GRANTS RECLAMATION PROJECT

2003 ANNUAL MONITORING REPORT / PERFORMANCE REVIEW FOR HOMESTAKE'S GRANTS PROJECT PURSUANT TO NRC LICENSE SUA-1471 AND DISCHARGE PLAN DP-200

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FOR
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FOR:

U.S. NUCLEAR REGULATORY COMMISSION
AND
NEW MEXICO ENVIRONMENT DEPARTMENT

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GROUND WATER MONITORING
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1.0 EXECUTIVE SUMMARY AND INTRODUCTION

1.1 EXECUTIVE SUMMARY

Homestake Mining Company manages a ground water restoration program as defined by Nuclear Regulatory Commission (NRC) License SUA-1471, and New Mexico Environment Department (NMED), DP-200 permit. The current operating program is a dynamic on-going strategy based on a restoration plan, which began in 1977, and is scheduled to be completed in 2011.

Homestake's long-term goal is to restore the ground water aquifer to levels as close as practicable to the up-gradient background levels. A ground water collection area (see shaded area on Figure 2.1-1, Page 2.1-10) has been established and is bounded by a down-gradient perimeter of injection wells. Alluvial ground water that flows beneath the tailings enters this collection area. All ground water in the alluvial aquifer that is within the collection area is eventually captured by the collection well system. Once ground water quality restoration within the zone is complete and approved by the agencies, the site is to be transferred to the U.S. Department of Energy, which will have the responsibility for long-term care and maintenance.

The data reported within this document represent the results of the monitoring program during 2003. This is a yearly reporting requirement. A similar report has been submitted to the agencies each year since 1983 (see list in Section 1.2).

The restoration program is designed to remove target contaminants from the ground water by flushing the alluvial aquifer with deep-well supplied fresh water or water produced from the reverse osmosis (R.O.) plant. A series of collection wells is used to collect the contaminated water, which is pumped to the R.O. plant for treatment or delivered to the evaporation ponds.

Historically, the contaminants are found in two different aquifer systems. The aquifer system of primary concern is the alluvial system, which averages approximately 100 feet in depth, and extends generally north to south encompassing both the Lobo Creek and San Mateo alluvial aquifers. In addition, a second aquifer system is found within the Chinle formation. It is comprised of three separate aquifers, the Upper, Middle and Lower Chinle aquifers. Hydro-Engineering 2003b should be reviewed for details of the geologic setting and aquifer conditions on the site. The Upper and Middle Chinle aquifers subcrop to the alluvial system near the project site. Slight to moderately elevated concentrations of constituents of concern have been observed in the Upper, Middle and Lower Chinle aquifers near their subcrops with the overlying alluvial system.

The restoration program, as described above, is made up of injection and collection well systems. R.O. product water, or fresh water pumped from deep wells, is injected in a series of wells to form a continuous line across the site. The injection line forms a hydraulic barrier that results in containment of the contaminants within the collection area. The contaminated ground water is pumped and collected from a series of wells within the collection area. The collected aquifer water is pumped to the R.O. plant or to two large lined evaporation ponds for passive and forced (spray) evaporation.

In the years from 1977 to the present, the combination of injection wells and the up-gradient collection system has gradually drawn the contaminated ground water plume up-gradient of the current hydraulic barrier leaving the restored portions of the aquifer with ground water concentrations at or below background levels.

An average of 431 gallons per minute (gpm) was pumped into the alluvial fresh-water injection systems in 2003. An additional 170 gpm of fresh water was injected into the Upper and Middle Chinle aquifer systems. An average rate of 266 gpm of R.O. product water was injected into the alluvial aquifer in 2003, in addition to the fresh-water injection program. Production of significant quantities of R.O. product water started in July of 1999 with consistent operation during 2000 through 2003 except during equipment repair periods.

In 2003, the average collection rate for the alluvial aquifer was maintained at 338 gpm. An additional 40 gpm was pumped from the alluvial aquifer and re-injected within the collection area. The Upper Chinle aquifer collection program consisted of pumping well CE2 an average of 31 gpm in 2003. The up-gradient alluvial aquifer collection system averaged 80 gpm in 2003, while average rates of 54 and 17 gpm were pumped from the Large Tailings pile toe drains and in situ tailings pile dewatering, respectively.

The continuing evaluation of the performance of the Grants restoration system, including the 2003 results, shows that sulfate, TDS, chloride, uranium, selenium and molybdenum are still the key constituents of interest at this site. Successful restoration of ground water quality with respect to these key constituents will also accomplish restoration for other constituents. The monitoring program has shown that any low levels of nitrate, radium-226, radium-228, vanadium and thorium-230 are also reduced when the key parameters are restored in the area.

The only area where sulfate, TDS and chloride concentrations exceed the alluvial background concentrations is in close proximity to the Large and Small Tailings piles in the Grants Project area.

Uranium concentrations exceed the alluvial background level of 0.15 mg/l within the collection area near the tailings. There are also seven wells in Felice Acres and one well in Murray Acres subdivision that contain concentrations of uranium exceeding background levels. Ground water withdrawal for irrigation is being used to further reduce uranium levels that exceed background levels in a small area southwest of Felice Acres in Section 3 and in the western half of Section 27 and Section 28.

Selenium concentrations also exceed background levels in the collection area near the Large Tailings pile and three small areas of Section 3. None of the subdivision wells contained selenium concentrations above background.

Molybdenum concentrations slightly above the background level of 0.05 mg/l are present in three subdivision wells in central Felice Acres. All remaining elevated molybdenum concentrations are near the Large and Small Tailings piles. Migration of this constituent has been limited due to natural retardation within the alluvial aquifer.

Up-gradient background concentrations of nitrate ranged up to 16.6 mg/l in 2003, which illustrates that significant natural levels are present up-gradient of the site. An area to the northwest of the Large Tailings pile contains higher nitrate concentrations than overall background levels, but these levels are likely natural given their location. Nitrate concentrations beyond the immediate Homestake Grants Project area are not at levels of concern. This constituent has been adequately remediated through completed restoration program efforts to date.

All radium activities in the alluvial aquifer outside of the tailings perimeter were less than the NRC site standard except for one value of 5.2 pCi/l on the east side of the Small Tailings pile. All other measured radium levels in a cluster of 5 wells in this area were less than 5 pCi/l. This demonstrates that radium is no longer a constituent of concern.

Vanadium concentrations exceeded the site standard in only three wells in 2003. Concentrations of this constituent have been adequately restored to below background levels except for a few low levels near the tailings.

The thorium concentration in all wells was less than or equal to the site standard in 2003 except for four slightly higher values east of the Small Tailings pile. The analytical results for this constituent vary significantly at these observed levels as they are approaching laboratory detection limits. The records for thorium indicate that thorium is a minor parameter of concern at the Grants site.

Observed alluvial background concentrations at the Grants site were similar to those in previous years with a maximum selenium concentration of 0.71 mg/l and a maximum uranium concentration of 0.22 mg/l. Background sulfate concentrations ranged up to 1780 mg/l in 2003, similar to previous years. All molybdenum concentrations were less than 0.03 mg/l in 2003 in the alluvial background wells.

Fresh-water injection into Upper Chinle well CW13, east of the East Fault, continued in 2003. This injection has maintained sufficient water levels in the Upper Chinle aquifer east of the East Fault which has allowed continued operation of the nearby Upper Chinle collection wells.

Fresh-water injection continued in 2003 in Upper Chinle well CW5 just north of Broadview Acres and was also initiated in Upper Chinle well CW4R during 2003. This injection has resulted in gradient reversal of the Upper Chinle, thereby forcing ground water from this area back to the north toward the tailings piles. Collection from Upper Chinle well CE2 was initiated in 1999 and continued through 2003. It is used in conjunction with injection wells CW4R, CW5 and CW25 to restore ground water quality in this area. Injection into well CW25 was started in 2000 and continued through 2003.

All sulfate and TDS concentrations in the Upper Chinle aquifer are below background concentrations except for samples from well CW3, where the concentration is slightly higher than the non-mixing zone Chinle level. The TDS concentration east of the East Fault also exceeds the non-mixing level for the Upper Chinle at well 945, but this level is considered natural due to the slow movement of water in this portion of the Upper Chinle. Therefore, the Upper Chinle aquifer only requires restoration with respect to TDS and sulfate in a localized area near the Large Tailings pile.

Uranium concentrations in six Upper Chinle wells exceeded the proposed Upper Chinle background concentrations in 2003. Restoration of these elevated values should result from the CE2 collection and the CW4R, CW5 and CW25 injection efforts.

Selenium concentrations in the Upper Chinle aquifer exceed the background concentrations in one well in the mixing zone and in one well in the non-mixing zone. The proposed site standards for selenium for the Upper Chinle mixing zone and the Upper Chinle non-mixing zone are 0.14 and 0.06 mg/l, respectively.

The concentrations of molybdenum exceeded the proposed site standard in five wells near the tailings in the Upper Chinle aquifer during 2003. Restoration for these locations should occur from continued CE2 collection and CW4R, CW5 and CW25 injection activities.

The proposed nitrate background levels for the Upper Chinle zones are greater than any of the concentrations observed in 2003. This indicates that nitrate is not a constituent of concern in this aquifer.

Only one of the Upper Chinle wells (CW52) contain a radium-226 plus radium-228 value above the Upper Chinle background value of 4 pCi/l. Well CW52 is up-gradient in the Upper Chinle aquifer and, therefore, this value has to be natural. Only one of the vanadium concentrations (well CW3) in the Upper Chinle aquifer exceeds the background level of 0.02 mg/l. This value needs to be confirmed before significance is given to this data point. None of the measured thorium-230 concentrations exceeded the proposed background levels for this parameter in the Upper Chinle aquifer wells during 2003. With the possible exception of a slightly higher vanadium value in well CW3, these constituents are not present in the Upper Chinle aquifer at levels of concern. This is expected due to their low observed concentrations in the overlying alluvial aquifer.

The direction and rate of ground water flow in the Middle Chinle aquifer in 2003 is very similar to that of past years. Fresh-water injection into well CW14 started in December of 1997. The fresh water is building up a mound of ground water in this area, which will result in a reversal of the flow of Middle Chinle water back toward the alluvial subcrop. Well CW44 is being used for irrigation supply, which will increase the flow in the Middle Chinle aquifer from Broadview Acres to the south. Additionally, well CW28 was added as a supply well for fresh-water injection in 2002.

Water quality in the Middle Chinle aquifer is generally good. All sulfate concentrations are less than the background concentration except for a non-mixing zone exceedance in well WCW and a natural exceedance of the mixing zone background in well WR25. All TDS and chloride concentrations in the Middle Chinle aquifer are less than the background values except for two TDS values in Felice Acres and one in Murray Acres that are slightly above the non-mixing zone background value. Uranium and selenium concentrations in the western portion of Felice Acres are above background levels due to the alluvial recharge to the Middle Chinle aquifer just south of Felice Acres. Continued irrigation use of this water by Homestake will reduce these elevated concentrations in western Felice Acres. The uranium background is also exceeded in Broadview Acres in well 434 and well WR25 west of the West Fault. The non-mixing zone background selenium concentration is slightly exceeded in well CW28 which is located east of the East Fault. Uranium site standards of 0.18 and 0.07 mg/l, respectively, are proposed for the mixing and non-mixing zones in the Middle Chinle aquifer, while proposed selenium site standards are 0.14 and 0.07 mg/l. Molybdenum concentrations in wells 434 and 482 are slightly above the proposed non-mixing zone standard of 0.05 mg/l.

Nitrate, radium, vanadium and thorium-230 concentrations in the Middle Chinle aquifer all are less than the Middle Chinle background levels. Hence, only uranium and selenium are considered important constituents relative to the Middle Chinle aquifer system.

The major constituents in the Lower Chinle aquifer generally increase in the down-gradient direction due to the slow movement of water in the fractured shale. All sulfate, TDS and chloride concentrations are less than the background levels except in farther down-gradient areas, where natural concentrations exceed the non-mixing zone background level. These exceedances result because there is only limited background data for the far-down-gradient areas of the Lower Chinle aquifer, and there is a naturally occurring deterioration of water quality in the down-gradient direction. Background uranium concentrations in the Lower Chinle aquifer are exceeded in six wells. The three wells that significantly exceed the background mixing zone concentration of 0.18 mg/l are located near the subcrop of the Lower Chinle aquifer with the alluvial aquifer. Concentrations in three non-mixing zone wells slightly exceed the very low background level of 0.02 mg/l. Concentration of selenium also exceeds the mixing zone standard in one well near the subcrop area.

All molybdenum concentrations in the Lower Chinle aquifer are less than the background level. One of the Lower Chinle nitrate concentrations slightly exceed the non-mixing zone background of 3.0 mg/l but is well below 10 mg/l. All radium, vanadium and thorium-230 concentrations in the Lower Chinle aquifer meet the proposed background for these constituents.

1.2 INTRODUCTION

This report, as required by the New Mexico Environment Department (NMED) discharge plan DP-200 and the Nuclear Regulatory Commission (NRC) License SUA-1471, presents results of the 2003 annual ground water monitoring program at Homestake's Grants Project. Homestake Mining Company (HMC) conducted uranium milling operations five miles northeast of Milan, New Mexico from 1958 to 1990 (see Figure 1.2-1). Referred to as the Grants Project or Grants site, HMC deposited uranium tailings from the alkaline (high pH) Grants mills into two unlined piles (Large and Small Tailings) that overlie San Mateo alluvium. The San Mateo alluvium is simply referred to as the alluvium or alluvial aquifer in this report. In 1977, due to concerns about ground water selenium levels, HMC installed a system of wells and pumps in order to inject fresh water into the alluvium at the property boundary and to withdraw contaminated water from the alluvium near the tailings.

Previous monitoring reports have been published in quarterly, semi-annual and annual reports[1], which were presented to the NMED and the NRC.

Four subdivisions, Broadview Acres, Murray Acres, Felice Acres and Pleasant Valley Estates, are adjacent to the HMC site. These subdivisions are shown on the various figures of the Grants Project area.

Monitoring data for ground water west of the project site is included in the 1995 through 2003 reports (see Appendix A for water levels and Appendix B for water quality). This area has been designated the "West Area" and was so labeled on the figures in the annual reports prior to 2003. This 2003 annual report combines the project site and West Area figures on one 11 in. x 17 in. figure.

The annual ALARA audit, required as an NRC license condition, is presented in Appendix C. Additionally, a report of an annual inspection of the tailings piles and pond dikes must be submitted per license condition and is presented in Appendix D. Appendix E provides an annual land-use survey discussion for the immediate Grants site area; this was an added license condition beginning in 2002.

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[1] See Hydro-Engineering 1983b, 1983c, 1984a, 1984b, 1984c, 1985a, 1985b, 1985c, 1985d, 1986a, 1986b, 1986c, 1987a, 1987b, 1988a, 1988b, 1990, 1991, 1992, 1993a, 1994, 1995, 1996, 1997, 1998, 1999, 2000a, 2001a, 2002 and 2003a.

A detailed table of contents is included for each report section including a list of associated figures and tables.

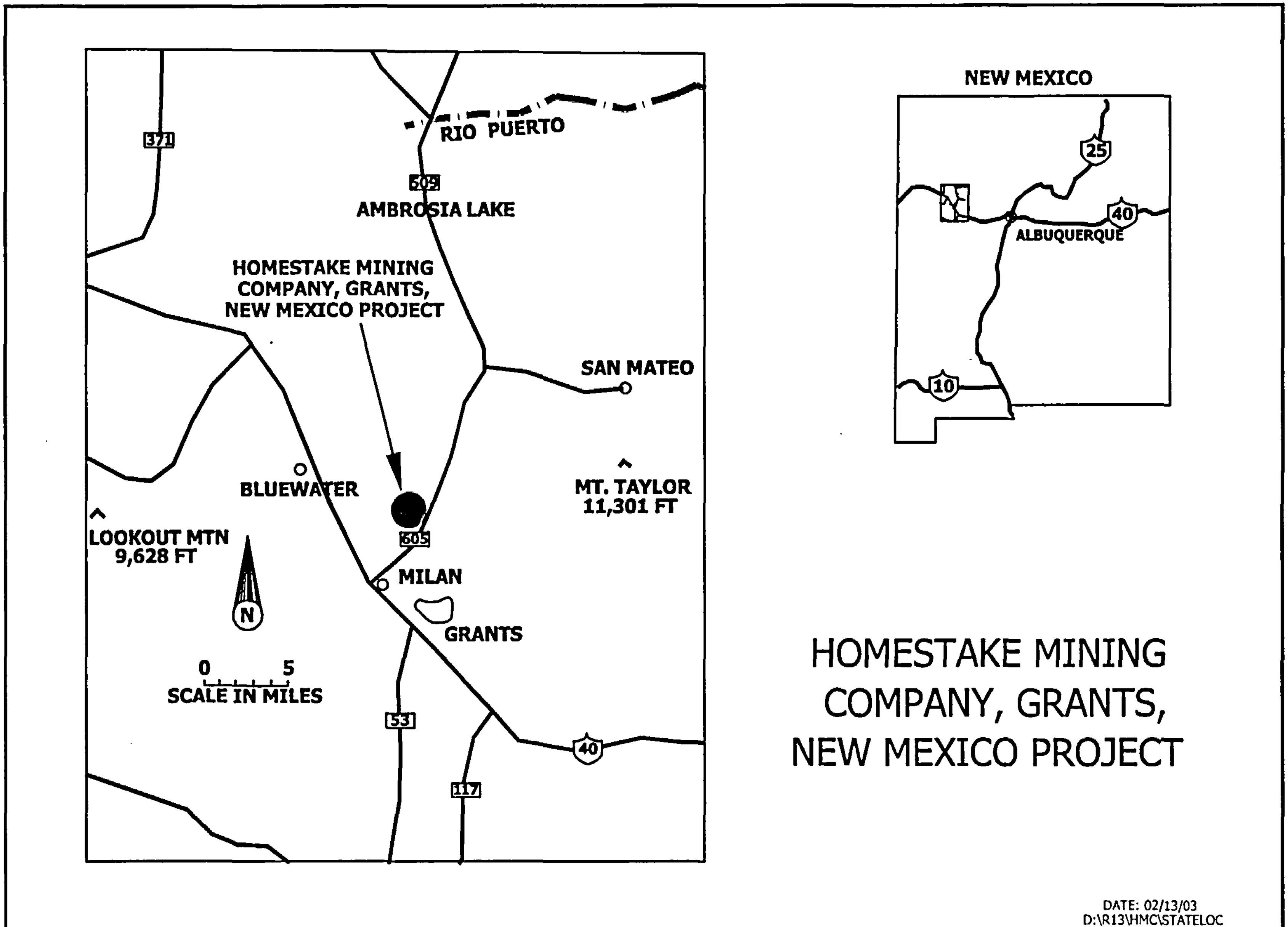

FIGURE 1.2-1. LOCATION OF THE GRANTS PROJECT

SECTION 2

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FIGURES

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TABLES

2.0 OPERATIONS

2.1 CURRENT OPERATIONS SUMMARY

The annual precipitation of 5.1 inches on site in 2003 was approximately one half of the normal precipitation for Grants, New Mexico. The ongoing drought condition has resulted in a continuing natural decline in water levels regionally and at the Grants site.

The Grants Project ground water remediation system consists of collection of contaminated ground water near the tailings piles and injection of fresh water and R.O. product water down-gradient. These collection and injection systems continued to operate in 2003, along with the reverse osmosis (R.O.) plant, which is used to treat and manage the majority of collected ground water. The R.O. plant produces product water that is of much better quality than the natural alluvial water, and it is used as injection water in some areas of the Grants Project restoration program. Figure 2.1-1 on page 2.1-10 shows the location of the present (end of 2003) injection and collection systems along with their starting dates of operation. Water collected from the site is pumped to the R.O. plant or discharged into lined collection ponds or one of two lined evaporation ponds (light blue areas).

The area where ground water flow is controlled by the fresh-water injection and collection systems is called the "Collection Area" and is shown by the yellow cross-hatched pattern on Figure 2.1-1. All of the alluvial ground water within the collection area converges to the collection wells.

2.1.1 R.O. PLANT

The R.O. plant utilizes a lime/caustic pre-treatment and clarification unit. Blowdown (sludge) from the pre-treatment unit discharges to the West Collection Pond with the treated water feeding the two 300 gpm low-pressure R.O. units. The brine from the No. 1 low-pressure unit feeds a 75-gpm high-pressure R.O. unit. The R.O. product water from the two units is discharged to a series of injection wells. The brine from the R.O. plant is discharged to the evaporation ponds. Other miscellaneous flows and blowdown from the R.O. plant are pumped to the West Collection Pond for recycle to the R.O. plant.

The R.O. plant inputs and output of R.O. product water for injection is listed in the following tabulation:

R.O. Plant Performance (GPM) (2000 – 2003)				
Year	*Input*		*Output*	
	Collection Wells	Tailings Collection	R.O. Injection	Brine and Blowdown
2000	274	0	204	70
2001	276	5	222	59
2002	383	5	288	100
2003	338	4	266	76

Aquifer restoration results continue to show that the R.O. product water injection is much more effective than the fresh water in reducing the uranium and molybdenum concentrations within the alluvial aquifer.

2.1.2 COLLECTION

The 2003 alluvial aquifer collection rate was slightly less than that in 2002, and both R.O. units were operated during portions of the year. Up-gradient alluvial aquifer collection continues north of County Road 53. Wells are used to collect background alluvial aquifer water (yellow triangle symbols) for transfer to the drainage system farther west (triangle symbols on Figure 2.1-1). These collection wells reduce the quantity of alluvial water flowing into the tailings area. Upper Chinle aquifer collection continued from well CE2 (located south of the collection ponds), and this water was used as injection supply water for the tailings pile flushing program.

2.1.2.1 ALLUVIAL AQUIFER

Figure 2.1-1 shows the locations of five lines of alluvial aquifer collection wells. The S and D-lines are adjacent to the Large Tailings pile, and the K and C-lines are adjacent to the Small Tailings pile. No new wells were added to the collection system in 2003. The L-line south of the

Small Tailings pile continued to operate in 2003 and includes collection wells 521, 522 and 639 which are located on the east side of Highway 605. Alluvial water is pumped from these lines of collection wells to the R.O. plant or it is pumped to re-injection wells. Figure 2.1-2 on page 2.1-11 graphically presents collection rates for the last seven years at the Grants Project. The alluvial collection system operated at an average rate of 338 gpm in 2003. Additionally, an average of 40 gpm was extracted from the alluvium for re-injection in 2003.

2.1.2.2 UP-GRADIENT ALLUVIAL WATER

Collection of alluvial water up-gradient of the tailings piles started in January of 1993 and continued through 2003. Wells P2 and P3 were the main wells pumped in 2003, with a small amount pumped from well P4 see Figure 2.1-1. This up-gradient water was transferred to the next drainage channel to the west. The transfer of this up-gradient water prevents some of the alluvial water from entering the Grants Project area at the north side of the Large Tailings pile. The collection rate for this effort averaged 80 gpm during 2003 (see Figure 2.1-2). Monthly rates were not measured for the up-gradient wells, and therefore only the yearly average is presented for 2001 through 2003 on Figure 2.1-2.

2.1.2.3 UPPER CHINLE AQUIFER

Figure 2.1-2 shows the collection rate for Upper Chinle collection well CE2, which is located on the south side of the collection ponds. Upper Chinle collection from well CE2 was started in 1999 and is expected to continue for several years. This well was used to supply water to the Large Tailings pile for the tailings flushing program during 2003. The yearly average collection rate from the Upper Chinle was 31.3 gpm.

2.1.2.4 QUANTITY OF CONSTITUENTS COLLECTED FROM THE ALLUVIAL AQUIFER

Table 2.1-1 (page 2.1-15) presents the quantities of chemical constituents extracted from the ground water system, the tailings piles and the toe drains. The ground water collection system has produced an average pumping rate of 257 gpm for the entire period between 1978 and 2003. The portion of the collection water that has been re-injected into the alluvial aquifer is not included in the values in Table 2.1-1. The quantity of constituents removed in 2003 was computed by multiplying the average concentration of a particular constituent for each collection well by the volume of water pumped from each well for that year.

2.1.3 INJECTION

The fresh-water and R.O. injection systems, which aid in the reversal of the ground water gradients back toward the collection wells, consists of a lines of injection wells which are oriented generally along the east, south and west perimeter of the two tailings piles and evaporation pond complex (see Figure 2.1-1).

In 2003, approximately 2100 feet of four-inch corrugated slotted polyethylene pipe was installed at a depth of approximately 6 feet below land surface west of the Large Tailings pile to serve as a horizontal injection line (Figure 2.1-1). A filter sock was placed over the pipe thus negating the need for a sandpack. Water is currently being injected into this injection line at three locations. The 2003 injection rate for this horizontal injection line is included in the Broadview and Murray Acres injection rates, and was approximately 200 gpm at year end.

2.1.3.1 BROADVIEW AND MURRAY ACRES

The Broadview Acres injection system started in 1977 with the G line on the north side of this subdivision. Injection into the majority of the G-line wells was discontinued in mid-April of 2000 in order to supply more water to injection wells near the collection area. The J-line, wells X1 through X10, and wells X28 through X31 are also considered part of the Broadview Acres injection system. Fresh water was injected into wells X13 through X27, 1A and 1E in 2003. Alluvial fresh-water injection wells 523 and 524 were added to the Broadview Acres injection system in 2002.

All wells adjacent to the northeast corner and to the north and west of Murray Acres are included in the Murray Acres injection system. This system includes all of the M and WR injection wells. The M line of the Murray Acres injection system was initially used in 1983. Injection into the M-line west of well WR1R was discontinued at the end of September of 2000, and injection into the

WR-line, north of WR10, began at this time. The horizontal injection line, west of the Large Tailings pile, was added to this system on August 25, 2003.

Figure 2.1-3 (page 2.1-12) presents fresh-water injection rates for the last seven years. An average of 431 gpm, or a total of 227 million gallons, was injected during 2003.

2.1.3.2 R.O. PRODUCT

The R.O. product water injection system supplies water to the X wells to the south and east of the Small Tailings pile. Through the end of 2003, R.O. product water was discharged into the X line and injected into wells X1 through X10, X28 through X31 and into wells K2, K6, KA through KE, KM, KN, C4, C13, C5, CW4R, C3R and PM. Figure 2.1-3 shows the rates of R.O. product water injection which averaged 266 gpm in 2003 for a total of 140 million gallons.

2.1.3.3 UPPER CHINLE AQUIFER

Hydro-Engineering 2003b should be reviewed for a detail discussion of the geologic setting for the Chinle aquifers. From 1984 through early 1995, the Upper Chinle injection system consisted of injecting fresh water into Upper Chinle well CW5, located on the north side of Broadview Acres. This effort restored most of the area in the Upper Chinle aquifer between the two faults. Injection into well CW5 was resumed in April of 1997 and continues at present to complete the restoration of this aquifer.

In order to maintain head in the Upper Chinle aquifer east of the East Fault, injection of fresh water into well CW13, an Upper Chinle well, was begun in June, 1996. Injection into Upper Chinle well CW25, located on the western edge of the Upper Chinle outcrop east of Murray Acres, began in 2000. Injection into CW25 will increase the head in the Upper Chinle aquifer and force flow in the Upper Chinle back toward collection well CE2. Injection into Upper Chinle well 944 started in June of 2002, and injection into well CW4R started in 2003. The red squares on Figure 2.1-3 present monthly average injection rates into Upper Chinle wells 944, CW4R, CW5, CW13 and CW25, with an overall 2003 average of 137 gpm on an annual basis.

2.1.3.4 MIDDLE CHINLE AQUIFER

Injection of San Andres fresh water into Middle Chinle well CW14 was started in December of 1997. This injection was initiated to prevent northward movement of alluvial water that recharges the Middle Chinle on the south side of Felice Acres. The injection rate averaged 33 gpm in 2003 (see Figure 2.1-3). This injection has prevented the movement of constituents further to the north and allows up-gradient collection from well CW44.

2.1.3.5 SECTIONS 28 AND 29

A test of fresh-water injection was initiated in late 1999 and continued through January of 2000 by pumping San Andres well 951, which is located in Section 20, (see Figure 2.1-1 for location of supply well 951). This water was subsequently injected into alluvial wells 682, 656, 894, 633 and 655. This fresh-water injection in Sections 28 and 29 was resumed in March of 2002 to impede movement of ground water with modest contaminant concentrations in Section 28 until ongoing irrigation water extraction can reduce these low concentrations. This injection rate is typically 400 gpm and averaged 376 gpm for 2003 with a total injected volume of 198 million gallons. Figure 2.1-3 presents the monthly injection rates in the wells located in Sections 28 and 29.

2.1.3.6 SECTIONS 35 AND 3

Fresh-water injection in the southwestern quarter of Section 35 was initiated in late 2002 utilizing production from Upper Chinle well CW18 and Middle Chinle well CW28. This water was injected into alluvial wells 641, 642, 848 and 868.

Fresh-water injection into alluvial wells 643, 863, 865 and 866, located in the northeast portion of Section 3 was initiated in 2003. These injection wells were supplied by Lower Chinle well CW29 and Middle Chinle well CW30.

Figure 2.1-3 presents the combined monthly injection rates for Section 35 and Section 3 fresh-water injection wells (see brown diamond symbols on Figure 2.1-3). This injection effort is associated with the ground water restoration of the Section 3 area. Water collected from wells in Section 3 is used for the irrigation program. During 2003 the yearly average injection rate in Sections 35 and 3 was 114 gpm.

2.1.4 RE-INJECTION

Alluvial water containing relatively low concentrations of contaminants is collected and is then injected into areas of the alluvial aquifer with higher concentrations of contaminants in order to enhance restoration of those areas. This aspect of the restoration plan at the Grants sites is referred to as the collection for re-injection program. The lower-concentration water will be as effective (see sulfate, uranium, selenium and molybdenum concentrations in plots for wells T and TA) as fresh water during the initial stages of restoration, and therefore, re-injection is a beneficial use of this slightly contaminated ground water. Water collected from the L-line to the south of the Small Tailings pile and wells 521, 522 and 639 was used for re-injection in 2003. The total re-injection rate into alluvial wells X11, X12, D2 through D4, DAA, DAB, DL, DW, DY, DF, DG, and DX in 2003 averaged 40 gpm. The monthly re-injection rates are presented on Figure 2.1-2 as the collection rates for re-injection use (COL/RE-INJ).

2.1.5 TAILINGS CONDITIONS

Tailings wells were installed in the Large Tailings pile beginning in 1994, and wells have periodically been added through early 2002. Data collected from these wells has been used to estimate the amount of drainable water in the re-contoured, stabilized tailings. The tailings wells are also a primary component of the tailings dewatering program. With the exception of some testing of dewatering options in 1999, no dewatering of the tailings occurred in 1998 and 1999 due to limited available capacity in the evaporation ponds. The complete dewatering program was restarted in 2000 and operated through mid-April 2002. Dewatering rates were reduced through the remainder of 2002 and 2003 due to limited available storage in the evaporation ponds.

Figure 2.1-4 shows the locations of tailings wells that were pumped in 2003. The cumulative volume of tailings water pumped from 1995 through 2003 is presented on Figure 2.1-5. A total volume of 107 million gallons of water had been removed from the tailings via dewatering wells by the end of 2003. A total of 8.9 million gallons was pumped from the tailings in 2003. The yearly average collection rate from the tailings was 17 gpm in 2003.

Wells CE2, CW1, CW2, CW3, 929 and 934 have been used to supply water for flushing the Large Tailings pile in 2003. A total of 140 million gallons were injected into the tailings in 2003, which is an average rate of 267 gpm. This injection for tailings flushing allows larger extraction rates from the tailings dewatering wells and reduces contaminant concentrations in the tailings.

Table 2.1-1 presents the quantity of constituents collected from the tailings wells since dewatering began in 1995. Tables B.1-1 and B.1-2 of Appendix B present chemical analyses of tailings well water during 2003.

2.1.6 TOE DRAIN CONDITIONS

A series of toe drains have been installed around the Large Tailings pile to intercept perched ground water seeping from the tailings into the alluvium. The locations of the toe drains and their associated sumps are also shown on Figure 2.1-4. Nine sumps are located around the perimeter of the Large Tailings pile that are utilized for collection of toe seepage. Two of these sumps are tied to the old tailings decant towers (East and West reclaim sumps).

Figure 2.1-5 shows that greater than 173 million gallons of water has been pumped from the toe drains. Approximately 54 gpm of water was collected from the toe drains in 2003, which is a 20 gpm increase from the 2002 rate. This increase is due to the ongoing flushing program used on the Large Tailings pile.

Table 2.1-1 also presents the 2003 quantity of constituents collected from the toe drains (see Tables B.2-1 and B.2-2 of Appendix B for water-quality results for 2003).

2.1.7 LINED EVAPORATION PONDS

The use of lined evaporation collection ponds (East Collection Pond and West Collection Pond) began in October of 1986 when the two ponds were constructed. The No. 1 Large Evaporation Pond located on the Small Tailings pile, began receiving water in November of 1990. Usage of the No. 2 Large Evaporation Pond began in March of 1996.

The water from the well collection system and some water from the tailings dewatering wells and toe drains is pumped to the R.O. plant as feed water. The majority of the extracted tailings water is reported directly to the East Collection Pond for subsequent evaporation. Excess water is transferred from the East Collection Pond to the No. 2 Evaporation Pond. When necessary, water is transferred from the No. 2 Evaporation Pond to the No. 1 Evaporation Pond. Both ponds use spray systems to enhance evaporation. A total of 76 million gallons (average rate of 144 gpm) of water was reported to the evaporation pond system in 2003.

Water quality samples results collected from the No. 1 and No. 2 Large Evaporation Ponds, the East Collection Pond (E COLL POND), and the West Collection Pond (W COLL POND) are presented in Tables B.3-1 and B.3-2 of Appendix B.

2.1.8 IRRIGATION

Three irrigation systems were operated in 2003 (see Figure 2.1-1 for locations). The 150-acre center pivot in the southwest quarter of Section 33 and 120 acres of flood irrigation in the eastern half of Section 34 were used for the fourth full irrigation season; the 60 acre center pivot in Section 28 was operated for the second irrigation season. Twenty-four acres of flood irrigation was added in late 2003 to Section 33. This area was only water enough to sprout the seed in 2003 but is expected to be added to the irrigation program in 2004. Figure 4.1-1 shows the supply wells for these three irrigated areas. In 2003, wells 631, 632, 855, 862, 869, 648, 649, 647, 496, 653, 657, 658, 685, 996 and CW44 were used for the irrigation supply to the areas in Sections 33 and 34. Discharge from these supply wells is piped together and is used on only one irrigation area at a time. Wells 634, 659, 881 and 890 were used to supply the Section 28 pivot irrigation. These three areas were successfully irrigated during the entire 2003 growing season with 3 hay cuttings produced from each of the areas within Sections 28, 33 and 34. A total of 949 Ac-Ft of water was applied to the three irrigation areas in 2003.

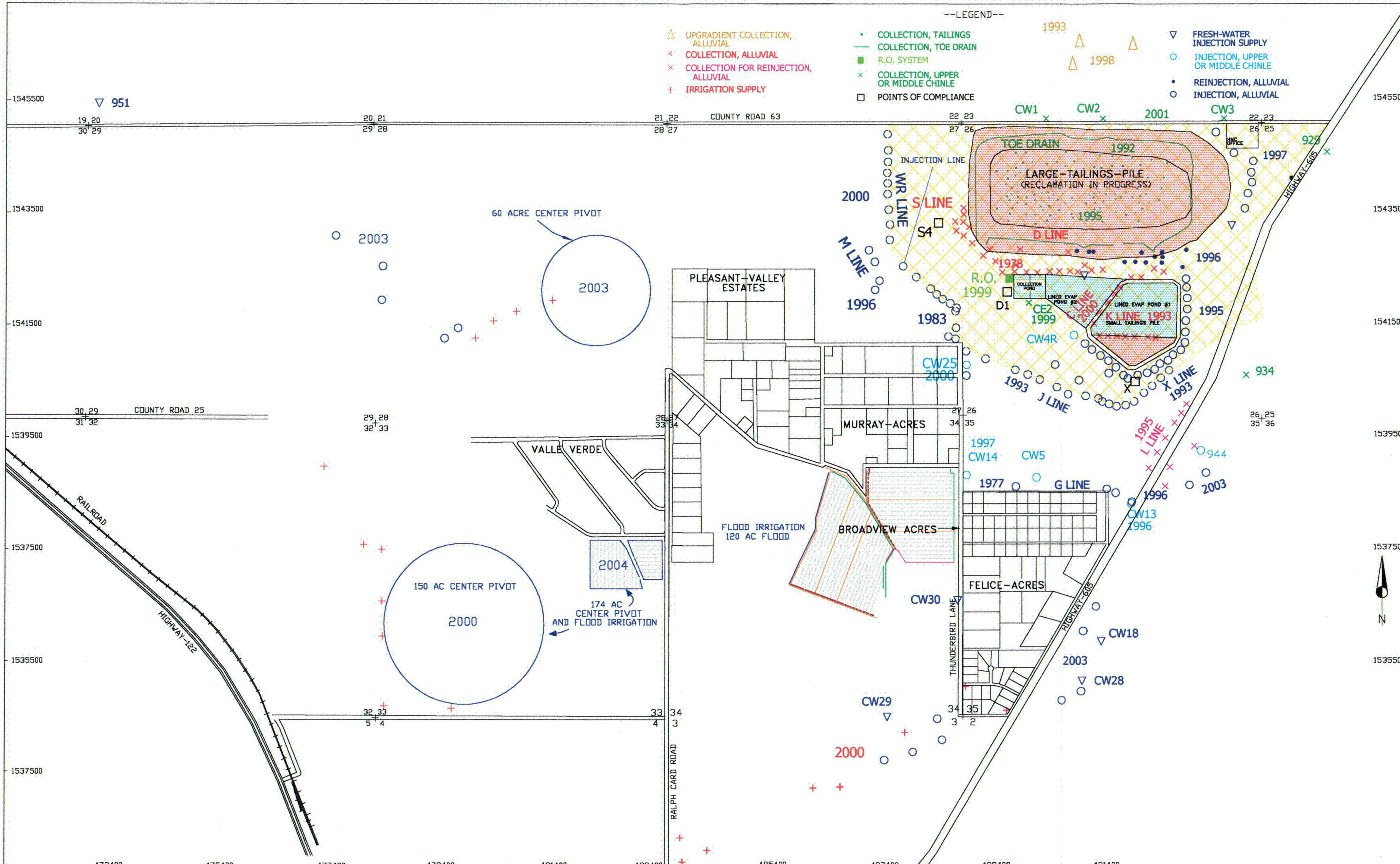

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FIGURE 2.1-1. LOCATION OF PRESENT INJECTION AND COLLECTION SYSTEMS WITH START OF OPERATION DATES

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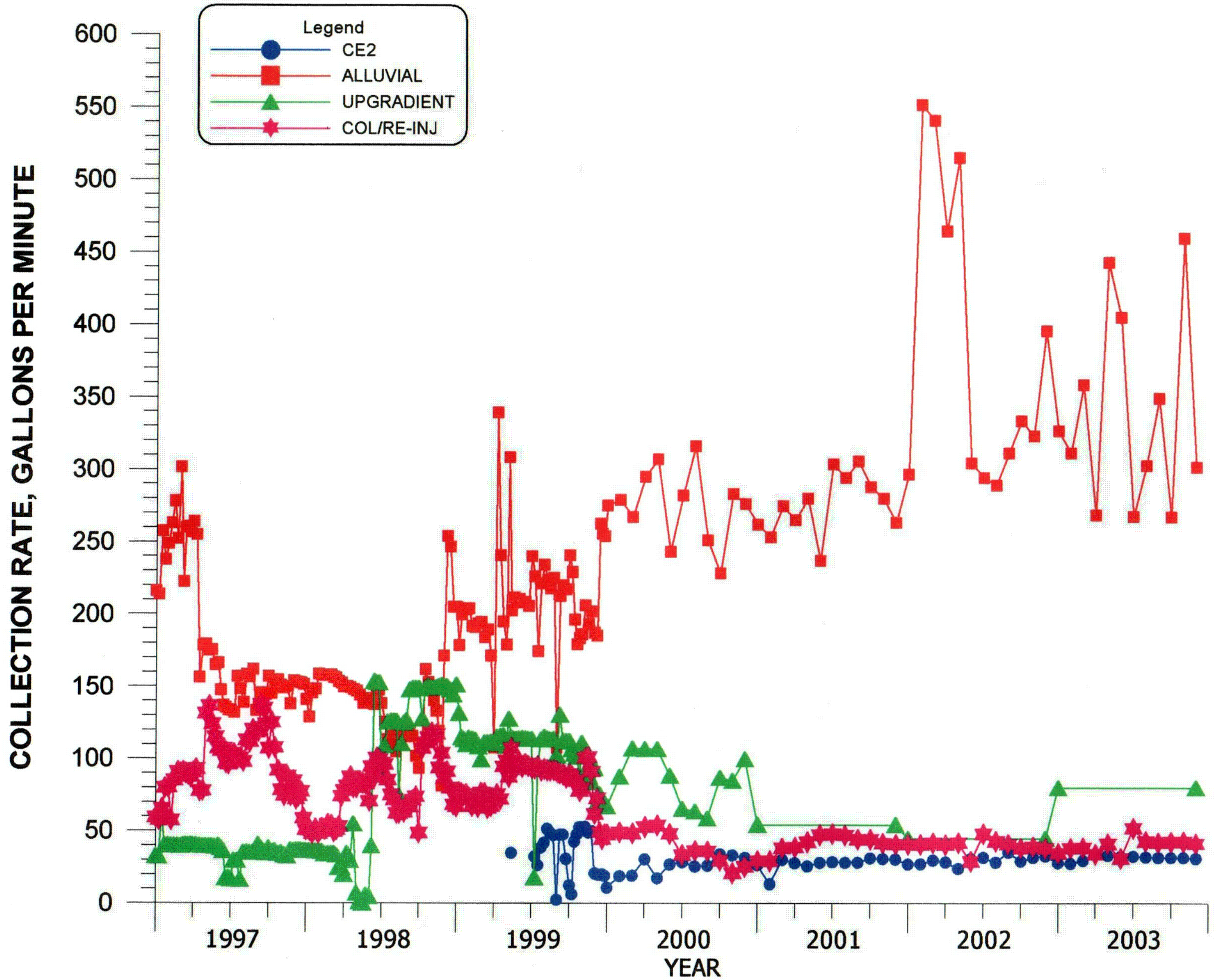

FIGURE 2.1-2. AVERAGE MONTHLY COLLECTION RATES FOR THE ALLUVIAL AND UPPER CHINLE AQUIFERS.

