Water-Data Report 2013

05114000 SOURIS RIVER NEAR SHERWOOD, ND

Souris Basin
Upper Souris Subbasin

LOCATION.--Lat 48°59′24″, long 101°57′28″ referenced to North American Datum of 1927, in NW ¼ SE ¼ NE ¼ sec.33, T.164 N., R.87 W., Renville County, ND, Hydrologic Unit 09010001, on right bank 3/4 mi south of International Boundary and 16 mi northwest of Sherwood.

DRAINAGE AREA.--8,940 mi^2 of which 5,900 mi^2 probably is noncontributing.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--DAILY DISCHARGE--March 1930 to current year. Monthly discharge only for some periods, published in WSP 1308.

PERIOD OF RECORD.--DAILY GAGE HEIGHT--October 2000 to current year.

REVISED RECORDS.--WSP 1308: 1934, 1945. WSP 2113: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,603.73 ft above National Geodetic Vertical Datum of 1929. Prior to April 8, 1935, nonrecording gage at same site and datum.

COOPERATION.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

REMARKS.--Records good except for estimated daily discharges, which are poor.

REGULATION.--Flow is regulated by reservoirs in Canada (Boundary Reservoir, 48,990 acre-ft - 1958; Rafferty Reservoir, 356,400 acre-ft - 1991; and Alameda Reservoir, 85,560 acre-ft - 1992). Total reservoir capacity is 490,950 acre-ft. Some diversions for irrigation and municipal supply.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in 1927 reached a stage of about 22 ft and flood in 1904 reached a stage of about 25.8 ft from information by local residents.

05114000 SOURIS RIVER NEAR SHERWOOD, ND—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013
DAILY MEAN VALUES
[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	16	19	e39	e62	e158	e50	e1,100	1,740	627	1,060	150	65
2	16	19	e40	e66	e150	e50	e1,250	2,030	672	999	164	60
3	16	19	e41	e70	e134	e49	e1,400	2,250	756	966	171	61
4	16	19	e42	e73	e113	e46	e1,600	2,170	935	941	172	58
5	15	20	e44	e75	e99	e43	e1,750	1,680	1,080	917	167	56
6	15	21	e46	e76	e89	e39	e1,950	1,240	1,220	868	164	57
7	15	21	e47	e77	e86	e35	e2,100	1,030	1,210	741	166	56
8	15	20	e48	e78	e88	e32	e2,250	840	1,200	636	158	57
9	15	e19	e49	e78	e103	e30	e2,300	548	e1,190	538	151	71
10	16	e18	e50	e79	e112	e29	e2,320	385	e1,230	487	151	91
11	16	e17	e50	e79	e116	e31	e2,300	309	1,310	471	139	84
12	16	e16	e51	e78	e115	e36	e2,250	270	1,360	462	122	90
13	15	e16	e51	e74	e107	e44	e2,180	242	1,340	447	109	119
14	16	e17	e50	e70	e87	e55	e2,100	230	1,290	414	98	99
15	16	e18	e50	e67	e63	e65	1,970	221	1,230	394	94	78
16	17	e18	e49	e67	e50	e77	1,900	208	1,110	451	140	71
17	17	e19	e49	e69	e46	e90	1,870	192	1,040	586	151	70
18	18	e19	e48	e75	e49	e100	1,750	183	1,020	577	150	70
19	18	e20	e48	e83	e47	e110	1,310	279	986	821	157	74
20	18	e20	e48	e96	e46	e119	681	481	967	1,180	165	69
21	17	e21	e48	e100	e45	e126	387	579	970	1,110	156	68
22	16	e22	e47	e99	e45	e132	259	627	e1,000	872	148	98
23	17	e23	e47	e82	e47	e140	198	634	e1,060	735	142	118
24	18	e24	e48	e60	e49	e150	162	672	1,080	594	141	104
25	18	e26	e48	e59	e51	e160	135	793	1,110	356	139	91
26	19	e30	e49	e75	e51	e180	114	892	1,170	270	137	81
27	18	e32	e50	e110	e51	e230	108	899	1,170	229	136	75
28	17	e35	e51	e143	e51	e290	247	777	1,170	198	96	72
29	17	e37	e53	e156	---	e370	855	664	1,150	182	75	69
30	18	e38	e56	e160	---	e530	1,590	634	1,110	171	70	67
31	19	---	e59	e160	---	e820	---	641	---	157	67	---
Total	516	663	1,496	2,696	2,248	4,258	40,386	24,340	32,763	18,830	4,246	2,299
Mean	16.6	22.1	48.3	87.0	80.3	137	1,346	785	1,092	607	137	76.6
Max	19	38	59	160	158	820	2,320	2,250	1,360	1,180	172	119
Min	15	16	39	59	45	29	108	183	627	157	67	56
Ac-ft	1,020	1,320	2,970	5,350	4,460	8,450	80,110	48,280	64,990	37,350	8,420	4,560

