

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

Yellow Medicine County, MN

LOCATION.--Lat 44°44'44.36", long 95°29'35.32" referenced to North American Datum of 1983, in SE ¼ SE ¼ SW ¼ sec.19, T.115 N., R.38 W., Yellow Medicine County, MN, Hydrologic Unit 07020004, 5.1 miles southeast of Granite Falls, Minnesota.

GROUNDWATER RECORDS

WELL CHARACTERISTICS.--Depth 120 ft. Upper casing diameter 8 in; top of first opening 86 ft, bottom of last opening 100 ft. The hole for well US-CM3 was drilled with a hydraulic rotary drill-rig to a depth of 120 feet on May 13, 1998. The well is constructed of a 14-foot-long, 8-inch-diameter, stainless-steel screen welded to about 90 feet of 8-inch-diameter, steel casing.

The casing had a stick-up of 2.61 feet above land surface on Jul. 19, 2005. The casing stickup was measured at 1.55 feet above land surface on Nov. 03, 2009 because the land around the well was bulldozed flat. This change in land-surface elevation was arbitrarily applied to the depth-below-land-surface hydrograph on Jul. 01, 2008 at midnight CDT.

This well contains a pump that infrequently withdraws water. It is about 1,200 feet from another well that regularly draws water from the same aquifer.

DATUM.--Land-surface datum is 1,009.25 ft above North American Vertical Datum of 1988. Measuring point: Land surface has settled -0.07 feet since MP002 measurement of 1.64 ft. above land-surface datum from Mar. 16, 2010 to the present. Water levels are in depth below land surface and feet above sea level. Water levels are accurate to within 0.01 feet below land surface. Water-level elevations are accurate to plus-or-minus 0.048 feet, based on differential GPS Survey on Oct. 06, 2010. Water-level differences are accurate to plus-or-minus 0.001 feet.

PERIOD OF RECORD.--Hourly water level measurements from Jul. 20, 2005 to Jan. 24, 2006 at 05:00 CDT. Hourly water level measurements from Jan. 30, 2006 at 06:00 CDT to Aug. 13, 2006 at 04:00 CDT. Hourly water level measurements from Aug. 14, 2006 at 05:00 CDT to Oct. 25, 2006 at 06:00 CDT. Hourly water level measurements from Oct. 26, 2006 at 07:00 CDT to the present.

The break in hourly water level measurements (above) were a result of station failure during those time periods.

PERIOD OF DAILY RECORD.--Daily-average water level measurements from Jul. 21, 2005 to Nov 21, 2005. Daily-average water level measurements from Nov. 24, 2005 to Jan. 23, 2006. Daily-average water level measurements from Jan. 31, 2006 to Aug. 12, 2006. Daily-average water level measurements from Aug. 15, 2006 to Oct. 24, 2006. Daily-average water level measurements from Oct. 27, 2006 to the present.

The break in daily-average water level measurements (above) were a result of station failure during those time periods.

GAGE.--Water level and water temperature are measured with a Design Analysis H-310 submersible pressure transducer nominally accurate to 0.01 feet and 0.1°C, respectively. A Texas Electronics TRP-525 tipping-bucket rain gage measures precipitation and is nominally accurate to 0.01 inches. All data are recorded by a Campbell Scientific, Inc. CR205 data logger, which records all data hourly. The data logger is housed in a 12-inch X 14-inch grey fiberglass shelter attached an antenna mast. The gage is powered by a 10W solar panel and is telemetered by radio and telephone.

COOPERATION.--Well US-CM3 is operated by the U.S. Geological Survey in cooperation with the Upper Sioux Community.

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 hourly water level: 86.640 feet below land surface datum (922.626 feet NGVD88) on Jun. 21, 2011 at 17:00 CDT; lowest hourly water level (due to pumping effects), 96.683 feet below land-surface datum (912.583 feet NGVD88) on July 10, 2008 at 09:00 CDT; lowest hourly water level (NOT considering pumping effects): 91.161 feet below land surface datum (918.105 feet NGVD88) on Dec. 15, 2008 at 17:00 CST.

