RECEIVED
FEB 13 2013
DEPARTMENT OF
WATER RESOURCES

February 12, 2013

Ken Neely
Watermaster, Water District 63-S
Idaho Department of Water Resources
P.O. Box 83720
Boise, ID 83720-0098

Re: TTCI Cold Water Transfer Application No. 78282

Dear Ken:

I am forwarding to you a copy of Amended Application for Transfer of water right nos. 63-3603 and 63-7595 recently filed by The Terteling Company, Inc. Transfer application no. 78282 was actually filed back in 2005, but processing was stayed pending the completion of the SRBA with respect to the two water rights. The purpose of this amended transfer application is to add two new cold water wells to our irrigation system, to remove the "Terteling Springs" geothermal well as a point of diversion for either of the rights, and to create a permissive place of use for our cold water rights. The decreed combined limitation of 178 irrigated acres in any given season will remain in place for water right nos. 63-3603 and 63-7595.

The benefit of the transfer to all Water District 63-S water users is that it will increase TTCI's cold water supply, and thus decrease our need to rely upon low temperature geothermal water for our irrigation needs. Please place this transfer application as an item on the agenda for the Water District 63-S annual meeting on Thursday, March 7. We will be happy to answer questions and address concerns at that time. Please note that I am copying Water District 63-S members with a copy of this letter and a copy of the transfer application so they can review it before the meeting.

Sincerely,

The Terteling Company, Inc.

J. L. Terteling
President

Enclosures

Cc: Dave Hendrickson (w/enclosures)
Garnette Monie (w/enclosures)
Mary & Rose Ryan (w/enclosures)
Dave Niznik (w/enclosures)

Review of Boise Front Low Temperature Geothermal Monitoring Data for Water Year 2012 (October 1, 2011 – September 30, 2012)

Kenneth W. Neely, Technical Hydrogeologist
Idaho Department of Water Resources (IDWR)

February 15, 2013

EXECUTIVE SUMMARY

The total gross withdrawal from the four downtown Boise Low Temperature Geothermal district heating systems in Water Year 2012 (WY12) was 731.8 million gallons (mgal), which was 9.3 mgal less than the total gross withdrawal in Water Year 2011 (WY11). The net withdrawal for WY12 was 287.6 mgal, which was 22.3 mgal more than the net withdrawal in WY11. Thus, the gross withdrawal in WY12 was about 1% less than in WY11, and the net withdrawal was about 8% more. The City of Boise and Boise Warm Springs Water District had increases in gross withdrawals, and the State of Idaho Capitol Mall and Veterans Administration had decreases. Boise Warm Springs Water District and the City of Boise had increases in net water withdrawal. About 61% of the water withdrawn in WY12 was re-injected, which is a decrease of about 3% from WY11.

The BLM and Kanta wells are very useful for analyzing water level[1] trends in the downtown Boise area because they are unused, are in key locations, and have water level responses that reflect the regional changes in the aquifer. The changes in maximum and minimum water levels from WY11 to WY12 in these wells were fairly small. In WY12, the maximum value for the BLM well decreased 0.5 feet, and the minimum value decreased 2.7 feet. In WY12, Kanta's maximum water level decreased 0.2 feet, and the minimum value decreased 1.4 feet.

The maximum water level in BGL #1 decreased 0.1 feet. The maximum water level for BWSWD #3 increased 2 feet; the minimum increased 20 feet. The Harris Ranch wells, located several miles east of the downtown area, continued to show slightly increasing water level trends, which have occurred over the last 10 years.

On average, the monthly maximum water supply temperature from the Capitol Mall Production well was about 0.6 degrees Fahrenheit lower in WY12 than in WY11; however the temperatures in WY12 were comparable to those in the water years before WY11. The maximum water supply temperatures for the BWSWD and City of Boise systems were essentially the same in WY12 as they were in WY11.

The total withdrawal of low temperature geothermal water in Stewart Gulch Ground Water District 63-S (GWD63-S) in WY12 was 176.4 mgal, which was 5.6 mgal more than in WY11. This equated to an increase of 3%. Overall, ground water levels in GWD63-S showed a very slight increasing trend in WY12.

[1]For flowing wells, pressure readings were converted to feet by multiplying each value by 2.31. The converted readings were then referenced to the measuring points by multiplying by -1. Thus, flowing wells have negative water level values since the Y ordinate is plotted as "Feet below measuring point".

DOWNTOWN BOISE/HARRIS RANCH

Withdrawals and Re-Injection

In WY12, gross and net withdrawals from the four downtown Boise district heating systems were 731.8 mgal and 287.6 mgal, respectively (Table 1 and Figure 1). The gross withdrawal was 9.3. mgal less in WY12 than in the previous water year. The net withdrawal was 22.3 mgal more in WY12 than in WY11. The gross withdrawal was 1% less in WY12 and the net withdrawal was 8% more in WY12, than their respective amounts in WY11. About 61% of the fluids were re-injected.

Table 1. Withdrawals[1] from the four district geothermal heating systems in the downtown Boise area for Water Year 2012 (October 1, 2011 through September 30, 2012).

System	Gross Withdrawals[1] for WY12 (million gallons) and percent change from WY11 to WY12	Net Withdrawals[2] for WY12 (million gallons) and percent change from WY11 to WY12
Boise Warm Springs Water District	247.3 (+1%)	247.3 (+1%)
Capitol Mall	72.0 (-26%)	0 (NC[3])
City of Boise	235.8 (+8%)	40.3 (+96%)
Veterans Administration	176.8 (-2%)	0 (NC[3])
Total	**731.8 (-1%)**	**287.6 (+8%)**

[1]These numbers contain some degree of uncertainty which is typically associated with measurement equipment and methods. Therefore, the amounts are being reported in millions with one decimal place.
[2]Net Withdrawals equal Gross Withdrawals minus Injection amounts.
[3]NC = No change.

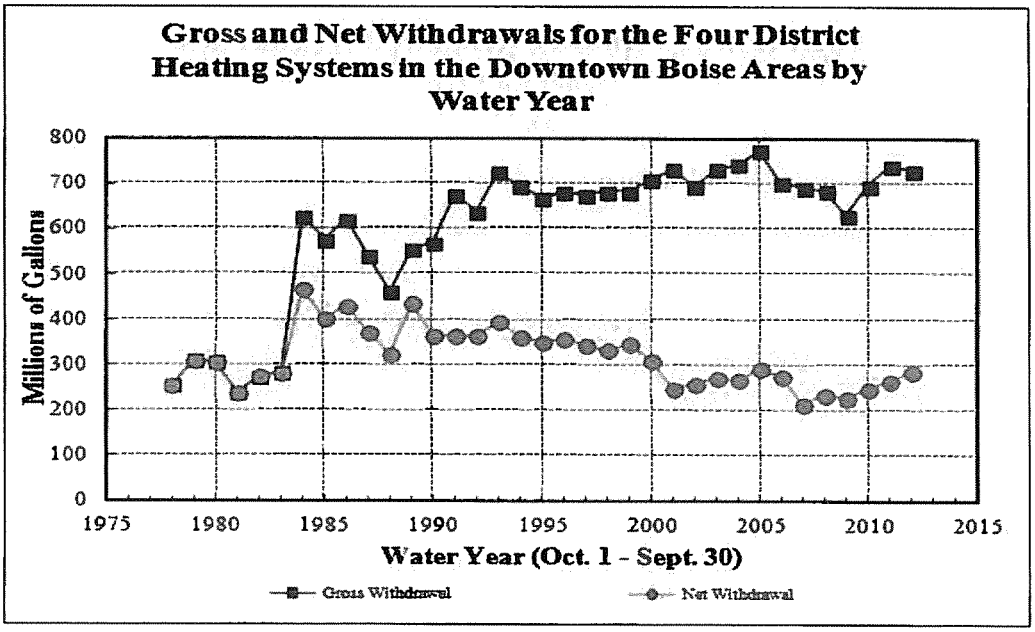

Figure 1. Gross and net withdrawals for the four district heating systems in the downtown Boise area for water years 1978 through 2012.

The City of Boise and the Boise Warm Springs Water District had increases in gross withdrawals in WY12, while the State of Idaho Capitol Mall and the Veterans Administration had decreases. The City of Boise and the State of Idaho had the largest changes in gross withdrawals: +8% and -26%, respectively.