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1930 - 2013, BY WATER YEAR (WY)

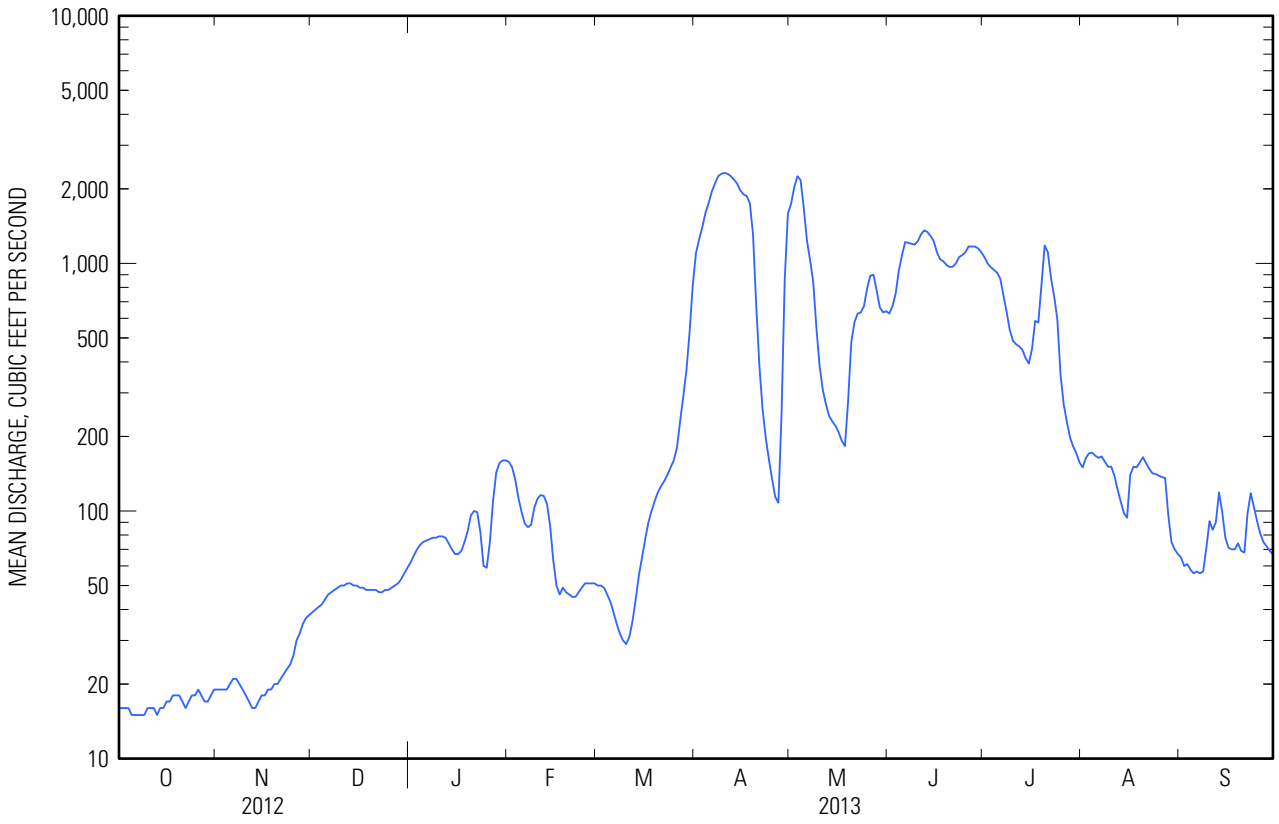
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	17.8	11.7	9.82	6.94	12.6	142	662	438	257	155	43.1	28.2
Max	217	108	264	155	443	1,159	6,739	4,822	10,520	5,556	1,079	585
(WY)	(2012)	(2011)	(2012)	(2011)	(2011)	(2011)	(1976)	(2011)	(2011)	(2011)	(2011)	(2011)
Min	0.00	0.00	0.00	0.00	0.00	0.00	1.82	2.63	0.17	0.00	0.00	0.00
(WY)	(1932)	(1935)	(1932)	(1931)	(1931)	(1936)	(1988)	(1988)	(1988)	(1937)	(1931)	(1931)

