

Sand and gravel aquifers (glaciated regions)  
Glacial Surficial Sand and/or Gravel

Redwood County, MN

LOCATION.--Lat 44°29'14.00", long 95°18'37.00" referenced to North American Datum of 1983, in SW ¼ SW ¼ SW ¼ sec.21, T.112 N., R.37 W., Redwood County, MN, Hydrologic Unit 07020006, 9.5 miles west and 3.8 miles south of Redwood Falls, Minnesota. The land surface at the site is 1030 plus-or-minus 5 feet above sea level, National Geodetic Vertical Datum of 1929.

### GROUNDWATER RECORDS

WELL CHARACTERISTICS.--Depth 17.82 ft. Upper casing diameter 1.25 in; top of first opening 16.32 ft, bottom of last opening 17.82 ft. The hole for well WLN02 was drilled with an 8.25-inch-diameter power auger on Oct. 25, 1977 to a depth of 20 feet. The well is constructed of a 1.5-foot-long, 1.25-inch-diameter, wire-wound steel sandpoint attached to 19.5 feet of steel casing. When drilled, this casing had a stick-up of about 2.5 feet above land surface. In 1978, the stick-up was 3.4 feet. On Nov. 9, 2005, the stick-up was measured at 3.18 feet. Using the latest stick-up, the open interval of the well is 16.32-17.82 feet and the well is 17.82 feet deep.

DATUM.--Land-surface datum is 1,030 ft above North American Vertical Datum of 1988. Measuring point: MP is top of casing, not protection post., 3.18 ft above land-surface datum, Nov. 9, 2005, to present. Water levels are in feet above sea level and depth below land surface. During Jun. 2, 2004 to Nov. 9, 2005, water level accuracy is unknown. After Nov. 9, 2005, absolute water-level elevations are accurate to plus-or-minus 5 feet, based on the elevation of the land surface from the USGS topographic map. Relative water-level elevations and water depths are accurate to plus-or-minus 0.01 feet.

PERIOD OF RECORD.--Water levels were measured nearly monthly from Oct. 26, 1977 to Nov. 30, 2005, manually with a steel or calibrated electric tape. Water levels were recorded hourly during Jun. 02, 2004 at 15:00 CDT to the present, except during the following periods:

Oct. 06, 2004 at 12:00 CDT - Feb. 12, 2005 at 19:00 CDT: due to station failure.  
Jan. 07, 2007 at 19:00 CDT - Jan. 09, 2007 at 18:00 CDT: due to station failure.  
Oct. 23, 2010 at 06:00 CDT - Dec. 07, 2010 at 13:00 CST: due to a dead station battery.

GAGE.--Water level and water temperature were measured with a Druck submersible pressure transducer of unknown accuracy from Jun. 02, 2004 - Nov. 09, 2005. Water level and water temperature are measured with a KPSI 500 submersible pressure transducer accurate to 0.01 feet and 0.1°C respectively from Nov. 09, 2005 to the present. Data were recorded hourly by a Campbell Scientific, Inc. CR500 data logger. The data logger is housed in a shelter attached to the well casing, is solar powered, and data are telemetered by telephone.

COOPERATION.--Well WLN02 is operated as part of the U.S. Geological Survey's Collection-of-Basic-Record program.

REMARKS.--Measured groundwater levels are precise to two decimal places, not the 3 decimal places reported. Differences between subsequent groundwater levels are precise to 3 decimal places, however. Three-decimal place precision is useful at this site for hydrologic analyses such as estimation of groundwater recharge and evapotranspiration.

EXTREMES FOR PERIOD OF RECORD.--Highest water level: Highest water level, 5.808 ft below land-surface datum (1014.192 ft above sea level NGVD29) on Apr. 12, 2011 at 18:00 CDT, lowest water level, 13.952 ft below land-surface datum (1006.048 ft above sea level NGVD29) on Sept. 25, 2009 at 01:00 CDT.