The percentage of net withdrawal to gross withdrawal for the City of Boise's system increased from 9.4% in WY11 to 17.1% in WY12. Some of this increase can be attributed to discharge into the Boise River, and some is attributed to "unaccounted-for water" (system leaks, unmonitored discharge, and variability in flow meter accuracies).

Water Levels in the BLM, Kanta, BWSWD, City of Boise, and Harris Ranch Wells

Historically, the BLM well has been the primary monitoring well for the downtown Boise geothermal system. The BLM well is located in the western end of the downtown area near the City of Boise, Capitol Mall and VA wellfields. In WY12, the maximum and minimum values for the BLM wells both decreased slightly (Figure 2). The maximum value decreased 0.5 feet from September 2011 to August 2012. The minimum value decreased 2.7 feet from February 2011 to January 2012.

The Kanta well, located on the east side of the downtown geothermal area, is another key monitoring well for the system because of its location near the BWSWD wellfield. Kanta's water levels trends are very similar to the trends in the BLM well (Figure 3). Kanta's maximum water level decreased 0.2 feet from October 2011 to September 2012, and the minimum value decreased 1.4 feet from February 2011 to February 2012.

All of the maximum values for the three BWSWD wells increased slightly in WY12 (Table 2, and Figures 4 and 5). The changes in minimum values were significantly different than the maximum changes, and they varied between the wells (Table 2). The minimum values are less reliable because they are caused by pumpage which varies and this results in variable water level measurements.

Table 2. Water level changes in the maximum and minimum values for the Boise Warm Springs Water District wells between WY11 and WY12.

	WY11_max (ft below MP)	WY12_max (ft below MP)	Change in Max	WY11_min (ft below MP)	WY12_min (ft below MP)	Change in Min
BWSWD#1 East	4 ft	0 ft	+ 4 ft	155 ft	162 ft	-7 ft
BWSWD#2 West	4 ft	2 ft	+ 2 ft	158 ft	160 ft	-2 ft
BWSWD#3	28 ft	26 ft	+2 ft	131 ft	111 ft	+20 ft

Currently, the City of Boise monitors the BGL #1 and #2 wells. For many years, hand measurements were recorded at BGL #1. In July 2011, a data logger transducer was installed in this well. Both hand measurements and transducer data were recorded until late 2011; however, only transducer data have been recorded since then. Although the trends for the two types of measurements are the same, the values are significantly different with the hand measurements having a maximum water level three feet higher than the transducer data in October 2011. The maximum water level (transducer data) for the City of Boise's BGL#1 well was 0.1 feet lower in WY12 (Figure 6). The change in the minimum water level cannot be determined because the transducer was installed after the minimum value

occurred in WY11. Hand measurements are recorded for BGL #2. The minimum increased 1.2 feet. The maximum value decreased 1.2 feet; however, this is based on an unusually high value in November 2011. If that value is incorrect, then the maximum value actually increased 0.6 feet from WY11 to WY12.

The Harris Ranch wells are located several miles east of the downtown geothermal heating systems. Water levels in the Harris Ranch West and East wells showed slight increasing trends in WY12 which is consistent with the water level pattern over the last 10 years (Figure 7). The Harris Ranch wells have distinctly different water level signatures than the wells in the downtown area. It appears that there is an offset of about six months between the annual cycles in the downtown wells and the Harris Ranch wells.

Water Supply Temperatures for the Capitol Mall, BWSWD and City of Boise.

The maximum supply water temperatures, determined on a monthly basis, for the Capitol Mall Production well were slightly lower in WY12 than in WY11 (Figure 8). The average of the November-March maximum values in WY12 was 0.62 degrees Fahrenheit lower than the average for WY11 (Figure 9). However, WY11's maximum values were unusually high compared to previous years, and WY12's values are more in the range of those values in Water Years 2004-2008.

The maximum water temperature for the BWSWD was about the same in WY12 as in WY11; the minimum water temperature was 1 degree Fahrenheit higher (Figure 10). The City of Boise's maximum supply water temperature was nearly the same in WY12 as they have been in the previous water years. The minimum water supply temperature was about 5 degrees lower in WY12 compared to WY11 (Figure 11). However, WY11 had an unusually high minimum temperature and WY12's minimum temperature was similar to those in years prior to WY11.

[1]Readings that are preceded by 8 hours of discharge rates over 300 gallons per minute are valid for considering as maximum values. Analysis is done on a monthly basis.

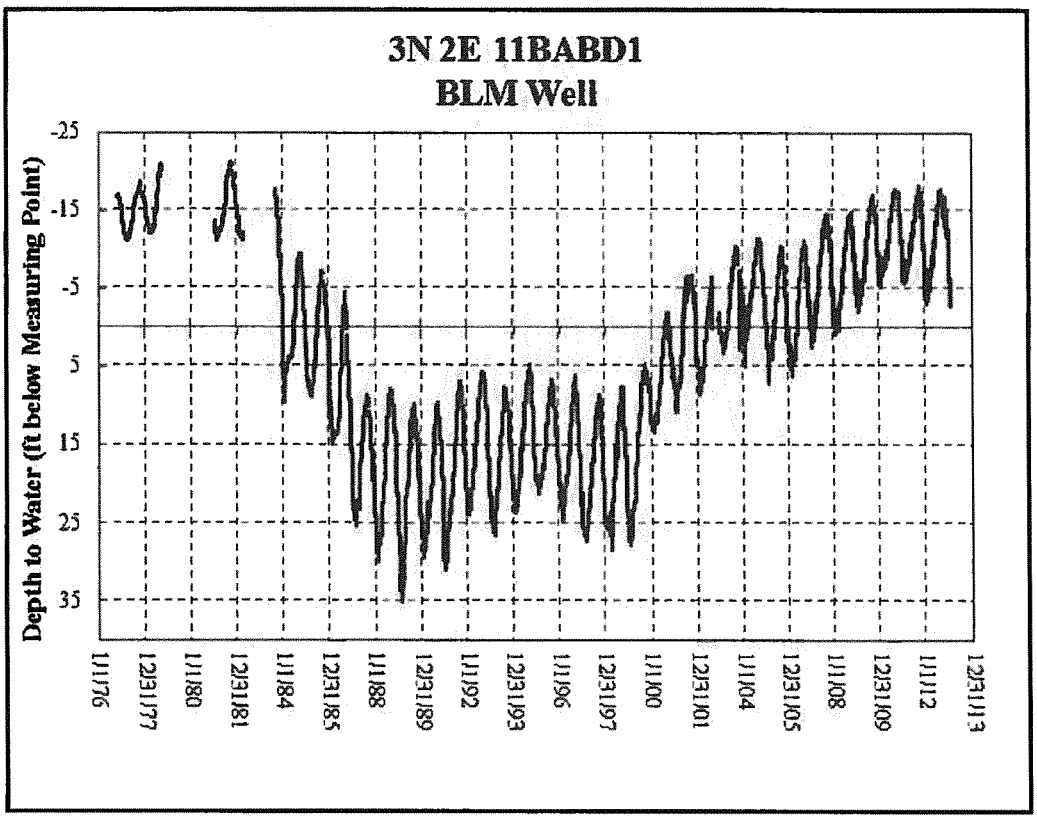

Figure 2. Water level hydrograph for the BLM well.