05114000 SOURIS RIVER NEAR SHERWOOD, ND—Continued

SUMMARY STATISTICS

	Calendar Year 2012		Water Year 2013		Water Years 1930 - 2013	
Annual total	29,774		134,741			
Annual mean	81.3		369		150	
Highest annual mean					2,267	2011
Lowest annual mean					0.62	1988
Highest daily mean	381	May 21	2,320	Apr 10	28,800	Jun 24, 2011
Lowest daily mean	13	Aug 31	15	Oct 5	0.00	Sep 4, 1930
Annual seven-day minimum	14	Aug 28	15	Oct 3	0.00	Sep 4, 1930
Maximum peak flow			[a]2,500	Apr 12	29,700	Jun 23, 2011
Maximum peak stage			[b]21.38	Apr 12	28.16	Jun 23, 2011
Annual runoff (ac-ft)	59,060		267,300		108,500	
10 percent exceeds	194		1,170		243	
50 percent exceeds	50		98		7.1	
90 percent exceeds	17		19		0.00	

[a] About.
[b] Backwater from ice.

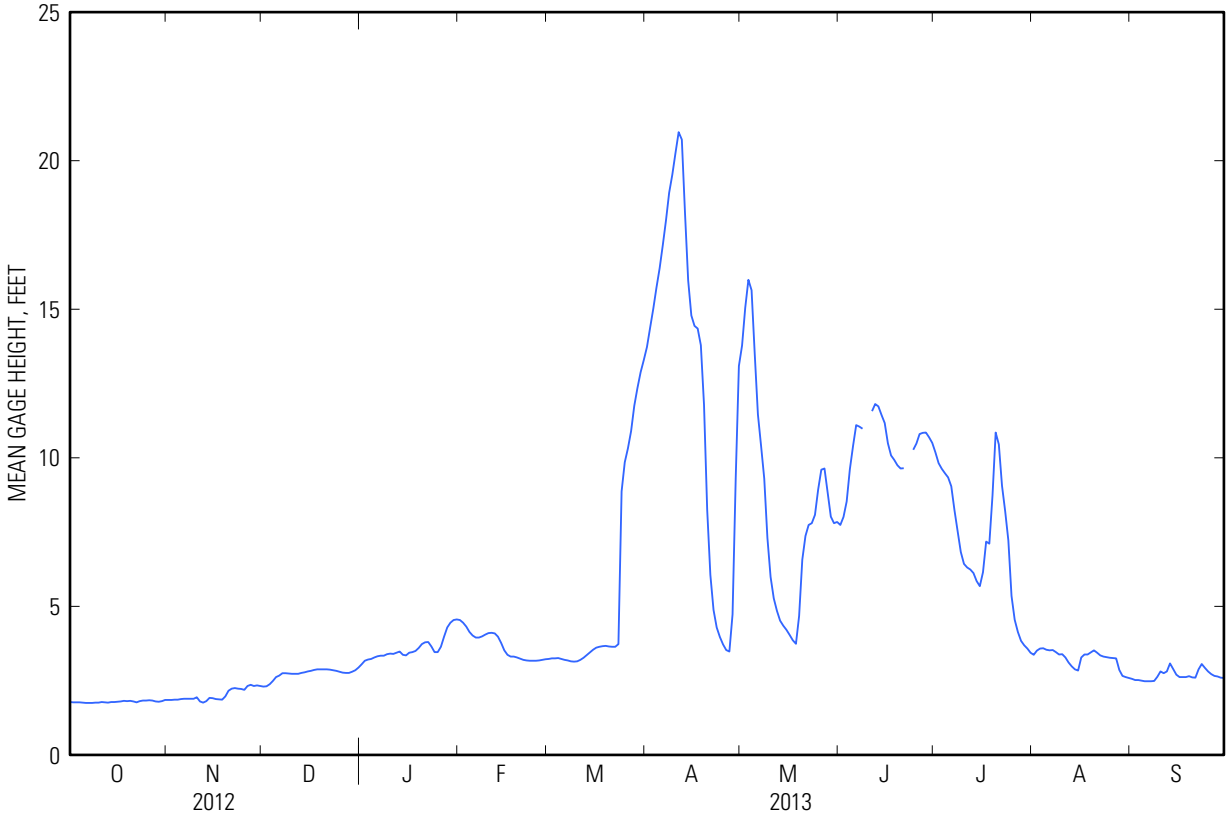


05114000 SOURIS RIVER NEAR SHERWOOD, ND—Continued

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013
DAILY MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	1.78	1.85	2.30	3.05	4.54	3.23	13.73	13.78	7.74	10.18	3.37	2.56
2	1.77	1.85	2.31	3.17	4.45	3.25	14.38	15.05	8.01	9.82	3.51	2.52
3	1.77	1.86	2.38	3.21	4.32	3.25	15.02	15.99	8.53	9.63	3.58	2.52
4	1.77	1.86	2.49	3.23	4.14	3.26	15.73	15.64	9.61	9.48	3.59	2.50
5	1.76	1.88	2.62	3.28	4.02	3.23	16.38	13.49	10.39	9.34	3.54	2.48
6	1.75	1.89	2.67	3.32	3.95	3.20	17.16	11.46	11.10	9.04	3.52	2.48
7	1.75	1.89	2.75	3.34	3.95	3.18	17.99	10.40	11.05	8.24	3.53	2.48
8	1.75	1.89	2.75	3.34	3.99	3.15	18.92	9.30	10.98	7.53	3.46	2.49
9	1.76	1.89	2.74	3.39	4.05	3.14	19.53	7.30	---	6.83	3.38	2.63
10	1.76	1.94	2.73	3.41	4.10	3.15	20.26	5.99	---	6.43	3.39	2.81