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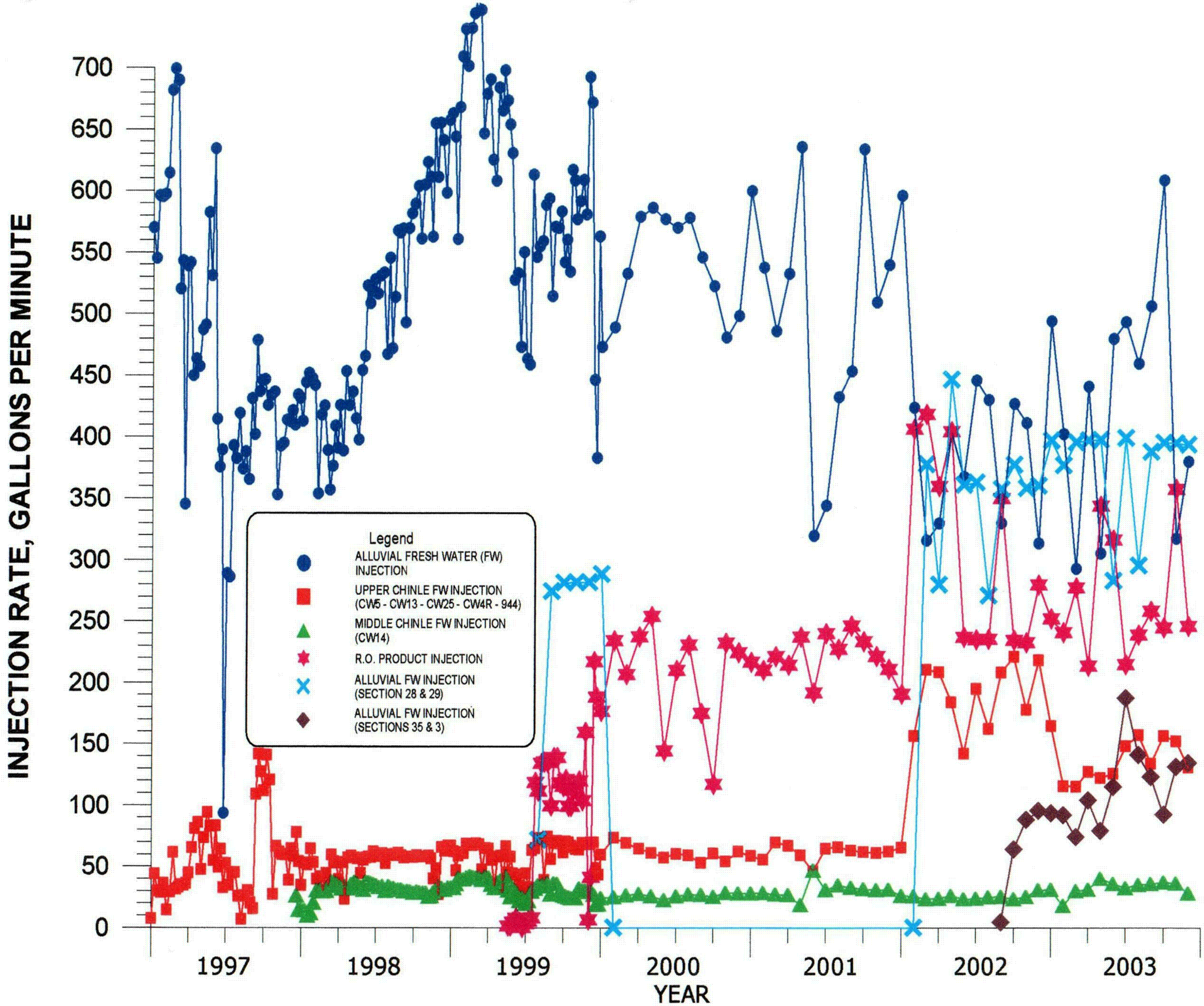

FIGURE 2.1-3. AVERAGE MONTHLY INJECTION RATES FOR THE ALLUVIAL UPPER CHINLE AND MIDDLE CHINLE AQUIFERS.

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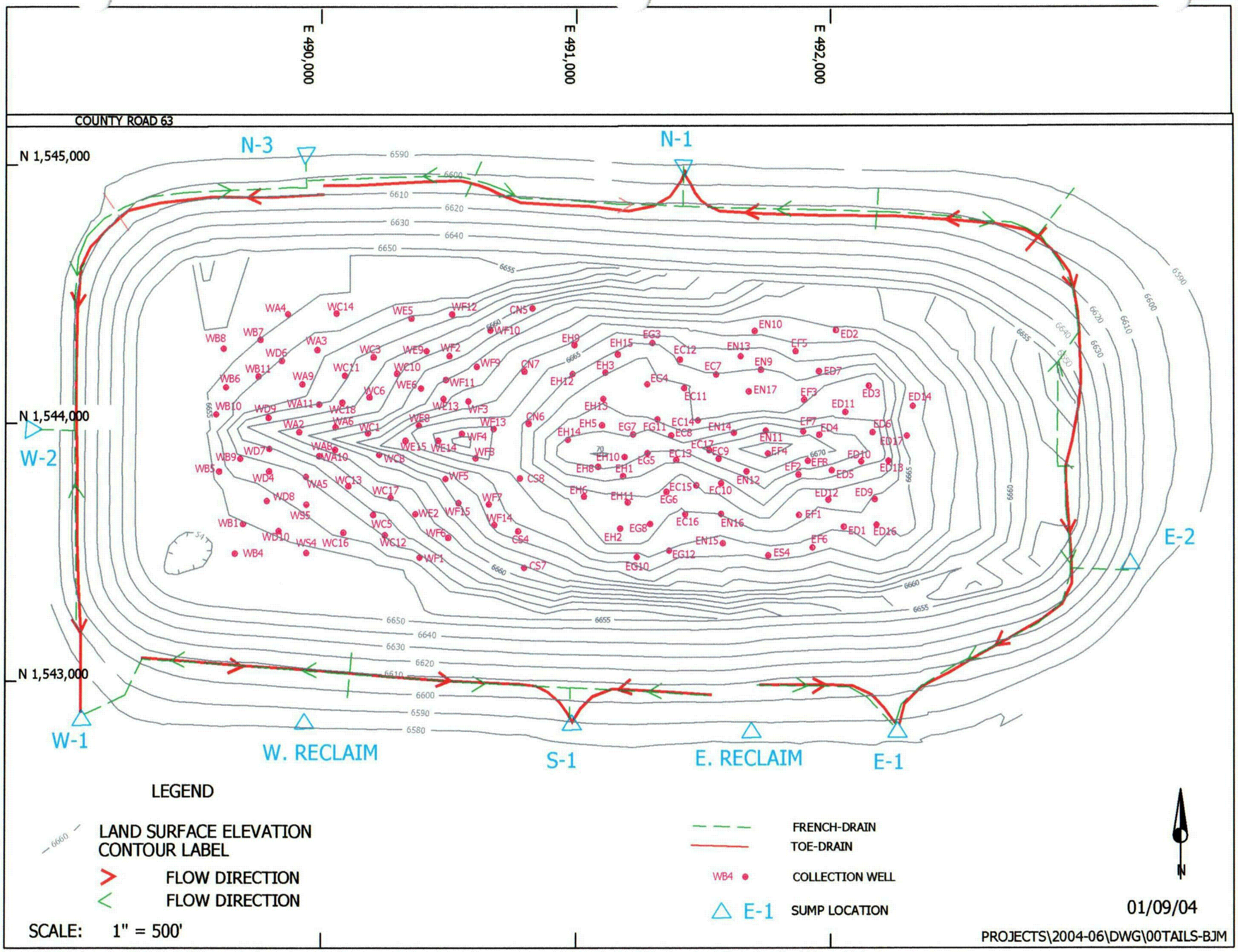

FIGURE 2.1-4. LOCATIONS OF TAILINGS DEWATERING WELLS, TOE DRAINS AND SUMPS

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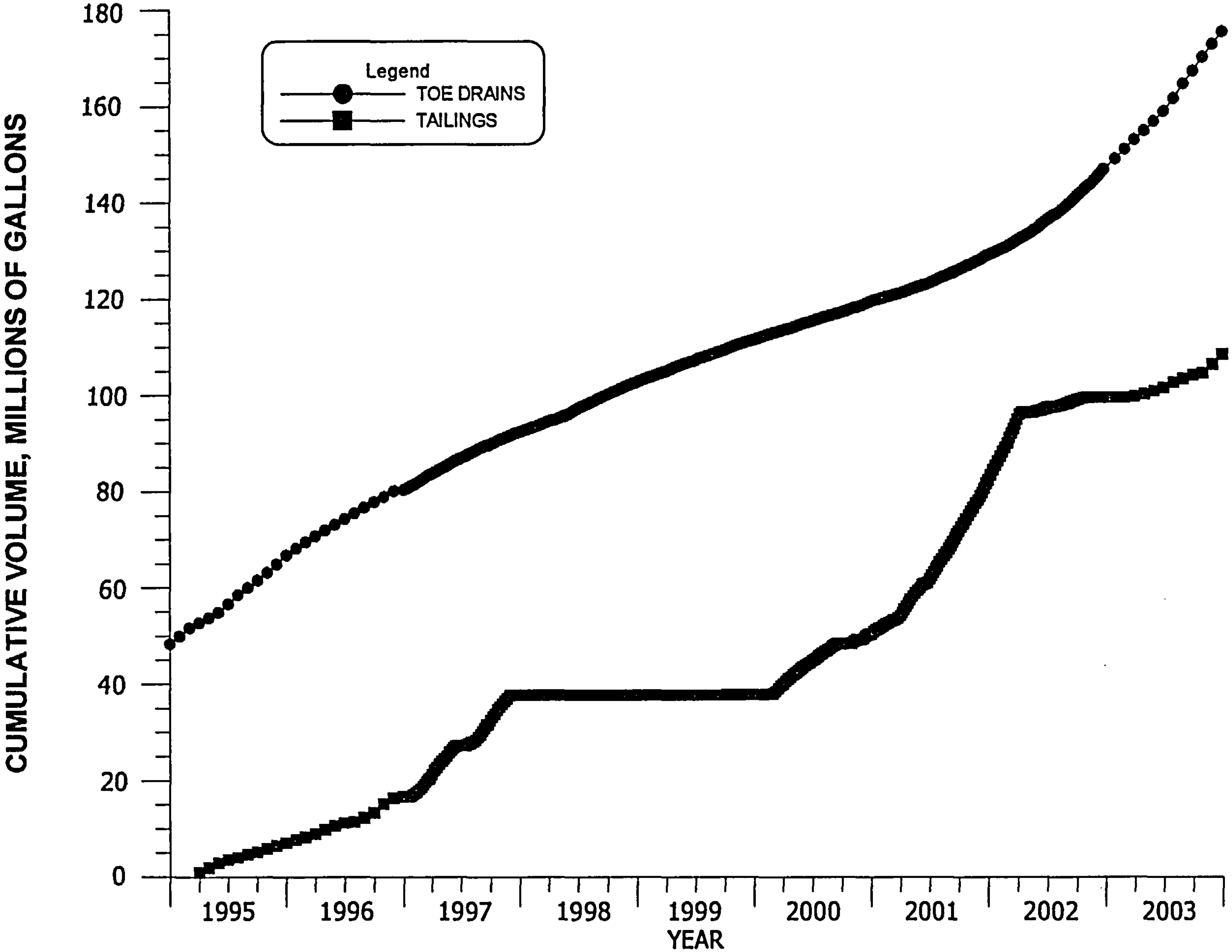

FIGURE 2.1-5. CUMULATIVE VOLUME OF COLLECTION WATER FROM TAILINGS DEWATERING WELLS AND TOE DRAINS.

TABLE 2.1-1. QUANTITIES OF CONSTITUENTS COLLECTED.

YEAR	SOURCE	TOTAL VOLUME PUMPED (GAL)	SULFATE (SO4) CONC. (MG/L)	SULFATE (SO4) AMT. (LB)	URANIUM (U) CONC. (MG/L)	URANIUM (U) AMT. (LB)	MOLYBDENUM (MO) CONC. (MG/L)	MOLYBDENUM (MO) AMT. (LB)	SELENIUM (SE) CONC. (MG/L)	SELENIUM (SE) AMT. (LB)
1978	G.W.	27670033	5200	1200620	35	8081	40	9236	2	462
1979	G.W.	46371629	5200	2012095	35	13543	40	15478	2	774
1980	G.W.	39385860	5200	1708978	35	11503	40	13146	2	657
1981	G.W.	91613183	5200	3975155	35	26756	40	30578	2	1529
1982	G.W.	159848025	5200	6935910	35	46684	40	53353	2	2668
1983	G.W.	167018540	5200	7247043	35	48778	40	55746	2	2787
1984	G.W.	203258522	5200	8819519	35	59362	40	67842	2	3392
1985	G.W.	194074421	5200	8421015	35	56680	40	64777	2	3239
1986	G.W.	199326030	5200	8648886	35	58214	40	66530	2	3326
1987	G.W.	180881740	5200	7848576	35	52827	40	60374	2	3019
1988	G.W.	166460826	5200	7222843	35	48615	40	55560	2	2778
1989	G.W.	175780800	5200	7627243	35	51337	40	58671	2	2934
1990	G.W.	164378919	5200	7132508	35	48007	40	54865	2	2743
1991	G.W.	171497720	5200	7441397	35	50086	40	57242	2	2862
1992	G.W.	128398849	4925	5276234	27.2	29134	35.9	38419	1.60	1718
1992	TOE	8544670	12117	864006	53.2	3793	106.5	7595	1.73	123
1993	G.W.	115795020	5011	4841203	28.1	27130	45.4	43885	1.47	1425
1993	TOE	18357680	12117	1856262	53.2	8150	106.5	16315	1.73	265
1994	G.W.	98294087	4423	3624762	26.0	21146	27.3	22349	1.42	1162
1994	TOE	18337680	12117	1854240	53.2	8141	106.5	16299	1.73	264
1995	G.W.	108306398	3256	2942827	16.1	14553	19.2	17355	1.65	1491
1995	TOE	17711370	11370	1680500	54.6	8069	94.4	13952	2.25	332
1995	TAILS	5905740	8191	403680	36.1	1778	89.7	4420	0.15	7
1996	G.W.	122064160	3899	3967919	20.9	21225	26.8	27259	1.92	1950
1996	TOE	15431810	11537	1484295	46.4	5970	105.0	13509	1.29	166
1996	TAILS	9181390	9434	722129	40.2	3077	108.0	8236	0.18	14
1997	G.W.	94465562	4955	3836678	26.9	20892	33.4	25887	3.17	2456
1997	TOE	12029390	11094	1113808	41.8	419	100.0	10040	0.81	81
1997	TAILS	21292900	10284	1827575	45.8	8139	92.4	16420	0.14	25
1998	G.W.	74459130	5088	3161866	29.6	18385	34.8	21625	1.85	1151
1998	TOE	10321780	9870	850257	42.5	3665	95.2	8203	0.73	63
1999	G.W.	117752408	3363	3305027	16.6	16314	14.8	14545	2.06	2024
1999	TOE	8809890	11560	849976	54.3	3993	106.0	7794	0.46	34
1999	TAILS	120550	9420	9478	40.9	41	111.5	112	0.19	0
2000	G.W.	146609842	3358	4108868	18.8	23004	20.6	25206	1.94	2374
2000	TOE	8032870	9734	652590	58.6	3929	118.0	7911	0.34	23
2000	TAILS	12446810	9710	1008685	37.8	3927	127.0	13193	0.30	31
2001	G.W.	144925056	2770	3350438	19.6	23707	21.4	25884	1.65	1996
2001	TOE	9606280	9935	796529	43.1	3455	95.7	7673	0.78	63
2001	TAILS	31465370	8688	2281555	34.6	9086	89.2	23425	0.19	50
2002	G.W.	201357360	2748	4618092	14.9	25040	16.7	28065	1.23	2067
2002	TOE	17975520	9210	1381718	33.4	5011	88.7	13307	0.76	114
2002	TAILS	17817840	7670	1140588	23.5	3495	40.8	6067	0.12	18
2003	G.W.	177727419	2417	3585168	13.8	20470	15.5	22991	0.73	1083
2003	TOE	28418871	9457	2243048	35.6	8444	78.9	18714	4.35	1032
2003	TAILS	8890076	9800	727126	28.0	2078	92.0	6826	0.30	22
SUM G.W.		3,517,721,539		132,860,871		841,472		976,868		54,067
SUM TOE		173,577,811		15,627,229		63,039		141,311		2,559
SUM TAILS		107,120,676		8,120,817		31,620		78,699		167
COMBINED SUM		3,798,420,026		156,608,916		936,131		1,196,879		56,793

NOTE: Average concentrations for 1978 to 1991 were used in calculating the quantities of constituents removed.
Concentrations from the collection wells have gradually decreased from 1978 through 1991.
G.W. = Ground water; TOE = Toe drains on edge of tailings; TAILS = Large tailings collection wells

2.2 FUTURE OPERATION

Ground water quality restoration in 2004 will continue as a combination of fresh-water and R.O. product injection to maintain the overall piezometric gradient reversal between the lines of injection (M Line and J Line) and contaminated water collection near the tailings piles. The reverse osmosis (R.O.) plant can be operated at a rate of up to 600 gpm but is projected to operate at an average rate of approximately 400 gpm in 2004. When the plant is operated at full capacity, approximately 440 gpm of R.O. product is produced for injection into the alluvium and approximately 160 gpm of brine reject and blowdown is discharged to the evaporation ponds. A larger collection rate and use of the very good quality R.O. product for injection will continue to enhance the progress in restoration.

Water collected from the alluvial and Chinle aquifers, where there are relatively low levels of selenium and uranium, will continue to be collected and used for re-injection in the initial phase of restoration of some areas. This re-injection will occur in the alluvium where concentrations are greater than those of the injected water until such time as injection with San Andres fresh water or R.O. product water will better complete the restoration. Use of the low-concentration re-injection water will be limited to areas up-gradient of the J and M injection lines. For the purpose of this document, the reversal zone is called the collection area. To date, re-injection has occurred in wells X5 through X27, 1A, D2 through D4 and DAA, DAB, DL, DW, DY, DF, DG, DQ and DX. Additional wells in this area will be included in the re-injection program in 2004.

Collection from Upper Chinle well CE2 will continue to intercept contaminants in this aquifer. Injection into Upper Chinle wells 944, CW4R, CW5, CW13 and CW25 is planned to continue to control the direction of flow in these areas of the Upper Chinle aquifer.

Injection into well CW14 will be continued in order to build the head in this area of the Middle Chinle aquifer. This will prevent alluvial water from flowing into this portion of the Middle Chinle aquifer.

Irrigation with water from Sections 3, 28, 32, 33 and 35 is planned for the entire growing season in 2004. Full irrigation of the 24 acres of flood in Section 33 is expected for 2004 and the 60 acre center pivot may be expanded to 100 acres in 2004. The fresh-water injection into wells located in Sections 28 and 29 will continue in 2004 to restore these areas with slightly elevated contaminant concentration. Fresh-water injection will be continued in Sections 35 and 3 in 2004, and additional injection wells or injection lines are planned to be added in both of these areas in 2004 to aid restoration and to complement the use of water for irrigation. Additional irrigation wells and injection lines in Sections 27 and 28 are planned to be added to the Section 28 irrigation system to aid restoration in this area.

SECTION 3

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GROUND WATER MONITORING FOR HOMESTAKE'S GRANTS PROJECT

Page Number

FIGURES

TABLES

3.0 SITE STANDARDS AND BACKGROUND CONDITIONS

3.1 ALLUVIAL SITE STANDARDS

Six water-quality site standards (U, Se, Mo, Ra226 + Ra228, Th230 and V) were previously set for the alluvial aquifer at the Homestake site by the United States Nuclear Regulatory Commission (NRC). These established site standards are presently exceeded by the full range in alluvial aquifer background values for many of the constituents. Accordingly, naturally occurring concentrations of these elements up-gradient of the Grants site have and will continue to prevent successful ground water restoration to meet those existing standards.

Adjustment of the site standards to account for the full range in natural background concentrations is presently under federal and state review by NRC and NMED. Both agencies have accepted the full range of background values for the alluvial aquifer as presented in Hydro-Engineering 2001c. The new (Proposed NRC) agreed upon standards are shown in Table 3.1-1 and will be incorporated in the renewal of the NMED DP-200 permit and amendment of site license SUA-1471 by NRC.

Site standards for the Grants Project are applicable at three points of compliance; the Point of Compliance (POC) wells are S4, D1, X and (see Figure 2.1-1 for locations).

TABLE 3.1-1. GRANTS PROJECT ALLUVIAL WATER QUALITY STANDARDS.

Constituents	Homestake Standards		
	Existing NRC License Site Standards	**Proposed NRC License Site Standards*** **	**Existing New Mexico Site Standards***
Uranium	0.04	0.15	5
Selenium	0.1	0.27	0.27
Molybdenum	0.03	0.05	1.0@
Vanadium	0.02	0.02	-----
RA-226 + Ra-228	5	5	30
Thorium-230	0.3	0.3	-----
Sulfate	-----	1870	1870
Chloride	-----	250	250
TDS	-----	3060	3060
Nitrate	-----	23	23

NOTE: All concentrations are in mg/l except: Ra-226 + Ra-228 and Th-230, which are in pCi/l.
@ = Irrigation Standard
* = Pending NMED issuance of DP-200
*** = Pending NRC license amendment

3.2 ALLUVIAL BACKGROUND WATER QUALITY

Background alluvial aquifer water-quality conditions at the Grants site are those found up-gradient or north of the Large Tailings pile. These conditions in the San Mateo alluvium have been monitored since 1976. Ground water flow in the San Mateo alluvial system is generally from the northeast to the southwest (see Figure 3.2-1). Lobo Creek joins San Mateo Creek at the Homestake site, although neither creek has a well-defined surface flow channel at the site. Surface-water flow occurs only after extreme precipitation events and then generally only within some reaches of the channels.

Hydrographs of up-gradient wells that have been used to define the background hydrologic conditions of the alluvial aquifer are presented in Section 4 of this report. Wells DD, P, P1, P2, P3, P4, Q, R and ND, located just north of the Large Tailings pile, have been used for monitoring alluvial background water quality and are called the near up-gradient wells.

Additional alluvial background wells located farther north were sampled in 2003 (wells 914, 920, 921, 922 and 950, see Figure 3.2-1 for locations). Information gathered from these wells has been used to further define the piezometric surface and water-quality conditions in the up-gradient alluvial aquifer, and these wells are referred to as the far up-gradient wells.

Figure 3.2-1 presents the latest 2003 water-quality data for the near and far-up-gradient alluvial background wells for six parameters: sulfate, uranium, selenium, chloride, TDS and nitrate. Molybdenum concentrations in all up-gradient wells were less than 0.03 mg/l. Sulfate concentrations for the wells varied from 404 to 1780 mg/l in 2003. Uranium concentrations also varied over a large range, from 0.001 to 0.22 mg/l. Selenium concentrations varied over an even larger range, from less than 0.005 to 0.71 mg/l.

Chloride concentrations in water sampled from the up-gradient wells ranged from a low of 46 mg/l to a high of 161 mg/l. The TDS concentrations varied from 1060 to 2720 mg/l. Nitrate concentrations also vary naturally over a large range in the alluvial aquifer, and ranged from less than 0.1 to 16.6 mg/l in 2003. Time versus concentration plots for up-gradient wells DD, ND, P, P4, Q and R are presented in Section 4.3 of this report.

The 95th percentile of the historical background alluvial aquifer water-quality data for the Grants site was defined by ERG (1999a and 1999b). These documents, along with a hydrologic support document (Hydro-Engineering 2001c), were submitted to the NRC in 2001 with a request to adjust some of the site standards based on the full range of natural background conditions. The 95th percentile is being used to define the upper limit of background. The present NRC standards used average background concentrations for establishing the standards. The 95th percentile is a more appropriate value for use in background discussions, because it better defines the natural full upper limit of background. A tabulation of the 95th percentile background levels for the Grants Project area constituents is included in Figure 3.2-1.

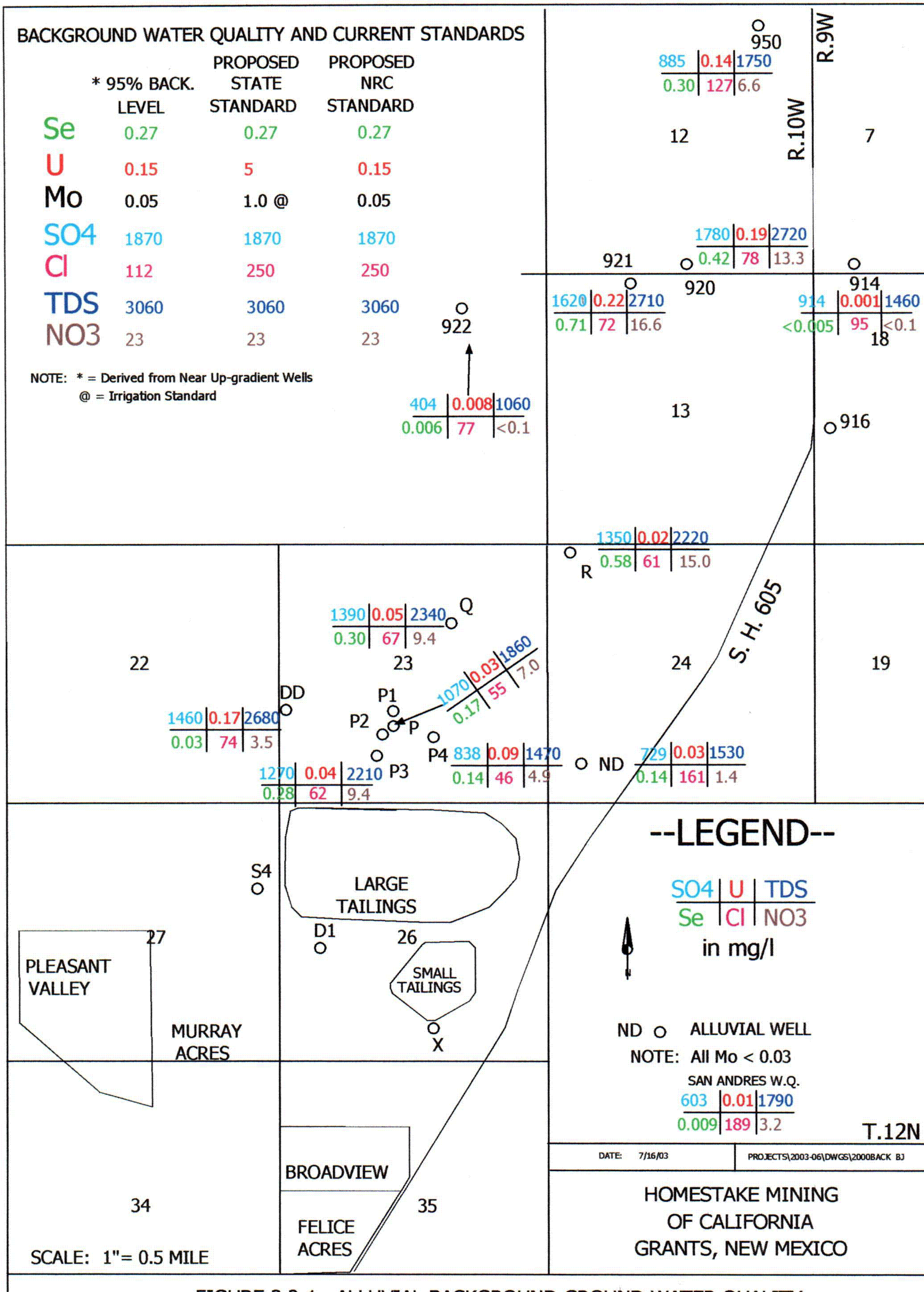

FIGURE 3.2-1. ALLUVIAL BACKGROUND GROUND WATER QUALITY

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3.3 COMPARISON OF ALLUVIAL SITE STANDARDS TO BACKGROUND

The range in concentrations (see Section 3.2) in the alluvial up-gradient wells during 2003 was such that 9 out of 12 selenium concentrations in background well[1] samples were equal to, or exceeded, the present NRC site standard. Additionally, 7 out of 12 uranium values were equal to, or exceeded, the present NRC site standard. The original site standards were set based on an average of concentrations in three samples[2] collected in December 1988, January 1989 and February 1989 from up-gradient well P. As shown by the present data, there is a large natural areal variability in the background water quality. Therefore, the cumulative database for all of the background wells more adequately defines background concentrations, and this expanded database, based on near-up-gradient wells, was utilized in the two ERG (1999a and 1999b) studies. Naturally occurring background variation is illustrated by the uranium concentrations, where concentrations in 2003 varied from 0.001 to 0.22 mg/l (see red values on Figure 3.2-1). The higher values are four times greater than the present site standard of 0.04 mg/l.

Table 3.3-1 presents the 95th percentile of background concentrations (see ERG 1999a and 1999b for computation of the 95th percentile levels) for selenium, uranium, molybdenum, sulfate, chloride, TDS and nitrate along with respective proposed State and NRC standards. The sulfate, TDS and nitrate 95th percentile levels are equal to the proposed State standards because the State has accepted the upper limit evaluation.

[1]Wells DD, ND, P, P4, Q, R, 914, 916, 920, 921, 922 and 950.
[2] Average of 3 samples from well P in 1988 and 1989.

TABLE 3.3-1. COMPARISON OF ALLUVIAL UPPER LIMIT OF BACKGROUND GROUND WATER QUALITY AND SITE STANDARDS.

Constituents	95% Background Level	Proposed State Standard	Proposed NRC Standard
Selenium	0.27	0.27	0.27
Uranium	0.15	5	0.15
Molybdenum	0.05	1.0@	0.05
Sulfate	1870	1870	1870
Chloride	112	250	250
TDS	3060	3060	3060
Nitrate	23	23	23

NOTE: All values are in mg/l
@ = Irrigation Standard

3.4 CHINLE BACKGROUND WATER QUALITY

The Chinle aquifer background water quality has been analyzed and presented to the NRC and NMED in Hydro-Engineering 2003b and ERG 2003. The proposed background concentrations for the mixing zones in the Upper, Middle and Lower Chinle aquifers were grouped together to develop a mixing zone background level. The non-mixing zone water chemistry data for each of the three aquifers were analyzed separately. Table 3.4-1 presents the results from the analysis of the Chinle background data. Figure 3.4-1 presents the Upper Chinle mixing-zone data and the wells used in the analysis of the mixing zone. The mixing zone is shown with a yellow pattern on Figure 3.4-1. Wells within the mixing zone that were used in the mixing-zone background calculations have a red rectangular box around the well name. Wells used to define the Upper Chinle non-mixing zone contain a light blue rectangular box around their well name. Figure 3.4-1 also presents the 2003 data collected from these background wells for selected parameters of sulfate, uranium, TDS, selenium, chloride and nitrate. None of the Upper Chinle background concentrations for 2003 exceed the proposed background levels for this aquifer. This data is presented in a format similar to that used for the alluvial background data.

The Middle Chinle mixing zone is presented in Figure 3.4-2 with a yellow pattern. Five wells are shown in the Middle Chinle mixing zone, and these wells were included with the Upper Chinle and Lower Chinle mixing-zone wells in establishing the mixing-zone background values. Six wells are shown on Figure 3.4-2 that were used to establish the Middle Chinle non-mixing zone background levels. This figure also presents the 2003 data collected for these background wells. One well in each of the mixing and non-mixing zones of the Middle Chinle aquifer exceeds the background sulfate concentrations for this aquifer. This indicates that what has previously been considered the range of background sulfate concentrations may not fully define the range of natural concentrations in this aquifer. These exceedances also serve as a reminder that standards established as the 95th percentile will occasionally be exceeded within the range of natural variation. None of the TDS or chloride background concentrations exceeded the proposed background levels for the Middle Chinle aquifer. Only one of the uranium concentrations west of the West Fault slightly exceeded the mixing zone concentration of 0.1 mg/l, while one of the non-mixing zone selenium concentrations also slightly exceeded this background level. None of the molybdenum, nitrate, radium, vanadium or thorium-230 values exceeded the background concentrations for the Middle Chinle aquifer for these constituents.

Figure 3.4-3 presents the Lower Chinle mixing zone in a yellow pattern. This figure also shows which wells were used to establish the background concentrations in the mixing and non-mixing zones of the Lower Chinle aquifer. The 2003 data for the Lower Chinle wells used to define background concentrations are also presented on Figure 3.4-3. One of the non-mixing zone sulfate concentrations in the Lower Chinle aquifer slightly exceeds this background level. This sulfate value is from the furthest down-gradient well and indicates additional data may be needed for some of the farther down-gradient wells. None of the TDS concentrations exceeded the background levels. One of the chloride concentrations exceeded the Lower Chinle non-mixing zone level of 634 mg/l. Additional data may be needed to further define the non-mixing zone background concentration for chloride. Two of the non-mixing zone uranium background concentrations exceeded the level of 0.02 mg/l. None of the selenium, molybdenum, nitrate, radium, vanadium or thorium-230 concentrations in the Lower Chinle background wells exceeded their background levels. The Lower Chinle non-mixing zone background levels are somewhat problematic, because the water quality tends to deteriorate naturally as the ground water moves down-gradient. Therefore, the expected natural water quality deterioration is a function of the distance from the subcrop with the alluvium.