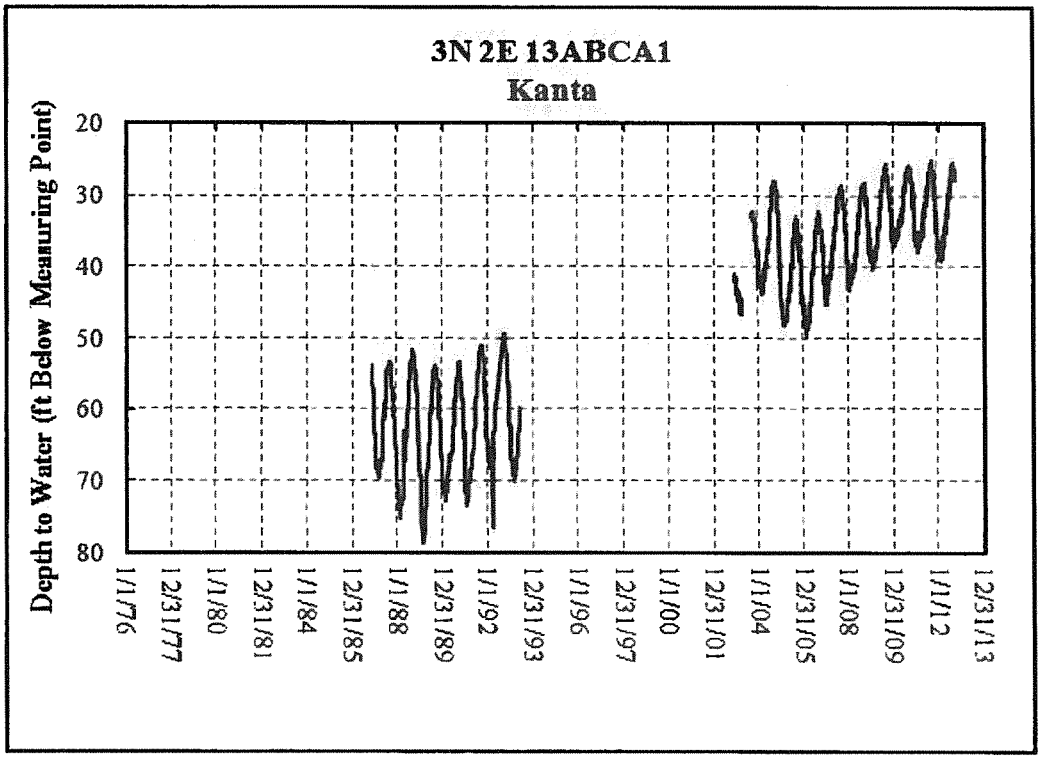

Figure 3. Water level hydrograph for the Kanta well.

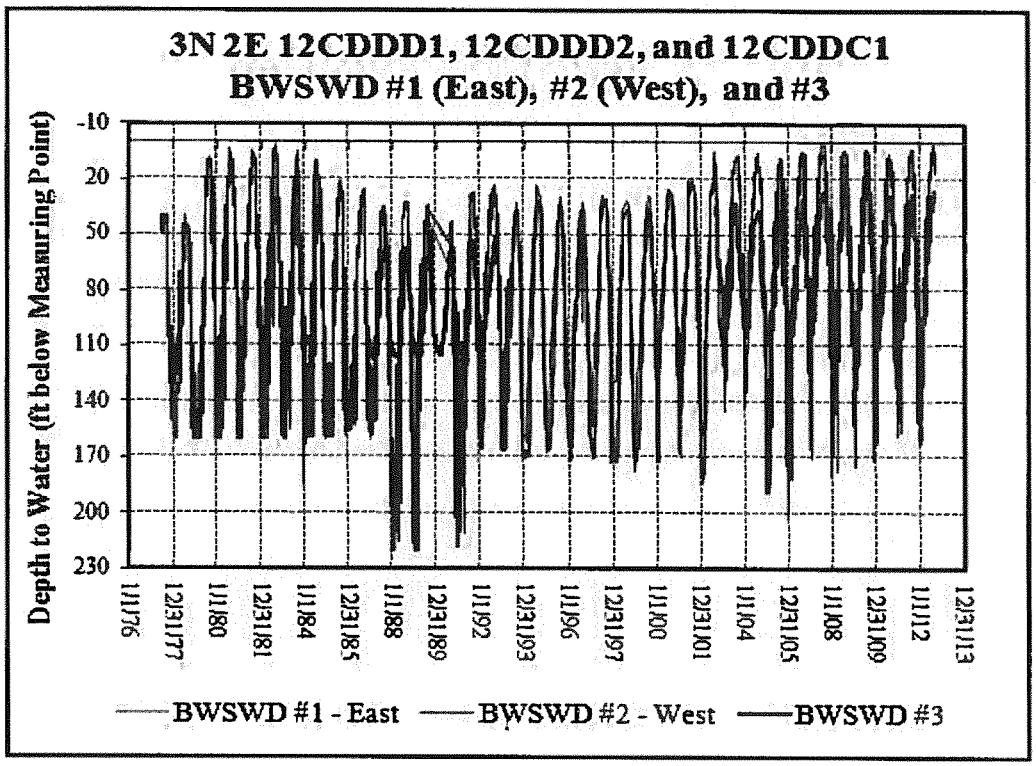

Figure 4. Water level hydrographs for the Boise Warm Springs Water District (BWSWD) wells.

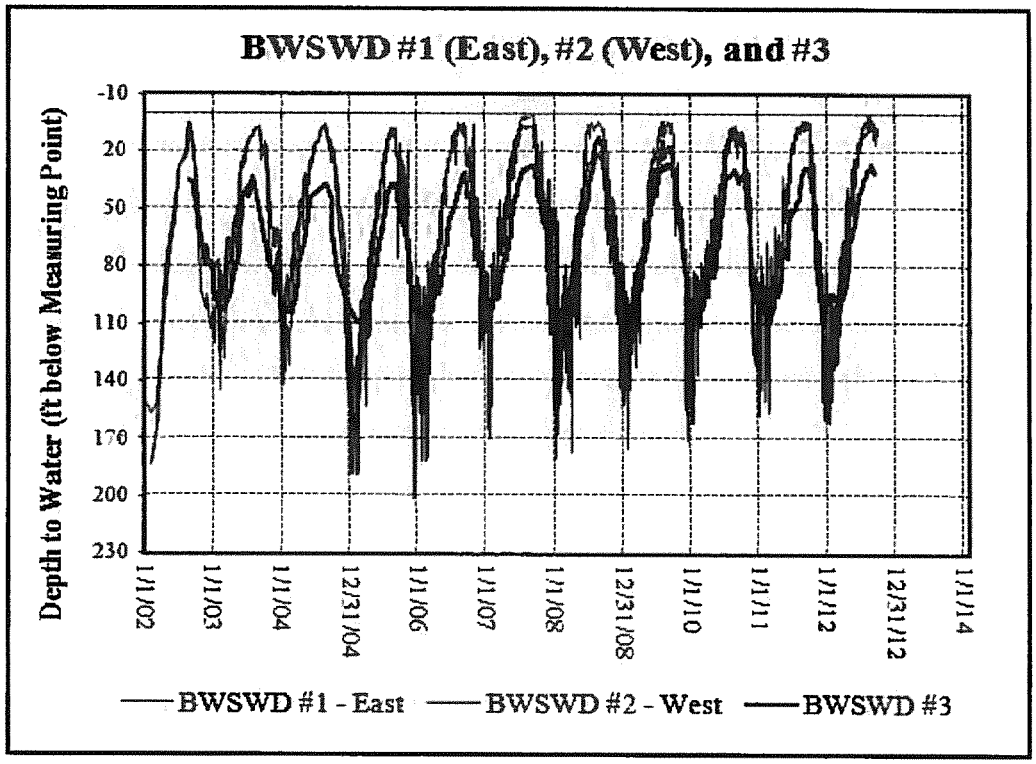

Figure 5. Water level hydrographs for the Boise Warm Springs Water District (BWSWD) wells, January 2002 to September 2012.