11	1.78	1.80	2.73	3.40	4.11	3.20	20.96	5.27	11.57	6.31	3.28	2.75
12	1.77	1.76	2.73	3.44	4.09	3.27	20.71	4.85	11.81	6.24	3.11	2.81
13	1.76	1.81	2.76	3.48	3.98	3.36	18.24	4.52	11.73	6.12	2.98	3.08
14	1.78	1.92	2.78	3.37	3.77	3.45	15.97	4.35	11.44	5.85	2.88	2.89
15	1.78	1.91	2.81	3.35	3.52	3.54	14.79	4.21	11.17	5.68	2.84	2.70
16	1.79	1.88	2.83	3.44	3.37	3.61	14.44	4.04	10.49	6.15	3.28	2.62
17	1.80	1.87	2.86	3.46	3.31	3.64	14.35	3.86	10.08	7.18	3.38	2.62
18	1.82	1.86	2.88	3.50	3.31	3.66	13.79	3.74	9.93	7.11	3.38	2.62
19	1.81	1.97	2.88	3.60	3.28	3.67	11.78	4.68	9.75	8.73	3.45	2.65
20	1.82	2.16	2.88	3.73	3.24	3.65	8.25	6.57	9.64	10.85	3.52	2.61
21	1.80	2.23	2.88	3.79	3.20	3.64	6.06	7.37	9.65	10.45	3.44	2.60
22	1.77	2.25	2.87	3.80	3.18	3.64	4.88	7.74	---	9.06	3.35	2.88
23	1.81	2.23	2.85	3.65	3.17	3.73	4.29	7.80	---	8.20	3.31	3.06
24	1.83	2.22	2.83	3.46	3.17	8.87	3.97	8.08	10.27	7.22	3.29	2.93
25	1.83	2.19	2.80	3.46	3.17	9.85	3.72	8.93	10.48	5.35	3.27	2.81
26	1.84	2.32	2.77	3.64	3.18	10.32	3.53	9.60	10.80	4.55	3.26	2.72
27	1.83	2.36	2.76	3.98	3.20	10.90	3.48	9.64	10.84	4.14	3.25	2.66
28	1.80	2.32	2.76	4.29	3.22	11.75	4.73	8.83	10.85	3.84	2.86	2.64
29	1.79	2.34	2.80	4.45	---	12.35	9.32	8.02	10.69	3.69	2.66	2.60
30	1.81	2.32	2.85	4.54	---	12.88	13.09	7.80	10.50	3.58	2.62	2.59
31	1.85	---	2.94	4.56	---	13.29	---	7.84	---	3.44	2.59	---
Mean	1.79	2.02	2.74	3.58	3.68	5.43	12.65	8.26	---	7.11	3.25	2.68
Max	1.85	2.36	2.94	4.56	4.54	13.29	20.96	15.99	---	10.85	3.59	3.08
Min	1.75	1.76	2.30	3.05	3.17	3.14	3.48	3.74	---	3.44	2.59	2.48