Highest daily-average water level: 86.727 feet below land surface datum (922.539 feet NGVD88) on Jun. 21, 2011; lowest daily-average water level: 91.167 feet below land surface datum (918.099 feet NGVD88) on Nov. 03, 2009.

EXTREMES FOR CURRENT YEAR.--Highest hourly water level: 86.640 feet below land surface datum (922.626 feet NGVD88) on Jun. 21, 2011 at 17:00 CDT; lowest hourly water level: 89.644 feet below land surface datum (919.622 feet NGVD88) on Oct. 02, 2010 at 11:00 CDT.

444447095293501 Local number US CM3 115N39W24CDDCBD Upper Sioux 0000607196—Continued

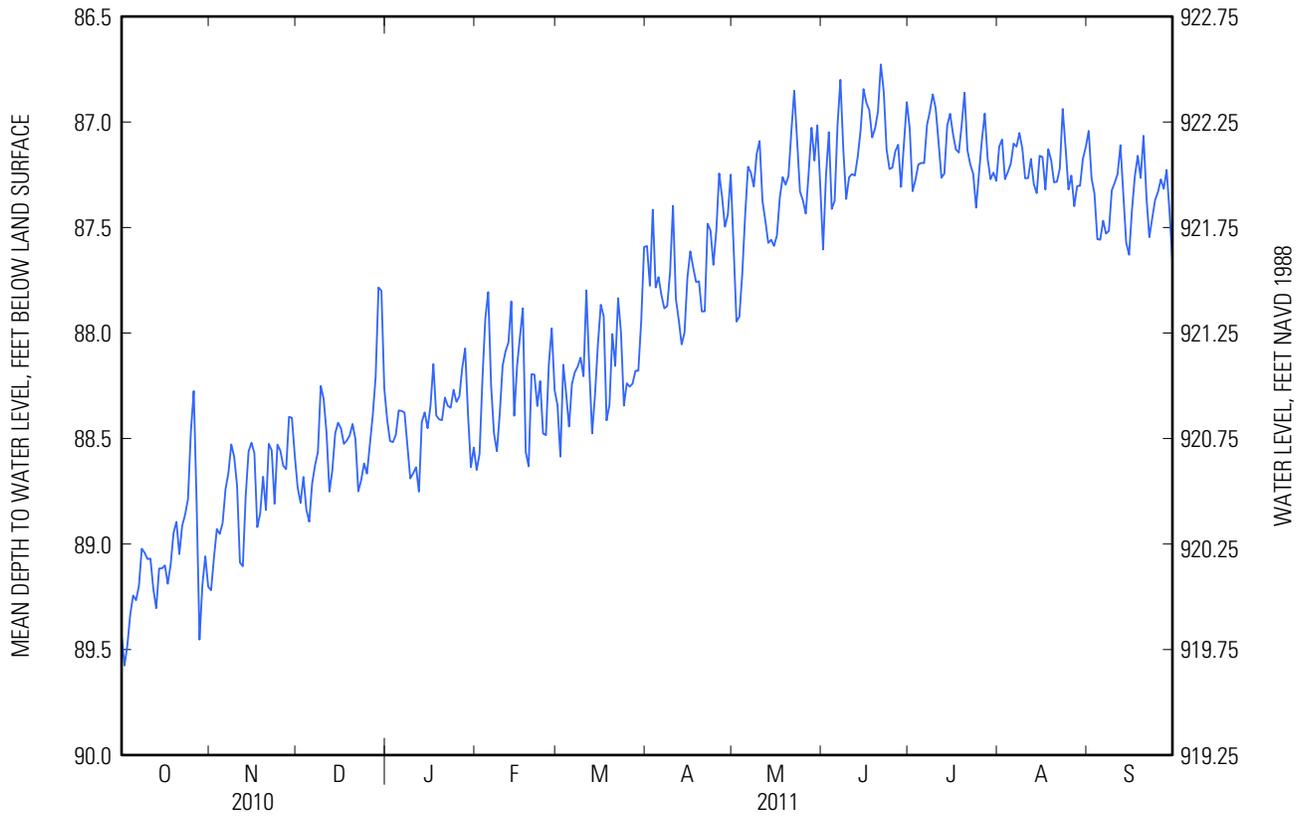
Highest daily-average water level: 86.727 feet below land surface datum (922.539 feet NGVD88) on Jun. 21, 2011; lowest daily-average water level: 89.576 feet below land surface datum (919.690 feet NGVD88) on Oct. 02, 2010.