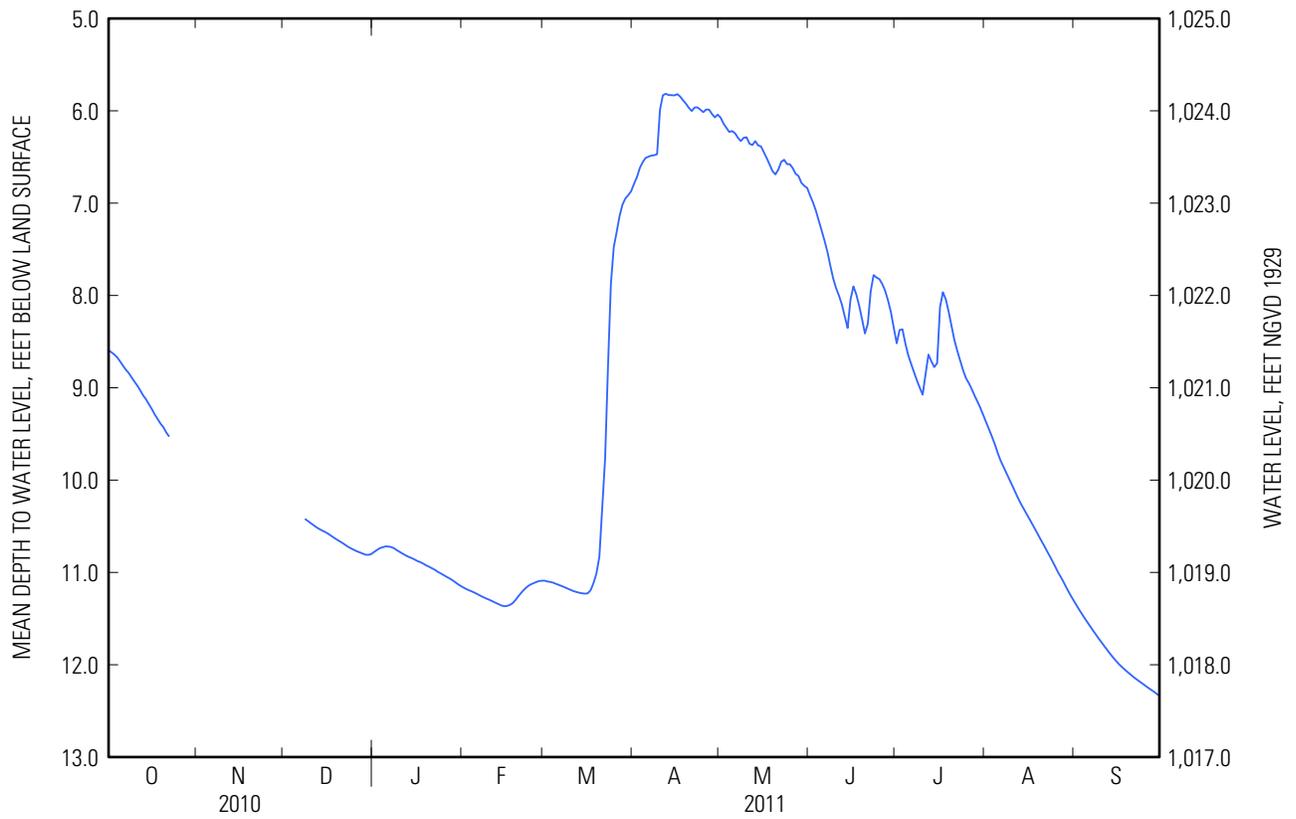
Highest daily-average water level: 5.816 feet below land surface datum (1014.184 feet NAVD88) on Apr. 12, 2010; lowest daily-average water level: 13.949 feet below land surface datum (1006.051 feet NAVD88) on Sept. 24, 2009.

EXTREMES FOR CURRENT YEAR.--Highest water level: Highest water level, 5.808 ft below land-surface datum (1014.192 ft above sea level NGVD29) on Apr. 12, 2011 at 18:00 CDT; lowest water level: lowest water level: 12.351 feet below land surface datum (1007.649 feet NAVD29) on Sep. 30, 2011 at 23:00 CST.

Highest daily-average water level: 5.816 feet below land surface datum (1014.184 feet NAVD88) on Apr. 12, 2010; lowest daily-average water level: 12.337 feet below land surface datum (1007.663 feet NAVD88) on Sept. 30, 2011.