05114000 SOURIS RIVER NEAR SHERWOOD, ND—Continued



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WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1970, 1972 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: August 1983 to September, 2003, October 2006 to September 2007.
SPECIFIC CONDUCTANCE: August 1983 to September, 2003, October 2006 to September 2007.
DISSOLVED OXYGEN: May 1993 to September, 2003, October 2006 to September 2007.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: Maximum recorded, 32.1°C, July 24, 2007; minimum recorded, -0.6°C, February 2, 2007.
SPECIFIC CONDUCTANCE: Maximum recorded, 3,490 microsiemens, April 28, 1991; minimum recorded, 94 microsiemens, April 5, 1990.
DISSOLVED OXYGEN: Maximum recorded, 19.6 milligrams per liter, March 16-21, 2000; minimum recorded, 0.1 milligrams per liter, March 8, 2003.

WATER-QUALITY DATA
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013

Part 1 of 6

[%, percent; ANC, acid neutralizing capacity; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; <, less than; E, estimated; @, holding time exceeded; c, see result laboratory comment; d, diluted sample: method hi range exceeded; n, below the LRL and above the LT-MDL]

Date	Sample start time	Barometric pressure, mm Hg (00025)	Discharge, ft^3/s (00060)	Discharge, instanta-neous, ft^3/s (00061)	Dissolved oxygen, water, unfiltered, mg/L (00300)	Dissolved oxygen, water, unfiltered, % saturation (00301)	pH, water, unfiltered, field, standard units (00400)	pH, water, unfiltered, laboratory, standard units (00403)	Specific conduc-tance, water, unfiltered, laboratory, µS/cm at 25°C (90095)	Specific conduc-tance, water, unfiltered, µS/cm at 25°C (00095)
10-29-2012	**1300**	720	--	17	13.6	100	8.5	8.4	1,540	1,540
01-03-2013	**0840**	724	E 70	--	11.2	81	7.1	8.0	1,420	1,420
04-22-2013	**1230**	728	--	254	10.8	87	7.4	8.2	859	870
05-09-2013	**0815**	728	--	579	9.1	92	8.1	8.2	1,130	1,150
05-22-2013	**0915**	722	--	627	8.5	87	8.1	8.2	1,180	1,230
06-06-2013	**0855**	723	--	--	8.2	85	--	--	--	884
06-12-2013	**1320**	721	--	1,370	7.3	85	7.9	8.1	1,000	1,020
07-08-2013	**1345**	717	--	629	7.9	100	8.2	8.3	813	841
08-26-2013	**1130**	716	--	137	7.5	91	8.2	8.3	1,170	1,200

05114000 SOURIS RIVER NEAR SHERWOOD, ND—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013
Part 2 of 6

[%, percent; ANC, acid neutralizing capacity; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; <, less than; E, estimated; @, holding time exceeded; c, see result laboratory comment; d, diluted sample: method hi range exceeded; n, below the LRL and above the LT-MDL]

Date	Sample start time	Temperature, water, °C (00010)	Dissolved solids dried at 180°C, water, filtered, mg/L (70300)	Dissolved solids, water, filtered, sum of constituents, mg/L (70301)	Dissolved solids, water, tons per day (70302)	Hardness, water, mg/L as $CaCO_3$ (00900)	Suspended solids, water, unfiltered, mg/L (00530)	Calcium, water, filtered, mg/L (00915)	Magnesium, water, filtered, mg/L (00925)	Potassium, water, filtered, mg/L (00935)
10-29-2012	**1300**	0.3	1,070	1,020	49.1	522	< 30 d	94.2	69.6	13.2
01-03-2013	**0840**	-.1	983	927	--	497	< 15	85.1	69.1	16.2
04-22-2013	**1230**	4.3	580	570	398	301	77	63.2	34.8	14.6
05-09-2013	**0815**	13.5	813	764	1,270	346	69	68.4	42.5	14.6
05-22-2013	**0915**	14.0	860	814	1,460	337	123 d	67.8	40.8	13.5
06-06-2013	**0855**	14.3	--	--	--	--	--	--	--	--
06-12-2013	**1320**	20.1	709	673	2,620	319	132 d	58.7	42.0	14.0
07-08-2013	**1345**	24.3	538	503	913	260	67	53.1	31.0	13.4
08-26-2013	**1130**	21.7	863	804	319	468	82 d	84.2	62.6	13.6

WATER-QUALITY DATA
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013
Part 3 of 6