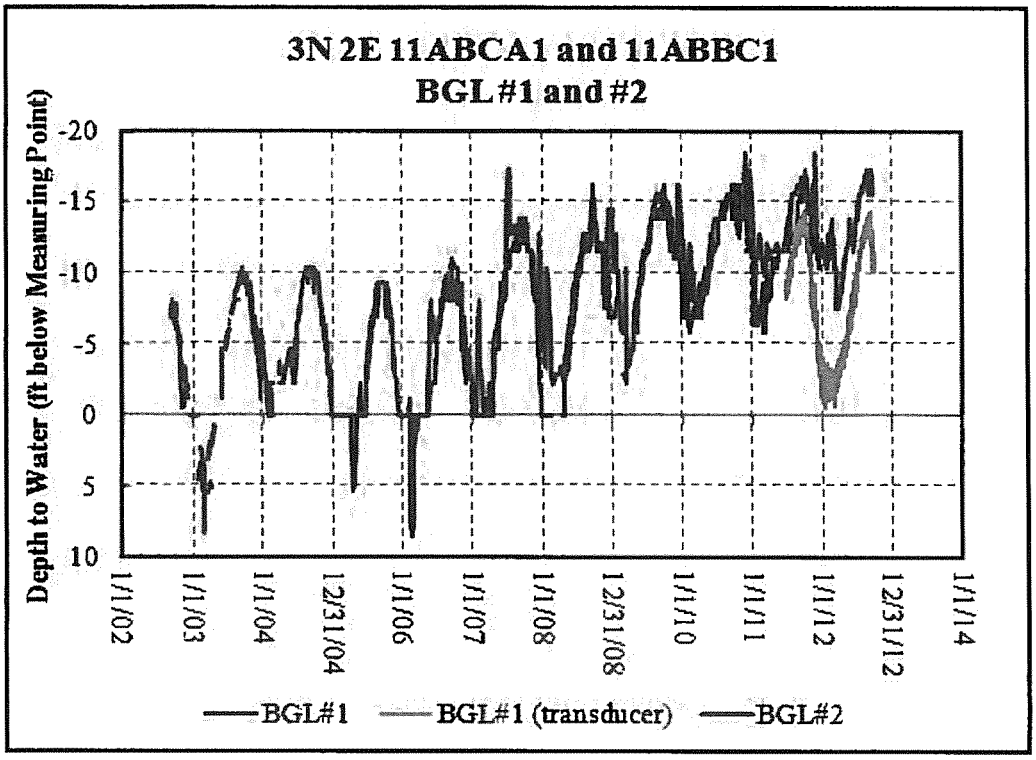

Figure 6. Water level hydrographs for the City of Boise's BGL #1 and #2 wells.

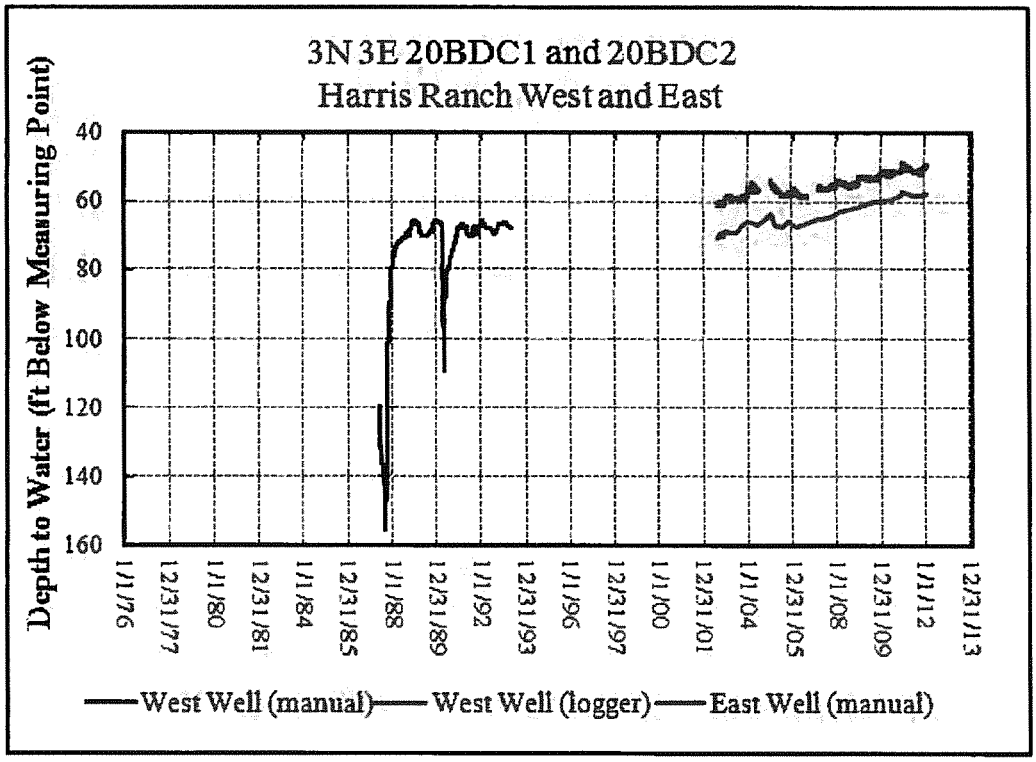

Figure 7. Water level hydrographs for the Harris Ranch wells.

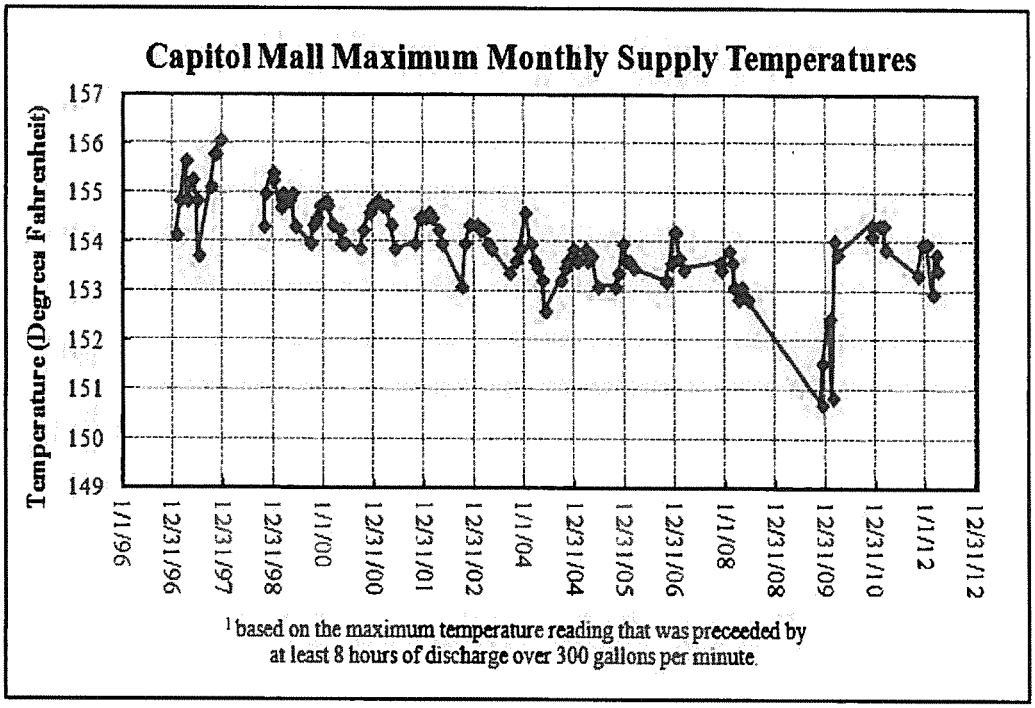

Figure 8. Monthly maximum supply water temperatures for the Capitol Mall geothermal system.

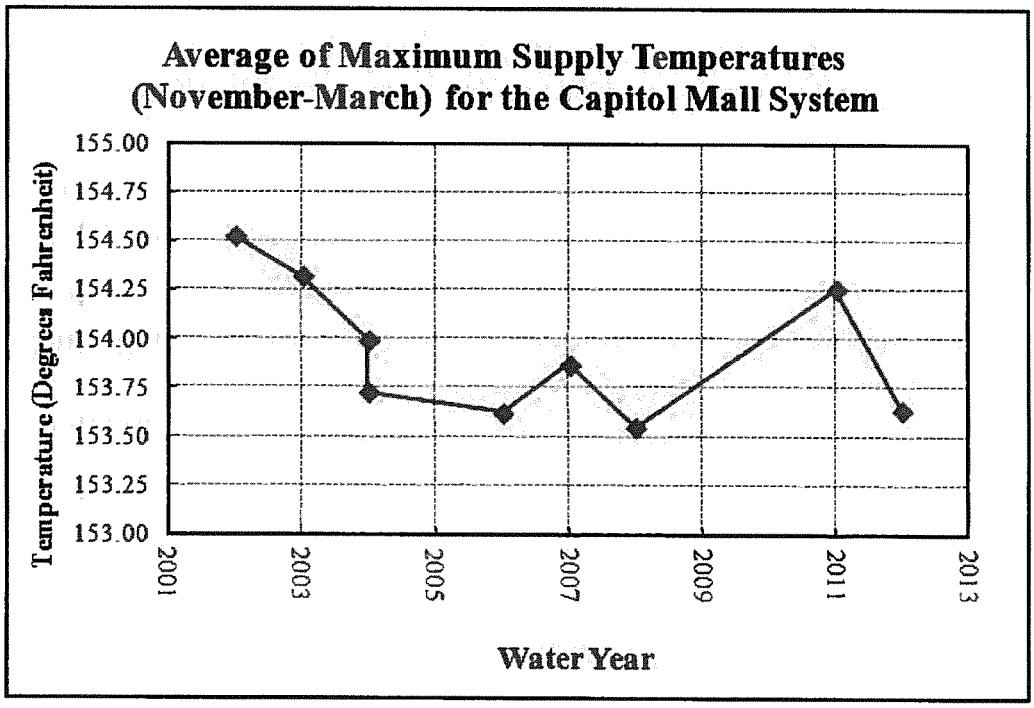

Figure 9. Average of the Capitol Mall maximum supply water temperatures for the November-March time periods for Water Years 2002 through 2012.