DEPTH TO WATER LEVEL, FEET BELOW LAND SURFACE
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	89.430	89.219	88.733	88.411	88.649	88.342	87.588	87.591	87.604	87.030	87.117	87.042
2	89.576	89.065	88.805	88.512	88.573	88.586	87.776	87.946	87.255	87.328	87.083	87.267
3	89.480	88.929	88.682	88.517	88.218	88.150	87.416	87.922	87.048	87.274	87.271	87.339
4	89.333	88.952	88.837	88.482	87.930	88.289	87.784	87.719	87.412	87.201	87.237	87.555
5	89.244	88.900	88.894	88.367	87.806	88.443	87.735	87.442	87.374	87.194	87.198	87.558
6	89.266	88.740	88.714	88.369	88.249	88.241	87.820	87.212	87.014	87.195	87.102	87.468
7	89.199	88.663	88.628	88.377	88.476	88.186	87.883	87.241	86.800	87.014	87.117	87.529
8	89.022	88.528	88.564	88.532	88.560	88.159	87.872	87.306	87.129	86.949	87.052	87.516
9	89.042	88.586	88.251	88.689	88.382	88.117	87.710	87.151	87.365	86.869	87.124	87.324
10	89.071	88.722	88.313	88.665	88.154	88.205	87.397	87.090	87.262	86.936	87.267	87.288
11	89.069	89.088	88.475	88.636	88.087	87.798	87.837	87.374	87.247	87.096	87.266	87.247
12	89.213	89.105	88.752	88.752	88.045	88.163	87.938	87.468	87.254	87.264	87.175	87.110
13	89.304	88.770	88.650	88.421	87.850	88.476	88.054	87.573	87.164	87.244	87.295	87.342
14	89.116	88.561	88.475	88.376	88.392	88.290	87.998	87.558	87.038	87.016	87.337	87.573
15	89.115	88.520	88.425	88.451	88.156	88.053	87.737	87.587	86.844	86.961	87.160	87.629
16	89.101	88.569	88.452	88.345	88.017	87.866	87.613	87.538	86.909	87.057	87.166	87.416
17	89.188	88.920	88.525	88.147	87.883	87.920	87.689	87.359	86.944	87.130	87.320	87.256
18	89.097	88.856	88.510	88.391	88.564	88.414	87.758	87.261	87.073	87.145	87.129	87.160
19	88.947	88.681	88.486	88.409	88.632	88.340	87.755	87.297	87.031	87.016	87.181	87.265
20	88.895	88.838	88.431	88.413	88.195	88.005	87.898	87.257	86.951	86.861	87.286	87.065
21	89.048	88.525	88.502	88.306	88.197	88.156	87.897	87.045	86.727	87.134	87.283	87.353
22	88.913	88.556	88.750	88.345	88.346	87.835	87.482	86.852	86.854	87.202	87.220	87.546
23	88.861	88.809	88.697	88.354	88.228	88.000	87.514	87.088	87.131	87.246	86.938	87.457
24	88.787	88.529	88.618	88.269	88.476	88.344	87.677	87.330	87.223	87.406	87.123	87.370
25	88.468	88.558	88.666	88.326	88.484	88.238	87.517	87.371	87.216	87.244	87.320	87.332
26	88.275	88.629	88.529	88.301	88.149	88.254	87.244	87.434	87.139	87.086	87.254	87.272
27	88.811	88.645	88.391	88.166	87.978	88.240	87.354	87.241	87.108	86.960	87.399	87.316
28	89.453	88.397	88.208	88.073	88.271	88.179	87.496	87.027	87.308	87.174	87.304	87.227
29	89.192	88.402	87.784	88.384	---	88.179	87.440	87.183	87.104	87.271	87.302	87.425
30	89.058	88.582	87.800	88.636	---	87.943	87.249	87.016	86.906	87.240	87.174	87.661
31	89.202	---	88.263	88.543	---	87.592	---	87.298	---	87.279	87.118	---
Mean	89.090	88.728	88.510	88.418	88.248	88.161	87.671	87.348	87.114	87.130	87.204	87.364
Max	89.576	89.219	88.894	88.752	88.649	88.586	88.054	87.946	87.604	87.406	87.399	87.661
Min	88.275	88.397	87.784	88.073	87.806	87.592	87.244	86.852	86.727	86.861	86.938	87.042
Med	89.101	88.672	88.525	88.391	88.223	88.179	87.723	87.306	87.118	87.145	87.198	87.340