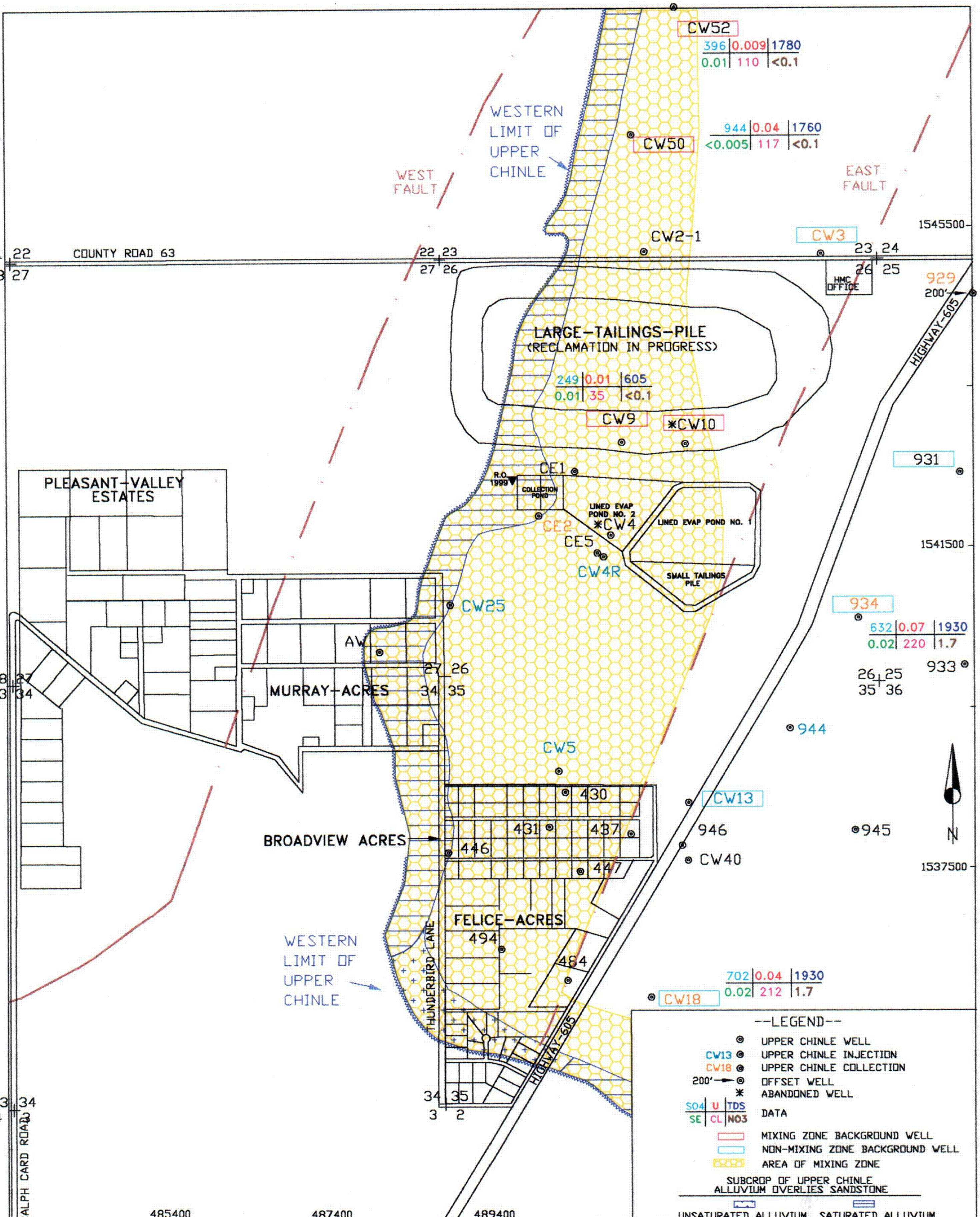

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FIGURE 3.4-1. UPPER CHINLE MIXING ZONE AND BACKGROUND GROUND WATER QUALITY

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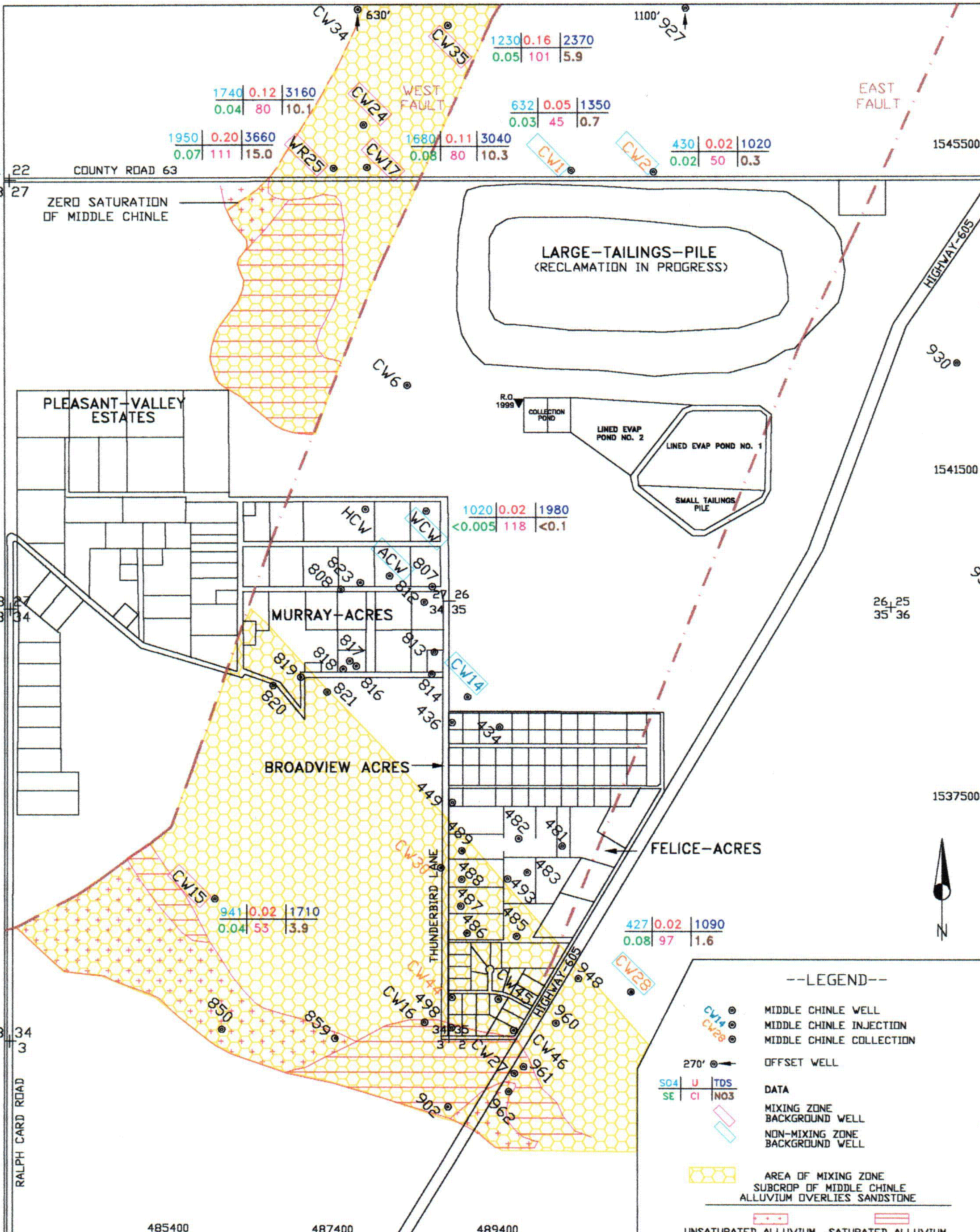

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FIGURE 3.4-2. MIDDLE CHINLE MIXING ZONE AND BACKGROUND GROUND WATER QUALITY

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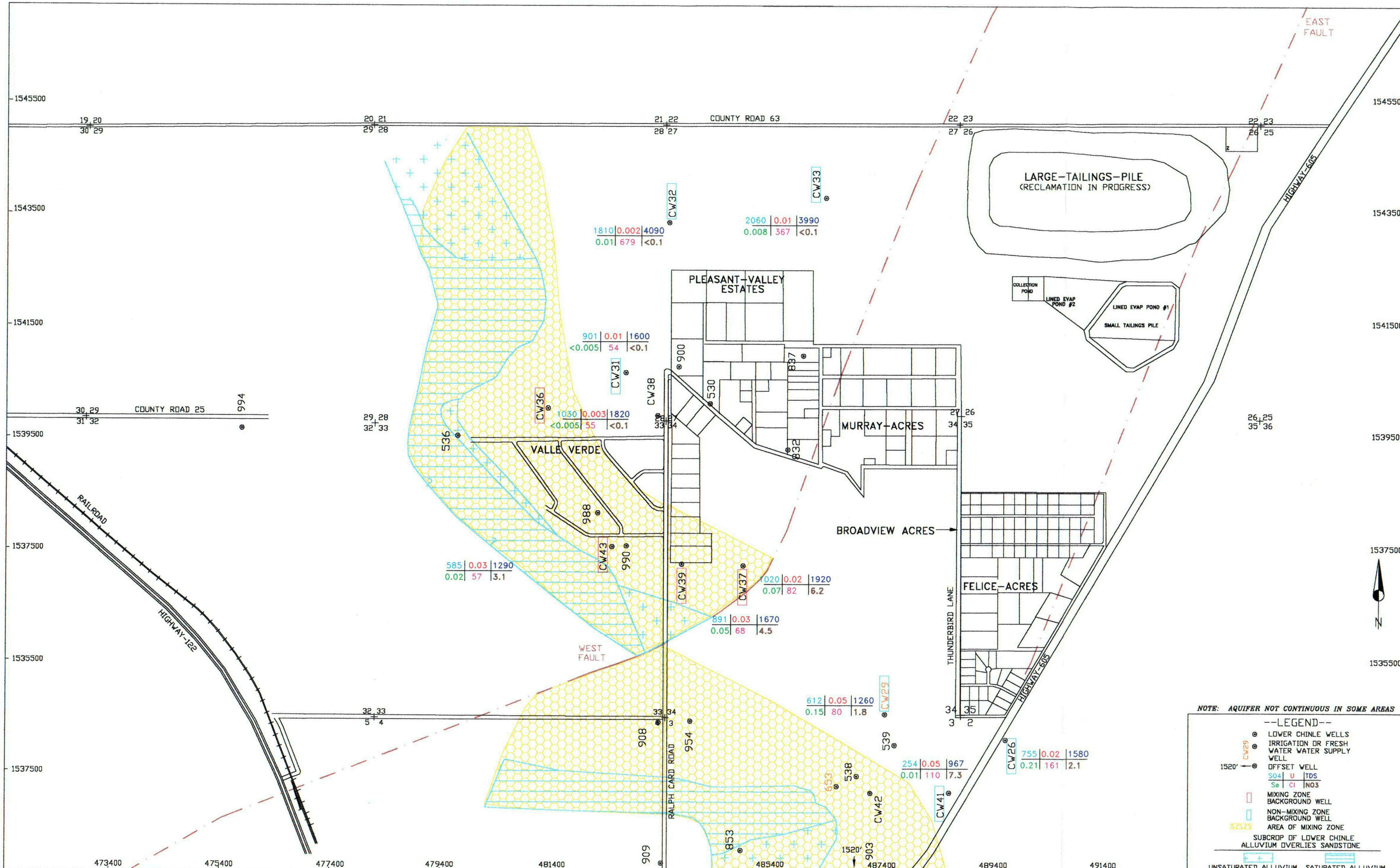

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FIGURE 3.4-3. LOWER CHINLE MIXING ZONE AND BACKGROUND GROUND WATER QUALITY

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TABLE 3.4-1. GRANTS PROJECT-CHINLE BACKGROUND CONCENTRATIONS

Aquifer Zone	CONSTITUENT, concentrations in mg/l except Thorium-230 and Ra226+Ra228 in pCi/l.									
	Selenium	Uranium	Molybdenum	TDS	Sulfate	Chloride	Nitrate	Vanadium	Thorium-230	Ra-226 +Ra-228
Chinle Mixing	0.14	0.18	0.10	3140	1750	96	15	0.08	0.97	4
Upper Chinle Non-Mixing	0.06	0.09	0.08	2010	914	412	4.9	0.02	0.55	4
Middle Chinle Non-Mixing	0.07	0.07	0.05	1560	857	63	4.0	0.02	0.86	4
Lower Chinle Non-Mixing	0.32	0.02	0.03	4140	2000	634	3.0	0.01	0.72	4

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4.0 ALLUVIAL AQUIFER MONITORING

This section presents 2003 monitoring results for the alluvial aquifer. The alluvial aquifer is the most important ground water system at the Grants Project site. The section describing well completions is presented first, and this is followed by sections presenting water-level and water-quality information.

4.1 ALLUVIAL WELL COMPLETIONS

New alluvial wells drilled in 2003 include 1Q, 1R, 1S, 1T, 498 and 538 through 540. Additionally, a 2100 feet long injection line was installed west of the Large Tailings pile at a depth of approximately 6 feet. This injection line is presently being used in conjunction with the WR injection-well line. Operational status and other characteristics of the new and previously installed alluvial wells are discussed in this section. The new 1 series wells were drilled for testing of the lithology and hydraulic properties of the alluvium east of the Small Tailings pile. Wells 498 and 538 are planned as future irrigation supply wells, and wells 539 and 540 will be used for monitoring or fresh-water injection. These four wells were drilled in the southwest corner of Section 35 and northwest quarter of Section 3. Figure 4.1-1 shows the locations of the alluvial wells near the Homestake Grants Project. This figure is plotted at a scale of 1" = 1600'. This figure also shows the location of the new injection line.

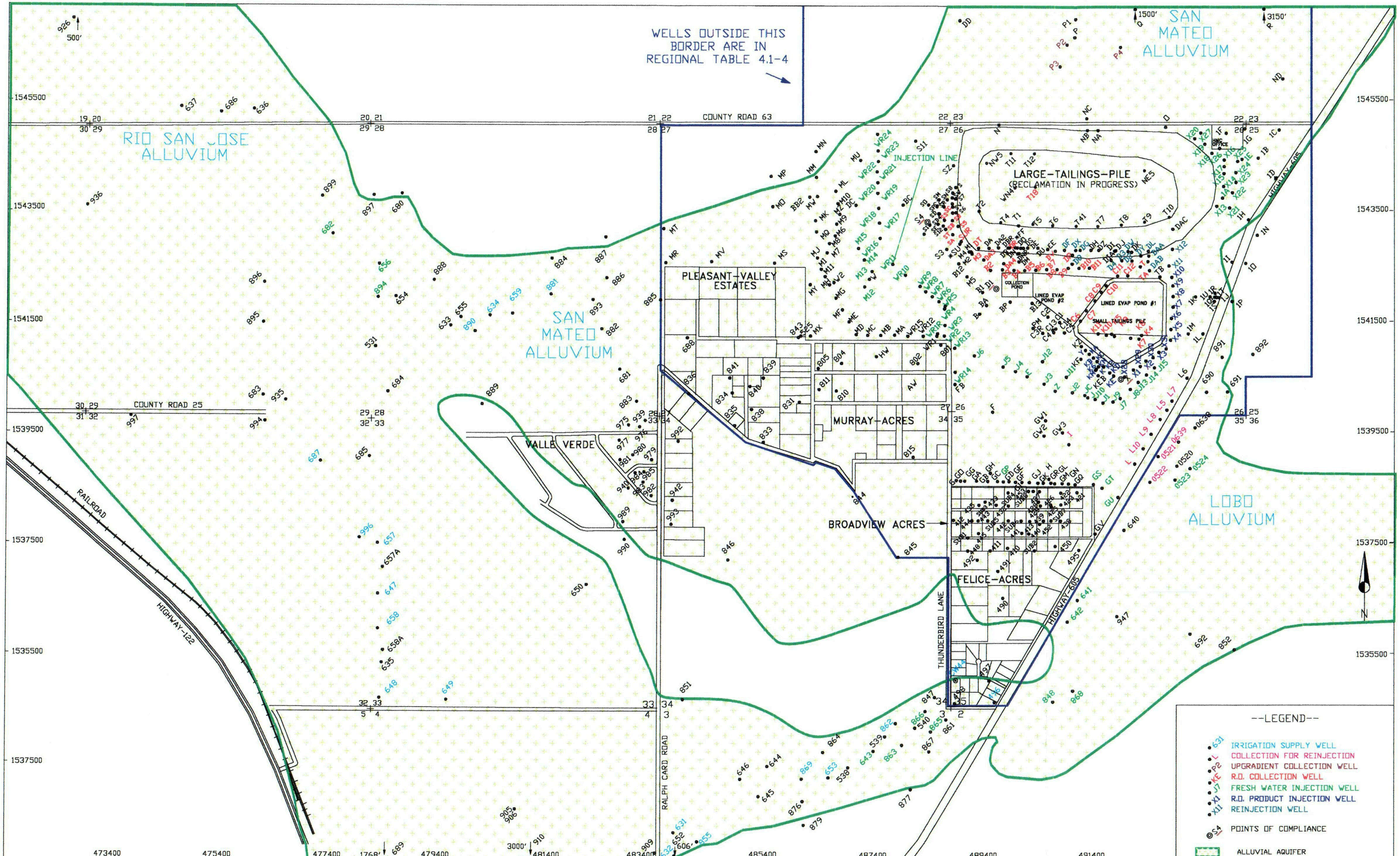
Alluvial wells 914, 920, 921, 922 and 950 are located outside of Figure 4.1-1. Drawing 1.1-1 of Hydro-Engineering, 1996 shows the wells that are located beyond the limits of the figures included in this report.

The currently active injection and collection wells are labeled with different colors on Figure 4.1-1 so that they can be distinguished from monitoring wells. This figure also shows the wells used for irrigation water supply during the 2003 irrigation season. Table 4.1-1 presents basic well data for alluvial wells located on the Grants Project that have been used to define the alluvial ground water hydrology. Many additional alluvial wells outside of the Grants Project have also been used for that purpose. The basic well data table presents the location, well depth, casing diameter, water-level information, depth to the base of the alluvium and casing perforation intervals for each well.

Table 4.1-2 presents the same type of basic well data for alluvial wells in the Broadview and Felice Acres subdivisions. These two subdivisions are located just south of the

Homestake property. Figure 4.1-1 shows the locations of the subdivision wells. Table 4.1-3 presents similar basic data for alluvial wells located in Murray Acres and Pleasant Valley Estates subdivisions.

Table 4.1-4 presents data for regional wells located outside of the subdivisions and the immediate Homestake property around the tailings sites (Grants Project). The limits of the Grants Project site boundary are delineated with a heavy line on Figure 4.1-1 and includes portions of Broadview Acres, Felice Acres, Murray Acres and Pleasant Valley Estates subdivisions. Wells outside this area are considered to be regional, and data for these wells are presented in the regional tables. Over 100 alluvial wells are included on the regional table, which brings the total number of alluvial wells used to characterize this site to more than 400. The wells are listed in numerical or alphabetical order based on their well names.



SCALE: 1"=1600'

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DATE: 02/27/04

HOMESTAKE-MILL-AND-ADJACENT-PROPERTIES
GRANTS-NM-TOWNSHIP-11&12-N-RANGE-10-W

FIGURE 4.1-1. ALLUVIAL WELL LOCATIONS

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TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS.

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
0690	1540279	493465	65.0	5.0	1/12/2004	33.61	6548.45	2.5	6582.06	55	6524.6 A	25-65	23.9
0691	1540276	493860	66.0	5.0	1/12/2004	43.01	6545.80	2.9	6588.81	55	6530.9 A	26-66	14.9
0891	1540904	493751	54.0	5.0	12/19/2002	30.51	6550.61	2.1	6581.12	50	6529.0 A	24-54	21.6
0892	1540954	494317	50.0	5.0	12/19/2002	41.96	6545.25	2.0	6587.21	42	6543.2 A	30-50	2.0
1A	1543790	493768	61.0	5.0	3/10/2003	39.40	6546.03	2.9	6585.43	47	6535.5 A	39-51	10.5
1B	1544502	494412	51.8	5.0	10/30/2001	38.70	6545.72	1.5	6584.42	50	6532.9 A	20-50	12.8
1C	1545018	494799	52.9	5.0	9/28/2000	43.26	6544.73	2.5	6587.99	43	6542.5 A	34-54	2.2
1D	1544142	494752	42.9	5.0	12/19/2002	29.23	6556.74	2.2	6585.97	40	6543.8 A	22-42	13.0
1E	1544481	494116	51.4	5.0	9/24/2001	2.00	6582.31	2.1	6584.31	43	6539.2 A	34-54	43.1
1F	1544952	493831	61.8	5.0	1/8/2004	44.47	6542.91	1.8	6587.38	54	6531.6 A	30-60	11.3
1G	1545034	494170	57.5	5.0	1/8/2004	42.71	6544.36	2.3	6587.07	48	6536.8 A	35-55	7.6
1H	1543363	494266	55.4	5.0	1/8/2004	55.00	6531.39	1.8	6586.39	43	6541.6 A	25-55	0.0
1I	1542627	493928	49.8	5.0	2/24/2003	34.00	6564.35	1.3	6598.35	35	6562.1 A	27-47	2.3
1J	1541986	493695	50.3	5.0	5/21/2003	34.38	6551.02	1.8	6585.40	40	6543.6 A	30-50	7.4
1K	1541992	493275	55.6	5.0	5/21/2003	33.18	6550.95	1.0	6584.13	47	6536.1 A	30-55	14.8
1L	1541256	493416	53.4	5.0	1/8/2004	25.38	6553.23	3.1	6578.61	40	6535.5 A	35-55	17.7
1M	1541327	493133	43.1	5.0	1/8/2004	20.98	6554.55	1.3	6575.53	33	6541.2 A	25-54	13.3
1N	1543100	494396	45.6	5.0	2/24/2003	32.51	6558.34	2.4	6590.85	25	6563.5 A	15-44	0.0
1O	1542592	494175	44.0	5.0	12/19/2002	43.82	6551.12	0.8	6594.94	29	6565.1 A	14-34	0.0
1P	1541902	493924	52.8	5.0	2/24/2003	34.31	6550.93	2.6	6585.24	35	6547.6 A	20-40	3.3
1Q	1541993	493619	56.0	5.0	5/20/2003	33.82	6549.29	1.8	6583.11	56	6525.3 A	36-56	24.0
1R	1542071	493623	56.0	5.0	5/20/2003	34.92	6551.07	1.5	6585.99	56	6528.5 A	36-56	22.6
1S	1541920	493614	56.0	5.0	5/20/2003	32.61	6549.38	1.8	6581.99	56	6524.2 A	36-56	25.2
1T	1541990	493656	56.0	5.0	5/20/2003	33.80	6551.11	1.8	6584.91	56	6527.1 A	36-56	24.0
1U	1542001	493542	44.2	4.0	5/21/2003	35.10	6551.12	3.2	6586.22	—	— A	-	—
* A1	1542365	491539	55.6	4.0	1/12/1994	45.29	6527.86	1.1	6573.15	55	6517.1 A	37-57	10.8
* A2	1542356	491539	46.4	4.0	12/23/1991	47.98	6525.42	1.1	6573.40	—	— A	27-47	—
B	1541684	489311	68.6	4.0	1/26/2004	42.59	6528.31	2.4	6570.90	60	6508.5 A	49-69	19.8
B1	1542071	489370	90.9	5.0	7/13/2000	45.11	6526.54	0.6	6571.65	82	6489.1 A	62-82	37.5
B2	1542475	489515	83.0	5.0	12/5/2000	49.78	6524.47	2.0	6574.25	72	6500.3 A	55-75	24.2
B3	1542480	489731	87.0	5.0	12/5/2000	62.15	6512.14	2.6	6574.29	77	6494.7 A	58-78	17.4
B4	1542471	489942	88.8	5.0	12/5/2000	59.60	6515.06	7.4	6574.66	82	6485.3 A	63-83	29.8
B5	1542474	490141	91.0	5.0	12/5/2000	57.23	6516.23	1.4	6573.46	81	6491.1 A	62-82	25.2
B6	1542478	490341	90.0	5.0	12/5/2000	48.94	6528.75	2.0	6577.69	80	6495.7 A	63-83	33.1
B7	1542488	490540	87.0	5.0	9/22/1995	43.82	6530.58	2.2	6574.40	77	6495.2 A	53-78	35.4
B8	1542488	490734	87.0	5.0	12/5/2000	49.94	6525.81	2.3	6575.75	77	6496.5 A	53-78	29.4

TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
B9	1542514	490935	86.0	5.0	12/5/2000	50.32	6525.85	2.2	6576.17	76	6498.0 A	51-78	27.9
B10	1542517	491133	84.8	5.0	6/26/2002	63.26	6513.51	2.3	6576.77	75	6499.5 A	51-78	14.0
B11	1542517	491329	84.9	5.0	10/14/2003	52.92	6524.47	2.2	6577.39	77	6498.2 A	42-80	26.3
B12	1542600	489000	100.0	5.0	12/12/2003	47.80	6525.20	2.2	6573.00	91	6479.8 A	30-100	45.4
B13	1541870	490200	80.0	5.0	12/12/2003	40.23	6527.77	3.1	6568.00	72	6492.9 A	30-80	34.9
BA	1541835	489440	86.0	5.0	1/26/2004	43.59	6527.99	1.7	6571.58	76	6493.9 A	64-78	34.1
BB2	1543791	486213	56.6	4.0	11/15/2002	53.36	6520.44	0.6	6573.80	—	— A	42-62	—
BC	1543655	487910	82.8	4.0	12/12/2003	47.78	6526.83	2.6	6574.61	75	6497.0 A	63-83	29.8
BP	1541882	489841	85.4	4.0	1/8/2004	44.49	6527.81	3.0	6572.30	75	6494.3 A	40-85	33.5
* C	1541762	490854	79.7	4.0	5/16/1994	41.50	6529.34	0.3	6570.84	75	6495.5 A	59-79	33.8
C1	1541533	490780	76.0	5.0	8/28/2003	34.83	6537.03	0.8	6571.86	67	6504.1 A	41-68	33.0
C2	1541630	490566	76.0	5.0	8/28/2003	31.00	6534.02	0.9	6565.02	66	6498.1 A	42-67	35.9
* C3	1541344	490481	75.0	5.0	6/20/1994	36.20	6532.33	0.9	6568.53	65	6502.6 A	45-67	29.7
C3R	1541338	490472	75.0	5.0	3/7/2002	18.00	6551.29	2.0	6569.29	66	6501.3 A	43-68	50.0
C4	1541348	490675	75.0	5.0	10/2/2000	39.66	6531.18	1.3	6570.84	66	6503.5 A	46-66	27.6
C5	1541344	490869	72.0	5.0	1/12/2004	30.41	6539.44	0.8	6569.85	62	6507.1 A	43-63	32.4
C6	1541533	491142	80.8	5.0	11/17/2003	51.87	6533.02	1.6	6584.89	72	6511.3 A	34-74	21.7
C7	1541734	491280	72.4	5.0	11/17/2003	59.18	6525.26	1.5	6584.44	61	6521.9 A	25-65	3.3
C8	1541906	491415	78.1	5.0	11/17/2003	49.39	6535.10	1.6	6584.49	67	6515.9 A	31-71	19.2
C9	1542075	491545	77.0	5.0	11/17/2003	56.41	6528.14	1.5	6584.55	65	6518.1 A	27-67	10.1
C10	1542182	491629	71.6	5.0	11/17/2003	49.04	6536.22	2.7	6585.26	65	6517.6 A	30-70	18.7
C11	1542376	491844	68.2	5.0	11/17/2003	63.00	6518.38	2.4	6581.38	60	6519.0 A	35-65	0.0
C12	1542375	492029	63.5	5.0	11/17/2003	45.95	6534.60	2.6	6580.55	55	6523.0 A	34-64	11.6
C13	1541394	490655	63.0	5.0	10/29/2001	37.58	6532.43	2.0	6570.01	63	6505.0 A	36-70	27.4
C14	1541413	490713	63.0	5.0	3/7/2002	1.50	6568.19	2.0	6569.69	63	6504.7 A	36-70	63.5
* D	1542127	490118	89.7	4.0	7/28/1986	48.04	6524.85	0.8	6572.89	90	6482.1 A	71-91	42.8
D1	1542140	489615	89.4	4.0	6/24/2003	46.67	6524.23	1.0	6570.90	80	6489.9 A	58-90	34.3
D2	1542641	492107	70.0	5.0	11/29/1999	0.50	6579.67	3.0	6580.17	62	6515.2 A	40-70	64.5
D3	1542646	491917	80.0	5.0	11/29/1999	0.50	6579.63	2.5	6580.13	72	6505.6 A	40-80	74.0
D4	1542652	491724	78.0	5.0	11/29/1999	0.50	6578.93	2.5	6579.43	70	6506.9 A	48-78	72.0
DA	1542864	489488	99.1	5.0	12/4/1997	61.40	6524.15	3.0	6585.55	90	6492.6 A	50-100	31.6
DA2	1542881	489656	82.1	5.0	1/13/1995	51.11	6536.18	2.8	6587.29	83	6501.5 A	64-74	34.7
DA3	1542664	489390	81.0	5.0	—	—	—	2.6	6574.36	72	6499.8 A	30-81	—
DA4	1542598	489756	81.0	5.0	6/26/2002	76.50	6497.47	1.7	6573.97	71	6501.3 A	31-81	0.0
DAA	1542733	492411	62.7	5.0	12/5/2000	2.00	6578.60	2.2	6580.60	54	6524.4 A	30-60	54.2
DAB	1542633	492399	65.1	5.0	12/5/2000	0.50	6579.38	2.3	6579.88	56	6521.6 A	30-60	57.8

TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
DAC	1543218	492851	67.7	5.0	—	—	—	4.1	6620.36	45	6571.3 A	20-30	—
DB	1542874	489842	73.2	5.0	9/8/1998	66.15	6523.33	0.5	6589.48	—	— A	55-85	—
DBR	1542877	489855	55.6	5.0	1/25/1995	52.19	6536.97	4.8	6589.16	—	— A	-	—
DC	1543646	487060	64.1	4.0	12/12/2003	44.38	6526.93	2.7	6571.31	—	— A	45-65	—
DD	1546989	488943	78.5	4.0	6/3/2003	57.71	6534.88	1.9	6592.59	83	6507.7 A	40-80	27.2
DE	1542877	490193	70.2	5.0	10/5/1998	63.70	6527.65	0.8	6591.35	80	6510.6 A	60-90	17.1
DF	1542839	490869	88.5	5.0	5/23/2002	65.06	6525.53	0.6	6590.59	—	— A	65-95	—
DG	1542839	491157	88.9	5.0	5/23/2002	59.80	6531.98	0.4	6591.78	—	— A	65-95	—
DH	1542835	491365	61.7	5.0	12/24/1991	52.65	6538.69	4.8	6591.34	—	— A	65-95	—
DI	1542821	491788	86.1	5.0	12/9/1997	57.87	6531.75	2.3	6589.62	75	6512.3 A	35-85	19.4
DIA	1542821	491793	—	4.0	12/23/1991	50.41	6543.22	1.4	6593.63	—	— A	-	—
DJ	1542821	491793	85.7	5.0	8/24/1988	46.87	6542.69	0.7	6589.56	75	6513.9 A	35-85	28.8
DK	1542799	492094	65.4	5.0	12/23/1991	43.58	6542.33	0.7	6585.91	55	6530.2 A	35-55	12.1
DL	1542813	492398	64.4	5.0	12/5/2000	2.00	6582.87	2.9	6584.87	55	6527.0 A	35-55	55.9
DM	1542628	490035	62.8	5.0	12/14/2000	52.00	6523.08	3.0	6575.08	—	— A	-	—
DN	1542776	490020	66.7	4.0	12/14/2000	51.52	6525.14	3.7	6576.66	—	— A	-	—
DNR	1542779	490031	79.7	4.0	12/5/2000	51.80	6525.26	3.3	6577.06	—	— A	-	—
DO	1542874	490049	75.8	5.0	12/5/2000	65.20	6525.13	1.6	6590.33	75	6513.7 A	65-75	11.4
DP	1542754	491012	79.8	5.0	6/26/2002	53.46	6526.25	3.5	6579.71	—	— A	-	—
DQ	1542592	491006	85.3	5.0	7/11/2002	48.10	6528.33	2.2	6576.43	—	— A	-	—
DR	1542884	489966	87.8	5.0	12/5/2000	66.05	6524.78	2.7	6590.83	85	6503.1 A	65-85	21.6
DS	1542876	490118	—	5.0	8/2/1999	65.22	6523.59	0.9	6588.81	77	6510.9 A	62-77	12.7
DT	1542871	489293	72.3	5.0	12/5/2000	59.80	6524.01	2.7	6583.81	99	6482.1 A	59-99	41.9
DU	1542879	490380	84.6	5.0	7/6/1988	51.56	6539.51	2.9	6591.07	81	6507.2 A	61-81	32.3
DV	1542826	490702	80.0	5.0	6/26/2002	83.45	6502.15	2.9	6585.60	77	6505.7 A	60-80	0.0
DW	1542818	492029	73.4	5.0	12/5/2000	2.50	6586.16	3.6	6588.66	59	6526.1 A	45-60	60.1
DX	1542838	491074	90.0	6.0	8/2/1999	61.80	6530.18	1.0	6591.98	80	6511.0 A	60-90	19.2
DY	1542737	492271	65.7	5.0	12/5/2000	1.50	6579.11	2.3	6580.61	56	6522.3 A	15-65	56.8
DZ	1542834	491501	81.8	5.0	1/26/2004	54.46	6536.07	2.2	6590.53	—	— A	-	—
E	1540553	490187	61.7	4.0	12/5/2000	2.00	6566.94	1.7	6568.94	60	6507.2 A	44-64	59.7
EE	1542853	490523	91.2	5.0	1/31/1995	45.26	6542.85	0.6	6588.11	80	6507.5 A	50-90	35.3
F	1539908	489554	63.8	4.0	7/15/2003	30.80	6534.02	1.2	6564.82	62	6501.6 A	45-65	32.4
FB	1540417	488857	62.0	4.0	1/13/2004	35.53	6530.13	2.0	6565.66	58	6505.7 A	43-58	24.5
* FF	1542878	490017	—	4.0	6/21/1983	41.08	6535.46	0.2	6576.54	124	6452.3 A	52-132	83.1
G	1538672	488890	78.3	4.0	12/11/2003	34.50	6528.59	2.0	6563.09	75	6486.1 A	50-80	42.5
GA	1538657	489255	—	4.0	12/11/2003	32.95	6529.84	1.8	6562.79	62	6499.0 A	45-65	30.8

TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
GB	1538654	489456	65.2	4.0	4/3/2000	4.00	6558.99	1.9	6562.99	64	6497.1 A	45-65	61.9
GC	1538650	489654	—	4.0	12/11/2003	33.82	6531.35	2.5	6565.17	78	6484.7 A	60-80	46.7
GD	1538646	489855	—	4.0	12/4/1995	0.50	6565.12	1.8	6565.62	72	6491.8 A	55-75	73.3
GE	1538637	489972	117.0	4.0	12/11/2003	34.61	6531.66	2.4	6566.27	65	6498.9 A	50-120	32.8
GF	1538632	490097	119.2	4.0	4/3/2000	4.00	6562.01	1.8	6566.01	67	6497.2 A	50-120	64.8
GG	1538662	489055	58.7	4.0	4/3/2000	4.00	6559.13	1.8	6563.13	57	6504.3 A	48-68	54.8
GH	1538807	489509	69.2	4.0	3/10/2003	32.44	6530.32	1.3	6562.76	67	6494.5 A	55-65	35.9
GI	1538631	490218	119.0	4.0	4/3/2000	4.00	6561.85	1.5	6565.85	67	6497.4 A	50-120	64.5
GJ	1538629	490382	119.2	4.0	4/3/2000	4.00	6562.15	2.0	6566.15	65	6499.2 A	50-120	63.0
GK	1538622	490482	115.7	4.0	12/11/2003	33.24	6533.52	2.4	6566.76	67	6497.4 A	50-120	36.2
GL	1538614	490701	119.3	4.0	4/3/2000	4.00	6563.15	2.1	6567.15	71	6494.1 A	50-120	69.1
GM	1538605	490824	118.2	4.0	4/3/2000	4.00	6563.65	2.1	6567.65	69	6496.6 A	50-120	67.1
GN	1538602	490944	116.5	4.0	4/3/2000	4.00	6563.97	1.8	6567.97	70	6496.2 A	50-120	67.8
GO	1538663	488973	122.3	4.0	4/3/2000	4.00	6559.00	1.6	6563.00	75	6486.4 A	50-120	72.6
GP	1538649	489752	121.4	4.0	12/5/2000	5.00	6559.87	2.1	6564.87	68	6494.8 A	50-120	65.1
GQ	1538599	491067	70.0	4.0	12/5/2002	1.77	6566.39	0.9	6568.16	71	6496.3 A	50-70	70.1
GR	1538619	490619	—	4.0	12/23/1991	36.55	6528.66	1.0	6565.21	75	6489.2 A	50-85	39.5
GS	1538597	491408	86.4	5.0	12/5/2000	33.00	6541.31	2.0	6574.31	80	6492.3 A	50-85	49.0
GT	1538534	491565	84.0	5.0	12/5/2000	8.30	6567.87	2.1	6576.17	76	6498.1 A	60-84	69.8
GU	1538367	491854	80.0	5.0	3/7/2002	15.00	6560.65	2.0	6575.65	73	6500.7 A	60-80	60.0
GV	1537701	491428	83.0	5.0	1/8/2004	48.98	6528.40	2.5	6577.38	74	6500.9 A	62-82	27.5
GW1	1539755	490530	73.0	5.0	12/11/2003	29.35	6535.92	1.0	6565.27	65	6499.3 A	48-73	36.6
GW2	1539471	490497	75.0	5.0	12/11/2003	30.73	6535.35	1.0	6566.08	68	6497.1 A	47-75	38.3
GW3	1539532	490835	72.0	5.0	5/4/1993	34.42	6531.86	1.0	6566.28	62	6503.3 A	45-72	28.6
H	1538703	490582	69.3	4.0	12/23/1991	37.93	6528.65	1.8	6566.58	69	6495.8 A	50-70	32.9
I	1539319	490954	70.0	4.0	6/25/2003	30.97	6536.23	1.6	6567.20	68	6497.6 A	52-72	38.6
J	1540174	491302	65.6	4.0	12/5/2000	6.00	6564.19	3.4	6570.19	56	6510.8 A	46-68	53.4
J1	1540082	491585	57.0	6.0	12/5/2000	18.80	6553.05	3.8	6571.85	55	6513.1 A	50-57	40.0
J2	1540271	491013	58.0	6.0	12/5/2000	26.00	6544.19	2.9	6570.19	55	6512.3 A	50-58	31.9
J3	1540414	490499	70.0	6.0	12/5/2000	27.40	6541.74	2.6	6569.14	66	6500.5 A	43-70	41.2
J4	1540643	489974	80.0	6.0	12/5/2000	18.00	6551.52	3.9	6569.52	68	6497.6 A	40-70	53.9
J5	1540728	489747	65.0	6.0	12/5/2000	10.55	6559.24	2.8	6569.79	61	6506.0 A	50-65	53.2
J6	1540919	489221	67.0	6.0	12/5/2000	7.10	6563.00	3.7	6570.10	65	6501.4 A	48-67	61.6
J7	1540168	491892	61.9	5.0	12/5/2000	19.50	6550.88	2.1	6570.38	53	6515.3 A	40-60	35.6
J8	1540318	492064	63.2	5.0	12/5/2000	23.30	6547.49	2.4	6570.79	52	6516.4 A	35-61	31.1
J9	1540101	491759	68.0	5.0	12/5/2000	24.60	6546.60	2.0	6571.20	58	6511.2 A	36-68	35.4

TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
J10	1540138	491436	66.0	5.0	12/5/2000	18.00	6552.91	3.5	6570.91	36	6531.4 A	66-	21.5
J11	1540545	490909	66.0	5.0	12/5/2000	12.00	6557.86	2.0	6569.86	55	6512.9 A	36-66	45.0
J12	1540827	490466	70.0	5.0	12/5/2000	18.44	6551.86	3.0	6570.30	60	6507.3 A	40-70	44.6
J13	1540451	492218	55.0	5.0	2/5/2002	4.00	6564.40	1.8	6568.40	46	6520.6 A	15-55	43.8
J14	1540585	492367	55.0	5.0	2/5/2002	12.90	6556.08	1.7	6568.98	44	6523.3 A	15-55	32.8
J15	1540719	492521	55.0	4.0	2/5/2002	3.10	6566.53	2.2	6569.63	46	6521.4 A	15-55	45.1
JC	1540215	491240	60.0	5.0	12/5/2000	22.10	6546.34	1.8	6568.44	50	6516.6 A	35-55	29.7
K	1540730	491590	61.7	4.0	8/12/2002	2.00	6571.51	3.8	6573.51	60	6509.7 A	44-64	61.8
K2	1540736	491587	58.9	4.0	8/12/2002	14.90	6557.31	2.5	6572.21	58	6511.7 A	46-56	45.6
K3	1540744	491571	56.7	2.0	10/31/1997	43.44	6527.23	1.3	6570.67	—	— A	53-58	—
K4	1541211	492371	86.2	5.0	1/13/2004	66.11	6535.91	2.5	6602.02	80	6519.5 A	65-85	16.4
K5	1541269	491935	86.4	5.0	1/13/2004	57.83	6543.90	2.8	6601.73	80	6518.9 A	55-85	25.0
K6	1540689	491459	58.0	5.0	3/6/2002	13.00	6557.07	2.0	6570.07	—	— A	33-58	—
K7	1541232	492237	86.0	5.0	1/13/2004	53.72	6547.81	2.0	6601.53	79	6520.5 A	56-86	27.3
K8	1541250	492081	86.0	1.0	1/13/2004	63.18	6537.31	2.0	6600.49	78	6520.5 A	66-86	16.8
K9	1541287	491787	86.0	5.0	1/13/2004	61.39	6538.95	2.0	6600.34	79	6519.3 A	56-86	19.6
K10	1541305	491638	87.0	5.0	1/13/2004	56.34	6544.47	2.0	6600.81	81	6517.8 A	47-87	26.7
K11	1541325	491490	84.0	5.0	1/13/2004	62.29	6538.32	2.0	6600.61	78	6520.6 A	64-84	17.7
KA	1540959	491331	67.8	5.0	8/12/2002	13.00	6559.19	1.9	6572.19	65	6505.3 A	42-72	53.9
KB	1540893	491406	61.8	5.0	8/12/2002	0.60	6571.05	0.8	6571.65	60	6510.9 A	40-70	60.2
KC	1540826	491477	68.6	5.0	8/12/2002	0.50	6569.81	0.7	6570.31	59	6510.6 A	42-72	59.2
KD	1540627	491701	62.1	5.0	8/12/2002	1.10	6569.12	0.6	6570.22	—	— A	40-70	—
KE	1540566	491776	60.8	5.0	8/12/2002	9.10	6563.18	2.5	6572.28	—	— A	40-70	—
KEB	1540570	491487	59.9	5.0	3/20/2003	18.64	6551.09	1.5	6569.73	50	6518.2 A	40-60	32.9
KF	1540870	491169	63.5	5.0	3/20/2003	24.83	6545.38	2.2	6570.21	50	6518.0 A	30-60	27.4
KM	1540671	491444	52.4	5.0	3/6/2002	12.20	6557.57	2.2	6569.77	—	— A	-	—
KN	1540734	491492	50.1	5.0	10/11/2002	8.36	6561.23	2.3	6569.59	—	— A	-	—
KZ	1541100	491183	58.4	5.0	1/26/2004	26.68	6545.04	1.2	6571.72	—	— A	-	—
L	1538970	492150	67.0	4.0	1/13/2004	49.63	6525.34	0.8	6574.97	59	6515.2 A	46-66	10.2
L5	1539946	492730	60.2	5.0	1/13/2004	39.23	6536.84	1.3	6576.07	50	6524.8 A	25-55	12.1
L6	1540526	493110	51.1	5.0	1/8/2004	22.01	6552.63	2.1	6574.64	50	6522.5 A	25-55	30.1
L7	1540113	492842	67.8	5.0	1/13/2004	42.81	6533.80	2.3	6576.61	62	6512.3 A	36-66	21.5
L8	1539773	492621	73.9	5.0	1/13/2004	44.26	6532.23	2.1	6576.49	65	6509.4 A	32-72	22.8
L9	1539509	492463	74.9	5.0	1/13/2004	43.78	6533.45	2.2	6577.23	64	6511.0 A	43-73	22.4
L10	1539250	492310	74.2	5.0	1/13/2004	46.50	6530.33	2.0	6576.83	63	6511.8 A	53-73	18.5
M1	1542797	489157	103.4	4.0	1/3/1989	79.80	6505.17	1.5	6584.97	120	6463.5 A	66-106	41.7

TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL			MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
					DATE	DEPTH (FT-MP)	ELEV. (FT-MSL)						
M2	1542785	489159	40.4	4.0	1/20/1995	34.85	6541.41	1.4	6576.26	—	— A	-	—
M3	1542805	489151	105.3	4.0	6/26/2002	65.80	6510.30	1.0	6576.10	—	— A	79-99	—
M4	1542804	489134	81.8	5.0	10/31/2000	56.72	6521.54	3.7	6578.26	—	— A	78-82	—
M5	1542360	489080	92.3	5.0	1/12/2004	49.61	6525.73	3.2	6575.34	84	6488.1 A	60-90	37.6
M6	1543097	486674	110.0	5.0	12/12/2003	65.10	6509.94	2.2	6575.04	65	6507.9 A	60-110	2.1
M7	1542790	486523	83.0	5.0	12/12/2003	60.33	6512.52	2.4	6572.85	71	6499.4 A	63-83	13.1
M8	1542960	486567	83.0	5.0	9/5/2000	33.71	6541.52	2.4	6575.23	57	6515.8 A	53-83	25.7
M9	1543310	486699	103.0	5.0	12/12/2003	65.10	6511.71	3.5	6576.81	78	6495.3 A	63-103	16.4
M10	1543677	486723	88.0	5.0	12/12/2003	65.10	6508.26	2.3	6573.36	86	6485.1 A	58-88	23.2
M11	1542358	486486	118.0	5.0	12/8/2003	53.98	6519.24	3.2	6573.22	109	6461.0 A	58-118	58.2
M12	1542174	487209	124.0	5.0	12/5/2000	3.87	6569.64	2.5	6573.51	118	6453.0 A	57-124	116.7
M13	1542450	487336	117.0	5.0	12/5/2000	29.81	6546.35	3.0	6576.16	108	6465.2 A	57-117	81.2
M14	1542661	487216	117.0	5.0	12/5/2000	29.42	6547.75	2.7	6577.17	109	6465.5 A	57-117	82.3
M15	1542872	487094	102.0	5.0	12/5/2000	3.71	6575.37	3.5	6579.08	93	6482.6 A	52-102	92.7
MA	1541290	487767	85.0	4.0	12/12/2003	46.15	6526.07	1.0	6572.22	85	6486.2 A	70-85	39.8
MB	1541296	487512	90.0	4.0	9/5/2000	2.05	6570.01	1.0	6572.06	85	6486.1 A	60-90	84.0
MC	1541304	487264	100.0	4.0	12/5/2002	45.80	6526.26	1.0	6572.06	95	6476.1 A	70-100	50.2
MD	1541311	487050	105.0	4.0	9/5/2000	2.00	6569.46	1.0	6571.46	105	6465.5 A	75-105	104.0
ME	1541537	486934	105.0	4.0	9/5/2000	1.61	6569.31	1.0	6570.92	105	6464.9 A	75-105	104.4
MF	1541757	486808	110.0	4.0	12/12/2003	49.95	6522.33	1.0	6572.28	110	6461.3 A	90-110	61.0
MG	1541972	486694	110.0	4.0	9/5/2000	1.72	6571.36	1.0	6573.08	110	6462.1 A	90-110	109.3
MH	1542208	486569	110.0	4.0	12/12/2003	55.20	6518.72	1.0	6573.92	110	6462.9 A	90-110	55.8
MI	1542486	486413	110.0	4.0	9/5/2000	2.24	6574.03	1.0	6576.27	110	6465.3 A	90-110	108.8
MJ	1542682	486350	60.0	4.0	12/5/2002	54.23	6518.71	1.8	6572.94	60	6511.1 A	40-60	7.6
MK	1543373	486324	57.0	4.5	12/5/2002	60.10	6513.69	1.5	6573.79	92	6480.3 A	-	33.4
ML	1543902	486691	76.0	5.0	12/12/2003	49.21	6523.49	2.3	6572.70	80	6490.4 A	56-76	33.1
MM	1544154	486324	63.0	5.0	9/5/2000	3.46	6573.99	2.4	6577.45	50	6525.1 A	33-63	48.9
MN	1544613	486325	63.0	5.0	12/18/1996	64.15	6513.41	1.9	6577.56	42	6533.7 A	23-63	0.0
MO	1543620	485518	88.0	4.5	10/13/2003	66.22	6506.67	2.0	6572.89	80	6490.9 A	45-85	15.8
MP	1544164	485492	80.0	5.0	12/18/1996	62.66	6511.82	2.1	6574.48	50	6522.4 A	33-63	0.0
MQ	1543173	486326	98.0	5.0	1/12/2004	66.60	6507.70	1.6	6574.30	88	6484.7 A	58-98	23.0
MR	1542609	483574	100.0	5.0	1/19/2004	70.19	6496.07	1.8	6566.26	100	6464.5 A	54-94	31.6
MS	1542607	485570	82.0	5.0	1/19/2004	63.49	6507.18	1.5	6570.67	89	6480.2 A	52-82	27.0
MT	1543221	483531	98.0	4.5	1/19/2004	69.94	6497.49	2.3	6567.43	87	6478.1 A	34-94	19.4
MU	1544461	487143	80.0	5.0	1/15/2004	44.31	6529.88	1.5	6574.19	72	6500.7 A	50-80	29.2
MV	1542618	484418	105.0	4.5	10/22/1998	65.97	6503.81	1.3	6569.78	95	6473.5 A	75-105	30.3

TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
MW	1543802	486346	85.0	5.0	12/12/2003	63.53	6511.38	1.9	6574.91	83	6490.0 A	35-85	21.4
MX	1541287	486244	103.0	5.0	1/15/2004	53.58	6515.03	1.7	6568.61	94	6472.9 A	63-103	42.1
MY	1542200	486213	112.0	5.0	1/15/2004	59.32	6514.24	3.0	6573.56	102	6468.6 A	72-112	45.7
MZ	1543485	486757	92.0	5.0	12/8/2003	67.83	6508.81	3.0	6576.64	84	6489.6 A	60-92	19.2
N	1545101	489665	92.0	4.0	8/28/2003	51.46	6532.51	0.9	6583.97	80	6503.1 A	54-94	29.4
NA	1545000	491488	91.4	5.0	9/2/2003	55.49	6535.49	1.1	6590.98	80	6509.9 A	50-90	25.6
NB	1545000	491296	96.4	5.0	8/28/2003	48.72	6544.58	3.5	6593.30	80	6509.8 A	50-90	34.8
NC	1545220	491282	95.0	4.0	8/28/2003	51.38	6534.45	0.8	6585.83	85	6500.0 A	65-95	34.4
ND	1545927	494872	70.0	4.0	5/22/2003	47.51	6545.38	1.1	6592.89	65	6526.8 A	50-70	18.6
NE5	1544279	492332	156.8	5.0	2/28/2002	64.81	6602.19	3.2	6667.00		— T	50-110	—
										150	6513.8 A	135-155	88.4
NW5	1544408	489433	149.8	5.0	2/28/2002	114.58	6543.00	2.7	6657.58		— T	39-79	—
										155	6499.9 A	119-159	43.1
O	1545060	492725	69.9	4.0	1/15/2004	47.58	6540.25	1.3	6587.83	77	6509.5 A	40-70	30.7
P	1546691	491058	109.1	4.0	7/15/2003	52.61	6534.65	1.7	6587.26	107	6478.6 A	82-112	56.1
P1	1547017	491060	105.0	6.0	11/28/2000	55.75	6536.72	0.8	6592.47	105	6486.7 A	60-105	50.1
P2	1546555	490912	105.0	6.0	12/9/2003	59.41	6530.38	0.9	6589.79	105	6483.9 A	60-105	46.5
P3	1546159	490785	95.0	5.0	12/9/2003	66.14	6523.81	2.2	6589.95	85	6502.8 A	55-95	21.1
P4	1546504	491899	92.0	5.0	12/9/2003	50.78	6538.74	3.6	6589.52	84	6501.9 A	52-92	36.8
PM	1541426	490292	81.9	4.0	1/12/2004	12.33	6555.09	1.8	6567.42	—	— A	-	—
Q	1548693	492153	98.3	4.0	5/15/2003	49.81	6544.01	2.3	6593.82	100	6491.5 A	72-102	52.5
R	1550372	494514	85.0	4.0	5/15/2003	43.08	6560.95	0.3	6604.03	95	6508.7 A	60-90	52.2
S	1543871	488816	72.2	4.0	1/12/2004	53.96	6527.21	2.0	6581.17	75	6504.2 A	52-72	23.0
S1	1543288	488401	85.0	2.0	1/26/2004	49.93	6525.26	5.3	6575.19	85	6484.9 A	60-85	40.4
S2	1543127	488299	100.0	3.0	1/26/2004	47.92	6525.80	2.0	6573.72	100	6471.7 A	90-100	54.1
S3	1542857	488714	122.6	5.0	1/12/2004	49.82	6524.96	6.2	6574.78	116	6452.6 A	80-120	72.4
S4	1543344	488359	112.4	5.0	7/15/2003	52.32	6522.97	2.3	6575.29	108	6465.0 A	50-110	58.0
S5	1543269	488923	115.0	5.0	6/26/2002	62.50	6512.19	1.0	6574.69	105	6468.7 A	54-106	43.5
S6	1543515	488874	113.2	5.0	1/3/2000	55.85	6524.22	1.3	6580.07	105	6473.8 A	55-105	50.5
S7	1543763	488874	97.0	5.0	1/4/1999	57.38	6522.51	1.0	6579.89	82	6496.9 A	40-84	25.6
S8	1543968	488879	43.8	5.0	8/22/1995	43.28	6537.06	1.0	6580.34	40	6539.3 A	12-42	0.0
S11	1544793	488150	76.2	5.0	1/12/2004	48.42	6529.97	1.9	6578.39	70	6506.5 A	48-78	23.5
S12	1543297	488628	93.0	5.0	12/12/2003	55.56	6523.29	2.1	6578.85	80	6496.7 A	53-93	26.5
SA	1543122	488811	123.7	5.0	12/5/2000	67.24	6513.07	1.0	6580.31	115	6464.3 A	100-130	48.8
SB	1543371	488811	125.0	5.0	12/5/2000	57.43	6523.66	0.9	6581.09	115	6465.2 A	100-130	58.5
SC	1543617	488815	105.4	5.0	12/5/2000	57.11	6521.69	1.2	6578.80	103	6474.6 A	55-105	47.1

TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
SD	1543490	488564	90.1	5.0	12/23/1991	63.14	6515.17	0.6	6578.31	107	6470.7 A	50-110	44.5
SD4	1543497	488556	95.0	5.0	6/1/1993	61.44	6517.33	1.1	6578.77	95	6482.7 A	45-95	34.7
SE	1543301	488550	111.8	5.0	3/19/2001	55.38	6522.61	0.5	6577.99	88	6489.5 A	50-90	33.1
SE4	1543308	488560	105.3	2.0	3/19/2001	53.71	6524.29	—	6578.00	—	— A	-	—
SM	1543748	488566	86.0	5.0	5/28/2003	55.61	6523.13	0.7	6578.74	—	— A	-	—
SN	1543752	488716	67.5	4.0	12/5/2000	55.48	6523.78	1.1	6579.26	—	— A	-	—
SO	1543652	488381	92.3	5.0	1/26/2004	53.19	6525.60	0.6	6578.79	—	— A	-	—
SP	1543630	488531	94.4	4.0	1/26/2004	53.66	6525.00	2.0	6578.66	—	— A	-	—
SQ	1543507	488814	95.0	5.0	6/26/2002	58.18	6521.02	0.9	6579.20	95	6483.3 A	55-95	37.7
SR	1543611	488669	95.0	5.0	11/2/1998	58.25	6520.94	0.8	6579.19	95	6483.4 A	50-90	37.6
SS	1543374	488666	101.0	5.0	6/26/2002	63.87	6514.51	1.2	6578.38	90	6487.2 A	51-101	27.3
ST	1543215	488688	97.0	5.0	6/26/2002	59.31	6520.00	2.2	6579.31	96	6481.1 A	55-97	38.9
SU	1542946	488953	110.0	5.0	9/5/1995	35.60	6542.50	0.7	6578.10	110	6467.4 A	50-110	75.1
SUR	1542991	488968	115.0	5.0	6/26/2002	62.86	6517.86	2.6	6580.72	106	6472.1 A	35-115	45.7
SV	1543676	488813	78.2	6.0	6/26/2002	64.60	6514.65	1.7	6579.25	100	6477.6 A	55-105	37.1
SW	1543783	488812	81.9	6.0	5/28/2003	60.54	6520.75	2.9	6581.29	75	6503.4 A	35-80	17.4
SX	1544510	489025	45.0	5.0	—	—	—	1.0	6581.49	40	6540.5 A	20-40	—
SZ	1544367	488833	62.6	5.0	12/5/2000	49.63	6531.84	0.4	6581.47	60	6521.1 A	40-70	10.8
T	1542536	492260	70.2	4.0	9/22/2003	35.30	6543.93	2.4	6579.23	68	6508.8 A	61-71	35.1
T1	1543285	490027	—	5.0	12/6/2002	102.40	6561.51	1.0	6663.91	161	6501.9 A	121-171	59.6
T2	1543538	489303	186.0	5.0	1/22/2004	131.28	6533.54	1.6	6664.82	180	6483.2 A	100-186	50.3
T4	1543340	489699	205.0	5.0	1/22/2004	129.74	6528.00	2.9	6657.74	175	6479.8 A	145-205	48.2
T5	1543307	490289	182.0	5.0	1/22/2004	120.65	6536.68	3.1	6657.33	151	6503.2 A	122-182	33.4
T6	1543282	490655	160.0	5.0	12/11/2003	106.47	6552.30	3.3	6658.77	156	6499.5 A	130-160	52.8
T7	1543272	491484	160.0	5.0	12/11/2003	124.35	6535.32	2.4	6659.67	142	6515.3 A	130-160	20.1
T8	1543296	491914	162.0	5.0	12/11/2003	123.65	6537.96	2.6	6661.61	158	6501.0 A	132-162	36.9
T9	1543347	492337	141.0	5.0	12/11/2003	92.90	6571.05	3.3	6663.95	138	6522.7 A	121-141	48.4
T10	1543434	492791	148.0	5.0	12/11/2003	106.12	6553.84	2.4	6659.96	142	6515.6 A	108-148	38.3
T11	1544585	489887	193.0	5.0	12/11/2003	124.30	6532.51	2.8	6656.81	160	6494.0 A	113-193	38.5
T12	1544583	490317	200.0	5.0	12/11/2003	63.34	6593.89	2.8	6657.23	170	6484.4 A	120-200	109.5
T18	1543977	490333	195.0	5.0	1/22/2004	133.00	6532.16	2.9	6665.16	162	6500.3 A	115-195	31.9
T41	1543278	491079	160.0	5.0	12/11/2003	125.72	6534.24	3.2	6659.96	155	6501.8 A	130-160	32.5
TA	1542471	492426	62.4	5.0	9/22/2003	39.20	6541.10	2.4	6580.30	55	6522.9 A	35-65	18.2
TB	1542351	492616	64.4	5.0	10/1/2002	39.58	6543.99	1.9	6583.57	55	6526.7 A	35-65	17.3
W	1542302	487297	99.3	4.0	1/12/2004	48.53	6523.61	0.3	6572.14	117	6454.8 A	58-118	68.8
W2	1542251	486654	79.1	4.0	3/2/1998	56.21	6515.29	0.9	6571.50	—	— A	-	—

TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
WN4	1543958	489961	142.4	5.0	3/21/2002	94.96	6567.82	3.0	6662.78		— T	40-100	—
										165	6494.8 A	50-190	73.0
WR1	1541280	488529	—	5.0	6/27/1989	46.54	6521.86	0.8	6568.40	—	— A	-	—
WR1R	1541302	488536	85.0	5.0	12/5/2000	28.62	6539.85	0.0	6568.47	85	6483.5 A	-	56.4
WR2	1541290	488678	94.1	5.0	12/5/2000	2.52	6566.07	0.9	6568.59	85	6482.7 A	65-95	83.4
WR3	1541490	488671	82.3	5.0	12/5/2000	32.96	6536.58	2.7	6569.54	83	6483.8 A	63-93	52.7
WR4	1541788	488678	62.0	5.0	12/5/2000	1.92	6570.89	0.0	6572.81	—	— A	-	—
WR5	1541813	488683	72.4	5.0	12/5/2000	38.69	6532.54	0.6	6571.23	80	6490.6 A	60-80	41.9
WR6	1541902	488566	96.8	5.0	12/5/2000	3.04	6569.99	1.3	6573.03	84	6487.7 A	55-85	82.3
WR7	1541997	488456	97.3	5.0	12/5/2000	38.91	6534.82	2.0	6573.73	84	6487.8 A	55-85	47.0
WR8	1542095	488328	110.2	5.0	12/5/2000	38.72	6533.88	0.4	6572.60	100	6472.2 A	50-100	61.7
WR9	1542185	488217	111.3	5.0	12/5/2000	46.82	6526.23	0.8	6573.05	100	6472.3 A	50-100	54.0
WR10	1542389	487961	120.6	5.0	1/29/2003	14.84	6558.35	0.7	6573.19	110	6462.5 A	60-110	95.9
WR11	1542586	487728	120.5	5.0	1/29/2003	14.88	6559.61	0.3	6574.49	110	6464.2 A	60-110	95.4
WR12	1541280	488277	96.7	4.0	12/12/2003	42.90	6525.29	1.1	6568.19	85	6482.1 A	55-85	43.2
WR13	1541068	488861	70.0	5.0	12/5/2000	18.98	6550.19	3.2	6569.17	60	6506.0 A	50-60	44.2
WR14	1540638	488863	70.0	5.0	5/28/2003	15.50	6551.41	2.3	6566.91	61	6503.6 A	50-60	47.8
WR15	1541280	488016	70.0	4.0	5/28/2003	10.90	6560.29	0.0	6571.19	75	6496.2 A	60-75	64.1
WR16	1543051	487495	122.3	5.0	1/29/2003	6.54	6566.24	1.9	6572.78	100	6470.9 A	40-120	95.4
WR17	1543328	487485	124.4	5.0	1/29/2003	2.45	6570.64	2.2	6573.09	75	6495.9 A	40-120	74.7
WR18	1543597	487465	73.6	5.0	1/29/2003	2.97	6569.94	2.2	6572.91	70	6500.7 A	20-70	69.2
WR19	1543873	487458	87.8	5.0	1/29/2003	3.31	6571.62	2.2	6574.93	74	6498.7 A	25-85	72.9
WR20	1544059	487449	102.3	5.0	1/29/2003	3.98	6570.49	2.1	6574.47	80	6492.4 A	42-102	78.1
WR21	1544241	487449	88.9	5.0	1/29/2003	6.28	6569.77	2.1	6576.05	77	6497.0 A	28-88	72.8
WR22	1544434	487462	91.5	5.0	1/29/2003	3.44	6574.45	2.4	6577.89	86	6489.5 A	30-90	85.0
WR23	1544632	487445	94.3	5.0	1/29/2003	1.72	6574.75	2.2	6576.47	77	6497.3 A	32-92	77.5
WR24	1544938	487438	89.2	5.0	1/29/2003	2.04	6586.63	3.0	6588.67	82	6503.7 A	50-90	83.0
X	1540512	491892	50.7	4.0	12/29/2003	18.00	6553.61	1.7	6571.61	—	— A	-	—
X1	1540671	492129	54.0	5.0	8/12/2002	7.50	6566.04	3.9	6573.54	47	6522.6 A	37-47	43.4
X2	1540836	492363	53.0	6.0	8/12/2002	2.50	6569.43	1.9	6571.93	45	6525.0 A	40-45	44.4
X3	1540992	492599	52.0	5.0	8/12/2002	2.50	6570.78	2.0	6573.28	42	6529.3 A	32-42	41.5
X4	1541210	492814	54.0	5.0	8/12/2002	13.10	6563.84	3.2	6576.94	45	6528.7 A	37-45	35.1
X5	1541408	492821	44.0	6.0	8/12/2002	7.80	6569.81	3.6	6577.61	35	6539.0 A	24-36	30.8
X6	1541609	492828	46.0	6.0	8/12/2002	8.00	6570.72	3.5	6578.72	35	6540.2 A	22-37	30.5
X7	1541808	492851	56.0	6.0	12/5/2000	8.60	6571.83	3.4	6580.43	45	6532.0 A	32-46	39.8
X8	1542007	492852	61.0	5.0	12/5/2000	13.00	6568.76	3.4	6581.76	51	6527.4 A	32-52	41.4

TABLE 4.1-1. WELL DATA FOR THE HOMESTAKE ALLUVIAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
X9	1542194	492852	61.0	5.0	12/5/2000	27.00	6555.92	3.6	6582.92	51	6528.3 A	24-52	27.6
X10	1542352	492835	61.0	5.0	8/12/2002	4.00	6578.43	3.6	6582.43	53	6525.8 A	30-55	52.6
X11	1542553	492782	57.0	5.0	12/5/2000	0.50	6581.50	3.0	6582.00	53	6526.0 A	17-57	55.5
X12	1542861	492852	57.0	5.0	12/5/2000	0.50	6582.83	3.0	6583.33	53	6527.3 A	17-57	55.5
X13	1543640	493665	56.0	5.0	4/9/2002	40.76	6546.18	2.5	6586.94	51	6533.4 A	16-56	12.7
X14	1544002	493777	56.0	5.0	4/9/2002	39.80	6546.40	2.1	6586.20	49	6535.1 A	16-56	11.3
X15	1544222	493800	57.0	5.0	4/9/2002	40.54	6542.37	2.3	6582.91	51	6529.6 A	17-57	12.8
X16	1544473	493795	47.0	5.0	4/9/2002	40.64	6544.15	2.3	6584.79	47	6535.5 A	22-47	8.7
X17	1544356	493793	55.0	5.0	4/9/2002	41.06	6544.78	3.3	6585.84	48	6534.6 A	35-55	10.2
X18	1544593	493569	57.0	5.0	4/9/2002	29.06	6557.02	3.8	6586.08	49	6533.3 A	37-57	23.8
X19	1544753	493437	63.0	5.0	4/9/2002	45.56	6539.64	4.5	6585.20	56	6524.8 A	33-63	14.9
X20	1544855	493256	71.0	5.0	4/9/2002	47.00	6538.73	3.5	6585.73	64	6518.2 A	31-71	20.5
X21	1543606	493894	55.0	5.0	12/5/2000	38.99	6547.34	2.7	6586.33	51	6532.6 A	35-55	14.7
X22	1543874	493946	56.0	5.0	12/5/2000	39.21	6546.49	2.6	6585.70	50	6533.1 A	36-56	13.4
X23	1544064	494012	56.0	5.0	12/5/2000	38.96	6546.98	2.8	6585.94	47	6536.1 A	36-56	10.8
X24	1544244	494011	56.0	5.0	12/5/2000	39.94	6545.78	2.6	6585.72	46	6537.1 A	36-56	8.7
X25	1544445	494042	53.0	5.0	12/5/2000	39.41	6546.22	2.8	6585.63	46	6536.9 A	33-53	9.3
X26	1544693	493702	53.0	5.0	12/5/2000	35.34	6552.30	2.8	6587.64	43	6541.8 A	33-53	10.5
X27	1544953	493374	71.0	5.0	12/5/2000	46.27	6539.03	5.1	6585.30	64	6516.2 A	31-71	22.8
X28	1540545	491971	56.0	5.0	8/12/2002	8.30	6561.66	2.0	6569.96	48	6520.0 A	16-56	41.7
X29	1540735	492256	51.0	5.0	8/12/2002	4.00	6566.03	2.0	6570.03	43	6525.0 A	11-51	41.0
X30	1540897	492493	51.0	5.0	8/12/2002	3.00	6569.53	2.0	6572.53	43	6527.5 A	11-51	42.0
X31	1541052	492731	51.0	5.0	8/12/2002	8.00	6566.13	2.0	6574.13	44	6528.1 A	11-51	38.0
Y	1541025	491256	60.8	4.0	10/15/2002	15.20	6557.68	2.4	6572.88	57	6513.5 A	54-59	44.2
Z	1540290	490701	73.9	4.0	12/5/2000	5.00	6564.22	0.6	6569.22	68	6500.6 A	60-70	63.6

Note: A = Alluvial Aquifer, Base
T = Tailings Aquifer
* = Well Abandoned
MP = Measuring Point
LSD = Land Surface Datum
IN = Inches
FT = Feet
MSL = Mean Sea Level

TABLE 4.1-2. WELL DATA FOR THE ALLUVIAL AQUIFER BROADVIEW AND FELICE ACRES WELLS.

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
						Broadview							
0410	1537440	489840	105.0	6.0	8/26/2003	36.60	6523.06	0.0	6559.66	75	6484.7 A	90-105	38.4
0411	1537400	489510	70.0	6.0	8/7/1996	35.10	6524.90	0.0	6560.00	70	6490.0 A	65-70	34.9
0412	1537940	488830	—	6.0	—	—	—	0.0	6561.00	—	— A	-	—
0413	1537900	490100	—	—	4/27/1994	35.25	6530.75	0.0	6566.00	—	— A	-	—
0421	1538450	491100	88.0	5.0	1/30/1996	37.58	6534.42	0.9	6572.00	92	6479.1 A	72-102	55.3
0422	1538440	490810	80.0	4.0	4/6/1994	32.82	6537.18	0.0	6570.00	75	6495.0 A	60-80	42.2
0423	1538230	490800	—	—	—	—	—	0.0	6570.00	—	— A	-	—
0425	1538430	490630	90.0	6.0	4/7/1994	32.42	6534.58	0.0	6567.00	71	6496.0 A	50-90	38.6
0426	1538230	490620	100.0	—	11/10/1981	30.65	6534.35	0.0	6565.00	80	6485.0 A	80-100	49.4
0427	1538450	490410	121.0	6.0	4/12/1994	35.00	6535.00	0.0	6570.00	81	6489.0 A	62-120	46.0
0428	1538280	490390	110.0	4.0	—	—	—	0.0	6570.00	66	6504.0 A	83-104	—
0429	1538210	490430	100.0	6.0	9/1/1995	37.21	6532.79	0.0	6570.00	74	6496.0 A	58-75	36.8
0430	1538469	490300	145.0	—	—	—	—	0.0	6568.00	72	6496.0 A	-	—
											6433.0 U	-	
0431	1538045	490090	130.0	6.0	4/12/1994	35.00	6533.00	0.0	6568.00	60	6508.0 A	125-130	25.0
											6450.0 U	125-130	
0432	1538210	489840	—	—	—	—	—	0.0	6565.00	—	— A	-	—
0433	1538220	489620	90.0	4.0	5/2/1997	36.05	6527.95	1.5	6564.00	75	6487.5 A	58-84	40.5
0435	1538220	489300	85.0	6.0	3/25/2003	34.48	6526.52	1.3	6561.00	85	6474.7 A	-	51.8
0438	1537940	490810	120.0	4.0	—	—	—	0.0	6571.00	105	6466.0 A	70-100	—
0439	1537940	490490	97.0	4.0	8/7/1996	39.80	6527.20	0.0	6567.00	75	6492.0 A	77-97	35.2
0440	1537700	490230	—	—	—	—	—	0.0	6566.00	—	— A	-	—
0441	1537720	490090	116.0	6.0	1/30/1995	35.19	6530.81	0.0	6566.00	78	6488.0 A	106-116	42.8
0442	1537940	489840	100.0	4.0	8/7/1996	37.15	6527.85	0.0	6565.00	80	6485.0 A	70-100	42.8
0443	1537940	489280	—	4.0	—	—	—	0.0	6561.00	75	6486.0 A	60-80	—
0444	1537940	489180	80.0	—	5/18/1994	28.84	6532.16	0.0	6561.00	—	— A	-	—
0445	1537720	489300	108.0	6.0	—	—	—	0.0	6561.00	79	6482.0 A	75-105	—
0446	1537720	488850	110.0	6.0	9/8/1983	41.28	6518.72	0.0	6560.00	60	6500.0 A	60-95	18.7
											6500.0 U	60-95	
0447	1537490	490480	142.0	6.0	4/11/1985	41.18	6526.82	0.0	6568.00	80	6488.0 A	120-142	38.8
											6430.0 U	120-142	
0448	1537400	489100	—	—	—	—	—	0.0	6561.00	—	— A	-	—
0450	1537480	490710	—	6.0	1/25/1995	42.29	6528.71	0.0	6571.00	85	6486.0 A	70-105	42.7
• 0451	1537700	490600	—	—	—	—	—	0.0	0.00	—	— A	-	—
0452	1537880	490420	100.0	4.0	8/7/1996	41.20	6525.80	0.8	6567.00	85	6481.2 A	40-100	44.6

TABLE 4.1-2. WELL DATA FOR THE ALLUVIAL AQUIFER BROADVIEW AND FELICE ACRES WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFORATIONS (FT-LSD)	SATURATED THICKNESS
0453	1538375	490300	110.0	4.0	7/1/2002	34.93	6533.07	0.9	6568.00	80	6487.1 A	60-110	46.0
* 0454	1537920	489025	—	4.0	—	—	—	0.0	0.00	—	— A	-	—
SUB1	1537620	489100	—	4.0	1/15/2004	33.74	6527.26	0.0	6561.00	—	— A	-	—
SUB2	1537395	490320	—	4.0	1/15/2004	40.80	6526.77	0.0	6567.57	—	— A	-	—
SUB3	1538280	489420	84.0	6.0	1/15/2004	28.60	6528.47	0.0	6557.07	72	6485.1 A	56-72	43.4
SUB4	1538440	489840	100.0	4.0	9/21/1978	49.11	6515.89	0.0	6565.00	78	6487.0 A	60-85	28.9
SUB5	1537940	489470	86.0	4.0	—	—	—	0.0	6562.31	66	6496.3 A	55-80	—
SUB6	1537940	490090	82.0	4.0	—	—	—	0.0	6566.00	80	6486.0 A	52-82	—
SUB7	1537940	490630	98.0	4.0	—	—	—	0.0	6568.00	85	6483.0 A	78-98	—
SUB8	1538450	490210	150.0	5.0	—	—	—	0.0	6568.00	72	6496.0 A	60-90	—
SUB9	—	—	—	—	—	—	—	0.0	0.00	—	— A	-	—
						Felice Acres							
0481	1538350	490180	320.0	4.0	—	—	—	0.0	6568.00	110	6458.0 A 6298.0 M	270-310 270-310	—
0482	1536985	489604	260.0	5.0	12/12/2003	40.00	6522.66	0.0	6562.66	80	6482.7 A 6352.7 M	220-260 220-260	40.0
0483	1536586	489753	280.0	5.0	7/24/1996	36.93	6525.73	0.0	6562.66	40	6522.7 A 6497.7 U 6326.7 M	- - 270-300	3.1
0490	1536540	489756	63.0	4.0	6/4/2003	37.18	6525.24	0.0	6562.42	75	6487.4 A	20-80	37.8
0491	1537025	489662	63.0	4.0	12/12/2003	42.68	6519.94	0.0	6562.62	40	6522.6 A	30-63	0.0
0492	1537220	489280	60.0	4.0	6/10/2002	34.70	6525.98	1.2	6560.68	55	6504.5 A	40-60	21.5
0495	1537400	497100	—	—	—	—	—	0.0	6571.00	—	— A	-	—
0496	1534650	489603	94.4	5.0	12/18/2003	55.24	6507.28	1.6	6562.52	86	6474.9 A	53-93	32.4
0497	1535039	489503	94.0	5.0	12/18/2003	55.07	6507.55	2.0	6562.62	89	6471.6 A	64-94	35.9
0498	1534580	488740	150.0	6.0	1/19/2004	57.80	6502.20	2.0	6560.00	80 80	6478.0 M 6478.0 A	130-150 70-110	24.2
CW44	1535048	488891	208.0	6.0	12/23/2003	61.50	6499.24	2.5	6560.74	94	6464.2 A 6428.2 M	- 69-208	35.0

Note: A = Alluvial Aquifer, Base
U = Upper Chinle Aquifer, Top
M = Middle Chinle Aquifer, Top
* = Well Abandoned
MP = Measuring Point
LSD = Land Surface Datum
IN = Inches
FT = Feet
MSL = Mean Sea Level

TABLE 4.1-3. WELL DATA FOR THE ALLUVIAL AQUIFER MURRAY ACRES AND PLEASANT VALLEY WELLS.

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
						Murray							
0801	1541020	488600	100.0	4.0	12/21/1994	36.85	6530.88	0.0	6567.73	85	6482.7 A	80-100	48.2
0802	1540790	488190	98.0	6.0	5/22/1997	40.20	6522.52	0.0	6562.72	81	6481.7 A	75-81	40.8
0803	1540800	487430	—	6.0	9/19/1983	84.86	6476.14	0.0	6561.00		— C	85-180	
										85	6476.0 A	85-180	0.1
0804	1540790	486790	137.0	6.0	5/7/2002	46.60	6515.40	0.0	6562.00	85	6477.0 A	125-136	38.4
0805	1540695	486373	140.0	5.0	10/6/1994	59.34	6507.66	0.0	6567.00	110	6457.0 A	100-140	50.7
0810	1540290	486700	105.0	6.0	—	—	—	0.0	6562.00	81	6481.0 A	75-101	—
0811	1540320	486373	140.0	4.0	—	—	—	0.0	6563.00	110	6453.0 A	100-140	—
0815	1539090	488100	255.0	4.0	5/22/1991	29.14	6526.12	0.0	6555.26	—	— A	-	—
0844	1538376	487002	75.0	4.0	7/15/2003	34.54	6521.59	1.2	6556.13	70	6484.9 A	35-75	36.7
0845	1537280	487833	65.0	4.0	1/13/2004	34.70	6522.35	1.7	6557.05	55	6500.4 A	45-65	22.0
AW	1540235	488015	156.0	6.0	1/5/1998	15.00	6548.43	0.1	6563.43	63	6500.3 A	-	48.1
											6463.3 U	66-155	
HW	1540900	487430	115.0	6.0	11/9/1994	40.00	6517.00	0.0	6557.00	95	6462.0 A	60-94	55.0
						Pleasant Valley							
0525	1541270	486020	—	4.5	7/12/2002	55.36	6514.64	—	6570.00	—	— A	-	—
0688	1541257	483955	105.0	5.0	6/4/2003	62.42	6500.20	2.9	6562.62	95	6464.7 A	65-105	35.5
0831	1540090	486030	—	—	9/6/1983	54.95	6506.05	0.0	6561.00	—	— A	-	—
0833	1539250	485350	110.0	6.0	12/10/1996	46.61	6511.39	0.0	6558.00	103	6455.0 A	60-90	56.4
0834	1540260	484800	100.0	4.0	—	—	—	0.0	6560.00	80	6480.0 A	60-80	—
0835	1539610	484795	98.0	5.0	5/2/2000	49.74	6509.26	0.0	6559.00	94	6465.0 A	73-94	44.3
0836	1540250	484010	90.0	4.0	—	—	—	0.0	6558.00	80	6478.0 A	65-80	—
0838	1540600	485640	100.0	—	7/22/1995	49.03	6513.97	0.0	6563.00	—	— A	-	—
0839	1541120	485465	100.0	5.0	12/19/1994	50.00	6510.00	0.0	6560.00	94	6466.0 A	80-96	44.0
0840	1540440	485360	98.0	6.0	9/8/1983	47.32	6513.68	0.0	6561.00	94	6467.0 A	73-94	46.7
0841	1540835	485020	100.0	—	7/22/1995	54.66	6506.34	0.0	6561.00	—	— A	-	—
0843	1541265	485995	120.0	4.0	6/27/1989	52.40	6517.60	0.0	6570.00	112	6458.0 A	100-110	59.6

Note: A = Alluvial Aquifer, Base
U = Upper Chinle Aquifer, Top
C = Chinle Shale
* = Well Abandoned
MP = Measuring Point
LSD = Land Surface Datum
IN = Inches
FT = Feet
MSL = Mean Sea Level

TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS.

