been several instances of detection of low concentrations of phthalate compounds and methyl ethyl ketone – these are commonly detected laboratory contaminants. Low concentration, one-time detections of other components have occurred: 1,2,4-Trimethylbenzene in Niese Road 1 at 0.4 ug/L and 1,4-Dioxane in Niese Road 2 at 42 ug/L. The source of these compounds in the samples is not known, but their presence is not a reoccurring phenomenon.



DESCRIPTION:
Arsenic Time Series in the Niese Rd. Piezometers

PROJECT: *Water Report*

DATE: 6/23/06

BERNALILLO COUNTY PUBLIC WORKS / WATER RESOURCES

Figure 3.79 Arsenic Concentrations in the Niese Road Piezometer