	Calendar Year 2010	Water Year 2011
Mean	89.832	87.915
High	87.784	86.727
Low	91.097	89.576
Med	89.928	87.872

444447095293501 Local number US CM3 115N39W24CDDCBD Upper Sioux 0000607196—Continued



WATER-QUALITY RECORDS

PERIOD OF RECORD.--The water temperature record is uncalibrated during all periods below due to the risk of getting the calibrating thermistor stuck on pumping equipment inside of this well.

Hourly water temperature measurements from Jul. 20, 2005 to Jan. 24, 2006 at 05:00 CDT. Hourly water temperature measurements from Jan. 30, 2006 at 06:00 CDT to Aug. 13, 2006 at 04:00 CDT. Hourly water temperature measurements from Aug. 14, 2006 at 05:00 CDT to Oct. 25, 2006 at 06:00 CDT. Hourly water temperature measurements from Oct. 26, 2006 at 07:00 CDT to the present.

The break in hourly water temperature measurements (above) were a result of station failure during those time periods.

PERIOD OF DAILY RECORD.--Daily-average water temperature measurements from Jul. 21, 2005 to Nov 21, 2005. Daily-average water temperature measurements from Nov. 24, 2005 to Jan. 23, 2006. Daily-average water temperature measurements from Jan. 31, 2006 to Aug. 12, 2006. Daily-average water temperature measurements from Aug. 15, 2006 to Oct. 24, 2006. Daily-average water temperature measurements from Oct. 27, 2006 to the present.

The break in daily-average water temperature measurements (above) were a result of station failure during those time periods.

INSTRUMENTATION.--Water temperature was measured with a Design Analysis Associates H-310 submersible pressure transducer accurate to 0.1°C. Record is currently uncalibrated while sufficient calibration data is being collected.

COOPERATION.--Well US-CM3 is operated by the U.S. Geological Survey in cooperation with the Upper Sioux Community.

EXTREMES FOR PERIOD OF RECORD.--

WATER TEMPERATURE: Maximum hourly: 8.3°C on many hours; minimum hourly: 8.0°C on many hours.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum daily-average: 8.3°C on many days; minimum daily-average: 8.1°C on many days.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum: 8.2°C on many days; minimum: 8.1°C on many days.

Maximum daily-average: 8.2°C on many days; minimum daily-average: 8.1°C on many days.