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
0520	1538934	492935	75.0	5.0	12/18/2003	54.05	6531.97	0.3	6586.02	68	6517.7 A	35-75	14.3
0521	1539104	492588	75.0	5.0	1/13/2004	55.89	6528.55	2.5	6584.44	65	6516.9 A	35-75	11.6
0522	1538640	492437	77.0	5.0	1/13/2004	51.90	6528.63	2.8	6580.53	68	6509.7 A	37-77	18.9
0523	1538680	492896	74.0	5.0	9/10/2002	2.00	6584.79	3.0	6586.79	62	6521.8 A	34-74	63.0
0524	1538889	493173	78.0	5.0	1/28/2003	3.47	6586.88	3.0	6590.35	70	6517.4 A	33-78	69.5
0531	1541086	478262	—	—	10/30/1996	79.24	6474.55	2.0	6553.79	—	— A	-	—
0532	1518700	482400	214.0	—	—	—	—	0.0	6515.00	—	— A	-	—
* 0533	—	—	195.0	—	—	—	—	0.0	6520.00	—	— A	-	—
0538	1533390	486900	170.0	6.0	1/19/2004	80.40	6467.60	2.2	6548.00	95	6450.8 A 6412.8 L	50-90 130-170	16.8
0539	1533920	487570	210.0	6.0	1/22/2004	82.26	6471.74	2.0	6554.00	100 100	6452.0 A 6452.0 A 6377.0 L	80-100 50-70 170-210	19.7 19.7
0540	1534150	488130	90.0	5.0	1/20/2004	67.81	6489.19	2.7	6557.00	80	6474.3 A	30-90	14.9
0631	1532234	483756	118.0	6.0	12/18/2003	87.35	6453.75	2.2	6541.10	109	6429.9 A	58-118	23.9
0632	1531850	483767	110.0	6.0	12/18/2003	86.97	6454.33	3.0	6541.30	102	6436.3 A	70-110	18.0
0633	1541467	479642	83.0	8.0	12/18/2003	74.53	6483.03	0.0	6557.56	95	6462.6 A	11-83	20.5
0634	1541652	480362	103.0	4.5	12/18/2003	72.25	6487.82	2.8	6560.07	95	6462.3 A	80-100	25.6
0635	1535363	478401	63.0	12.0	—	—	—	—	6546.25	—	— A	4-63	—
0636	1545374	476038	123.0	4.5	1/6/2004	99.08	6474.36	2.3	6573.44	119	6452.1 A	103-123	22.2
0637	1545409	474710	124.0	4.5	1/6/2004	105.07	6470.13	2.5	6575.20	118	6454.7 A	104-124	15.4
0638	1539628	493265	75.0	5.0	12/18/2003	53.03	6532.53	0.0	6585.56	65	6520.6 A	35-75	12.0
0639	1539370	492961	80.0	5.0	1/13/2004	60.00	6527.88	2.5	6587.88	71	6514.4 A	35-80	13.5
0640	1537790	491961	84.0	5.0	1/7/2004	51.65	6528.32	2.2	6579.97	77	6500.8 A	64-84	27.5
0641	1536494	491110	95.0	5.0	1/29/2003	2.23	6571.13	2.5	6573.36	87	6483.9 A	65-95	87.3
0642	1536104	490932	95.0	5.0	1/29/2003	1.69	6570.19	2.4	6571.88	89	6480.5 A	65-95	89.7
0643	1533760	487386	108.0	5.0	1/5/2004	72.18	6479.15	1.5	6551.33	93	6456.8 A	58-108	22.3
0644	1533481	485450	110.0	5.0	1/7/2004	81.02	6462.88	2.2	6543.90	102	6439.7 A	55-110	23.2
0645	1532924	485282	80.0	5.0	10/19/1998	66.48	6477.31	2.5	6543.79	70	6471.3 A	60-80	6.0
0646	1533246	484953	100.0	5.0	1/7/2004	82.49	6460.86	1.5	6543.35	91	6450.9 A	60-100	10.0
0647	1536623	478308	140.0	4.5	12/18/2003	96.57	6455.34	1.4	6551.91	132	6418.5 A	80-140	36.8
0648	1534730	478343	120.0	4.5	12/18/2003	101.40	6446.39	0.5	6547.79	120	6427.3 A	80-120	19.1
0649	1534730	479798	124.0	4.5	12/18/2003	94.55	6448.74	0.3	6543.29	115	6428.0 A	84-124	20.7
0650	1536779	482135	109.0	4.5	4/14/1998	71.10	6476.01	2.2	6547.11	103	6441.9 A	89-109	34.1
0652	1531170	483779	88.0	5.0	1/7/2004	85.11	6453.04	1.5	6538.15	79	6457.7 A	60-88	0.0
0653	1533283	486570	206.0	6.0	12/18/2003	78.35	6466.62	1.3	6544.97	97	6446.7 A	69-206	20.0

TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
0653	1533283	486570	206.0	6.0	12/18/2003	78.35	6466.62	1.3	6544.97		6408.7 L	-	
0654	1541994	478636	120.0	4.5	1/5/2004	72.21	6478.29	1.4	6550.50	106	6443.1 A	60-120	35.2
0655	1541620	479830	96.0	8.0	5/2/2000	75.15	6483.03	—	6558.18	88	— A	21-84	—
0656	1542578	478333	88.0	8.0	5/2/2000	77.32	6476.75	—	6554.07	88	— A	6-88	—
0657	1537497	478392	128.0	6.0	12/18/2003	93.05	6458.76	2.2	6551.81	120	6429.6 A	87-128	29.1
0657A	1537083	478412	35.0	12.0	4/13/1999	37.00	6512.00	—	6549.00	—	— A	17-35	—
0658	1535922	478436	130.0	6.0	12/18/2003	98.43	6451.75	0.4	6550.18	129	6420.8 A	89-130	31.0
0658A	1535589	478423	30.6	—	—	—	—	—	6546.10	—	— A	14-31	—
0659	1541689	480772	101.0	4.5	1/5/2004	72.26	6487.91	2.0	6560.17	97	6461.2 A	61-101	26.7
0680	1543850	478746	80.0	4.5	10/25/1996	77.39	6481.48	2.0	6558.87	75	6481.9 A	50-80	0.0
0681	1540676	482734	117.0	6.0	9/24/1998	64.18	6496.34	2.1	6560.52	111	6447.4 A	67-117	48.9
0682	1543125	477489	94.0	4.0	4/3/2001	80.80	6473.17	2.8	6553.97	102	6449.2 A	54-94	24.0
0683	1540198	476217	120.0	6.0	1/6/2004	86.04	6470.00	2.0	6556.04	140	6414.0 A	80-120	56.0
0684	1540273	478499	143.0	6.0	1/6/2004	83.00	6470.28	2.0	6553.28	118	6433.3 A	83-143	37.0
0685	1539098	478170	100.0	4.5	12/18/2003	91.33	6465.24	1.7	6556.57	116	6438.9 A	60-100	26.4
0686	1545319	475438	115.0	4.5	1/6/2004	107.26	6471.54	1.8	6578.80	136	6441.0 A	75-115	30.5
0687	1539011	477276	102.0	6.0	12/18/2003	90.43	6465.53	2.2	6555.96	120	6433.8 A	62-102	31.7
0689	1530024	478478	80.0	4.5	1/7/2004	73.34	6468.68	2.6	6542.02	75	6464.4 A	60-80	4.3
0692	1535892	493175	90.0	5.0	1/7/2004	65.73	6519.09	2.5	6584.82	80	6502.3 A	58-90	16.8
0846	1537219	484730	75.0	4.0	7/14/2003	44.27	6504.65	1.1	6548.92	65	6482.8 A	40-65	21.8
0847	1534736	488508	92.0	5.0	11/22/1996	53.88	6504.39	2.6	6558.27	80	6475.7 A	52-92	28.7
0848	1534634	490660	92.0	5.0	1/29/2003	13.22	6559.27	2.7	6572.49	91	6478.8 A	52-92	80.4
0851	1534692	483909	91.0	5.0	8/25/2003	77.96	6468.48	3.3	6546.44	80	6463.1 A	41-91	5.3
0852	1535610	493989	74.0	5.0	11/22/1996	73.26	6516.88	2.5	6590.14	70	6517.7 A	54-74	0.0
0855	1532111	484184	105.0	5.0	8/21/2003	92.60	6448.51	2.1	6541.11	97	6442.0 A	70-105	6.5
0861	1534332	488702	100.0	5.0	8/25/2003	73.16	6486.69	2.3	6559.85	65	6492.6 A	50-100	0.0
0862	1534265	487800	110.0	5.0	12/18/2003	64.68	6491.50	3.3	6556.18	97	6455.9 A	63-103	35.6
0863	1533867	487912	110.0	5.0	8/21/2003	8.00	6548.56	2.5	6556.56	94	6460.1 A	63-103	88.5
0864	1533735	486464	95.0	5.0	8/25/2003	77.43	6469.29	1.9	6546.72	78	6466.9 A	44-84	2.4
0865	1534123	488429	97.0	5.0	12/11/2002	71.98	6484.80	2.2	6556.78	88	6466.6 A	37-97	18.2
0866	1534494	488340	120.0	5.0	8/21/2003	2.60	6555.52	1.8	6558.12	80	6476.3 A	33-113	79.2
0867	1533762	488409	88.0	5.0	12/18/2003	70.23	6485.67	2.0	6555.90	86	6467.9 A	48-88	17.8
0868	1534848	491033	103.0	5.0	1/29/2003	5.38	6569.36	2.2	6574.74	94	6478.5 A	53-103	90.8
0869	1533251	486073	94.0	5.0	12/18/2003	80.56	6463.93	2.0	6544.49	99	6443.5 A	44-94	20.4
0870	1532680	484906	93.0	5.0	1/11/1996	68.56	6475.60	1.9	6544.16	95	6447.3 A	69-89	28.3
0871	1533603	485400	100.0	5.0	1/11/1996	66.86	6477.85	2.4	6544.71	93	6449.3 A	60-100	28.5

TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
* 0872	1533092	485407	100.0	5.0	1/11/1996	65.80	6477.51	1.8	6543.31	96	6445.5 A	55-100	32.0
* 0873	1533286	484505	100.0	5.0	1/11/1996	67.55	6475.46	1.9	6543.01	96	6445.1 A	60-100	30.3
* 0874	1533968	484925	105.0	5.0	1/11/1996	68.68	6476.66	2.2	6545.34	110	6433.1 A	55-105	43.5
* 0875	1532785	483634	125.0	5.0	1/11/1996	69.85	6472.99	1.7	6542.84	116	6425.1 A	65-125	47.9
0876	1532853	486088	95.0	5.0	12/18/2003	80.92	6463.34	1.9	6544.26	85	6457.4 A	58-88	6.0
0877	1533068	488067	70.0	5.0	8/18/1998	63.58	6489.50	1.9	6553.08	65	6486.2 A	58-68	3.3
0879	1532401	486104	70.0	5.0	12/18/2003	69.24	6475.31	2.2	6544.55	62	6480.4 A	48-68	0.0
0881	1542034	481478	96.0	4.5	1/5/2004	76.13	6488.91	2.0	6565.04	103	6460.0 A	76-96	28.9
0882	1541404	482396	110.0	4.5	1/5/2004	68.11	6493.05	2.0	6561.16	98	6461.2 A	70-110	31.8
0883	1540097	483039	100.0	5.0	1/5/2004	61.56	6495.57	1.9	6557.13	96	6459.3 A	60-90	36.3
0884	1542677	481498	90.0	5.0	1/5/2004	76.38	6489.72	1.0	6566.10	85	6480.2 A	58-88	9.6
0885	1541919	483474	100.0	5.0	1/5/2004	68.71	6495.93	1.5	6564.64	95	6468.1 A	70-100	27.8
0886	1542327	482487	90.0	5.0	1/5/2004	72.00	6492.55	1.5	6564.55	87	6476.1 A	60-90	16.5
0887	1543063	482469	67.0	5.0	3/12/1998	69.21	6498.52	1.5	6567.73	60	6506.2 A	42-67	0.0
0888	1542285	479335	105.0	5.0	1/6/2004	76.61	6480.72	1.1	6557.33	90	6466.2 A	75-105	14.5
0889	1540047	480222	65.0	5.0	10/24/1996	63.31	6486.32	1.5	6549.63	60	6488.2 A	35-65	0.0
0890	1541365	480088	101.0	5.0	1/5/2004	74.68	6483.75	1.7	6558.43	93	6463.7 A	81-101	20.0
0893	1541934	482244	98.0	4.5	1/5/2004	72.10	6491.87	2.1	6563.97	93	6468.9 A	78-98	23.0
0894	1541976	478317	78.0	4.5	10/2/2002	77.12	6477.17	3.0	6554.29	97	6454.3 A	58-78	22.9
0895	1541521	476222	104.0	5.0	1/6/2004	80.86	6472.98	2.4	6553.84	116	6435.4 A	61-101	37.5
0896	1542246	476237	113.0	5.0	1/6/2004	81.91	6473.70	2.0	6555.61	117	6436.6 A	73-113	37.1
0897	1543819	478237	93.0	4.0	9/27/1998	83.28	6478.97	2.0	6562.25	70	6490.3 A	63-93	0.0
0899	1543801	477288	110.0	4.0	1/6/2004	95.50	6475.34	2.0	6570.84	120	6448.8 A	70-110	26.5
0905	1532700	480850	120.0	5.0	—	—	—	0.0	6545.00	120	6425.0 A	100-120	—
0906	1532900	480450	—	—	8/29/1995	74.65	6462.75	0.0	6537.40	—	— A	-	—
0909	1531900	483400	140.0	4.0	11/19/1982	77.45	6461.45	0.0	6538.90	112	6426.9 A	80-135	34.6
											6426.9 L	80-135	
0910	1528800	481150	138.0	5.0	—	—	—	0.0	6535.00	132	6403.0 A	120-134	—
0912	1471000	478250	—	—	—	—	—	0.0	6530.00	—	— A	-	—
0913	1555800	500950	—	8.0	1/24/1996	38.40	6604.60	0.3	6643.00	—	— A	-	—
0914	1555500	500850	93.0	6.0	5/15/2003	40.42	6601.58	1.4	6642.00	—	— A	-	—
0915	1552650	499650	100.0	4.0	—	—	—	0.0	6625.00	70	6555.0 A	55-85	—
0916	1552350	499600	160.0	4.0	4/26/1994	40.00	6585.00	0.0	6625.00	—	— A	45-70	—
0917	1542200	514600	—	—	—	—	—	0.0	6800.00	—	— A	-	—
0920	1555800	496900	—	7.0	5/11/1994	33.40	6594.20	0.7	6627.60	—	— A	-	—
0921	1555400	495800	73.0	5.0	5/15/2003	38.38	6585.62	1.9	6624.00	—	— A	-	—

TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
0922	1555200	492500	96.0	6.0	5/15/2003	52.00	6569.70	1.7	6621.70	—	— A	-	—
0924	1547500	438900	135.0	4.0	—	—	—	0.0	6592.90	112	6480.9 A	94-114	—
0925	1548600	480800	150.0	4.0	—	—	—	0.0	6601.40	140	6461.4 A	126-141	—
0926	1547500	472700	134.0	4.0	—	—	—	0.0	6596.90	132	6464.9 A	123-132	—
0935	1540115	476629	300.0	16.0	9/18/2003	89.90	6468.22	2.6	6558.12	125	6430.5 A	95-132	37.7
0936	1543621	472978	160.0	5.0	—	—	—	0.0	6573.38	160	6413.4 A	100-160	—
0939	1539750	483200	97.0	8.0	7/25/1996	59.31	6497.69	2.3	6557.00	—	— A	-	—
0940	1537750	482850	70.0	—	7/24/1996	57.30	6495.70	8.8	6553.00	—	— A	-	—
0942	1538300	483710	102.0	—	—	—	—	0.0	6550.20	95	6455.2 A	85-95	—
0947	1536206	491841	100.0	4.0	7/27/1994	54.63	6520.55	0.0	6575.18	95	6480.2 A	70-100	40.4
0950	1560400	498300	81.0	5.0	7/12/2000	25.70	6631.30	0.5	6657.00	—	— A	-	—
0952	1534550	477800	140.0	—	—	—	—	0.0	6550.00	—	— A	-	—
0975	1539640	482880	—	—	—	—	—	0.0	6556.00	—	— A	-	—
0976	1539630	483100	115.0	—	—	—	—	0.0	0.00	—	— A	-	—
0977	1539400	482730	—	—	12/9/1995	61.47	6495.53	1.0	6557.00	—	— A	-	—
0979	1539010	483280	105.0	5.0	7/10/2002	57.56	6593.44	0.0	6651.00	100	6551.0 A	90-100	42.4
0980	1539040	483080	—	—	11/8/1995	57.70	6497.30	0.0	6555.00	—	— A	-	—
0981	1538970	482820	—	—	—	—	—	0.0	6554.00	—	— A	-	—
0982	1538370	483290	110.0	5.0	—	—	—	0.0	6651.00	105	6546.0 A	90-105	—
0983	1538590	483100	—	—	—	—	—	0.0	6552.00	—	— A	-	—
0984	1538750	482950	103.0	5.0	—	—	—	0.0	6651.00	98	6553.0 A	88-98	—
0985	1538820	483180	115.0	5.0	7/18/1996	58.75	6592.25	0.0	6651.00	102	6549.0 A	90-110	43.3
0989	1537890	482760	—	—	11/2/1995	58.10	6494.90	1.0	6553.00	—	— A	-	—
0992	1539340	483780	100.0	5.0	—	—	—	0.0	6652.00	95	6557.0 A	85-95	—
0993	1537860	483680	102.0	5.0	—	—	—	0.0	6650.00	98	6552.0 A	85-98	—
0994	1539700	476240	144.0	6.0	12/2/2003	90.52	6464.48	0.0	6555.00	—	— L	95-110	—
										—	— A	95-110	—
0996	1537621	477989	138.0	5.0	12/18/2003	94.37	6458.15	1.7	6552.52	136	6414.8 A	126-136	43.3
0997	1539821	473807	—	—	3/12/1996	76.90	6491.40	0.0	6568.30	—	— A	-	—
0999	1524230	480187	185.0	—	—	—	—	0.0	6527.00	—	— A	-	—
1012	—	—	—	6.0	—	—	—	0.0	0.00	—	— A	-	—
1013	—	—	—	4.0	—	—	—	0.0	0.00	—	— A	-	—
1014	—	—	—	9.0	—	—	—	0.0	0.00	—	— A	-	—
1015	—	—	—	6.0	—	—	—	0.0	0.00	—	— A	-	—
1018	—	—	—	5.0	—	—	—	0.0	0.00	—	— A	-	—
1020	—	—	—	5.0	1/18/1996	15.17	-15.17	0.0	0.00	—	— A	-	—

TABLE 4.1-4. WELL DATA FOR THE ALLUVIAL AQUIFER REGIONAL WELLS. (cont'd.)

WELL NAME	NORTH. COORD.	EAST. COORD.	WELL DEPTH (FT-MP)	CASING DIAM (IN)	WATER LEVEL DATE	WATER LEVEL DEPTH (FT-MP)	WATER LEVEL ELEV. (FT-MSL)	MP ABOVE LSD (FT)	MP ELEV. (FT-MSL)	DEPTH TO BASE OF ALLUVIUM (FT-LSD)	ELEV. TO BASE OF ALLUVIUM (FT-MSL)	CASING PERFOR-ATIONS (FT-LSD)	SATURATED THICKNESS
1021	—	—	—	—	1/18/1996	18.00	-18.00	0.0	0.00	—	— A	-	—

Note: A = Alluvial Aquifer, Base
L = Lower Chinle Aquifer, Top
* = Well Abandoned
MP = Measuring Point
LSD = Land Surface Datum
IN = Inches
FT = Feet
MSL = Mean Sea Level

4.2 ALLUVIAL WATER LEVELS

4.2.1 WATER-LEVEL ELEVATION - ALLUVIAL

This section presents information necessary to evaluate the direction of ground water flow in the alluvial aquifer. Water-level elevations are used to quantify the gradient of the alluvial water table, which in turn can be used to interpret the direction of ground water flow.

Figure 4.2-1 presents the Fall of 2003 alluvial aquifer water-level elevation contours for the Grants Project area near Homestake's tailings. The alluvial aquifer limits were defined based on the 2002 water-level elevation map and base of the alluvium map. There were no recent adjustments in the alluvial aquifer limits, because water-level changes between 2002 and 2003 have been minor. Locations of the alluvial wells, with their respective well names listed adjacent to the well symbol, are plotted on Figure 4.1-1. The 2003 ground water flow patterns in the alluvial aquifer are very similar to those observed in the Fall of 2002 However, in 2003 there exists a slightly smaller depression on the south side of the Large Tailings pile which is attributable to operational variation in the collection system (see Figure 4.2-1 of Hydro-Engineering, L.L.C., 2002). The hydraulic ridge on the southeast side of the Small Tailings pile was similar in 2003 to that which was observed in 2002. Water-level elevation contours were drawn at one foot interval near the collection wells where space allowed. The water-level elevations and flow directions indicate the extent of the area of the alluvial aquifer from which ground water is drawn by the collection system. The area of collection is between the fresh-water injection area and the collection wells, where ground water is flowing back to the collection wells. The area of the Large Tailings pile is also within the collection area, because alluvial ground water in this area flows to the collection wells.

The water-level elevations in Section 3 decreased from 2002 to 2003 as a result of pumping irrigation supply water from six wells in this section (see Figure 4.2-1). Water-level changes are even more pronounced in Section 33 (see the western half of Figure 4.2-1), because seven irrigation supply wells are located in this area, and because natural recharge was below normal in 2003. The water levels in Section 28 were fairly similar to the 2002 levels even though irrigation supply wells were pumped in this area. The injection of water in the western portion of Section 28 probably supported these steady water levels.

Several wells were drilled in the area of the zero saturation boundaries to better define the limits of the alluvial aquifer. However, there are occurrences of limited saturation in the Chinle shale below the alluvium, indicating that there may be zones of perched water in the upper part of the Chinle shale. These wells have been used to help define where the zero saturation boundary of the alluvium occurs and the water levels in these wells may not be representative of the alluvial aquifer.

Flow in the San Mateo alluvium is naturally diverted either west through the western portion of Section 28 or southwest through Section 35 around the area where the base of the alluvium is elevated. In this elevated area, there is no alluvial saturation. The San Mateo alluvial water then mixes with the Rio San Jose alluvial water flowing from the northwest. The combined flow continues to flow in a southerly direction. The gradient of the alluvial water surface has been increased somewhat due to irrigation water withdrawal, but it is still relatively flat in the Rio San Jose alluvium due to its large transmitting ability. Alluvial ground water that flows through the northern portion of Section 3 (see Figure 4.2-1) joins the Rio San Jose ground water system in the eastern portion of Section 4.

Water-level data for the alluvial wells are presented in Appendix A as Table A.1-1 (HMC alluvial wells), Table A.1-2 (Murray Acres, Broadview Acres, Felice Acres, and Pleasant Valley Estates alluvial wells) and Table A.1-3 (regional alluvial wells).

4.2.2 WATER-LEVEL CHANGE - ALLUVIAL

Figure 4.2-2 presents well locations and indicates the grouping of wells for presentation on water-level elevation versus time plots. The figure number of the water-level elevation plots for each group of wells is shown by the well groupings. The colors used for the well name and well symbol on Figure 4.2-2 correspond with those used on the water-level elevation plots. Water-level elevation data considered to be anomalous were removed from the plots for better visual presentation of trends, but the excluded data remains in the Appendix A tabulations. Time plots (Figures 4.2-3 through 4.2-18) present the last eight years of data to better show the recent trends.

Water levels in the alluvial aquifer have been fairly stable during the last year. Figure 4.2-3 presents water-level elevation data for up-gradient wells DD, ND, NC, P, Q and R. A very slight increasing trend was observed in up-gradient wells during 2003.

Water-level elevation data are presented for two sets of wells monitored for the purpose of detection of a reversal of water-surface gradient near the S line of the collection system. These wells (SP and SO) are located just northeast of the majority of the S line of collection wells. Figure 4.2-4 graphically illustrates that the alluvial hydraulic gradient is reversed between wells SO and SP. Water-level rises were observed in these two wells in 2003. However, an adequate gradient reversal was maintained during this rise.

Wells S1 and S2 are the two reversal wells down-gradient of the S line of collection wells (see Figures 4.1-1 and 4.2-2 for their location). Recent data from these two wells show continued reversal of the ground water flow direction down-gradient of the S collection wells (see Figure 4.2-5).

Figure 4.2-6 presents water-level elevation data for a group of wells located west of the S line of collection wells. Water-level elevations in wells DC, MU and S4 decreased in 2003, while the level rose in wells BC and S11.

The alluvial water levels north of Murray Acres declined in 2003 in wells MO, MQ and MY. Water levels increased in well W in 2003 (see Figure 4.2-7).

Wells B and BA are monitored in order to define the reversal in the ground water gradient between the M and J injection lines and the D collection line. Figure 4.2-8 presents water-level elevation data for wells B and BA and indicates a continued ground water reversal. Water levels in this area were generally steady in 2003.

Figure 4.2-9 presents water-level elevation plots for alluvial wells BP, B13, D1 and M5, which are located near the lined collection ponds. This plot shows that the water levels gradually increased in each of these wells during 2003.

Water-level elevations in the alluvial aquifer near the Small Tailings collection system are presented on Figure 4.2-10 for reversal wells DZ and KZ. Well DZ is near the D collection line and well KZ is close to the K injection line and, therefore, is naturally down-gradient of well DZ. This plot shows that, during 2003, a strong reversal of the ground water gradient was maintained between the line of injection and line of collection. This pair of reversal wells is adequate to define the ground water gradient between this major zone of injection and the collection system.

Figure 4.2-11 presents water-level elevation data for wells B11, C12, L6 and TA. This data reflects the changes in water levels near the north and east sides of the Small Tailings pile. The variation in water levels in well B11 is due to fluctuations in the collection rate from this well. Injection of R.O. product and fresh water has caused the higher water-level elevations observed in well L6. A rise in the water level at well TA occurred in 2003.

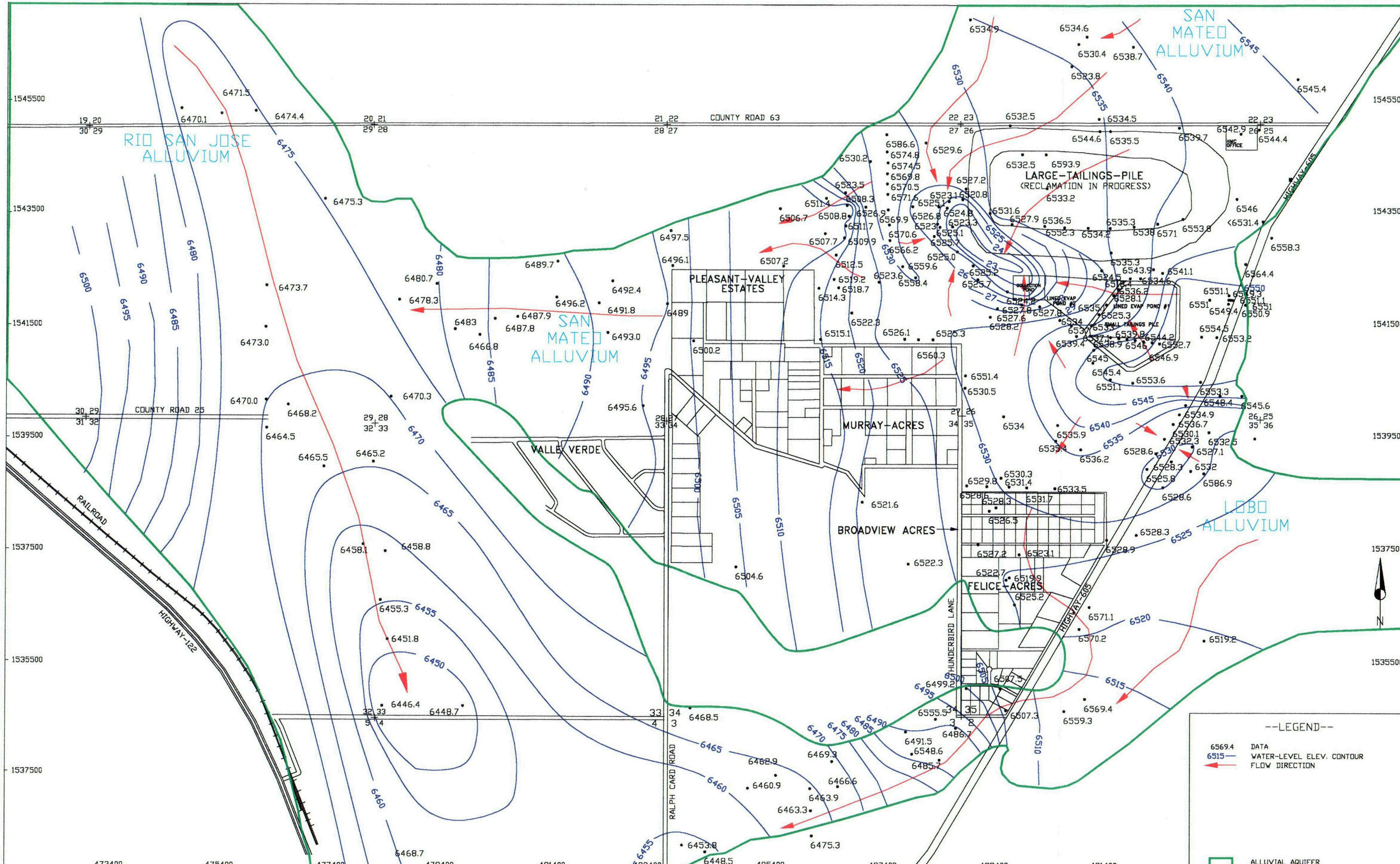
Figure 4.2-12 shows the water-level elevation plots for wells I, KEB and X. Water levels were fairly steady in these wells in 2003 due to injection of R.O. product water.

Water-level elevations in the alluvial aquifer south of the Broadview Acres injection system were fairly steady during 2003 (see water levels for wells 490, 497, GH and SUB1 on Figure 4.2-13). Water levels were also fairly steady in alluvial wells 688, 844, 846, FB and MX during 2003 except for a continued gradual decrease in the water level in well 688 (see Figure 4.2-14).

Figure 4.2-15 presents water-level hydrographs for five wells in Section 3. Wells 653, 855, 862 and 869 are irrigation supply wells, and therefore the dramatic changes in water level reflect periods of pumping. Water levels in alluvial well 652 have gradually declined over the last four years due to the production of irrigation water and continuing drought conditions.

Water-level hydrographs for five wells in the Section 28 area are presented on Figure 4.2-16. Wells 881 and 890 have been used as irrigation supply wells since 2002. Water levels were decreasing in this area prior to the start of the irrigation project, but were fairly steady or rose in 2003. This is attributable to the fresh-water injection in wells located in Sections 28 and 29. Figure 4.2-17 presents the water- level time plots for the group of wells down-gradient of the Section 28 irrigation supply wells. Some recovery of water levels in wells 895 and 899 was observed in 2003 due to the injection of fresh water into wells in Section 29. The water levels in wells 686 and 935 declined in 2003. Well 687 was used as an irrigation supply well beginning in 2003.

Figure 4.2-18 presents the water-level plots for the Section 33 wells shown on Figure 4.2-2. Wells 648, 649, 657, 658 and 996 are irrigation supply wells, and therefore, their water levels are influenced by the periodic withdrawal of water from these wells. The observed water levels during periods when there was no withdrawal after the 2003 irrigation season are below those observed in early 2001. The combination of withdrawal for irrigation and the ongoing drought conditions is the likely cause of the overall decline in water levels with time.



SCALE: 1"=1600'

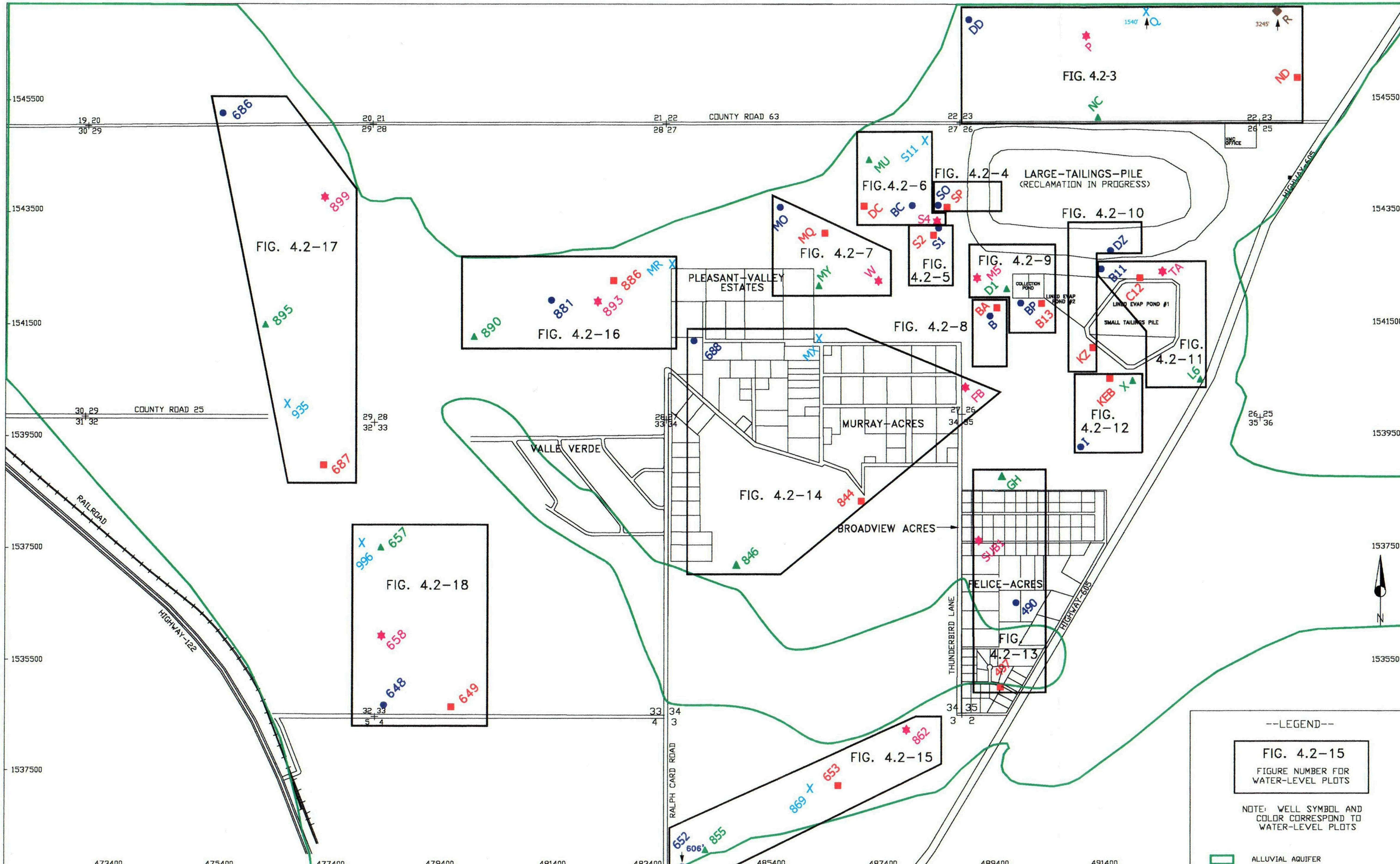
C:\PROJECTS\ 2004-06\C-QAL03

DATE: 03/16/04

HOMESTAKE-MILL-AND-ADJACENT-PROPERTIES
GRANTS-NM-TOWNSHIP-11&12-N-RANGE-10-W

FIGURE 4.2-1. WATER-LEVEL ELEVATION FOR THE ALLUVIAL AQUIFER, FALL 2003, FT-MSL

C10



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DATE: 03/16/04

HOMESTAKE-MILL-AND-ADJACENT-PROPERTIES
GRANTS-NM-TOWNSHIP-11&12-N-RANGE-10-W

FIGURE 4.2-2. LOCATIONS OF ALLUVIAL WELLS WITH WATER-LEVEL PLOTS

C11

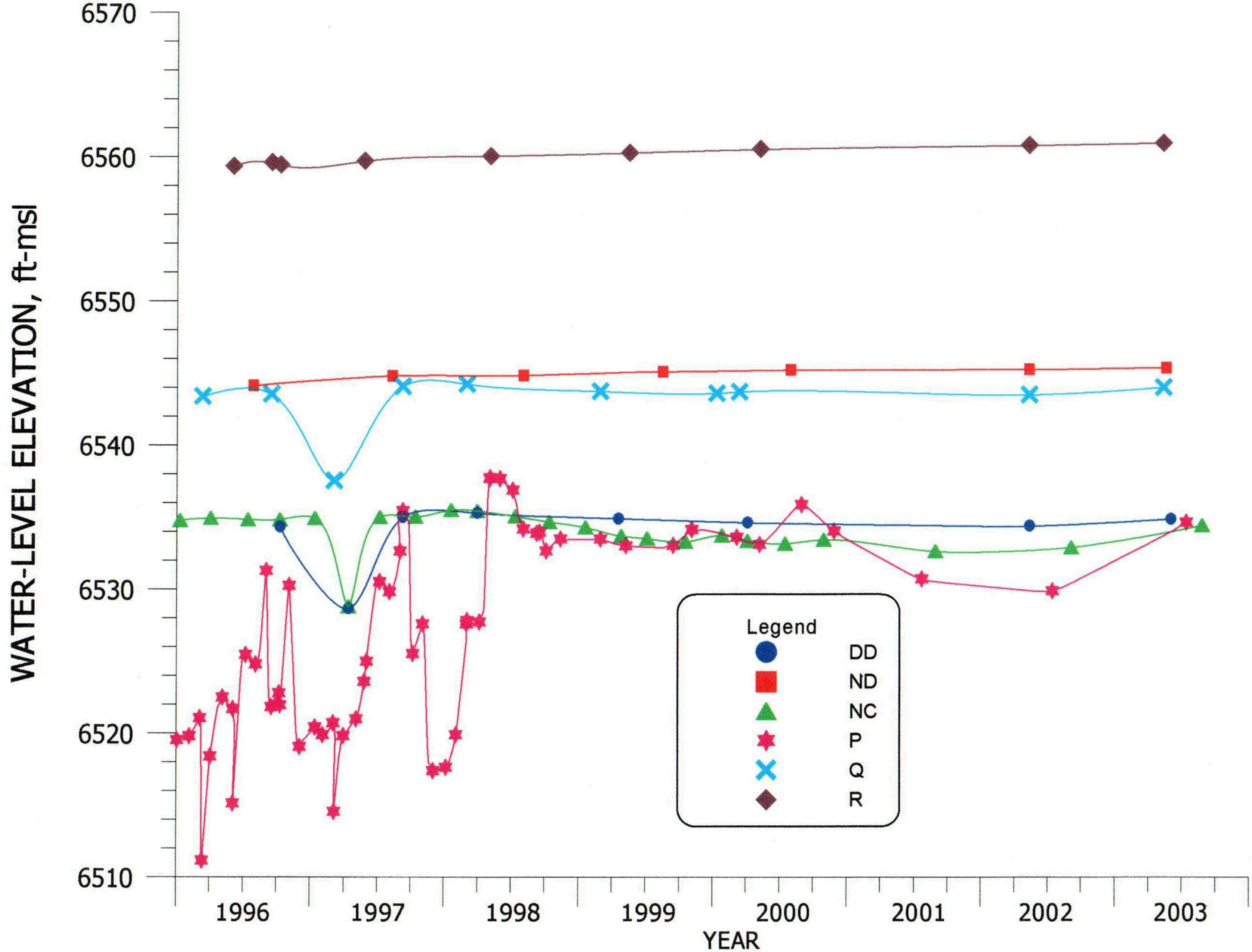


FIGURE 4.2-3. WATER-LEVEL ELEVATION FOR WELLS DD, ND, NC, P, Q AND R.