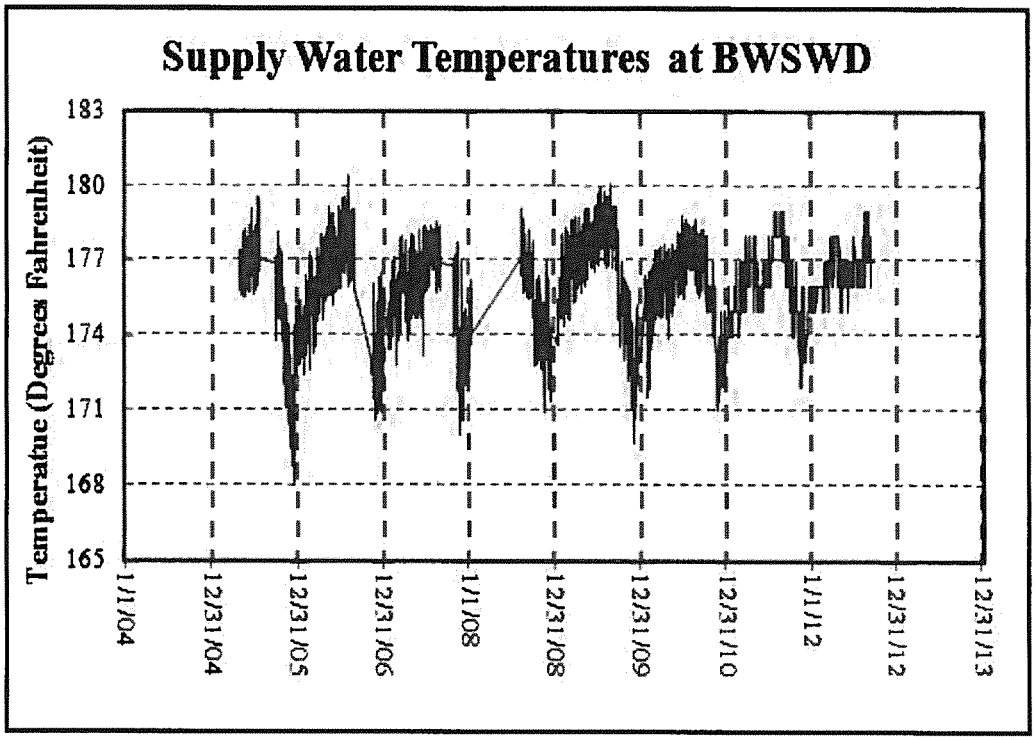

Figure 10. Supply water temperatures for the Boise Warm Springs Water District.

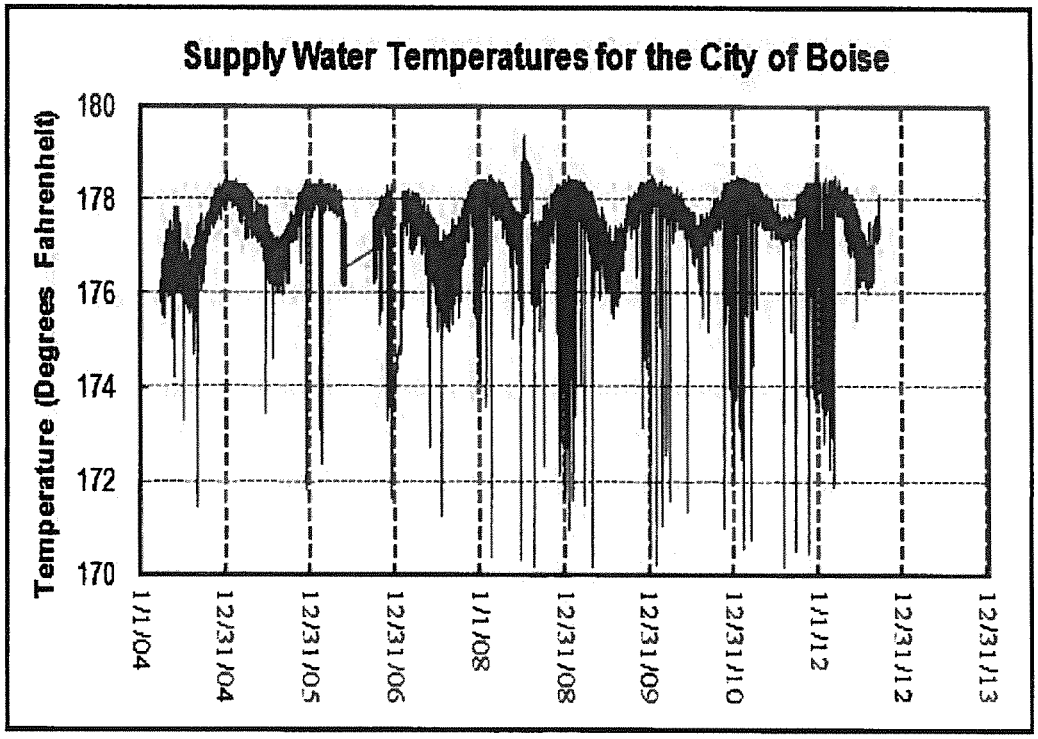

Figure 11. Supply water temperatures for the City of Boise's geothermal system. Readings less than 170 degrees Fahrenheit were removed from the dataset.

STEWART GULCH GROUND WATER DISTRICT 63-S

Withdrawals

The total withdrawal of low temperature geothermal water in GWD63-S in WY12 was 176.4 mgal (Figure 12). This amount is 5.6 mgal more than the withdrawal in WY11, which is a 3% increase (Table 3).

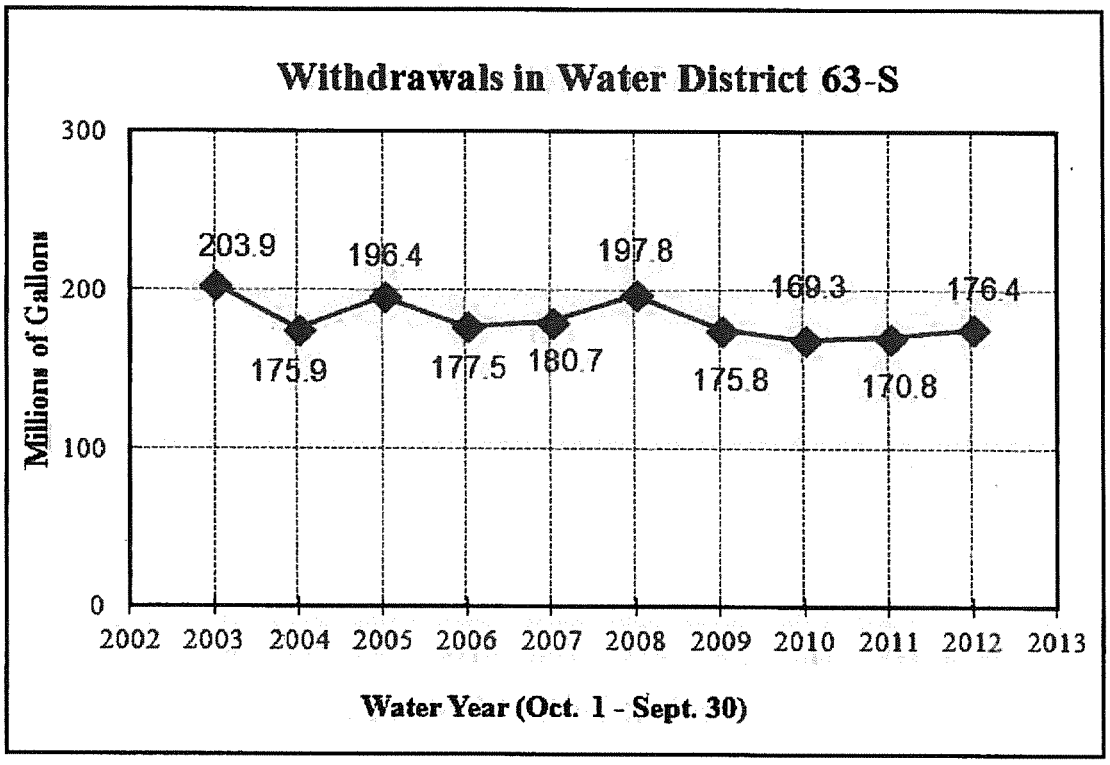

Figure 12. Geothermal withdrawals in Stewart Gulch Water District 63-S for Water Years 2003-2012.