**DEPTH TO WATER LEVEL, FEET BELOW LAND SURFACE**  
**WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011**  
**DAILY MEAN VALUES**  
[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	8.594	---	---	10.778	11.165	11.089	6.792	6.074	6.918	8.518	9.375	11.341
2	8.616	---	---	10.756	11.181	11.098	6.719	6.138	6.993	8.374	9.451	11.393
3	8.640	---	---	10.737	11.195	11.103	6.621	6.184	7.081	8.367	9.530	11.442
4	8.671	---	---	10.727	11.208	11.111	6.557	6.229	7.190	8.521	9.612	11.491
5	8.715	---	---	10.718	11.223	11.124	6.511	6.219	7.297	8.647	9.707	11.537
6	8.762	---	---	10.720	11.239	11.136	6.497	6.243	7.407	8.742	9.790	11.583
7	8.805	---	---	10.726	11.256	11.148	6.485	6.292	7.527	8.832	9.856	11.629
8	8.841	---	10.420	10.741	11.271	11.161	6.481	6.328	7.676	8.920	9.924	11.673
9	8.889	---	10.442	10.762	11.285	11.175	6.470	6.292	7.816	9.001	9.990	11.718
10	8.935	---	10.466	10.781	11.298	11.188	5.990	6.287	7.921	9.074	10.057	11.759
11	8.979	---	10.488	10.799	11.313	11.202	5.832	6.356	8.002	8.852	10.125	11.802
12	9.030	---	10.511	10.817	11.328	11.211	5.816	6.371	8.097	8.640	10.193	11.843
13	9.084	---	10.530	10.832	11.342	11.220	5.829	6.328	8.226	8.712	10.255	11.884
14	9.127	---	10.547	10.845	11.357	11.226	5.831	6.375	8.353	8.776	10.311	11.923
15	9.180	---	10.562	10.860	11.366	11.230	5.833	6.386	8.044	8.734	10.367	11.959
16	9.231	---	10.580	10.877	11.363	11.226	5.819	6.450	7.902	8.128	10.422	11.994
17	9.290	---	10.601	10.889	11.352	11.191	5.846	6.515	7.988	7.965	10.479	12.024
18	9.339	---	10.623	10.905	11.332	11.114	5.886	6.583	8.111	8.041	10.535	12.053
19	e9.389	---	10.643	10.924	11.297	11.010	5.923	6.654	8.257	8.176	10.593	12.080
20	9.428	---	10.662	10.938	11.256	10.832	5.968	6.689	8.412	8.332	10.651	12.106
21	9.485	---	10.681	10.955	11.218	10.298	6.002	6.637	8.304	8.485	10.706	12.132
22	9.529	---	10.702	10.971	11.184	9.762	5.964	6.552	7.953	8.602	10.766	12.156
23	---	---	10.723	10.993	11.155	8.763	5.963	6.530	7.779	8.707	10.822	12.179
24	---	---	10.740	11.010	11.134	7.872	5.988	6.577	7.806	8.810	10.881	12.201
25	---	---	10.756	11.028	11.119	7.475	6.015	6.579	7.823	8.896	10.943	12.224
26	---	---	10.771	11.046	11.106	7.313	5.986	6.622	7.876	8.950	11.005	12.247
27	---	---	10.783	11.063	11.094	7.141	5.987	6.683	7.949	9.015	11.058	12.269
28	---	---	10.796	11.082	11.090	7.017	6.034	6.707	8.055	9.087	11.116	12.290
29	---	---	10.808	11.104	---	6.951	6.071	6.781	8.181	9.151	11.178	12.313
30	---	---	10.810	11.127	---	6.913	6.041	6.813	8.353	9.220	11.235	12.337
31	---	---	10.801	11.147	---	6.872	---	6.836	---	9.297	11.289	---
<b>Mean</b>	---	---	---	10.892	11.240	9.973	6.125	6.462	7.843	8.696	10.394	11.919
<b>Max</b>	---	---	---	11.147	11.366	11.230	6.792	6.836	8.412	9.297	11.289	12.337
<b>Min</b>	---	---	---	10.718	11.090	6.872	5.816	6.074	6.918	7.965	9.375	11.341



**WATER-QUALITY RECORDS**

PERIOD OF RECORD.--Water temperatures were recorded hourly during Jun. 02, 2004 at 15:00 CDT to the present, except during the following periods:

Oct. 06, 2004 at 12:00 CDT - Feb. 12, 2005 at 19:00 CDT: due to station failure.  
Jan. 07, 2007 at 19:00 CDT - Jan. 09, 2007 at 18:00 CDT: due to station failure.  
Oct. 23, 2010 at 06:00 CDT - Dec. 07, 2010 at 13:00 CST: due to a dead station battery.

INSTRUMENTATION.--Water temperature is measured with a KPSI 500 submersible pressure transducer accurate to 0.1°C. Record is currently uncalibrated while sufficient calibration data is being collected.

COOPERATION.--Well WLN02 is operated as part of the U.S. Geological Survey's Collection-of-Basic-Record program.