C12

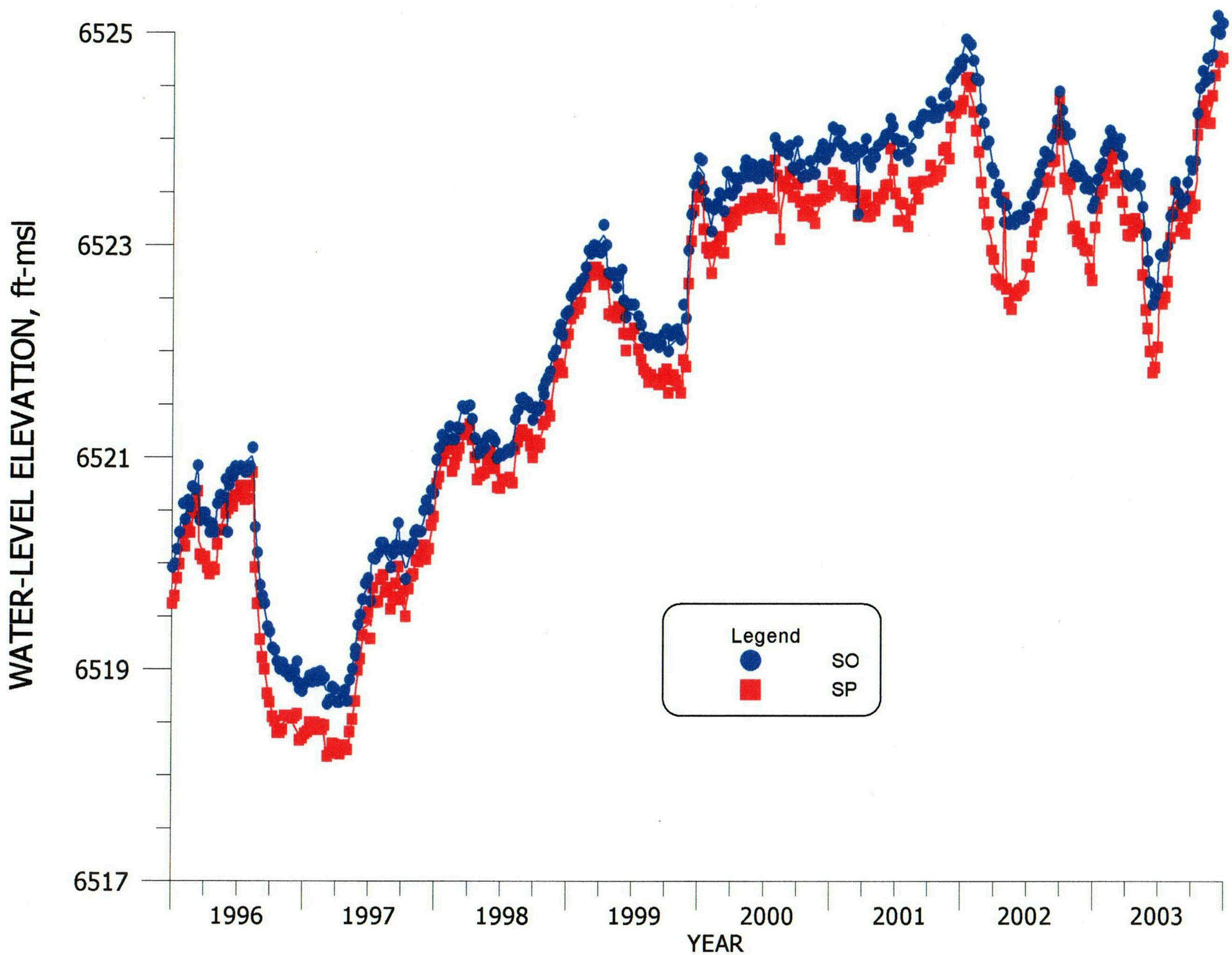


FIGURE 4.2-4. WATER-LEVEL ELEVATION FOR WELLS SO AND SP.

C13

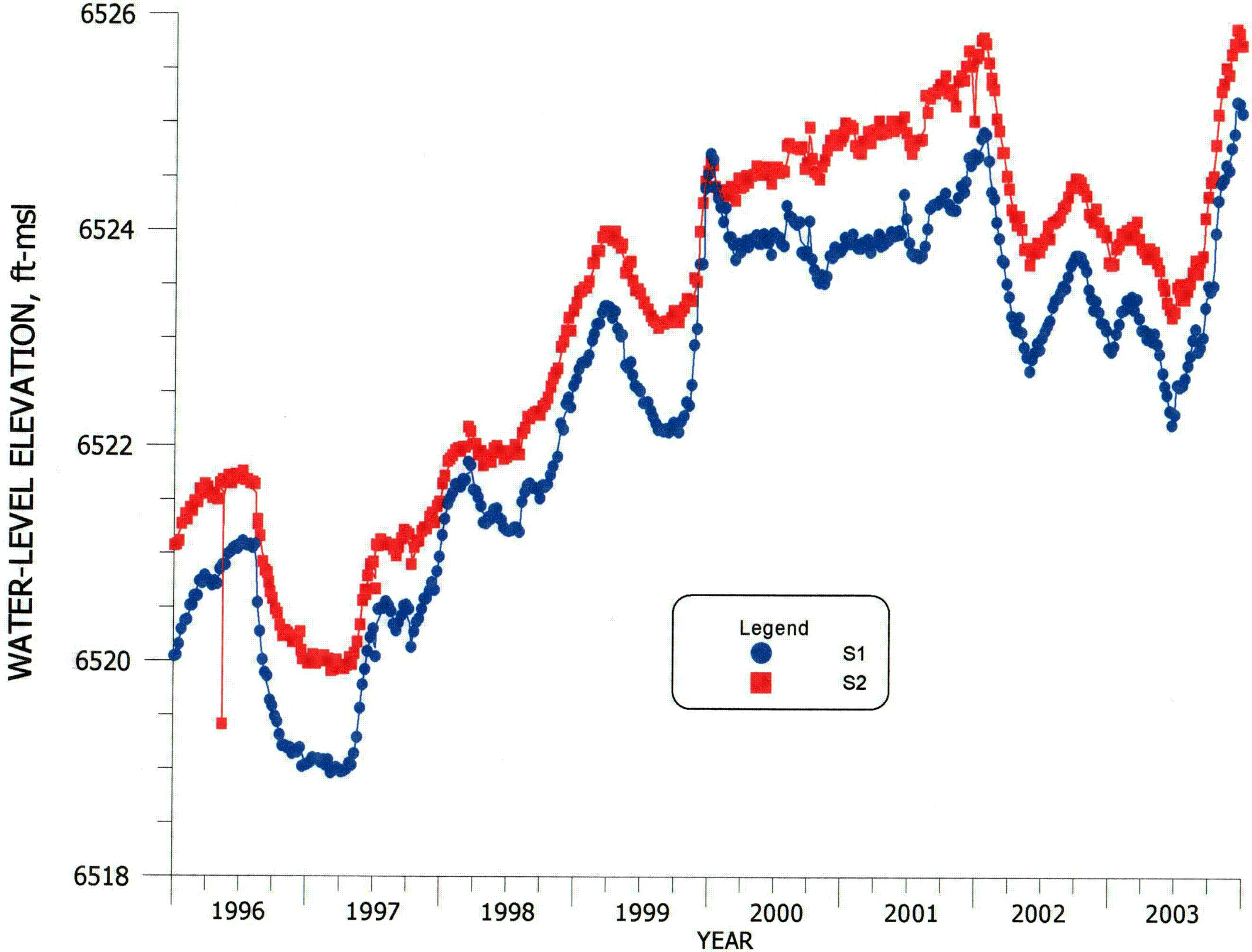


FIGURE 4.2-5. WATER-LEVEL ELEVATION FOR WELLS S1 AND S2.

C14

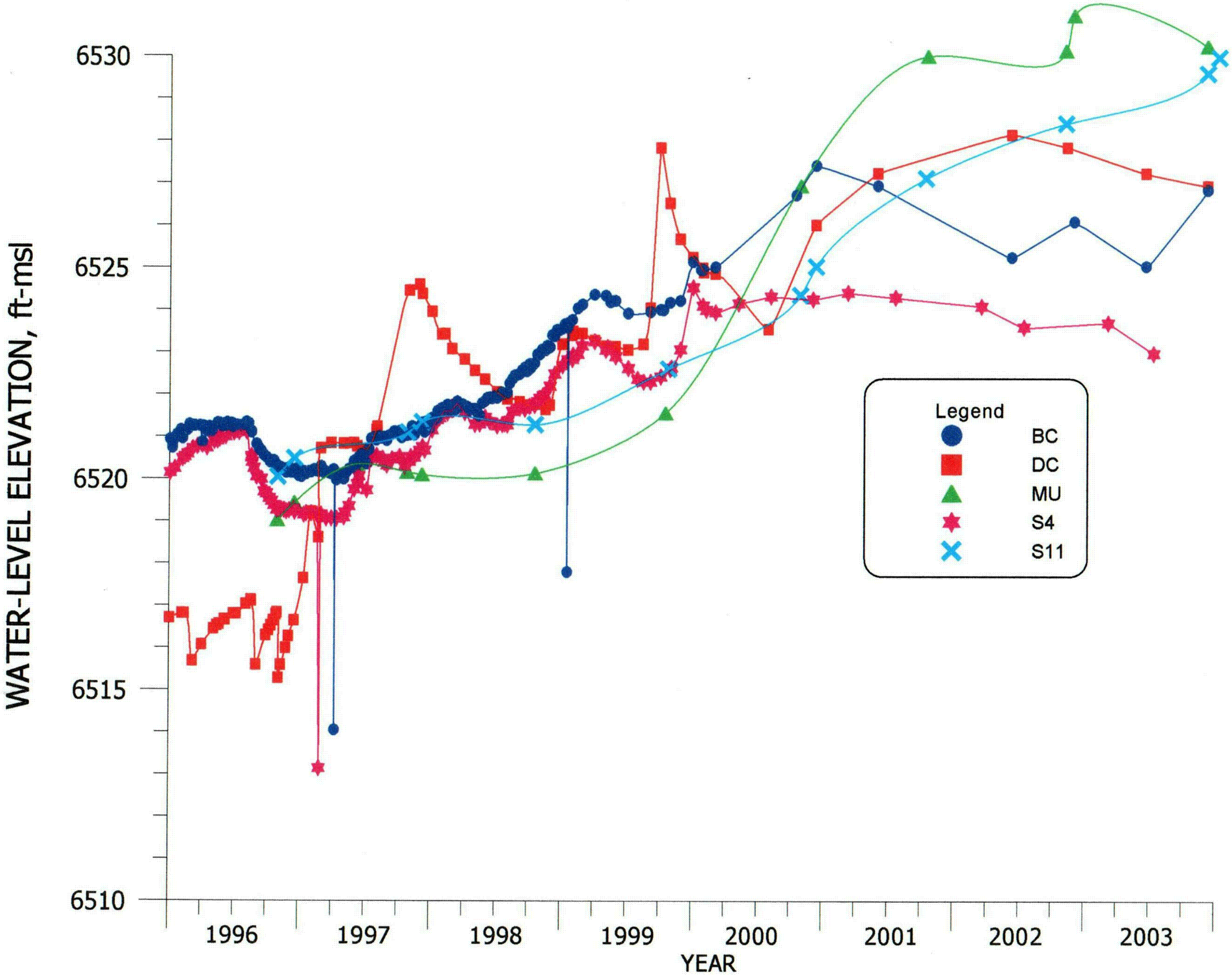


FIGURE 4.2-6. WATER-LEVEL ELEVATION FOR WELLS BC, DC, MU, S4 AND S11.

C15

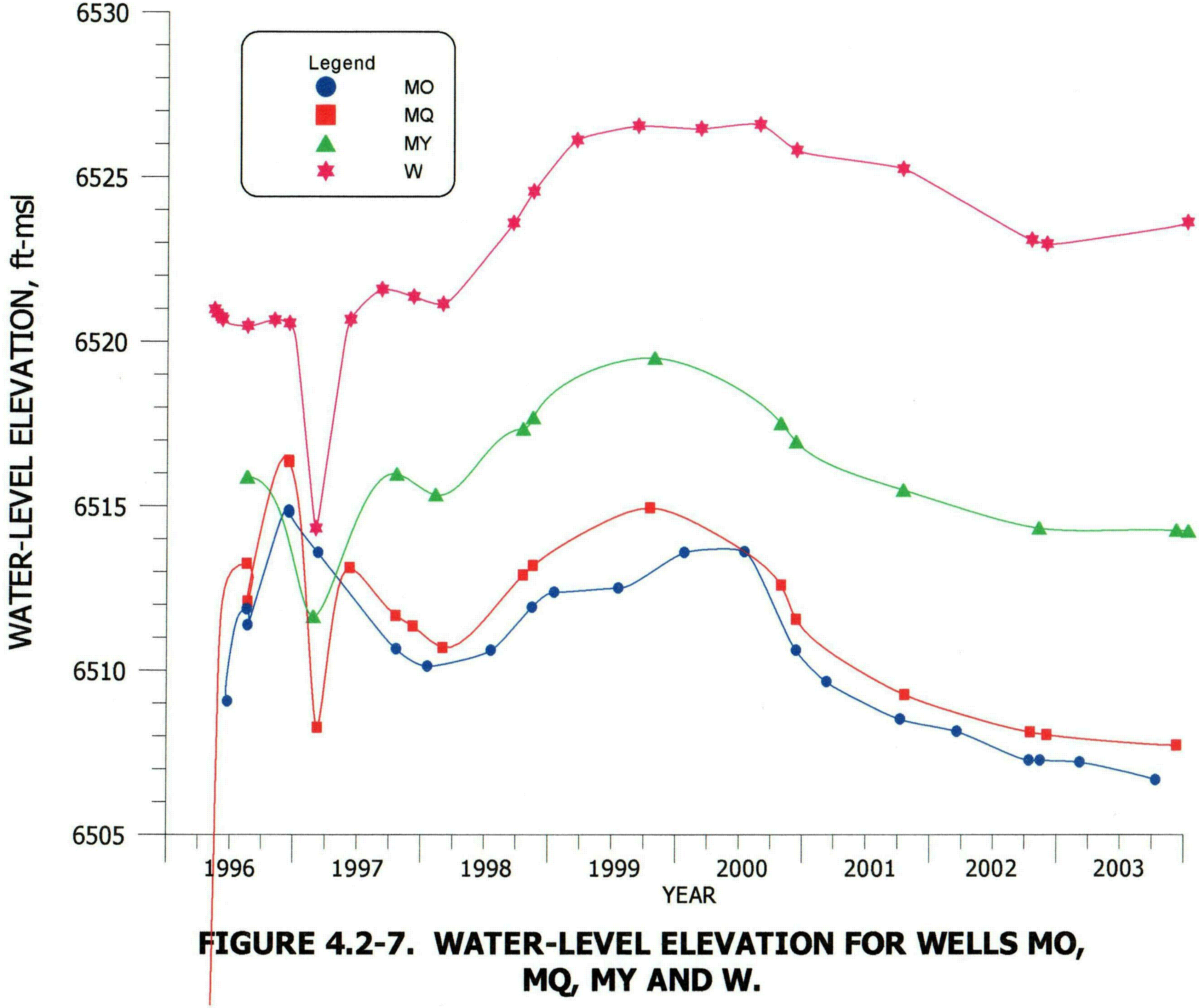


FIGURE 4.2-7. WATER-LEVEL ELEVATION FOR WELLS MO, MQ, MY AND W.

C16

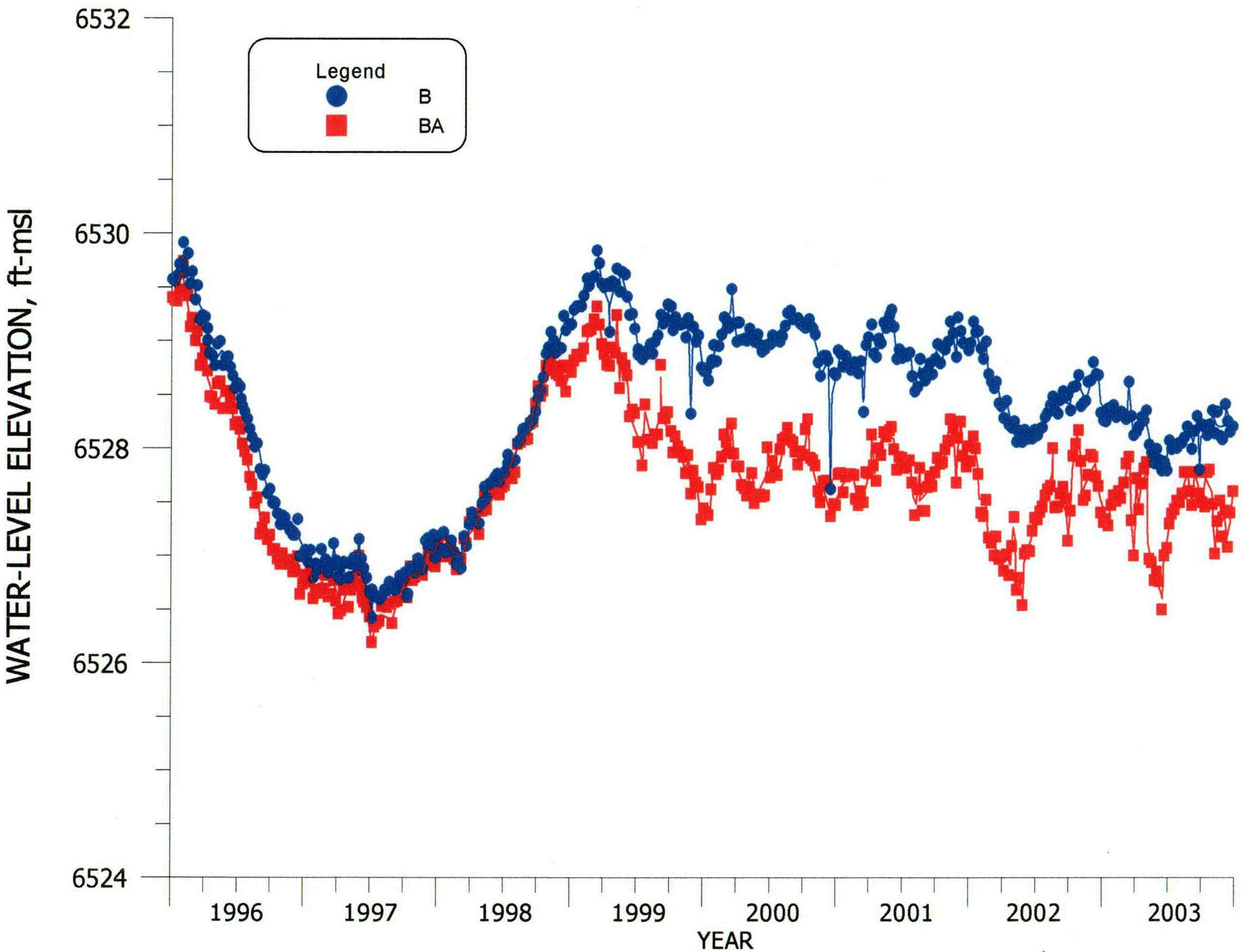


FIGURE 4.2-8. WATER-LEVEL ELEVATION FOR WELLS B AND BA.

C17

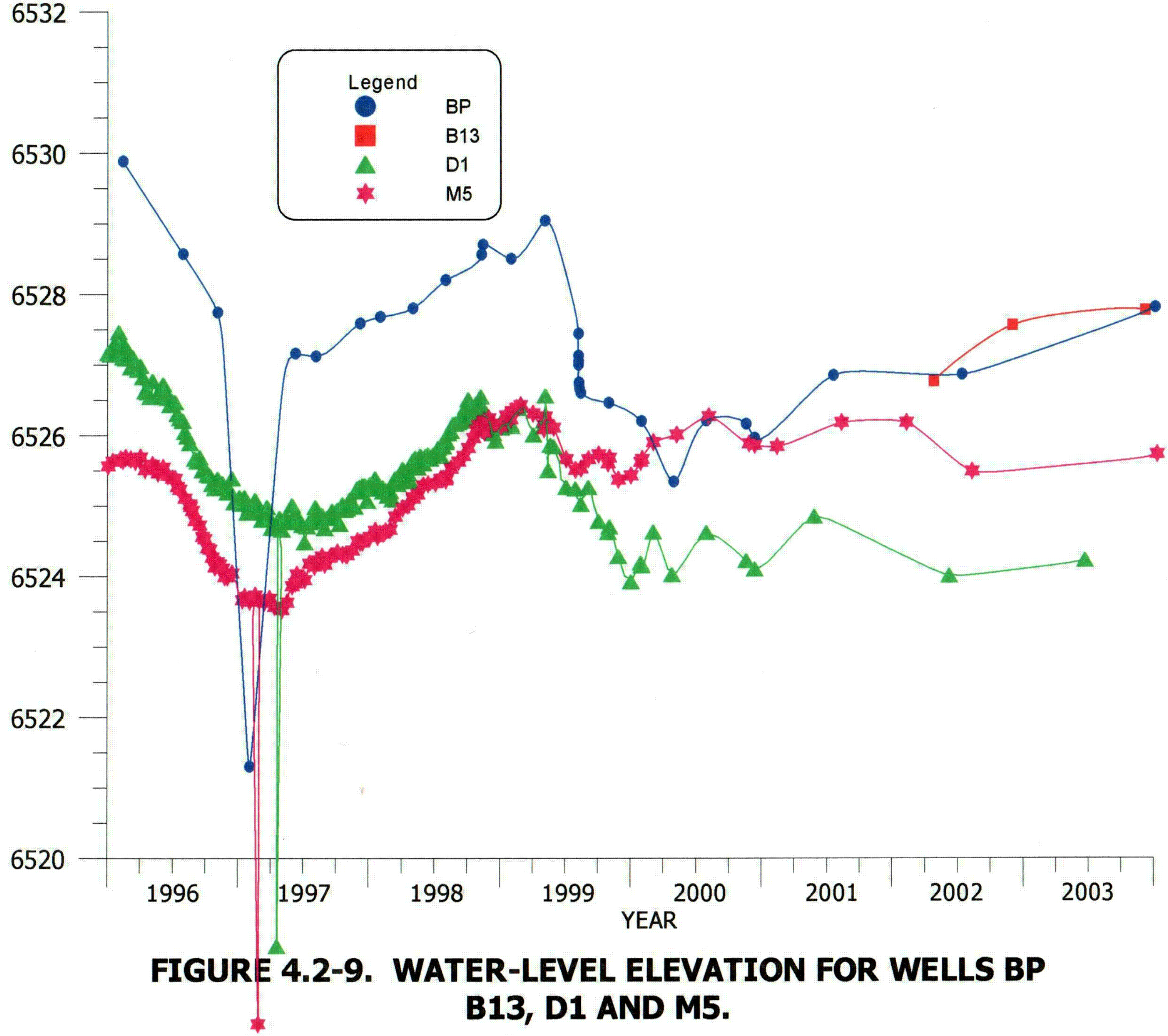


FIGURE 4.2-9. WATER-LEVEL ELEVATION FOR WELLS BP B13, D1 AND M5.

C18

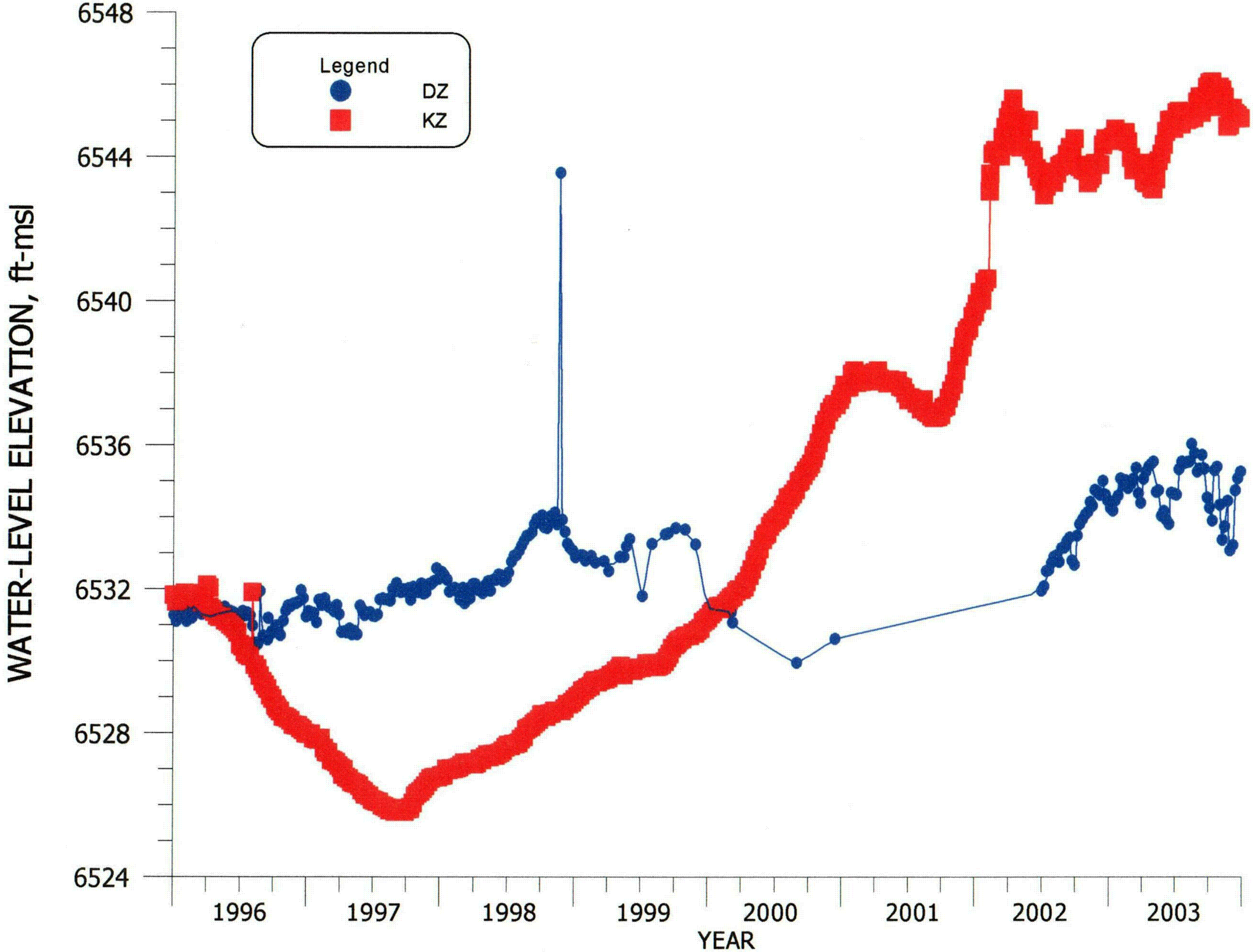


FIGURE 4.2-10. WATER-LEVEL ELEVATION FOR WELLS DZ AND KZ.

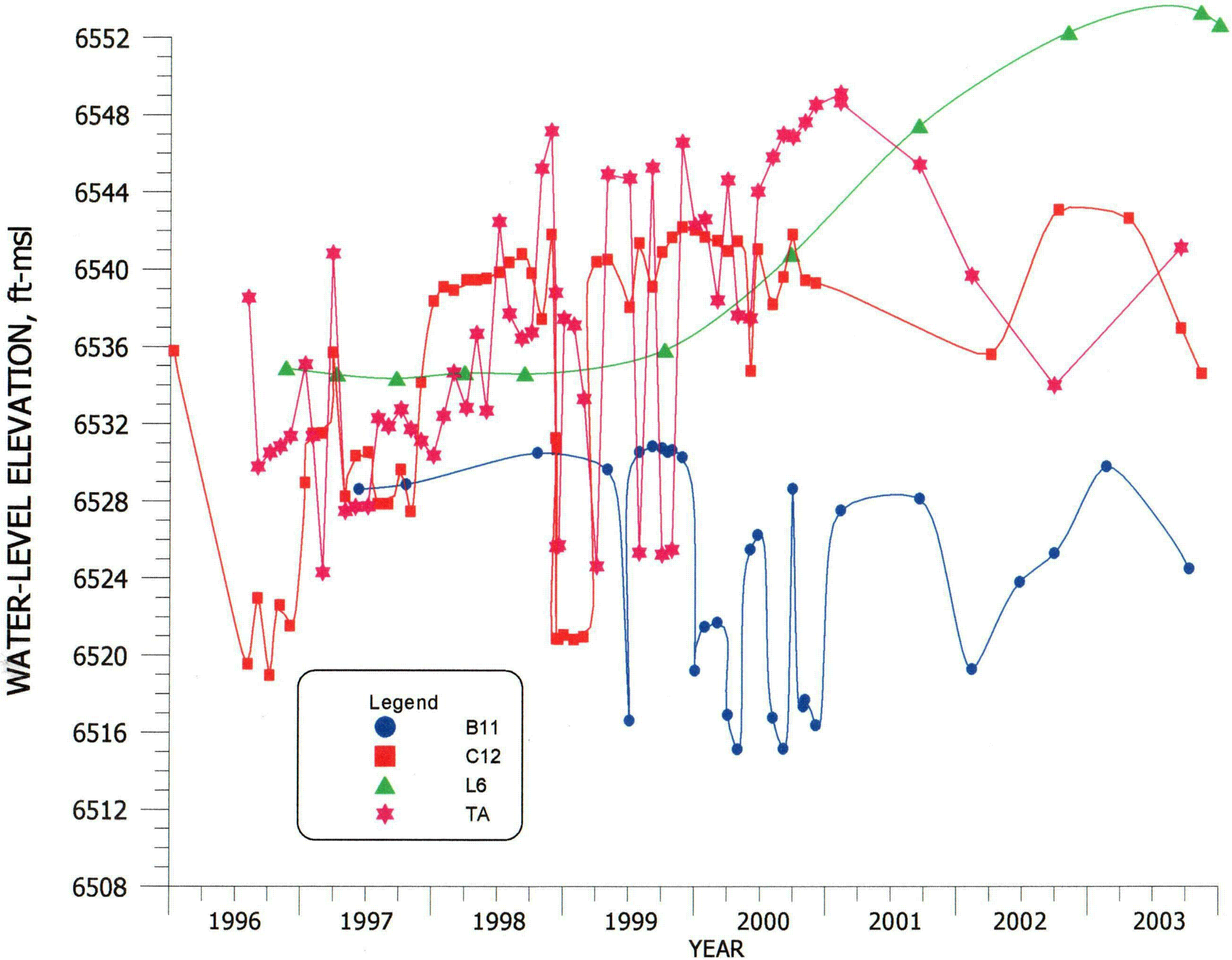


FIGURE 4.2-11. WATER-LEVEL ELEVATION FOR WELLS B11, C12, L6 AND TA.

C20

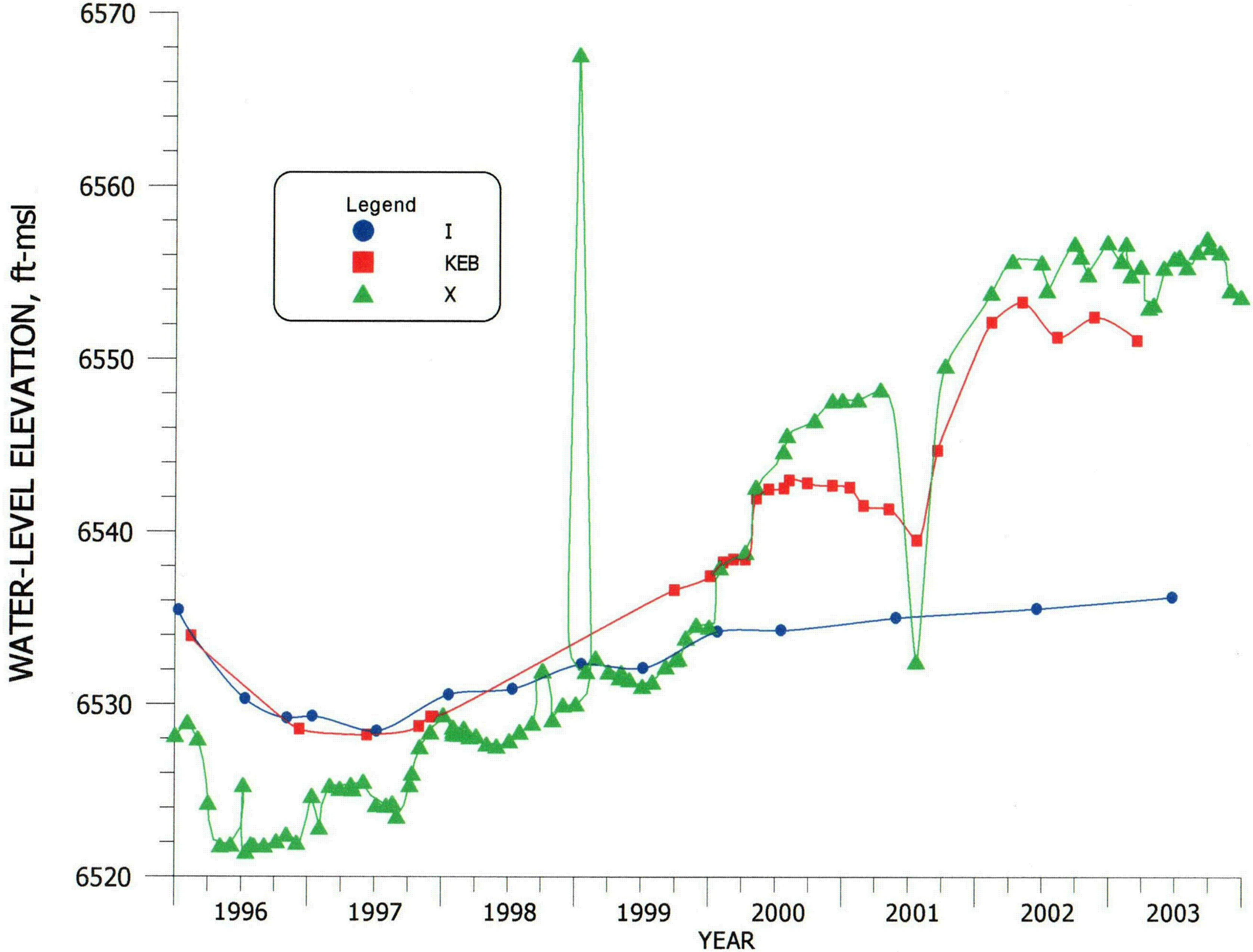


FIGURE 4.2-12. WATER-LEVEL ELEVATION FOR WELLS I, KEB AND X.

C21

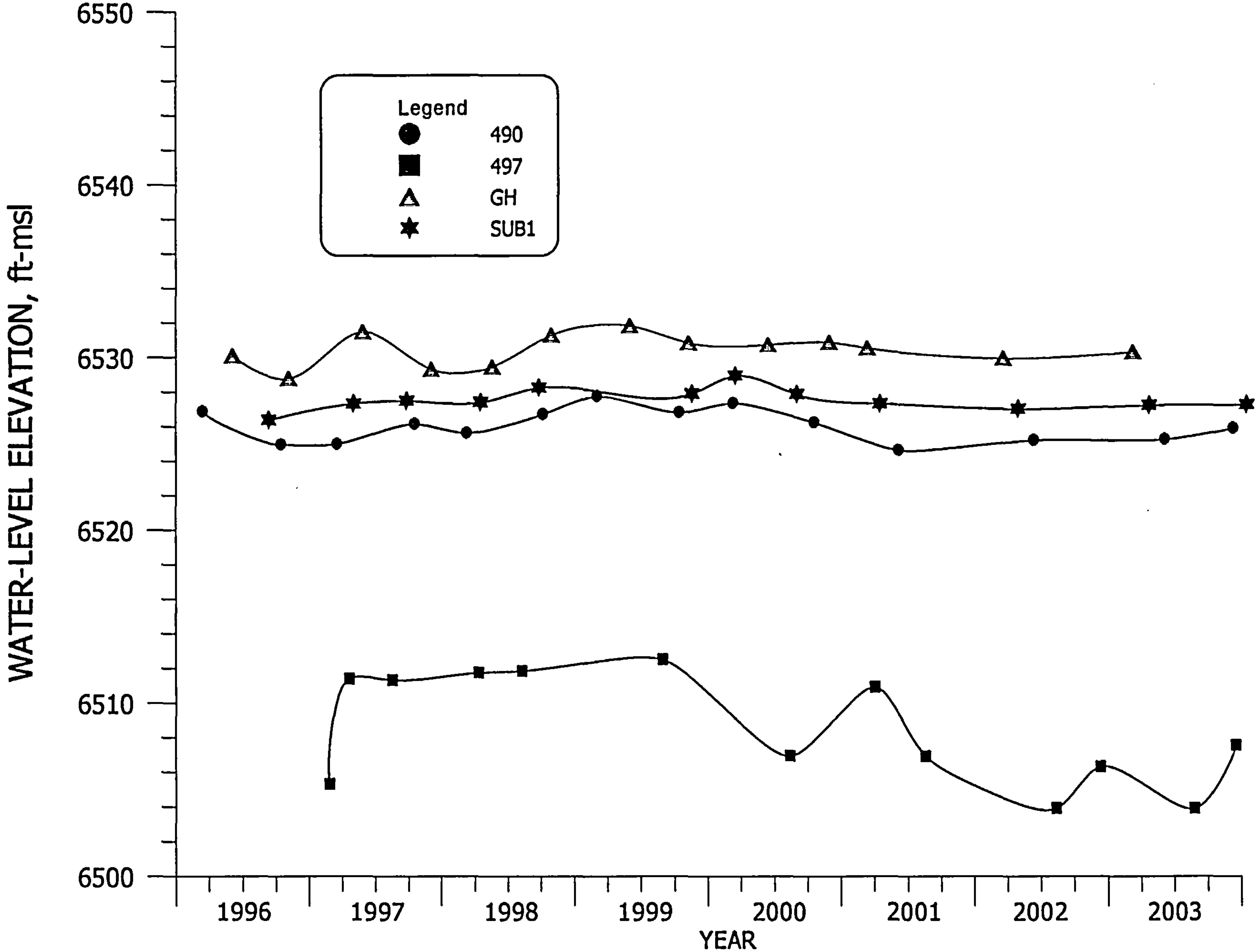


FIGURE 4.2-13. WATER-LEVEL ELEVATION FOR WELLS 490, 497, GH AND SUB1.