Table 3. Withdrawals[1] from Stewart Gulch Ground Water District 63-S geothermal wells for Water Year 2012 (October 1, 2011 through September 30, 2012).

Well	Withdrawals in WY12 (millions of gallons)	Change from WY11 (millions of gallons)	Percent Change from WY11
TTCI Tiegs (Triangle)	0	0	0
TTCI Silkey (Shed)	7.9	+0.3	+4%
TTCI House (Office)	0.3	-0.5	See Comments[2]
Edwards Greenhouse	65.4	+0.4	+<0.1%
Terteling Ranch Windsock	66.9	-2.4	-4%
Terteling Ranch Pool	19.2	+0.6	+3%
Quail Hollow (Tee Ltd) Upper	<0.1	<0.1	See Comments[3]
Quail Hollow (Nibbler) Lower	11.7	+7.5	+276%
Whitehead	4.9	-0.1	-2%
Total	**176.4**	**+5.6**	**+3%**

[1]These numbers contain some degree of uncertainty which is typically associated with measurement equipment and methods. Therefore, the amounts are being reported in millions with one decimal place.
[2]The withdrawal in WY12 was 300,000 gallons; in WY11 the withdrawal was 800,000 gallons. This is decrease of over 60% but because the actual amounts are low, it would be misleading to report a percentage in this column.
[3]The withdrawal in WY12 was 71,700 gallons; in WY11 the withdrawal was 59,500 gallons. This is increase of about 20% but the actual amounts are so low that it would be misleading to report a percentage in this column.

The ownerships and locations of the wells allow them to be grouped into four individual withdrawal centers, which is a useful approach for summarizing the withdrawals in these localized areas within the District. Table 4 shows the four centers and the changes in withdrawals from WY11 to WY12.

Table 4. Four withdrawal centers in GWD63-S and changes from WY11 to WY12.

Withdrawal Center	Number of Wells	Numerical change from WY11 to WY12	Percentage change from WY11 to WY12
Edwards Greenhouse	1	+0.4 mgal	+<0.1%
Terteling Garden Center	3 (2 in use; 1 unused)	-0.2 mgal	-2%
Quail Hollow	2	+7.5 mgal	+276%
Terteling Ranch	2	-1.8 mgal	-2%

Water Levels

Overall, ground water levels in GWD63-S wells showed a slight increasing trend in WY12.

The Edwards well had a decrease in the maximum water level of 1.2 feet and an increase in the minimum water level of 3.5 feet in WY12 (Figure 13).

The TTCI Tiegs (Triangle) well also had a slight decrease in the maximum water level (0.2 feet), and an increase in the minimum water level of 2.3 feet (Figure 14). The TTCI House (Office) well had a larger decrease in the maximum level (2.8 feet); the minimum value increased slightly (0.2 feet)(Figure 15). The Silkey (Shed) had very slight increases in both the maximum and minimum water level (Figures 16).

The maximum water levels in the Quail Hollow wells were nearly the same in WY12 as in WY11, and the minimum levels were a little higher in WY12 (Figures 17 and 18).

The Terteling Ranch Windsock and Pool wells showed slight increases in the minimum water levels and the maximum water levels remained about the same as in WY11 (Figures 19 and 20).

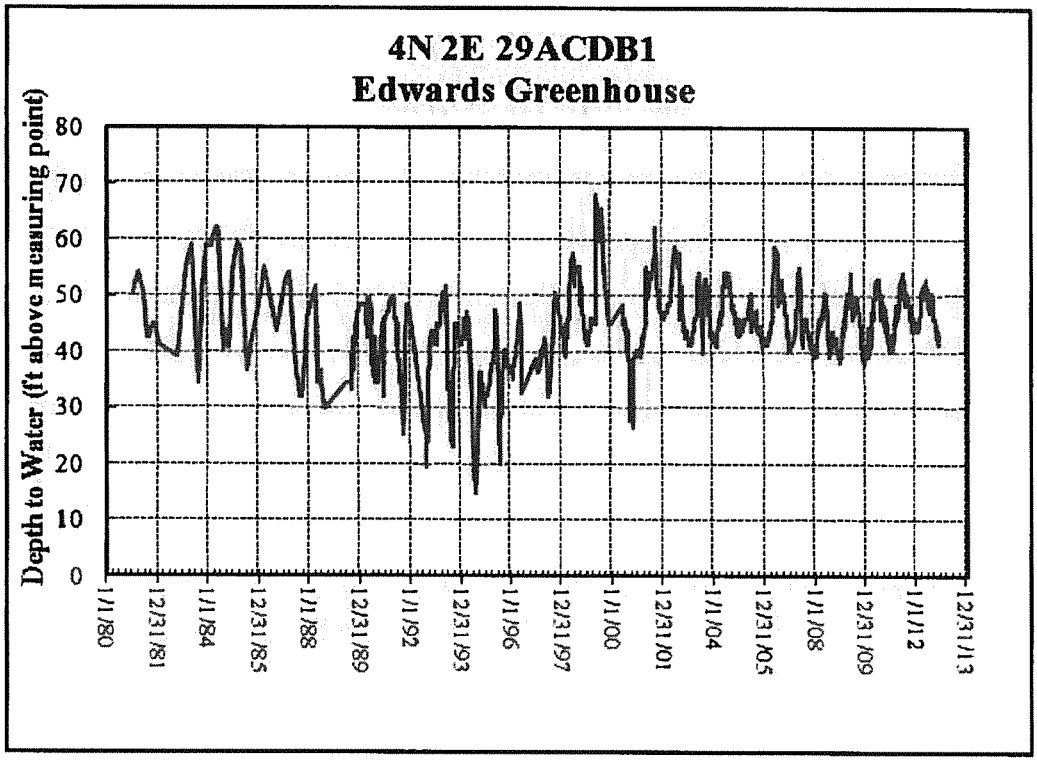

Figure 13. Water level hydrograph for the Edwards Greenhouse well.

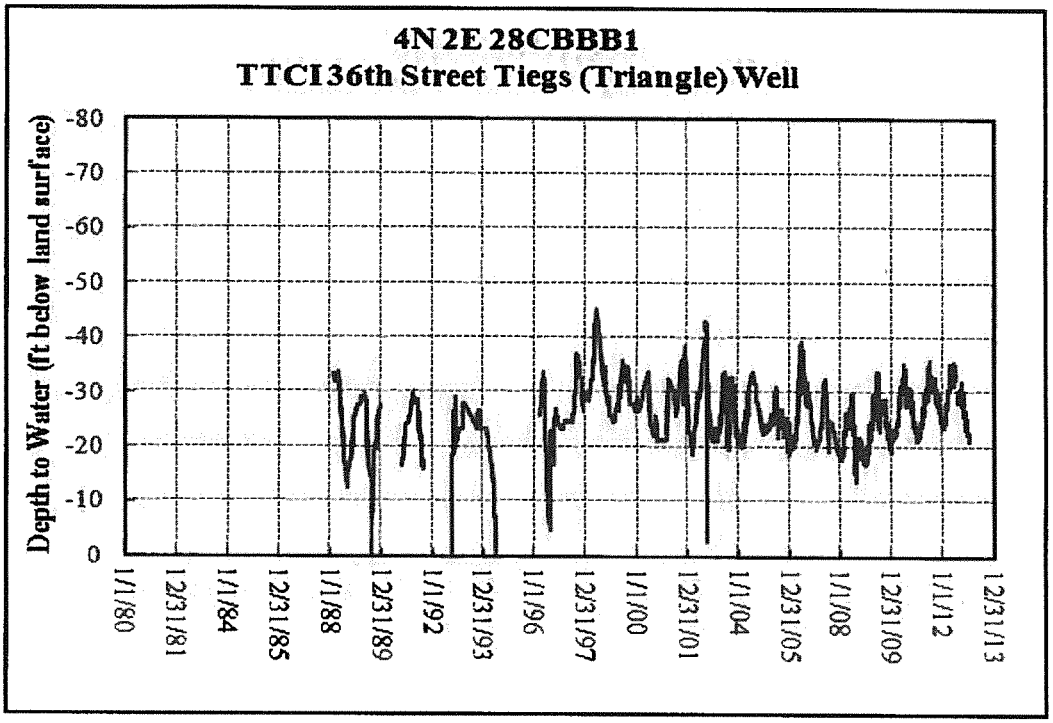

Figure 14. Water level hydrograph for the TTCI 36th Street Tiegs (Triangle) well.