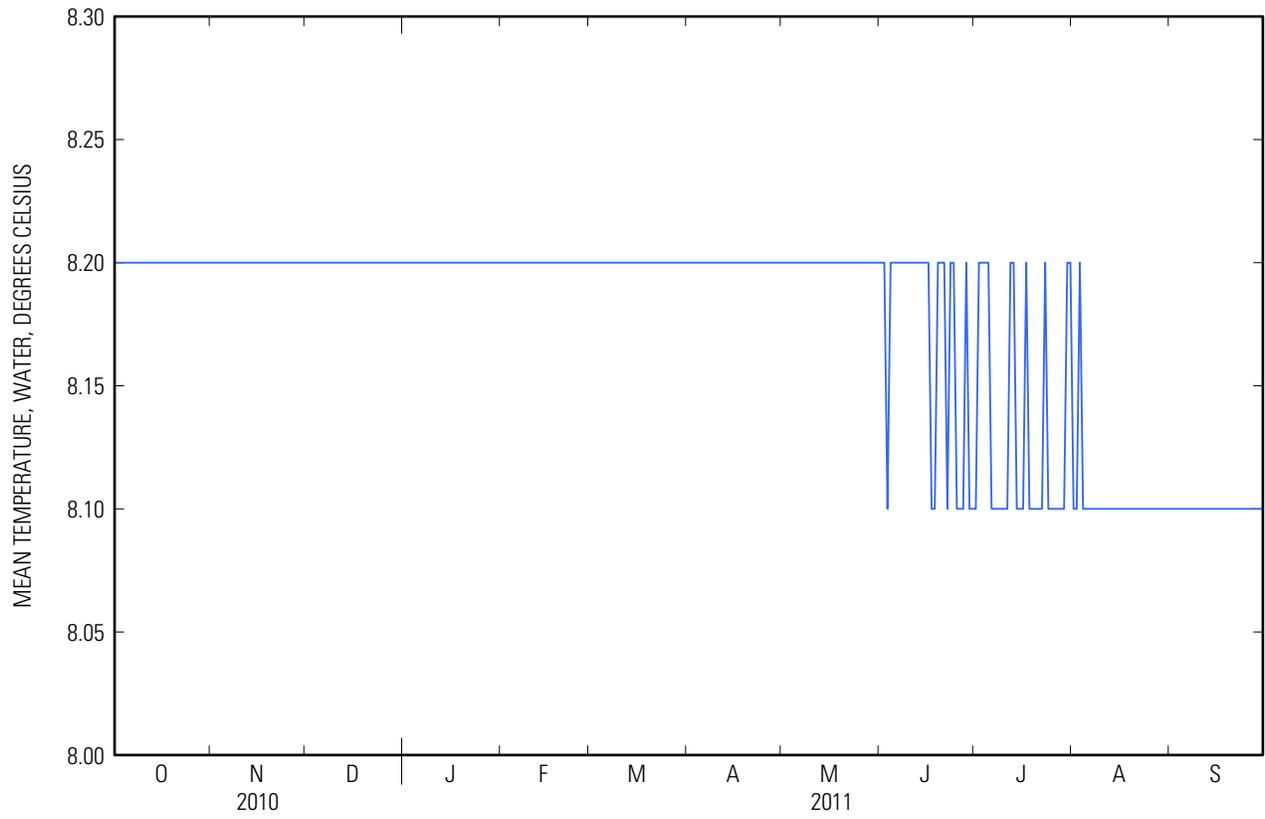
TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1
3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.2	8.2	8.1
4	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1
5	8.2	8.2	8.2	8.2	8.2	8.2	e8.2	8.2	8.2	8.2	8.1	8.1
6	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
7	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
8	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
9	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
10	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
11	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
12	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1
13	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1
14	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
15	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
16	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
17	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.2	8.1	8.1
18	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1
19	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
20	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
21	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
22	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1
23	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1
24	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
25	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1
26	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1
27	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1
28	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
29	8.2	8.2	8.2	8.2	---	8.2	8.2	8.2	8.1	8.1	8.1	8.1
30	8.2	8.2	8.2	8.2	---	8.2	8.2	8.2	8.1	8.2	8.1	8.1
31	8.2	---	8.2	8.2	---	8.2	---	8.2	---	8.2	8.1	---
Mean	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1
Max	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1
Min	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1
Med	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1