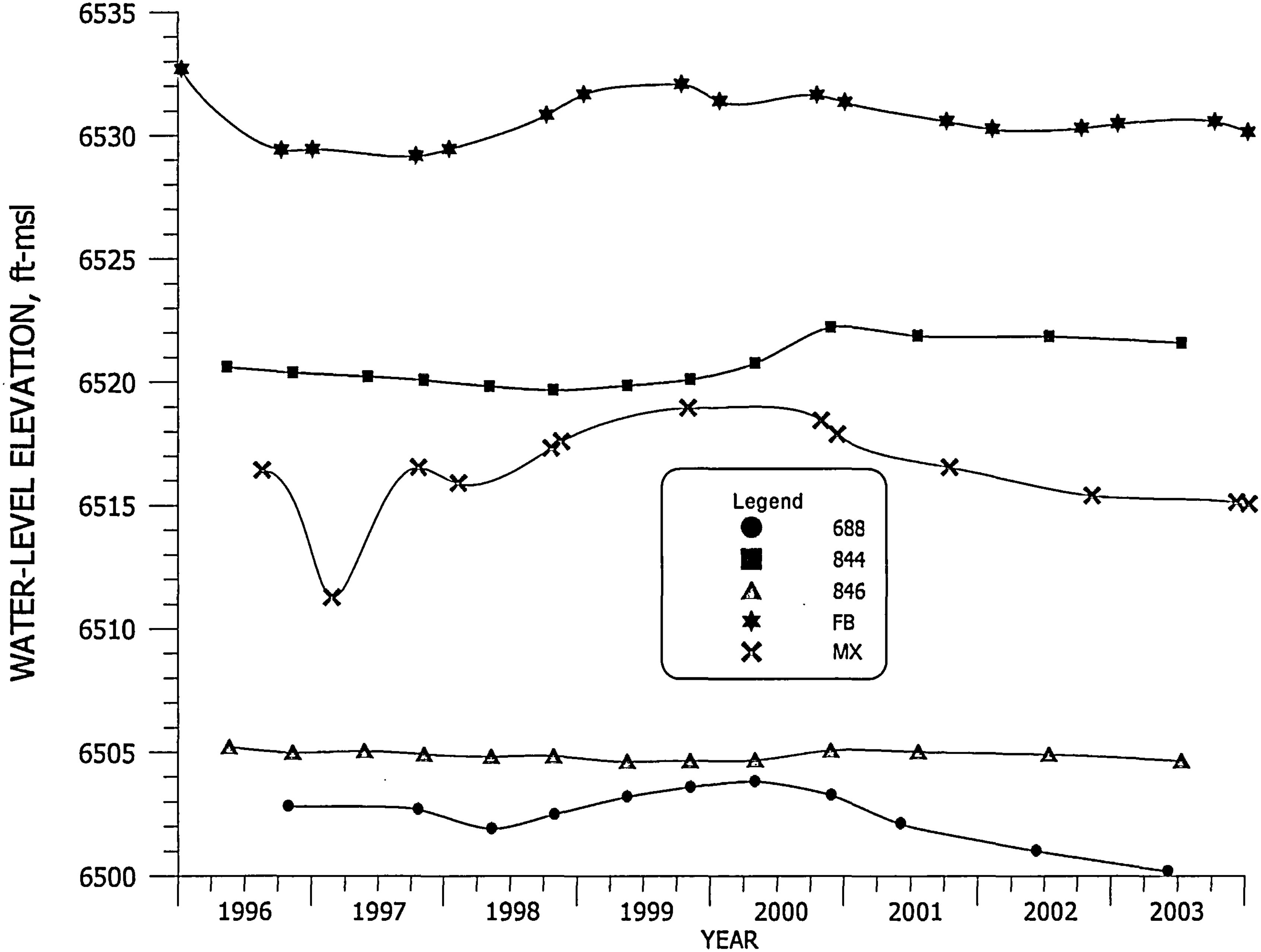


FIGURE 4.2-14. WATER-LEVEL ELEVATION FOR WELLS 688, 844, 846, FB AND MX.

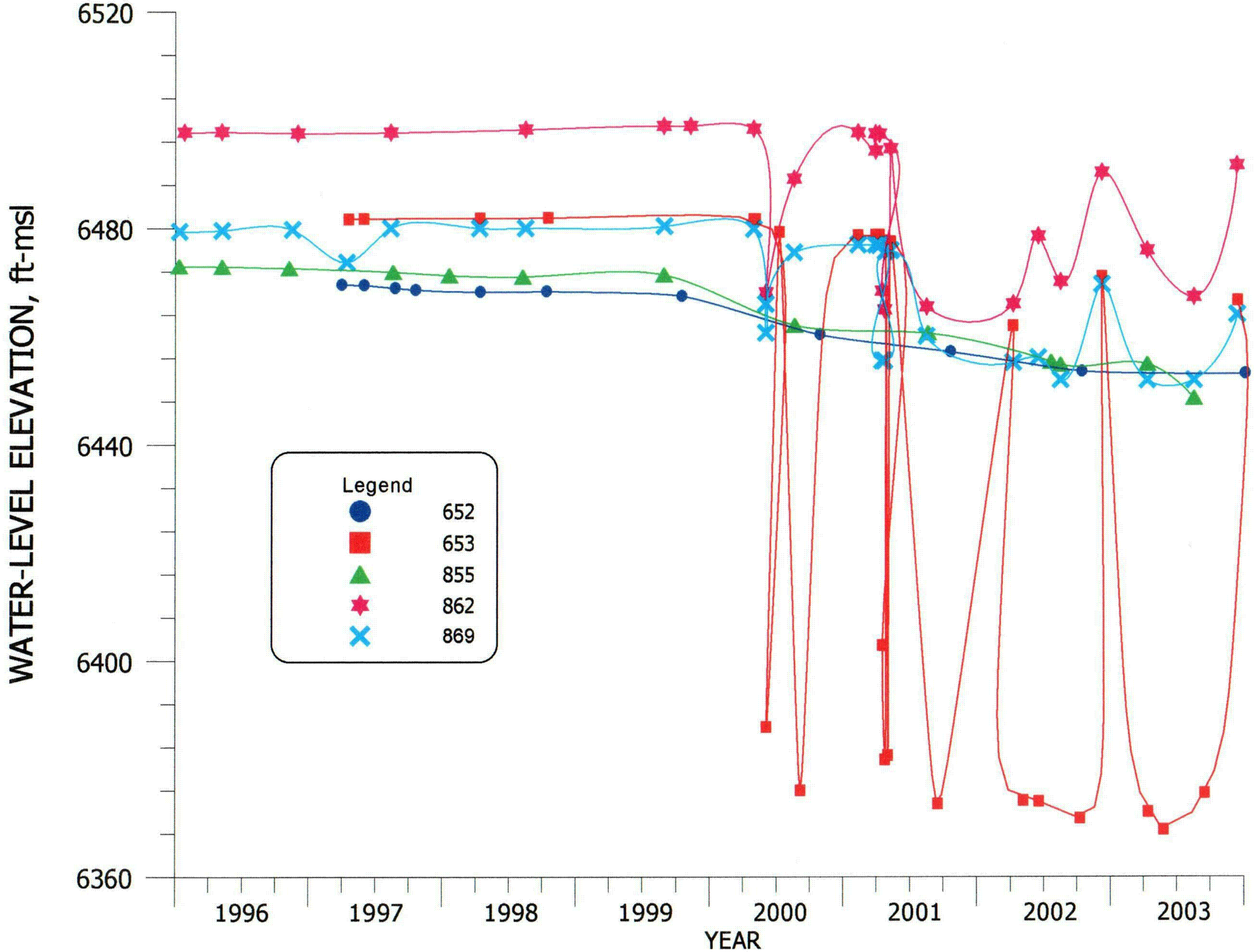


FIGURE 4.2-15. WATER-LEVEL ELEVATION FOR WELLS 652, 653, 855, 862 AND 869.

C22

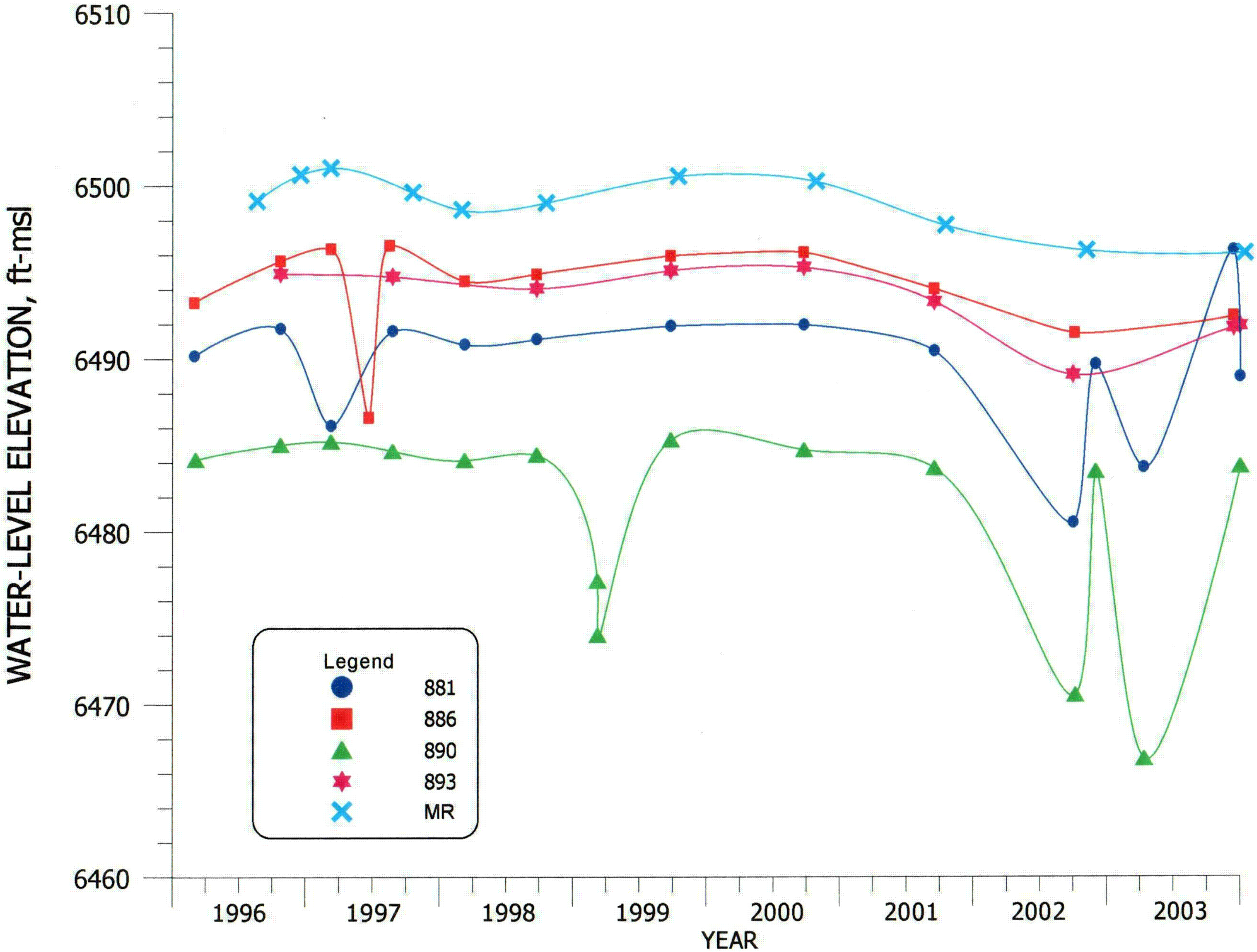


FIGURE 4.2-16. WATER-LEVEL ELEVATION FOR WELLS 881, 886, 890, 893 AND MR.

C23

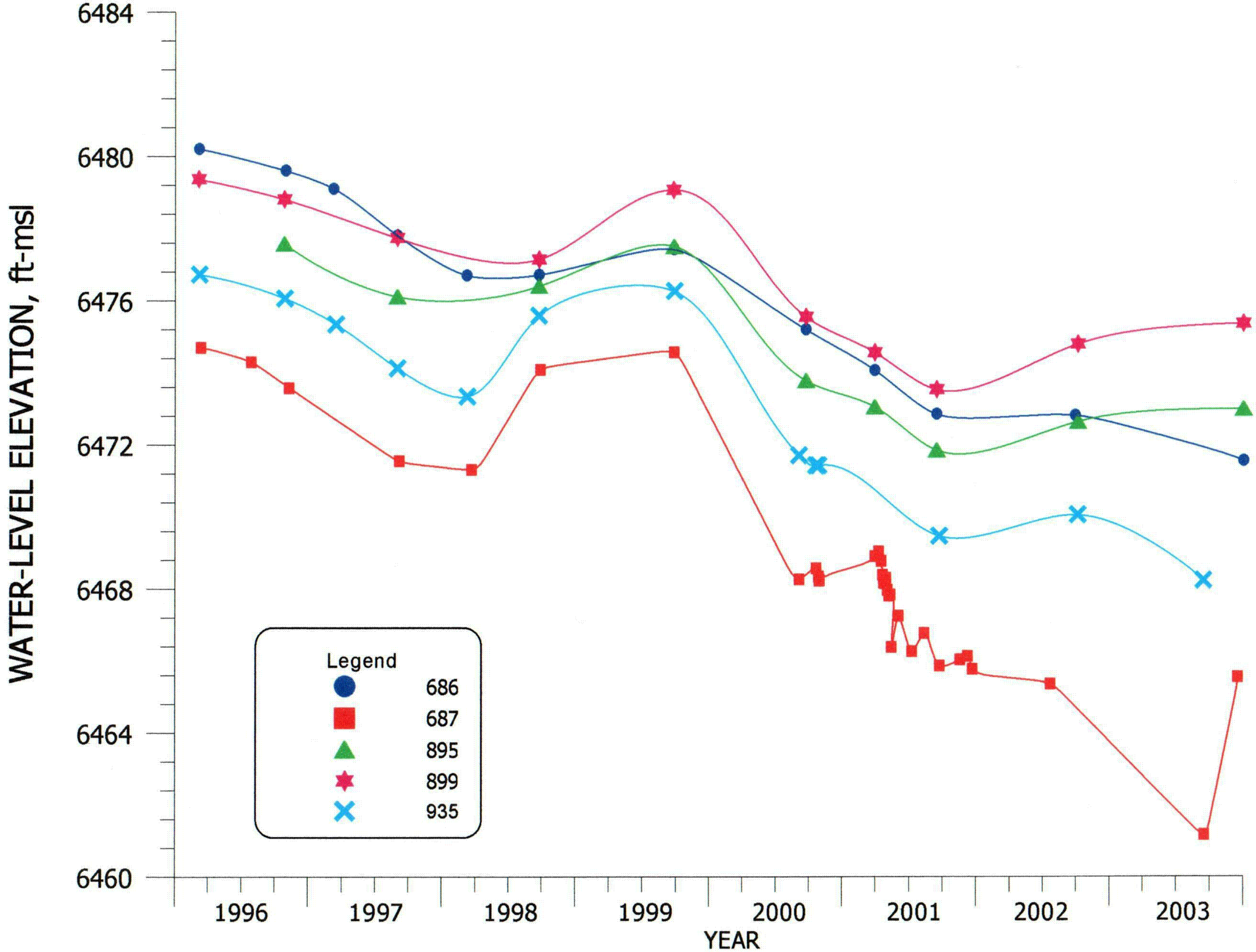


FIGURE 4.2-17. WATER-LEVEL ELEVATION FOR WELLS 686, 687, 895, 899 AND 935.

C24

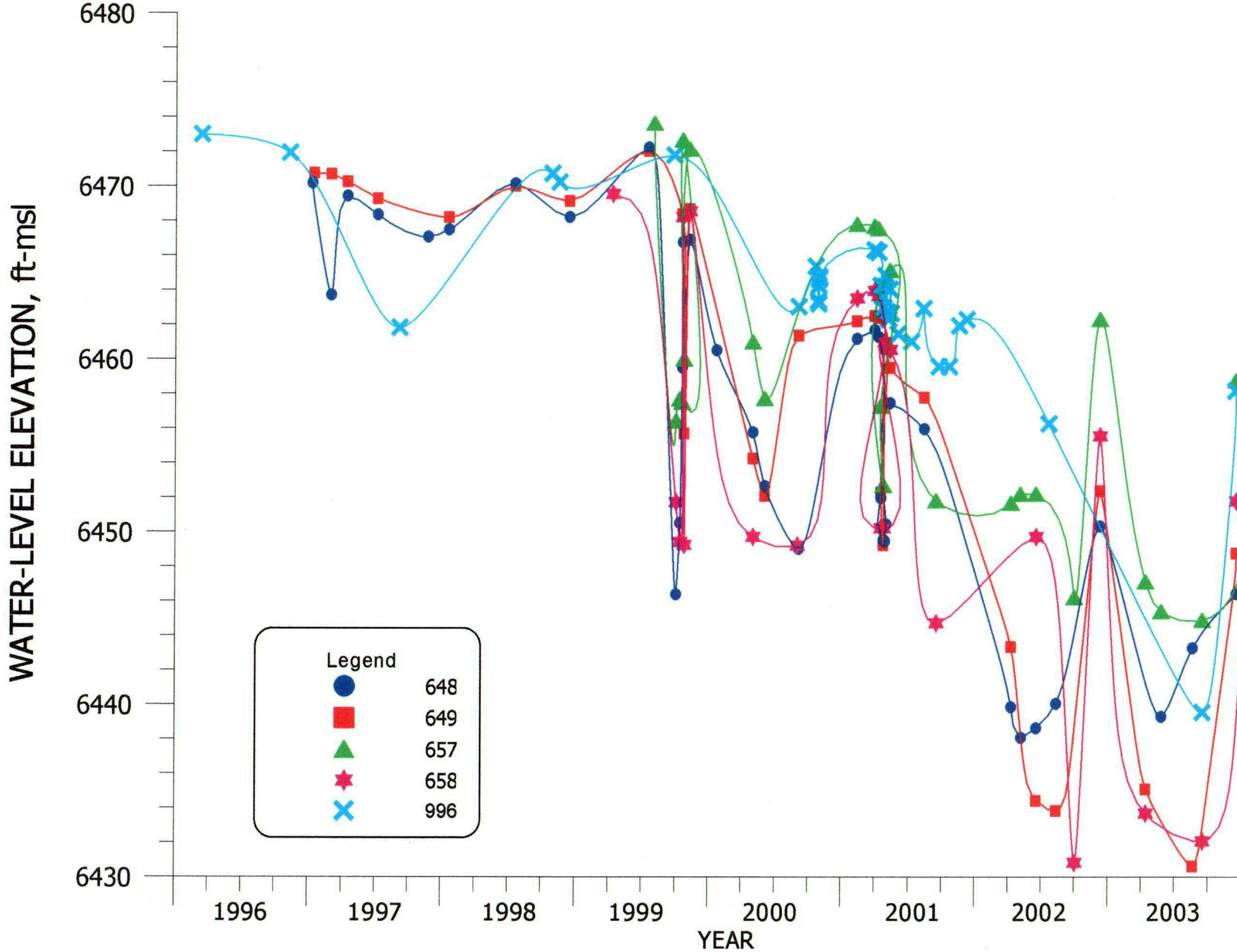


FIGURE 4.2-18. WATER-LEVEL ELEVATION FOR WELLS 648, 649, 657, 658 AND 996.

C25

4.3 ALLUVIAL WATER QUALITY

This section presents the 2003 water-quality data for the alluvial aquifer. The major constituents that are typically measured at this site are sulfate, chloride and TDS. Sulfate concentrations are used as the primary indicator of contaminant remediation. Selenium, uranium and molybdenum are the metal constituents of concern at this site. Nitrate, radium, chromium, vanadium and thorium are also discussed in the monitoring report, but these constituents are of only minor concern at this site. Tables B.4-1 through B.4-6 in Appendix B present the 2003 alluvial water-quality data for each well. The most recent monitoring values were used for the concentration contour figures presented in this section.

Colored patterns are used on the figures to delineate where concentration limits exceed the full range of background for each of the constituents.

4.3.1 SULFATE - ALLUVIAL

Sulfate has been used as the primary indicator constituent for this site, because concentrations are large in the tailings solution. Concentrations of sulfate in the alluvial aquifer for 2003 are presented on Figure 4.3-1. Background concentrations observed in 2003 ranged from 404 to 1780 mg/l. The proposed standard is presented in the legend of the respective figure for each parameter. A greater than sign was added in front of the numeric value to note that the pattern shows where the standard is exceeded. The New Mexico sulfate standard and the proposed NRC standard for this site is 1870 mg/l. An updated statistical evaluation of the background sulfate concentration with data through 1998 showed that concentrations as great as 1870 mg/l could be naturally occurring at this site. Therefore, areas where sulfate concentrations exceed 1870 mg/l are shown with a green pattern. Areas where the upper background concentration of 1870 mg/l is exceeded are near the two tailings piles and are indicated by the green shading on Figure 4.3-1. Sulfate concentrations in an area underlying the Large Tailings pile still exceed 10,000 mg/l. A significant reduction in sulfate concentration was achieved along the restoration zone, near the Small Tailings pile, in 2003. The observed sulfate concentrations in Broadview Acres and Felice Acres were less than 1000 mg/l in 2003, except for a value of 1490 mg/l measured in a water sample collected from well SUB3. Sulfate concentrations were fairly stable in Section 3 in 2003. Sulfate concentrations exceeded 1000 mg/l in the southwest portion of Murray Acres and southern Pleasant Valley Estates. Sulfate concentrations also exceeded 1000 mg/l adjacent to the zero saturation boundary in the northern portion of Section 27 and extending into Section 28 (see Figure 4.3-1). Down-gradient of the Grants Project site, the sulfate concentrations are all within the natural range of background and, therefore, no water-quality restoration with respect to sulfate is necessary beyond the immediate Grants Project area.

Plots of constituent concentrations versus time have been prepared for the alluvial aquifer for sulfate, TDS, chloride, uranium, selenium, molybdenum and nitrate. The groupings of wells used for these plots are shown on Figure 4.3-2. The figure numbers for each of the well groupings that correspond with the sulfate concentration versus time plots are indicated on Figure 4.3-2. The color and symbol used for each well are the same as those used in the time plots for each constituent. Figure numbers for the time plots of other constituents are not shown on this map; however, it is useful for the other time-concentration plots because the color, symbol and well groupings are consistent.

Figure 4.3-3 presents sulfate concentrations plotted versus time for up-gradient wells DD, ND, P, P4, Q and R. A gradually increasing trend is occurring in the up-gradient wells ND and R. An overall declining trend in sulfate concentration has been observed in well DD, while an increasing trend has developed in wells P and Q during the last three years. The historical values for well P show similar periods of short term increasing values in the alluvial aquifer. The changes in sulfate concentration in these wells are well within the range previously observed for sulfate in the up-gradient wells. The increases could be due to the influx of ground water with higher sulfate concentrations into this area up-gradient of Homestake's background wells.

Sulfate concentrations in alluvial well S3 were steady in 2003 (see Figure 4.3-4). The sulfate concentrations for well S2 decreased in late 2003 after a period of relative stability was observed in 2002 and early 2003. Sulfate concentrations increased in well S4 in 2003. Concentrations had been steady to the northwest of the Large Tailings pile at well S11, but sulfate concentration increased in 2003. Concentrations to the north of the Large Tailings pile at well NC were steady in 2003.

Figure 4.3-5 presents sulfate concentrations plotted versus time for alluvial wells BC, DC, MO, MU and W. Sulfate concentrations were fairly stable in alluvial wells BC, MO and MU in 2003, while concentrations decreased in well DC. Concentrations remained low with a small increase in well W in 2003.

Figure 4.3-6 presents sulfate concentration versus time plots for alluvial wells B, BP, D1 and M5. Overall, sulfate concentrations in each of these wells were fairly steady in 2003.

Figure 4.3-7 presents time plots of sulfate concentrations for wells B11, DQ, S5, T and TA. The sulfate concentrations in collection wells B11 and DQ have shown an overall decrease during 2003 except for a recent increase in well B11. Sulfate concentrations in well S5 were fairly steady in 2003. Concentrations in wells T and TA have decreased to low levels, which indicate the influence of the R.O. product injection.

Figure 4.3-8 presents plots of sulfate concentration versus time for alluvial wells on the west side of the Small Tailings pile. Sulfate concentrations were relatively stable in wells C2, C9 and C12 in 2003, while concentrations in well C6 decreased.

Figure 4.3-9 presents sulfate concentrations versus time for alluvial wells on the south side of the Small Tailings pile. Sulfate concentrations in these wells were all small in 2003 as a result of injected R.O. product water flowing toward these wells. R.O. product water injection has decreased sulfate concentrations in wells KF, KZ and X to very low levels over the last 3 years.

Figure 4.3-10 shows the sulfate concentrations for the Small Tailings pile collection wells K4, K5, K7 and K10. Some increase in 2003 was observed in well K7, while sulfate concentrations declined in wells K4 and K5. Sulfate concentrations were generally steady in well K10 following a significant decline in 2001 and 2002.

Time plots of sulfate concentrations in collection wells located southeast of the Small Tailings pile are presented on Figure 4.3-11. This figure shows a gradual decline in concentrations in 2003 in wells L5, L6, L7, L9 and L10 and fairly steady sulfate concentrations in well L8.

Figure 4.3-12 presents sulfate concentration time plots for Broadview Acres alluvial wells GH, SUB1, SUB2 and SUB3. Small variations were observed in wells SUB1, SUB2, SUB3 in 2003, and the observed concentrations are similar to those in the injection water, except for the slightly higher values observed in well SUB3. A small decrease was observed in the 2003 sulfate concentration in well GH.

Figure 4.3-13 presents sulfate concentrations versus time for Felice Acres alluvial wells 490, 491, 496 and 497. The sulfate concentrations in wells 490 and 496 were fairly steady in 2003, while concentrations declined in well 491 and increased slightly in well 497.

Figure 4.3-14 contains time plots of sulfate concentrations for Murray Acres and Pleasant Valley Estates alluvial wells 688, 802, 844, 846 and FB. This plot shows that sulfate concentrations in water taken from alluvial well 846 increased in 2003. A decrease in sulfate concentrations was observed in wells 844 and FB. Concentrations were fairly steady in alluvial wells 688 and 802 during 2003.

Figure 4.3-15 presents the sulfate concentration time plots for five wells in Section 3 (see Figure 4.3-2 for the location of these wells). Sulfate concentrations in each of these Section 3 alluvial wells had been fairly steady over the last several years, but sulfate levels gradually increased in 2003. No significant long-term trends in the sulfate concentration are noted for these wells.

The sulfate concentrations in water from five wells near the Section 28 center pivot irrigation system are presented on Figure 4.3-16. There are no significant trends for sulfate concentration in this area.

Figure 4.3-17 presents sulfate concentrations with time for five wells located to the west of the Section 28 irrigation area. Sulfate concentrations in wells 899 and 935 previously were gradually decreasing, but they increased slightly in 2003. The sulfate concentrations in the other three wells remained fairly stable during 2003. Some of the small changes in sulfate concentrations may be due to the injection of fresh water in wells in Sections 28 and 29.

The time variations of sulfate concentrations in water sampled from four wells in Section 33 and a well in the eastern portion of Section 32 are plotted on Figure 4.3-18. Sulfate concentrations in each of these wells were fairly steady in 2003, with a slight increase noted in well 657.

4.3.2 TOTAL DISSOLVED SOLIDS - ALLUVIAL

Total dissolved solids (TDS) concentration contours for the alluvial aquifer during 2003 are presented on Figure 4.3-19. The alluvial background TDS concentrations measured up-gradient of the Large Tailings pile in 2003 varied from 1060 to 2720 mg/l. Based on an updated statistical analysis, TDS concentrations must exceed 3060 mg/l to indicate an elevation in concentration beyond the naturally occurring range. A light green pattern is shown on Figure 4.3-19 to indicate where the TDS concentrations exceed 3060 mg/l. None of the observed concentrations in the west half of this figure exceed this level. The TDS concentrations near the tailings exceed 3060 mg/l for approximately 800 feet to the west of the Large Tailings pile. Some TDS concentrations underlying the Large Tailings area exceed 20,000 mg/l. A zone of 2000 mg/l or greater TDS concentration extends to the west of the Large Tailings pile to the west side of Section 28 (see Figure 4.3-19) and in the western portion of the alluvial aquifer up-gradient of the site. An additional area of TDS concentrations greater than 2000 mg/l exists in the southern portion of Pleasant Valley Estates and the southwest portion of Murray Acres and to the south and southwest of this area. The only other area of TDS concentrations above 2000 mg/l is a small area in western Broadview Acres. Only the areas closely proximal to the two tailings piles require ground water quality restoration with respect to TDS.

TDS-time concentration plots were developed for the same grouping of wells as were prepared for sulfate (see Figure 4.3-2 for groupings of wells with TDS plots). Figure 4.3-20 presents the TDS concentrations versus time for the up-gradient wells. TDS concentrations have gradually increased in wells ND, Q and R over the last few years. A gradual overall decrease in TDS concentrations was previously observed in well DD, and the levels remained fairly steady in 2003.

Figure 4.3-21 presents TDS concentrations plotted versus time for wells NC, S2, S3, S4 and S11. This plot shows steady concentrations in 2003 for wells NC and S4. Declines in TDS concentrations are noted in wells S2 and S3 while an increase was observed in well S11.

TDS concentrations were relatively stable in water collected from wells BC, MO, and W during 2003 (see Figure 4.3-22). Declining concentrations have been observed over the last few years in wells DC and MU.

TDS concentrations in water sampled from wells B, BP, D1 and M5 are presented in Figure 4.3-23. TDS concentrations were relatively unchanged in 2003 in each of these wells.

Figure 4.3-24 presents TDS concentrations for wells B11, DQ, S5, T and TA. Low and steady concentrations were observed in wells T and TA in 2003, while decreases were observed in wells DQ and S5. A small increase in TDS concentrations was observed in well B11 during 2003.

Figure 4.3-25 presents time concentration plots for the wells on the west side of the Small Tailings pile. The concentrations in wells C6 and C9 declined in 2003, while concentrations were mostly unchanged in wells C2 and C12.

TDS concentrations versus time for four wells just south of the Small Tailings pile are presented in Figure 4.3-26. This figure shows low and steady recent concentrations for wells KF, KZ and X. A small decrease in TDS concentration was observed in well KEB in 2003.

Figure 4.3-27 presents plots of TDS concentrations for four wells on the south side of the No. 1 Evaporation Pond on top of the Small Tailings pile. These alluvial wells have shown reduced TDS concentrations in recent years, except for well K7, in which an increase was noted in 2003.

TDS concentrations in water taken from the L line of wells are presented in Figure 4.3-28. TDS concentrations are gradually decreasing with time in each of the wells.

Figure 4.3-29 presents the TDS concentrations versus time for the Broadview Acres wells. This plot shows fairly steady TDS concentrations in 2003.

The TDS concentrations in the Felice Acres alluvial wells also were steady in 2003, except that a decrease in TDS occurred in well 491 to levels that are consistent with nearby alluvial wells (see Figure 4.3-30).

TDS concentrations for the Murray Acres and Pleasant Valley Estates alluvial wells are presented in Figure 4.3-31. A gradual increasing trend in concentrations has been observed in well 846. The TDS concentration in water sampled from well 844 decreased in 2003 after it was observed to be increasing in 2002. The TDS concentrations in the other three wells have remained relatively unchanged.

Figure 4.3-32 presents time plots of TDS concentrations for five wells located in Section 3. Overall, TDS concentrations have been relatively steady over the last few years. The TDS concentrations for the Section 28 irrigation supply and monitoring wells were also stable in 2003 (see Figure 4.3-33).

TDS concentrations in alluvial wells in Section 29 and adjacent areas are presented on Figure 4.3-34. TDS concentrations in wells 686, 687 and 895 gradually declined in 2003, while the concentrations in 899 and 935 were fairly steady in 2003. Figure 4.3-35 presents TDS concentrations in the Section 33 alluvial wells. This plot shows fairly steady concentrations in the Section 33 wells in 2003.

4.3.3 CHLORIDE - ALLUVIAL

Chloride concentration is another important indicator of tailings seepage because of the conservative nature of this constituent and the fact that up-gradient concentrations are low. Chloride concentrations measured in 2003 in the alluvial aquifer near the tailings are presented on Figure 4.3-36. Up-gradient chloride concentrations in the alluvial aquifer varied from 46 to 161 mg/l in 2003. The fresh-water injection systems have used water with chloride concentrations of approximately 200 mg/l, whereas the R.O. product chloride concentration is less than 10 mg/l. The alluvial aquifer around and underlying the Large and Small Tailings piles contains chloride concentrations in excess of the State drinking water standard of 250 mg/l. Measurement of chloride concentration in ground water is useful in defining areas where the R.O. product water has migrated in the alluvial aquifer. A light green pattern on Figure 4.3-36 was used to illustrate where concentrations exceed 250 mg/l. The limited areal extent of the green pattern on this figure shows that ground water-quality restoration with respect to chloride is only needed near the tailings. Chloride concentrations in the alluvial water in the western half of Figure 4.3-36 have never exceeded 250 mg/l and, therefore, chloride concentrations are not typically measured in most of the wells in the west area. However, chloride concentrations were measured in samples collected from these wells in 2003 in order to provide a comprehensive water-quality update.

Figure 4.3-37 presents chloride concentrations versus time for the six up-gradient wells. Analysis of the data on this figure shows an overall gradual increasing trend in chloride concentrations with time in wells R and Q. However, the 2003 value for both of these wells was slightly less than the 2002 value. A much larger increase in chloride concentration is indicated in the sample from well ND. The sulfate and TDS concentrations in well ND also gradually increased during 2003, but the magnitude of increase for chloride concentration is dramatically greater. Therefore, the 2003 chloride concentration for well ND should be considered suspect until it can be confirmed with additional data.

Figure 4.3-38 presents time plots of chloride concentration for wells NC, S2, S3, S4 and S11. A gradual decreasing trend in chloride concentration was observed in well S2 while fairly steady levels were measured in wells NC, S3 and S4 in 2003. The 2003 chloride concentration in S11 is modestly greater than the two previous values.

Chloride concentrations in wells BC and DC have remained low in 2003, while a gradual increase in chloride concentrations was observed in wells MO, MU and W (see Figure 4.3-39).

Plots of chloride concentration for wells B, BP, D1 and M5 are presented on Figure 4.3-40. A small increase in chloride concentration has been observed in wells B and BP, while concentrations in wells D1 and M5 remained relatively unchanged during 2003.

Chloride concentrations in wells B11, DQ, S5, T and TA are presented on Figure 4.3-41. This figure shows a dramatic declining trend in chloride concentration in well DQ over the last few years. Chloride concentrations in water taken from wells T and TA were small in 2003. A small increase in chloride concentration was observed in well B11, while no trend was observed for well S5 data.

Chloride concentrations in alluvial wells on the west side of the Small Tailings pile are presented on Figure 4.3-42. This figure shows stable chloride concentrations in wells C2 and C12, while a small reduction is noted in wells C6 and C9.

All of the chloride concentrations on the south side of the Small Tailings pile stayed very low in 2003, and this reflects the impact of injection of R.O. product water in this area (see Figures 4.3-43 and 4.3-44).

The chloride concentrations in water collected from the L line wells are presented in Figure 4.3-45. Since the previous measurements in 2001, chloride concentrations have generally decreased. With respect to chloride concentration, the quality of water has been restored in the vicinity of the L wells, and measured concentrations are approximately equal to the concentration of the injected fresh water.

Figure 4.3-46 presents time plots of chloride concentrations in the Broadview Acres wells, in which fairly steady chloride concentrations have been observed over recent years.

Figure 4.3-47 presents the chloride concentration-time plots for the four Felice Acres wells. The 2003 chloride concentrations are fairly similar to previous chloride concentrations observed in these four wells.

Chloride concentration plots for the Murray Acres and Pleasant Valley Estates wells are presented on Figure 4.3-48. Chloride concentrations have gradually increased in wells 688, 844 and 846 since the previous measurements. Each of these levels is very similar to the chloride concentrations of the fresh-water injection water and are, therefore, approaching concentrations that would be expected down-gradient of the fresh-water injection.

The plots of chloride concentration versus time in Section 3 wells are presented on Figure 4.3-49. Chloride concentrations are fairly similar in most of these wells except for lower values measured in wells 855 and 652. These wells are located near the edge of the alluvial aquifer in Section 3.

Figure 4.3-50 presents plots of the variation of chloride concentrations with time in Section 28 wells. The recent chloride concentrations in these wells are slightly above those observed previously, but are similar to the injected fresh-water concentration.

Chloride concentrations in the Section 29 monitoring wells are presented on Figure 4.3-51. It is anticipated that chloride concentrations in water taken from these wells will decrease with time because of the nearby injection of fresh water which has a lower chloride concentration. The water in injection supply well 951 typically has a chloride concentration of approximately 50 mg/l.

Figure 4.3-52 presents time plots of chloride concentrations in the Section 33 wells. The 2003 chloride concentrations for these wells are fairly similar to those measured prior to 2003. A modest increase in chloride concentration has been observed in well 657 since 1999.

4.3.4 URANIUM - ALLUVIAL

Uranium is considered an important ground water constituent at this site due to the significant levels in the tailings seepage. Uranium data and contours for 2003 are presented on Figure 4.3-53. Background uranium concentrations during 2003 varied from 0.001 to 0.22 mg/l, and the proposed NRC alluvial site standard is 0.15 mg/l. The light green pattern on Figure 4.3-53 shows where uranium concentrations exceed 0.15 mg/l, the statistical upper range of background.

Uranium concentrations exceed background in the area of the Large and Small Tailings piles, and to the west through Section 28 and into the northern portion of Section 32. Uranium concentrations in Sections 28 and 29 also reflect a contribution from the Rio San Jose alluvial system in Section 20, but these levels have decreased to slightly less than 0.15 mg/l. The zones of moderately elevated concentrations join together and the combined area extends down-gradient approximately one-half mile into Section 33. Uranium concentrations greater than 0.15

mg/l are also present near the L collection wells south of the Small Tailings pile. Uranium concentrations in the L wells were significantly reduced over those observed last year.

An additional area where uranium concentrations in the alluvium are greater than 0.15 mg/l exists in Felice Acres and to the southwest into Section 3 (see Figure 4.3-53). The area of elevated concentrations extends for approximately one-half mile to the southwest of the southwest corner of Felice Acres. Uranium concentrations in this area were generally reduced in 2003. The uranium concentration in another small area in the northeast portion of Murray Acres at well 802 exceeds 0.15 mg/l. Additional restoration is needed in each of these areas with respect to uranium concentrations.

Uranium concentration plots were prepared in order to illustrate changes that result from the corrective action program and other factors. Figure 4.3-2 shows the grouping and location of the alluvial wells used for the uranium-time plots. The figure numbers shown on Figure 4.3-2 correspond to the sulfate time plots. The same grouping of wells was used for the uranium plots, and their symbols and colors are the same as those used on the sulfate plots.

Figure 4.3-54 presents uranium concentrations plotted versus time for up-gradient wells DD, ND, P, P4, Q and R. The uranium concentrations in these wells have been fairly steady during the last three years except for an increase in well P4. The proposed NRC site standard is shown in the legend on Figure 4.3-53.

A decrease in uranium concentrations was observed in 2003 for wells S2, S3 and S4 (see Figure 4.3-55). Uranium concentrations remained low in wells NC and S11.

Figure 4.3-56 presents the uranium concentration time plots for alluvial wells west of the Large Tailings pile. Uranium concentrations are low and are gradually decreasing in well BC, and concentrations were also low in wells DC, MU and W. A small increase in concentration was observed in 2003 in well MO.

Figure 4.3-57 presents time plots of uranium concentrations for alluvial wells B, BP, D1 and M5. Relatively stable uranium concentrations were observed in well B in 2003. Uranium concentrations generally decreased in water collected from wells BP, D1 and M5.

Plots of uranium concentration versus time are presented on Figure 4.3-58 for alluvial wells B11, DQ, S5, T and TA. In general, concentrations in collection wells DQ, T and TA decreased in 2003. A gradual increase in concentration was observed in water from wells B11 and S5 during 2003.