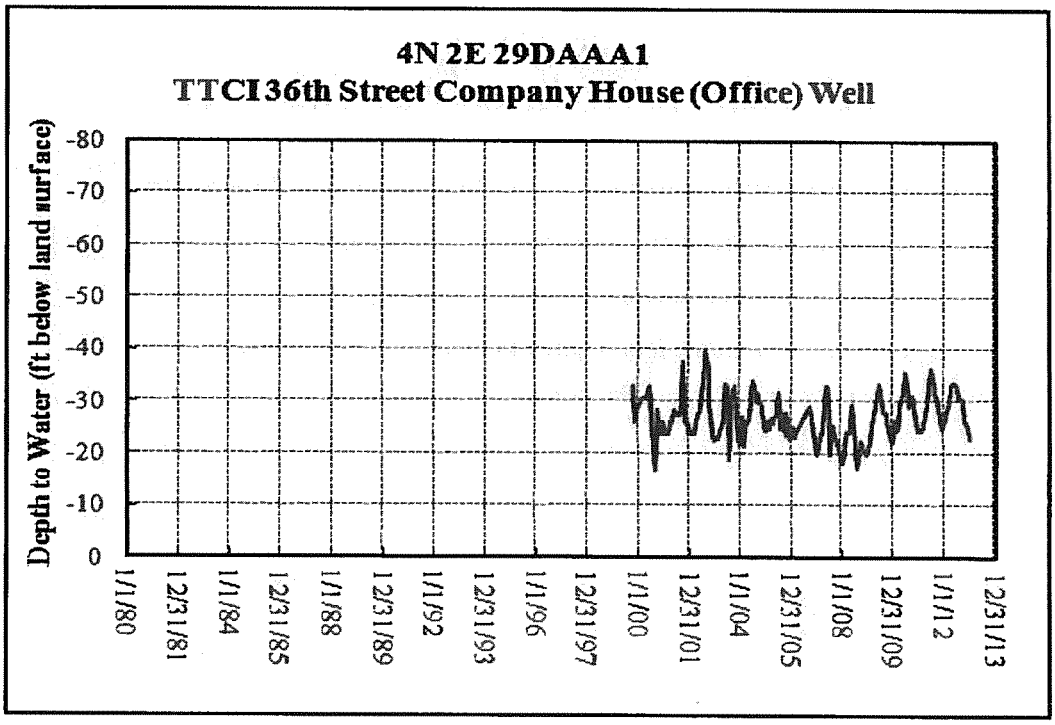

Figure 15. Water level hydrograph for the TTCI 36th Street House (Office) well.

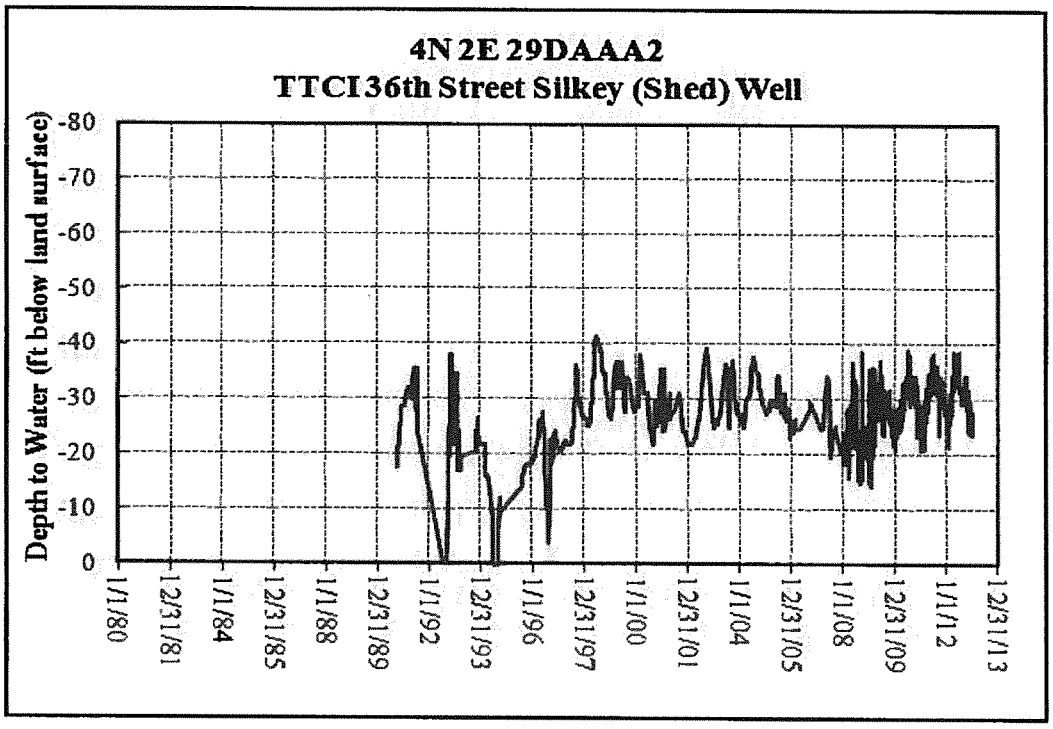

Figure 16. Water level hydrograph for the TTCI 36th Street Silkey (Shed) well.

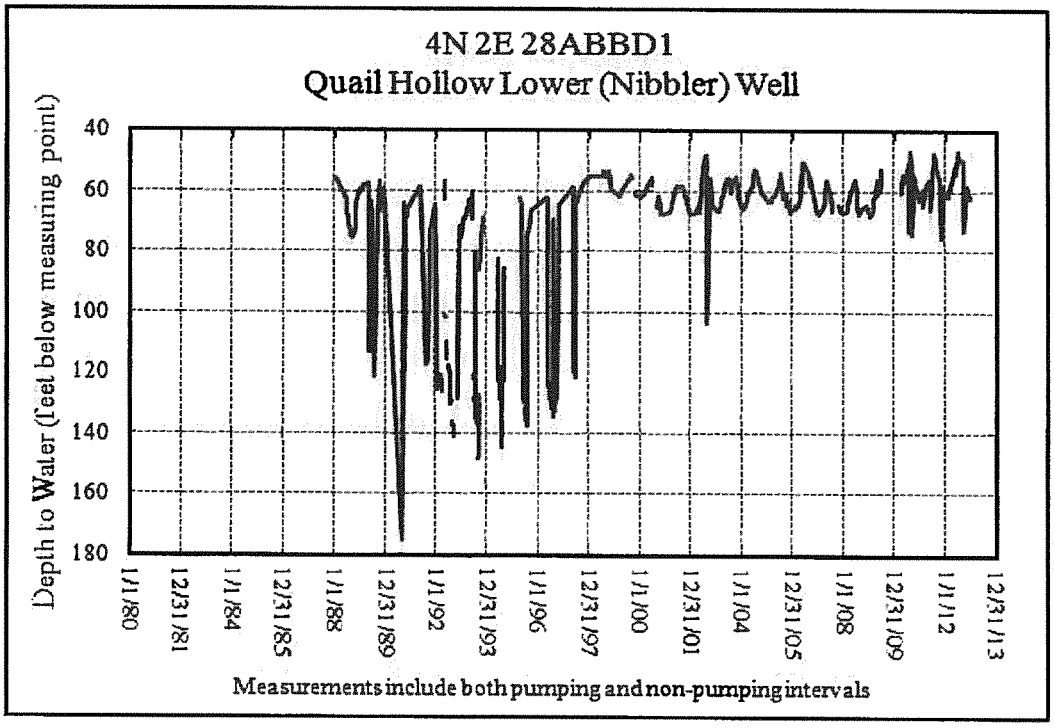

Figure 17. Water level hydrograph for the Quail Hollow Lower well.