EXTREMES FOR PERIOD OF RECORD.--

WATER TEMPERATURE: Maximum hourly, 19.7°C on hours during Aug., 2011; minimum hourly, 4.0°C on Apr. 11, 2011 at 21:00 CDT.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum daily-average, 19.6°C during Aug. 07 - 12, 2011; minimum daily-average, 4.1°C on Apr. 11, 2011.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum hourly, 19.7°C on hours during Aug., 2011; minimum hourly, 4.0°C on Apr. 11, 2011 at 21:00 CDT.

Maximum daily-average, 19.6°C during Aug. 07 - 12, 2011; minimum daily-average, 4.1°C on Apr. 11, 2011.

**TEMPERATURE, WATER, DEGREES CELSIUS**  
**WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011**  
**DAILY MEAN VALUES**  
[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	10.4	---	---	10.8	9.4	8.3	7.2	7.3	13.4	15.9	18.9	18.1
2	10.4	---	---	10.8	9.3	8.3	7.1	7.9	13.6	15.9	19.1	18.1
3	10.4	---	---	10.7	9.3	8.3	6.9	8.3	13.7	15.9	19.2	18.1
4	10.5	---	---	10.6	9.3	8.2	6.8	8.7	13.7	15.8	19.4	18.0
5	10.5	---	---	10.6	9.3	8.2	6.6	9.0	13.6	15.8	19.4	18.0
6	10.6	---	---	10.6	9.2	8.2	6.4	9.1	13.5	15.8	19.5	17.9
7	10.6	---	---	10.5	9.2	8.1	6.0	8.9	13.5	15.7	19.6	17.9
8	10.6	---	11.8	10.5	9.1	8.1	5.6	8.4	13.6	15.7	19.6	17.9
9	10.7	---	11.7	10.4	9.1	8.1	5.1	8.2	13.8	15.7	19.6	17.8
10	10.7	---	11.7	10.4	9.0	8.0	4.6	8.3	14.1	15.8	19.6	17.8
11	10.8	---	11.6	10.3	9.0	8.0	4.1	8.9	14.5	15.8	19.6	17.8
12	10.8	---	11.6	10.3	8.9	7.9	4.3	9.8	14.8	16.0	19.6	17.7
13	10.8	---	11.6	10.2	8.9	7.9	5.2	10.7	15.2	16.1	19.5	17.7
14	10.9	---	11.6	10.2	8.9	7.9	6.6	11.6	15.5	16.4	19.5	17.7
15	10.9	---	11.5	10.2	8.8	7.9	7.7	12.3	15.7	16.7	19.4	17.7
16	10.9	---	11.5	10.1	8.8	7.8	8.2	12.8	16.0	17.1	19.3	17.6
17	11.0	---	11.4	10.0	8.8	7.8	8.6	13.4	16.3	17.5	19.2	17.6
18	11.1	---	11.4	10.0	8.7	7.8	8.9	13.8	16.5	17.8	19.1	17.6
19	e11.1	---	11.4	9.9	8.7	7.7	8.8	13.9	16.4	17.9	19.1	17.5
20	11.2	---	11.3	9.9	8.7	7.7	8.3	13.4	16.2	18.0	19.0	17.5
21	11.2	---	11.3	9.9	8.6	7.6	7.6	12.7	15.9	18.0	18.9	17.5
22	11.3	---	11.3	9.9	8.6	7.6	7.1	12.0	15.6	18.1	18.8	17.5
23	---	---	11.2	9.8	8.5	7.7	6.9	11.6	15.2	18.1	18.7	17.4
24	---	---	11.1	9.7	8.5	7.8	6.8	11.4	15.0	18.2	18.7	17.4
25	---	---	11.1	9.7	8.5	7.8	6.8	11.5	15.0	18.2	18.6	17.4
26	---	---	11.0	9.6	8.4	7.8	6.7	11.7	15.0	18.3	18.5	17.3
27	---	---	11.0	9.6	8.4	7.7	6.6	12.0	15.2	18.4	18.4	17.3
28	---	---	11.0	9.6	8.4	7.5	6.4	12.3	15.4	18.5	18.4	17.3
29	---	---	10.9	9.5	---	7.4	6.4	12.6	15.6	18.6	18.3	17.2
30	---	---	10.9	9.5	---	7.2	6.7	12.9	15.8	18.7	18.3	17.2
31	---	---	10.8	9.4	---	7.2	---	13.1	---	18.8	18.2	---
<b>Mean</b>	---	---	---	10.1	8.9	7.9	6.7	10.9	14.9	17.1	19.1	17.6