	Calendar Year 2010	Water Year 2011
Mean	8.2	8.2
Max	8.2	8.2
Min	8.1	8.1
Med	8.2	8.2

444447095293501 Local number US CM3 115N39W24CDDCBD Upper Sioux 0000607196—Continued



444447095293501 Local number US CM3 115N39W24CDDCBD Upper Sioux 000607196—Continued

CLIMATOLOGICAL RECORDS

PERIOD OF RECORD.--Hourly precipitation measurements from Jul. 20, 2005 to Jan. 24, 2006 at 05:00 CDT. Hourly precipitation measurements from Jan. 30, 2006 at 06:00 CDT to Aug. 13, 2006 at 04:00 CDT. Hourly precipitation measurements from Aug. 14, 2006 at 05:00 CDT to Oct. 25, 2006 at 06:00 CDT. Hourly precipitation measurements from Oct. 26, 2006 at 07:00 CDT to the present.

The break in hourly precipitation measurements (above) were a result of station failure during those time periods.

INSTRUMENTATION.--Precipitation is measured with a tipping-bucket rain gage that was installed at the station on Jul. 20, 2005, which measures and records precipitation total hourly and is accurate to 0.01 inches. The rain gage is unheated and uncovered during the winter. Thus precipitation data during freezing periods (about December through early April) result from melting of snow during warm periods and do NOT represent actual precipitation.

EXTREMES FOR PERIOD OF RECORD.--

PRECIPITATION: Maximum hourly: 1.99 in. on Aug. 13, 2010 at 00:00 CDT; maximum daily-average: 3.82 in. on Aug. 12, 2010.

EXTREMES FOR CURRENT YEAR.--

PRECIPITATION: Maximum hourly: 1.53 in. on May 30, 2011 at 06:00 CDT; maximum daily-average: 1.78 in. on Jun. 21, 2011.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY SUM VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.36	0.00	0.02
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.01
4	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.16	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.26	0.30	0.00
6	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.17	0.00	0.00	0.00	0.00
9	0.02	0.00	0.07	0.00	0.00	0.01	0.15	0.32	0.03	0.28	0.00	0.00
10	0.00	0.55	0.00	0.00	0.00	0.00	0.08	0.00	0.12	1.06	0.00	0.00
11	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.01	0.01	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.00
13	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.26	0.87	1.61	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.08	0.14	0.02	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.03	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.02	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.09
19	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.27	0.00	0.00	0.08	0.01
21	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.60	1.78	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	1.38	0.19	0.48	0.37	0.00	0.00	0.00
23	0.03	0.00	0.00	0.00	0.11	0.01	0.02	0.00	0.01	0.00	0.27	0.00
24	0.08	0.00	0.00	0.00	0.00	0.50	0.00	0.04	0.01	0.00	0.00	0.00
25	0.49	0.00	0.00	0.00	0.00	0.06	0.00	0.11	0.01	0.00	0.00	0.00
26	0.42	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.14	0.04	0.00	0.00
27	0.05	0.06	0.00	0.08	0.04	0.00	0.00	0.61	0.00	0.53	0.00	0.00
28	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
29	0.00	0.05	0.09	0.00	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.64	0.00	---	0.00	0.29	1.66	0.00	0.00	0.04	0.00
31	0.00	---	0.00	0.00	---	0.14	---	0.12	---	0.00	0.01	---
Total	1.09	0.79	0.87	0.08	0.31	2.15	1.61	5.78	3.94	5.28	0.85	0.13
Mean	0.04	0.03	0.03	0.00	0.01	0.07	0.05	0.19	0.13	0.17	0.03	0.00
Max	0.49	0.55	0.64	0.08	0.11	1.38	0.29	1.66	1.78	1.61	0.30	0.09
Med	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00

	Calendar Year 2010	Water Year 2011
Total	33.52	22.88
Mean	0.09	0.06
Max	3.82	1.78
Med	0.00	0.00

444447095293501 Local number US CM3 115N39W24CDDCBD Upper Sioux 0000607196—Continued