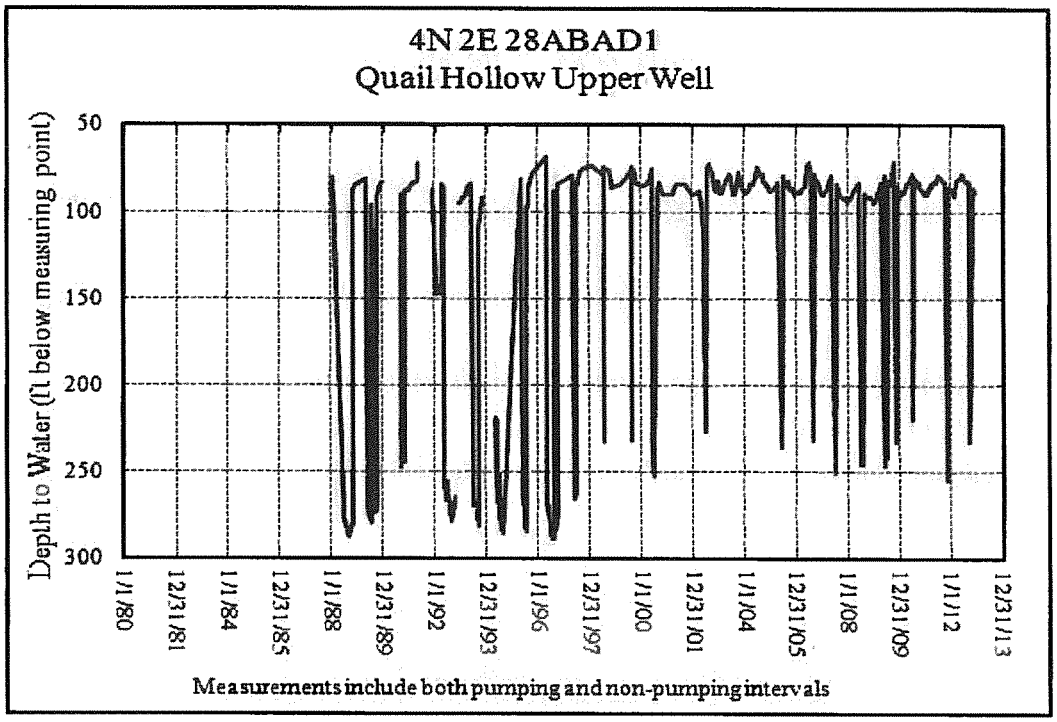

Figure 18. Water level hydrograph for the Quail Hollow Upper well.

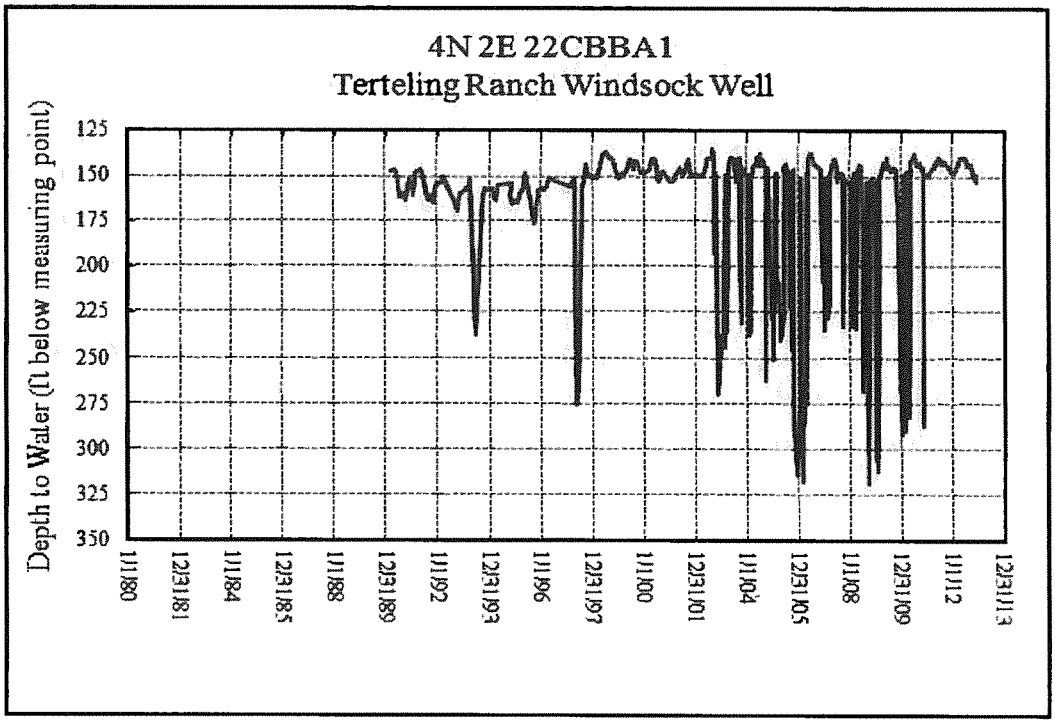

Figure 19. Water level hydrograph for the Terteling Ranch Windsock well.

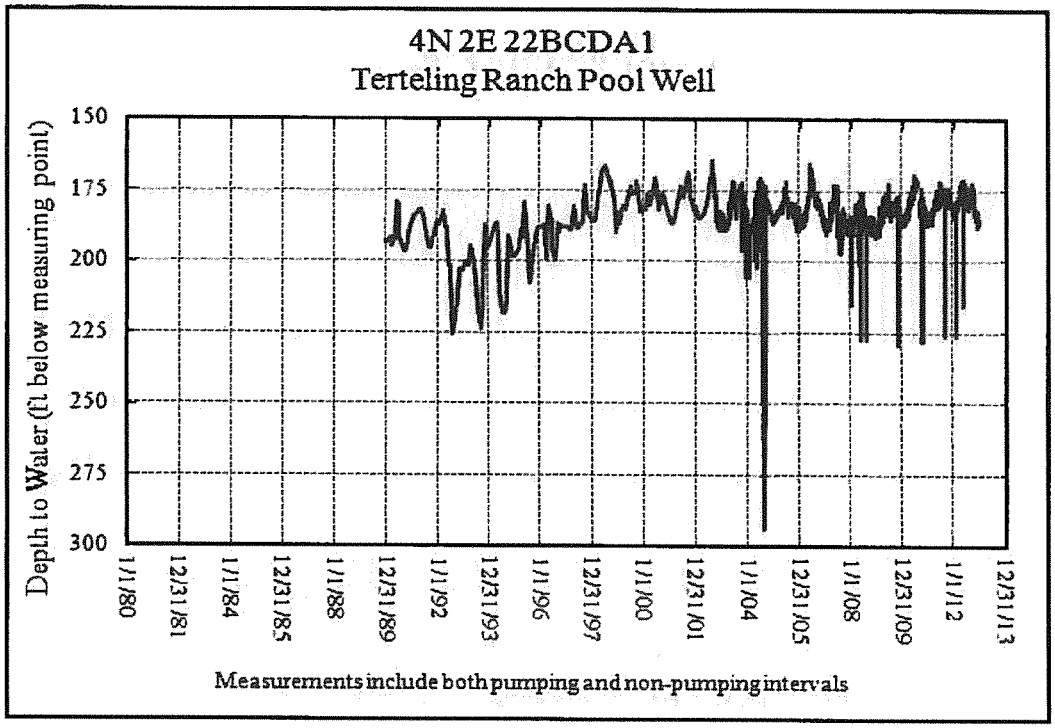

Figure 20. Water level hydrograph for the Terteling Ranch Pool well.