Figure 4.3-59 presents plots of uranium concentration versus time for collection wells on the west side of the Small Tailings pile. Uranium concentrations in collection wells C6, C9 and C12 are gradually declining. Uranium concentrations remained low in well C2 during 2003.

Figure 4.3-60 presents uranium concentrations for wells on the south side of the Small Tailings pile. Uranium concentrations are low in each of these wells, due to the injection of R.O. product water into this area.

The rate of reduction of uranium concentrations in wells K4, K5 and K10 decreased in 2003 (see Figure 4.3-61). A slightly increasing trend was observed in collection well K7.

Uranium concentrations in water from alluvial wells L5, L6, L7, L8, L9 and L10 are presented on Figure 4.3-62. Uranium concentrations decreased in 2003 in all of these wells.

Figure 4.3-63 presents uranium concentrations versus time for four Broadview Acres alluvial wells: GH, SUB1, SUB2 and SUB3. Uranium concentrations in wells SUB1 and SUB2 are similar and gradually declined in 2003. Uranium concentrations to the north in wells GH and SUB3 have been small for several years.

Figure 4.3-64 presents the uranium concentration time plots for Felice Acres wells 490, 491, 496 and 497. Uranium concentrations in alluvial wells 490 and 491 have been fairly stable during the last few years, while a gradually decreasing trend has been observed in well 496. A small increase in concentration was observed in well 497 in 2003.

Figure 4.3-65 presents uranium concentrations for wells in the Murray Acres and Pleasant Valley Estates subdivision areas. Uranium concentrations gradually declined in well 802 in 2003 and are expected to continue to gradually decrease with time. Uranium concentrations in the remainder of the wells in this area are low.

The uranium concentrations for five wells in Section 3 southwest of Felice Acres are plotted on Figure 4.3-66. The uranium concentrations in the two western wells 652 and 855 have always been low. Uranium concentrations are gradually increasing in well 862 but are expected to start to decrease as a result of fresh- water injection in this area. An outlier in uranium concentration from well 653 was observed during the first half of 2003, whereas the concentration in the second half of 2003 was similar to previous values. The concentration at the leading edge of the uranium plume, as demonstrated by the values measured in well 869, was fairly steady in 2003.

Uranium concentrations from four Section 28 wells and one western Section 27 well are plotted versus time on Figure 4.3-67. Relatively steady concentrations were observed in these wells in 2003.

Uranium concentration time plots for wells in the eastern area of Section 29 are presented on Figure 4.3-68. The uranium concentrations to the north of Section 29 (well 686) are gradually decreasing with time. Well 686 is located in the Rio San Jose alluvial system up-gradient of its confluence with the San Mateo alluvial system. A gradual decline was also noted in alluvial well 935 in Section 29. Concentrations during 2003 were relatively steady in wells 895 and 899. The uranium concentrations in well 687, which is located farther south in the northeast portion of Section 33, also decreased.

Uranium concentrations in wells located in Sections 32 and 33 are relatively small and are plotted on Figure 4.3-69. Concentrations have remained low with a gradually decreasing trend in wells 648, 649 and 996 during 2003. The concentration in mid-2003 in well 657 appears to be an outlier based on the observed values prior to and after this measurement.

4.3.5 SELENIUM - ALLUVIAL

Selenium is another important constituent at the Grants Project site due to the presence of significant amounts previously in the tailings. Figure 4.3-70 presents a map of the spatial distribution of selenium concentrations throughout the site. Although the present NRC selenium site standard is 0.1 mg/l, the upper limit of background based on statistical analysis and the proposed NRC site standard is 0.27 mg/l. Concentrations that exceed 0.27 mg/l are considered indicative of seepage impacts, while smaller concentrations are within the range of natural variation. A green pattern is superimposed on the concentration contour figure to show where concentrations exceed 0.27 mg/l. A 0.1 mg/l selenium concentration contour extends approximately 0.8 miles into Section 28. Selenium concentrations in excess of 0.1 mg/l were measured southwest of Felice Acres in areas of Section 3 and just into the edge of Section 4.

Selenium concentrations exceeding 0.27 mg/l were measured in wells around the Large and Small Tailings piles and extend approximately 1000 feet to the west of the Large Tailings pile and also extend to the south of the Small Tailings pile in the area of the L collection wells. Concentrations in a small isolated area in central Section 27 also exceed the background level. Selenium concentrations were reduced in the L collection area during 2003. Selenium concentrations also slightly exceed 0.27 mg/l in three small areas of Section 3, southwest of Felice Acres. None of the selenium concentrations in alluvial wells located in the subdivisions exceeded 0.1 mg/l. This shows that only the area near the tailings and portions of Section 3 need additional restoration in order to reduce selenium concentration.

Figure 4.3-2 presents the location and grouping of wells for selenium concentration plots. The symbols and colors used on Figure 4.3-2 are the same as those used on each constituent time plot.

Figure 4.3-71 presents plots of selenium concentration versus time for up-gradient wells DD, ND, P, P4, Q and R. There is an increasing trend in up-gradient well R which is the farthest near-up-gradient well from the tailings. A smaller increasing trend is also seen in the 2003 data for wells Q, ND and P4. Collection of water from up-gradient well P began in 1993. However, the pumping from well P has not been continuous since 1998. Thus, the concentrations of selenium have remained higher in this well. The selenium concentration in well DD was less than that of other up-gradient wells during 2003.

Figure 4.3-72 shows a decreasing selenium concentration trend in well S2 during 2003. An overall gradually decreasing trend has been observed in well S3 over the last few years. Low, and relatively unchanged concentrations, have been observed in wells NC and S4 for the last few years. An increase in selenium concentration was observed in well S11 in 2003.

Figure 4.3-73 presents selenium concentrations for wells BC, DC, MO, MU and W. Selenium concentrations have remained low in all of these wells.

Selenium concentrations in water from alluvial wells located southwest of the Large Tailings pile are plotted on Figure 4.3-74. This figure shows an overall decrease in selenium concentrations in wells BP and M5 in 2003. No trend was observed for data from wells B and D1.

Figure 4.3-75 presents plots of selenium concentrations for wells B11, DQ, S5, T and TA. An overall increasing trend in selenium was noted for well B11 in 2003, while selenium concentrations in well DQ decreased in 2003 after increasing in 2002. A decline in selenium concentrations in wells T and TA occurred in 2003, while fairly steady concentrations were observed in well S5.

The selenium concentrations for collection wells located on the west side of the Small Tailings pile are plotted on Figure 4.3-76. Selenium concentrations in water collected from wells

C6 and C9 have generally decreased over the last few years. Relatively steady concentrations were observed in wells C2 and C12.

Figure 4.3-77 presents selenium concentrations on the south side of the Small Tailings pile for wells KEB, KF, KZ and X. Only small concentrations were measured in water taken from these wells due to injection of R.O. product water in this area.

Selenium concentrations in wells K4, K5 and K10 declined in 2003 (see Figure 4.3-78). Concentrations in 2003 in collection well K7 increased above the measured 2002 levels.

Figure 4.3-79 presents selenium concentration for wells L5, L6, L7, L8, L9 and L10. A decreasing trend is indicated by the data for wells L5, L6 and L7. Fairly steady selenium concentrations with time were observed in collection wells L8, L9 and L10 during 2003.

Figures 4.3-80 and 4.3-81 present selenium concentration plots for the Broadview Acres and Felice Acres alluvial wells. These plots show that the selenium concentrations have been reduced and maintained at low levels for the last several years in these two subdivisions, except for the slightly higher values in southern Felice Acres wells 496 and 497. Selenium concentrations decreased slightly in 2003 in well 496; a steady decrease was observed in well 491.

Selenium concentrations are presented for the Murray Acres and Pleasant Valley Estates areas on Figure 4.3-82. This plot shows continuing low selenium concentrations in monitoring wells in this area of the alluvial aquifer.

Selenium concentrations for five wells in Section 3 are plotted on Figure 4.3-83. Wells 652 and 855 are located in the western portion of Section 3. Selenium concentrations in well 652 have gradually decreased over the last few years, while well 855 concentrations have remained fairly steady. Concentrations in the remaining three wells, which are located in the eastern and central portion of Section 3, do not indicate any significant trend with time.

The selenium concentrations in alluvial water in Section 28 have been fairly steady with time. Figure 4.3-84 presents the selenium concentrations from the Section 28 alluvial wells. A very gradual overall increasing trend has been observed in wells 886 and MR.

Figure 4.3-85 displays selenium concentrations in wells in Section 29 and in wells 686 and 687, which are located to the north and south of Section 29, respectively. A very gradual increasing trend in selenium concentration had been observed over the last few years in well 687, but the 2003 value indicates a recent gradual decrease. The selenium concentration in well 895 remained steady in 2003 after it had increased in 2001. Selenium concentrations declined slightly in well 935 in 2003.

Selenium concentrations from wells in Section 33 are presented on Figure 4.3-86. The data demonstrated a gradual increasing trend in selenium concentrations over the last three years in well 996, however, the 2003 value indicates a gradual decrease. In general, selenium concentrations have remained stable in the Section 33 wells during the last few years. The higher value in well 657 in the first half of 2003 is considered mildly anomalous.

4.3.6 MOLYBDENUM - ALLUVIAL

This section discusses the molybdenum concentrations in the alluvial aquifer at the Grants Project during 2003. Figure 4.3-87 is a spatial presentation of the concentration data and contours. Molybdenum concentrations in alluvial water in the west area of this figure have typically been less than 0.03 mg/l and, therefore, samples from the western wells are not routinely analyzed for molybdenum. However, samples were taken from these wells in 2003 to update the molybdenum database. The movement of molybdenum in the alluvial aquifer is significantly less extensive than that of selenium and uranium. Molybdenum concentrations exceed 100 mg/l near the Large Tailings pile and a 10 mg/l contour extends around most of the Large Tailings pile and the western portion of the Small Tailings pile. Significant molybdenum concentrations extend approximately 900 feet west of the Large Tailings pile and also to the southeast of the Small Tailings pile to the L collection wells. Concentrations in two wells in the central portion of Section 27 exceed the molybdenum background level of 0.05 mg/l. Significant reduction in molybdenum concentrations occurred in 2003 in alluvium near the Small Tailings pile. Concentrations in three alluvial wells in Felice Acres slightly exceeded 0.05 mg/l of molybdenum.

The light green pattern on Figure 4.3-87 shows the area where molybdenum concentrations exceed 0.05 mg/l, the proposed NRC site standard. A molybdenum concentration of 0.05 mg/l is considered the threshold of significance for this constituent at this site.

Figure 4.3-88 presents molybdenum concentration for the up-gradient wells DD, ND, P, P4, Q and R. Concentrations have remained low in these six wells.

A decreasing trend in molybdenum concentration was observed in wells S2 and S3 in 2003, while the molybdenum concentrations in well S4 remained low (see Figure 4.3-89). Molybdenum concentrations in wells NC and S11 were small in 2003.

Figure 4.3-90 presents time plots of molybdenum concentration for wells BC, DC, MO, MU and W. Molybdenum concentrations in each of these wells were small and no trend is apparent.

Figure 4.3-91 displays molybdenum concentrations for wells B, BP, D1 and M5. Molybdenum concentrations in well M5 were fairly steady in 2003 after significantly declining prior to 2000. Relatively stable concentrations with time were observed in wells B, BP and D1.

Figure 4.3-92 presents of molybdenum concentrations for wells B11, DQ, S5, T and TA. A sharp decrease in the molybdenum concentration in well DQ was observed in 2003. Molybdenum concentrations in well S5 decreased in 2003 after a few years of an increasing trend. Molybdenum concentrations in wells B11, T and TA gradually declined in 2003.

Molybdenum concentrations in wells on the west side of the Small Tailings pile are on Figure 4.3-93. Large molybdenum concentrations continue to be present in the water in wells C6 and C9, but concentrations decreased in 2003. Steady concentrations were observed in wells C2 and C12.

Figure 4.3-94 presents molybdenum concentrations for wells on the south side of the Small Tailings pile. Small molybdenum concentrations were observed in wells KEB, KF, KZ and X during the last year.

Figure 4.3-95 shows a decrease in molybdenum concentrations in wells K4, K5 and K10 and gradual increase for well K7.

Figure 4.3-96 presents molybdenum concentrations in wells L5, L6, L7, L8, L9 and L10 which are located further to the southeast. A decreasing trend continues to be observed in wells L5, L6, L7 and L8 during 2003. A slight increase in molybdenum concentrations, however, was observed in wells L9 and L10.

Molybdenum concentrations in alluvial wells located in Broadview Acres and Felice Acres are plotted on Figures 4.3-97 and 4.3-98, respectively. The molybdenum concentrations in Broadview wells GH, SUB1, SUB2 and SUB3 have been low for the last several years. Slightly higher molybdenum concentrations were measured in wells 490 and 491 in Felice Acres.

Figure 4.3-99 presents the molybdenum concentrations for wells in the Murray Acres and the Pleasant Valley Estates areas. This plot shows that molybdenum concentrations have remained low in these alluvial wells except for an outlier in the first value in 2001 for well FB.

Molybdenum concentration plots for the irrigation area wells have been updated. Figures 4.3-100 through 4.3-103 present the molybdenum concentration time plots for the Section 3, Section 28, Section 29 and Section 33 wells, respectively. All of the molybdenum concentrations have remained low in wells located in these areas, except that one higher value each was measured in well 648 and well 657 in the first half of 2003. Concentrations in the second semi-annual measurement for these two wells were small, which suggests that the previous slightly higher values for wells 648 and 657 may not be reliable. This updated molybdenum concentration data confirms that molybdenum has been very limited in its migration beyond the tailings area.

4.3.7 NITRATE - ALLUVIAL

The presence of relatively large nitrate concentrations up-gradient of the Grants site has resulted in a proposed NRC site standard of 23 mg/l (see Table 3.1-1). A statistical analysis of the up-gradient data through 1998 produced the nitrate concentration of 23 mg/l based on the 95th percentile of background. Figure 4.3-104 presents nitrate concentrations in 2003 measured in the alluvial aquifer. The nitrate concentrations north and up-gradient of the tailings ultimately impact the nitrate concentrations down-gradient of the Large Tailings pile in the northern portion of Sections 27 and 28. It is difficult to determine whether seepage from the tailings has any significant impact on the nitrate concentrations in this area, because the naturally higher concentrations up-gradient of the Large Tailings pile makes modestly elevated nitrate concentrations indistinguishable from background. The nitrate concentrations in the northeast portion of Section 27 that exceed 23 mg/l are most likely naturally occurring based on the patterns of ground water flow in this area. Figure 4.3-104 shows that higher nitrate concentrations exist in Section 20, and the area of elevated concentrations extends into Section 29. This higher measured nitrate concentration in the Rio San Jose alluvial system are also up-gradient from the confluence with the San Mateo alluvial system. Therefore, none of these elevated nitrate concentrations can be attributed to Homestake tailings seepage.

Nitrate concentrations exceed 10 mg/l in two wells in an area between the Large and Small Tailings piles but none of these values exceed 23 mg/l. The nitrate concentrations in two wells east of the Small Tailings pile exceeded 23 mg/l. The water-quality restoration with respect to nitrate is complete except for the small area east of the Small Tailings pile and a small area west of the Large Tailings pile.

Plots of nitrate concentration over time were prepared for the alluvial wells that are listed on Figure 4.3-2. Figure 4.3-105 presents the nitrate concentrations for the background wells. Concentrations in these wells have been relatively stable except for a gradual increasing trend over the last few years in well R.

The nitrate concentrations in wells NC, S2, S3, S4 and S11 are plotted on Figure 4.3-106. This figure shows small and steady concentrations except for the higher levels in well S11. However, there was a decrease in nitrate concentration in well S11 in 2003.

Figure 4.3-107 presents the nitrate concentrations for wells BC, DC, MO, MU and W. Nitrate concentrations decreased significantly in 2003 in well MU but have gradually increased in well MO, while the levels were fairly steady and low in wells BC, DC and W.

Nitrate concentrations in the group of wells southwest of the Large Tailings pile are presented as time plots on Figure 4.3-108. All of the concentrations in these wells are fairly steady and small.

Figure 4.3-109 presents nitrate concentrations in wells B11, DQ, S5, T and TA. Nitrate concentrations in general have been declining in these wells for the last few years, except that a small increase was detected in well B11 in 2003.

Nitrate concentrations in wells on the west side of the Small Tailings pile are plotted on Figure 4.3-110. A gradually decreasing or steady trend has occurred over the last couple of years in these wells.

Figure 4.3-111 shows nitrate concentrations for wells on the south side of the Small Tailings pile. All of the nitrate concentrations in these wells are low.

The nitrate concentrations in the K and L wells are presented on Figures 4.3-112 and 4.3-113, respectively.

Nitrate concentrations in the Broadview Acres wells are presented on Figure 4.3-114. Small nitrate concentrations were measured in water from all of these wells. A minor gradual increase in nitrate concentrations has occurred in well SUB1.

Nitrate concentrations for the Felice Acres wells are presented on Figure 4.3-115, with relatively steady concentrations over time.

Nitrate concentrations in Murray Acres and Pleasant Valley Estates wells are presented on Figure 4.3-116. Nitrate concentrations in well 846 are slightly higher than the other four wells shown, but the recent measurements from all four wells show steady concentrations.

Nitrate concentrations in Section 3 wells are presented on Figure 4.3-117. The nitrate concentrations decreased in wells 652 and 653, and they were relatively stable in wells 855, 862 and 869.

Nitrate concentrations for the Section 28 wells are presented on Figure 4.3-118. There has been a gradual increasing trend with time for well 886. The nitrate concentrations for the remainder of the wells have been steady.

Figure 4.3-119 presents nitrate concentrations in wells 686, 687, 895, 899 and 935. The nitrate concentrations have been decreasing over the last few years in each of these wells except for an increase in 2003 in well 899.

Nitrate concentrations in the Section 33 wells are presented on Figure 4.3-120, and, in these wells, nitrate concentrations were steady in 2003.

4.3.8 RADIUM-226 AND RADIUM-228 - ALLUVIAL

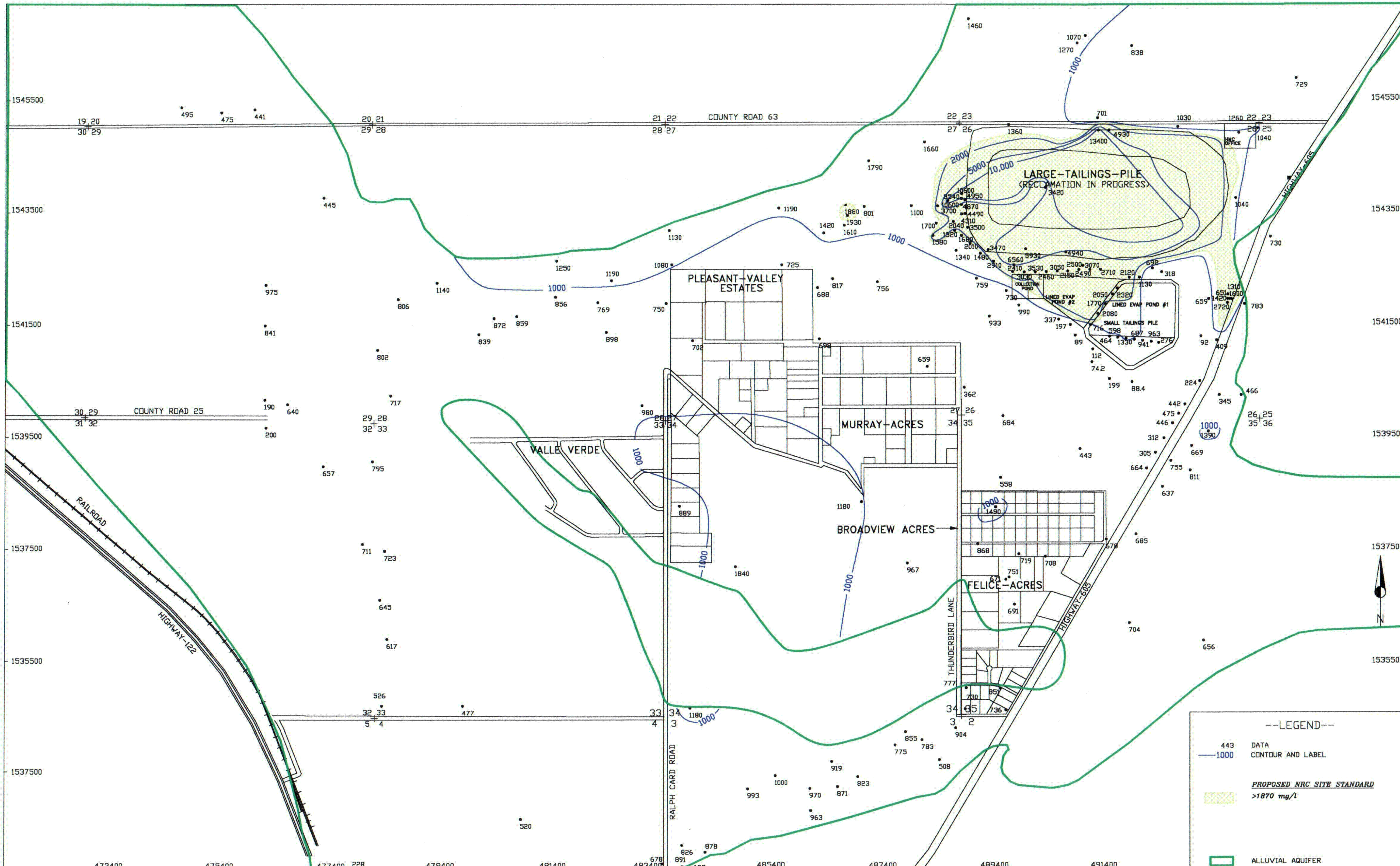
Figure 4.3-121 presents radium concentrations for the alluvial ground water in the Grants Project area. Radium concentrations are very small in the alluvial aquifer. The monitoring program for radium has been scaled back, because radium is not present in significant concentrations in the alluvial aquifer. The radium-226 concentrations are printed horizontally in black, while the radium-228 values are shown at a 45° angle and in magenta. The State standard for radium-226 plus radium-228 is 30 pCi/l, while the existing NRC site standard is 5 pCi/l. Measured activities in alluvial wells beneath the Large Tailings pile and one well east of the Small Tailings pile slightly exceeded the NRC site standard in 2003. No radium concentrations outside of the collection area are in exceedance of the standard. Past data has shown that radium is not mobile in the alluvial aquifer at this site.

4.3.9 VANADIUM - ALLUVIAL

Vanadium concentrations are shown on Figure 4.3-122 for 2003. None of the vanadium concentrations in the POC wells exceeded the existing site standard of 0.02 mg/l. POC well X was the only POC well that routinely contained a vanadium concentration above the site standard prior to restoration of that area. Therefore, none of the POC wells are expected to contain vanadium concentrations above the site standard of 0.02 mg/l in the future. Injection of R.O. product water has effectively restored ground water quality in the area near well X. Vanadium concentrations in three wells east of the Small Tailings pile were slightly above the site standard for vanadium. The ongoing corrective action program will restore the water quality in this area.

4.3.10 THORIUM-230 - ALLUVIAL

Figure 4.3-123 presents the 2003 thorium concentrations in the alluvial aquifer. Thorium concentrations are low at this site. The very low site standard of 0.3 pCi/l was established to reflect the low background concentrations. The site standard for thorium-230 was exceeded in 2003 in only four wells in a small localized cluster east of the Small Tailings pile. This area is within the collection area and additional restoration will result from the ongoing collection/injection programs.



SCALE: 1"=1600'

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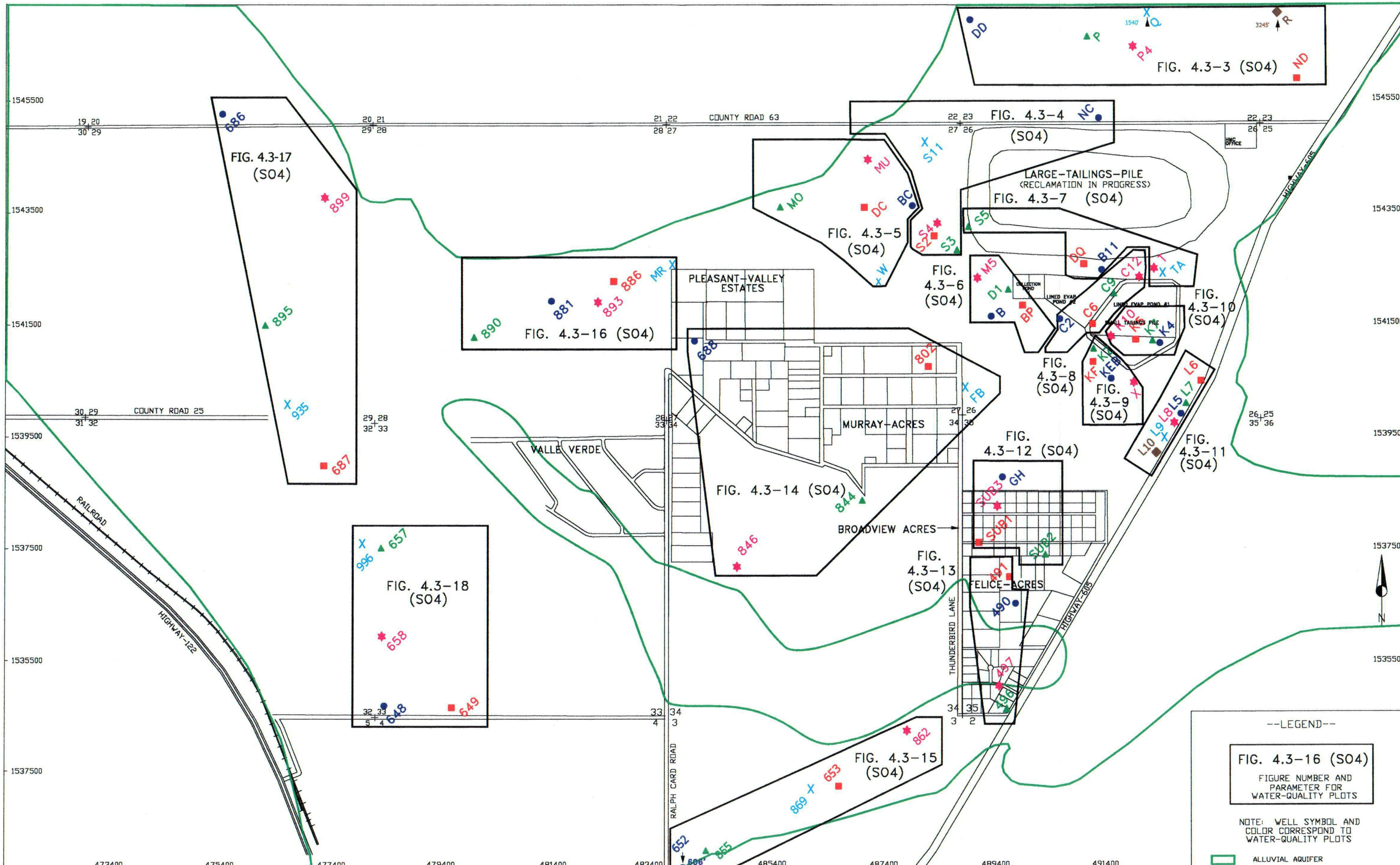
2004-06\C-QAL03

DATE: 03/16/04

HOMESTAKE-MILL-AND-ADJACENT-PROPERTIES
GRANTS-NM-TOWNSHIP-11&12-N-RANGE-10-W

FIGURE 4.3-1. SULFATE CONCENTRATIONS OF THE ALLUVIAL AQUIFER, 2003, mg/l

C26



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HOMESTAKE-MILL-AND-ADJACENT-PROPERTIES
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FIGURE 4.3-2. LOCATION OF ALLUVIAL WELLS WITH WATER-QUALITY PLOTS

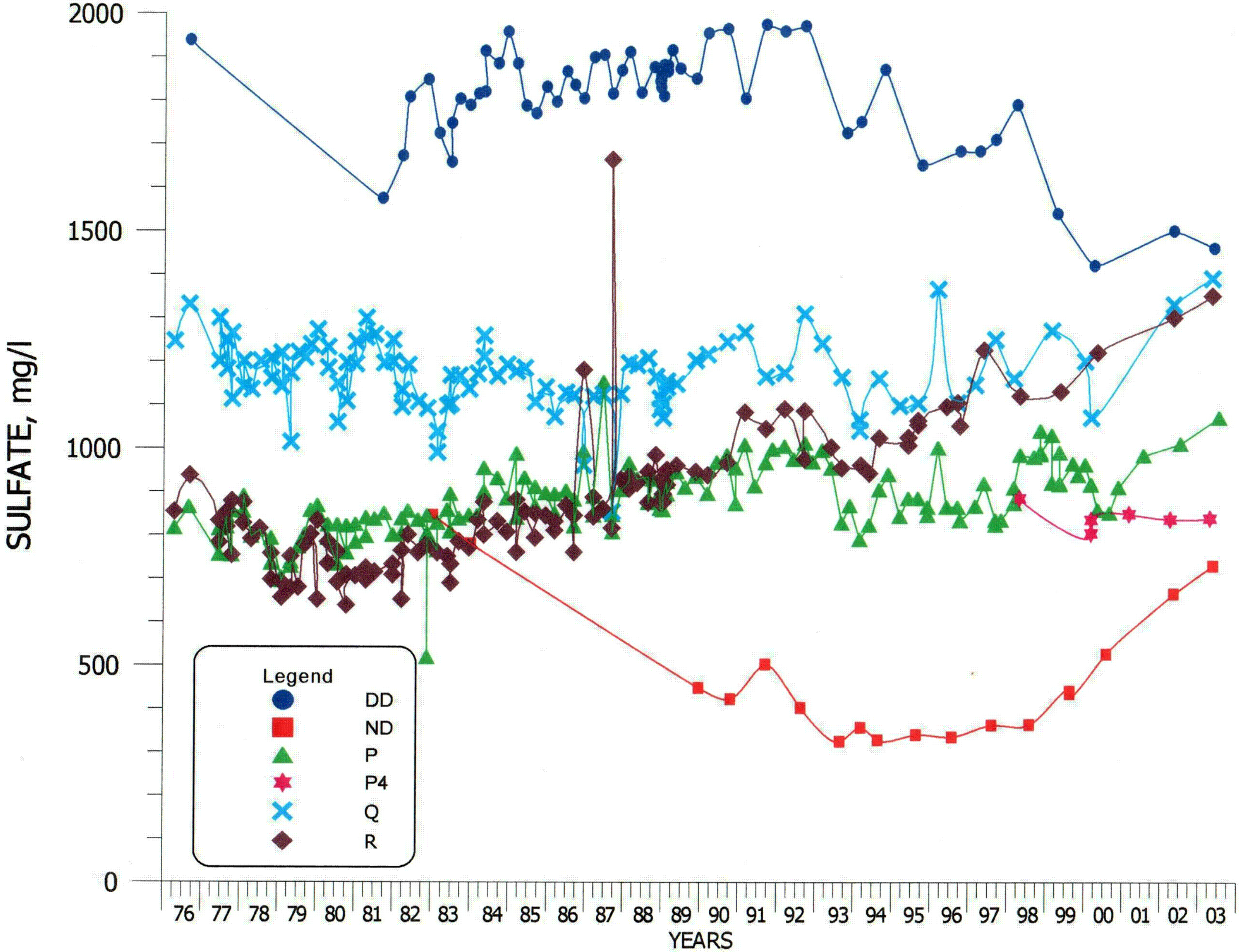

FIGURE 4.3-3. SULFATE CONCENTRATIONS FOR WELLS DD, ND, P, P4, Q AND R.

C28

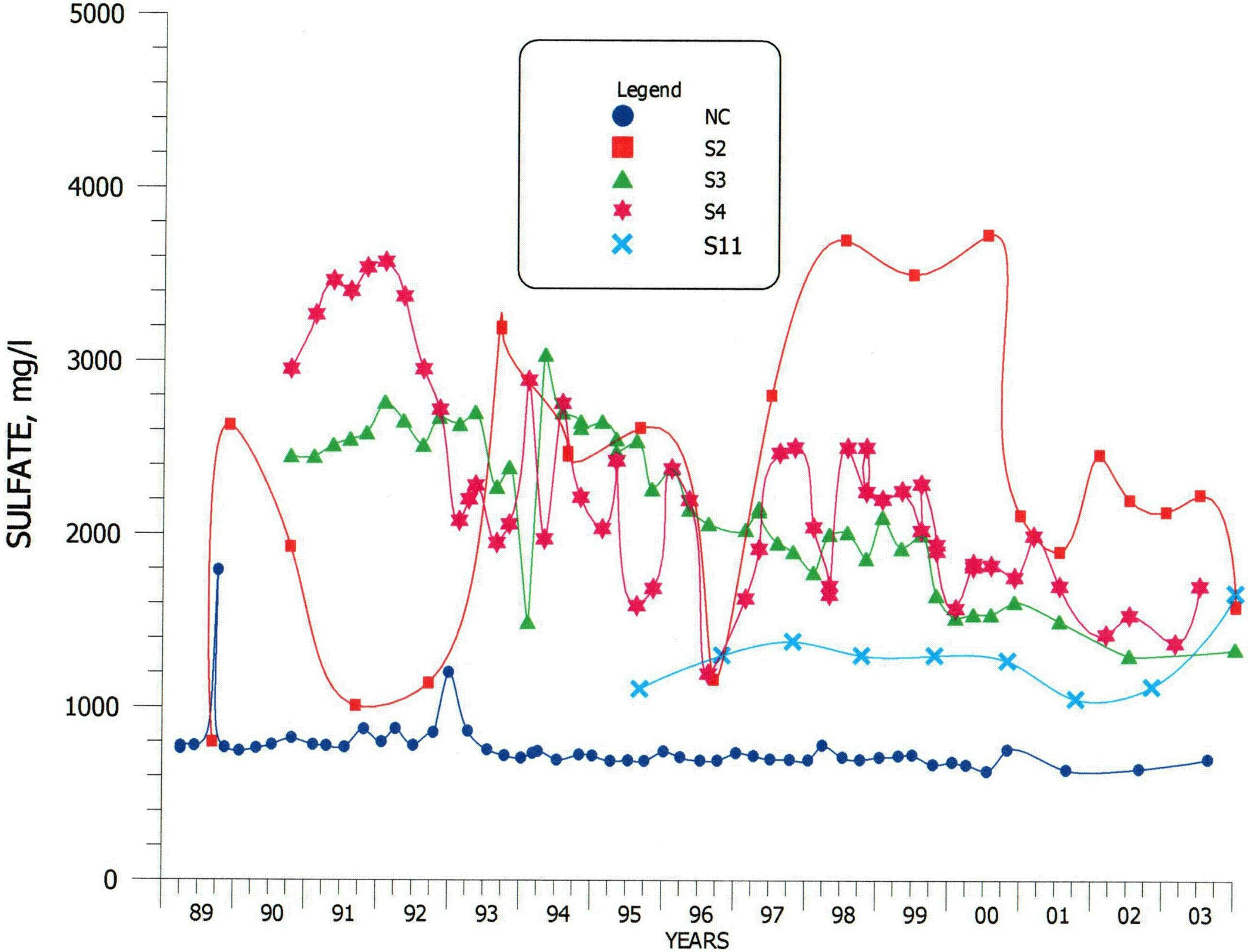

FIGURE 4.3-4. SULFATE CONCENTRATIONS FOR WELLS NC, S2, S3, S4 AND S11.

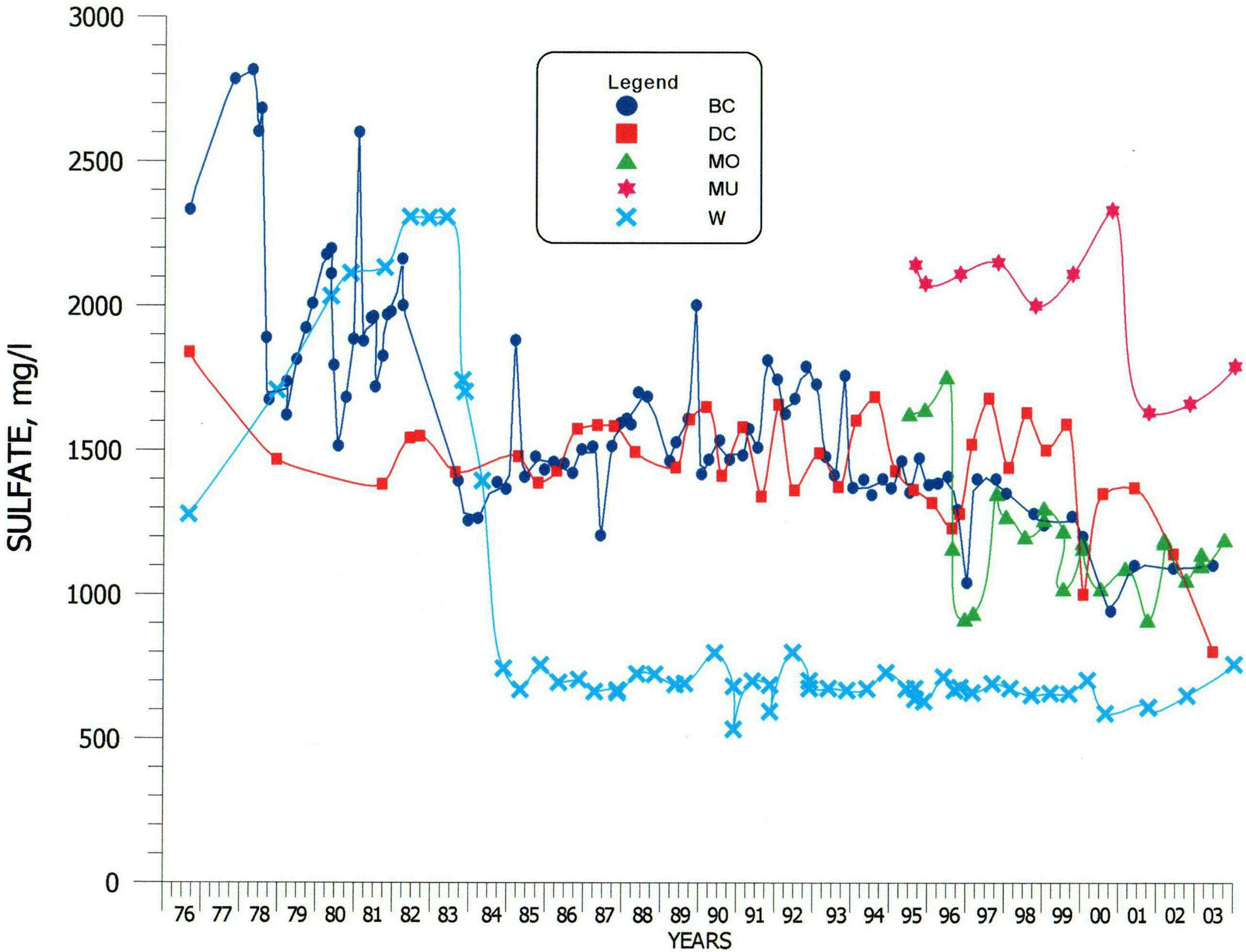

FIGURE 4.3-5. SULFATE CONCENTRATIONS FOR WELLS BC, DC, MO, MU AND W.

C30