[%, percent; ANC, acid neutralizing capacity; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; <, less than; E, estimated; @, holding time exceeded; c, see result laboratory comment; d, diluted sample: method hi range exceeded; n, below the LRL and above the LT-MDL]

Date	Sample start time	Sodium adsorption ratio, water, number (00931)	Sodium fraction of cations, water, percent in equivalents of major cations (00932)	Sodium, water, filtered, mg/L (00930)	ANC, water, unfiltered, fixed endpoint (pH 4.5) titration, laboratory, mg/L as $CaCO_3$ (90410)	Chloride, water, filtered, mg/L (00940)	Fluoride, water, filtered, mg/L (00950)	Sulfate, water, filtered, mg/L (00945)	Ammonia plus organic nitrogen, water, unfiltered, mg/L as N (00625)	Ammonia, water, filtered, mg/L as N (00608)
10-29-2012	**1300**	3.33	41	175	418 @c	58.0	0.16	357 d	1.4	< .010
01-03-2013	**0840**	2.74	37	141	383 @c	33.1	.20	351 d	1.5	.221
04-22-2013	**1230**	1.81	33	72.2	238 @c	16.0 d	--	225 d	1.5	.072
05-09-2013	**0815**	2.67	41	114	231 @c	15.5 d	.25 dc	369 d	1.5	.013 n
05-22-2013	**0915**	3.27	46	138	248 @c	23.1 d	--	381 d	1.4	.021
06-06-2013	**0855**	--	--	--	--	--	--	--	--	--
06-12-2013	**1320**	2.29	38	93.9	198 @c	12.7 d	.17 dc	331 d	1.5	.066
07-08-2013	**1345**	1.88	35	69.5	217 @c	13.0 d	.17 dc	192 d	1.3	< .010
08-26-2013	**1130**	1.76	28	87.8	309 @c	25.6 d	.16 d	345 d	1.9	.014 n

05114000 SOURIS RIVER NEAR SHERWOOD, ND—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013
Part 4 of 6

[%, percent; ANC, acid neutralizing capacity; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; <, less than; E, estimated; @, holding time exceeded; c, see result laboratory comment; d, diluted sample: method hi range exceeded; n, below the LRL and above the LT-MDL]

Date	Sample start time	Nitrate plus nitrite, water, filtered, mg/L as N (00631)	Organic nitrogen, water, unfiltered, mg/L (00605)	Phosphorus, water, unfiltered, mg/L as P (00665)	Aluminum, water, unfiltered, recoverable, µg/L (01105)	Barium, water, unfiltered, recoverable, µg/L (01007)	Beryllium, water, unfiltered, recoverable, µg/L (01012)	Cadmium, water, unfiltered, µg/L (01027)	Chromium, water, unfiltered, recoverable, µg/L (01034)	Cobalt, water, unfiltered, recoverable, µg/L (01037)
10-29-2012	1300	< .040	< 1.4	0.20	129	87.6	< .02	0.020 n	< .30	0.51
01-03-2013	0840	.410	1.3	.17	281	95.3	< .02	.021 n	.61	.35
04-22-2013	1230	.275	1.4	.27	1,060	96.2	.09	.085	1.5	1.5
05-09-2013	0815	.075 n	1.5	.27	769	110	.11	.109	1.2	1.3
05-22-2013	0915	.045 n	1.3	.25	1,120	111	.10	.095	2.3	1.5
06-06-2013	0855	--	--	--	--	--	--	--	--	--
06-12-2013	1320	.316	1.4	.29	1,210	110	.11	.101	2.4	1.6
07-08-2013	1345	.110	< 1.3	.24	629	82.3	.06	.042	1.3	.94
08-26-2013	1130	< .040	1.9	.33	850	99.1	.08	.054	2.0	1.3

WATER-QUALITY DATA
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013
Part 5 of 6

[%, percent; ANC, acid neutralizing capacity; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; <, less than; E, estimated; @, holding time exceeded; c, see result laboratory comment; d, diluted sample: method hi range exceeded; n, below the LRL and above the LT-MDL]

Date	Sample start time	Copper, water, unfiltered, recoverable, µg/L (01042)	Iron, water, unfiltered, recoverable, µg/L (01045)	Lead, water, unfiltered, recoverable, µg/L (01051)	Mercury, water, unfiltered, recoverable, µg/L (71900)	Molybdenum, water, unfiltered, recoverable, µg/L (01062)	Nickel, water, unfiltered, recoverable, µg/L (01067)	Zinc, water, unfiltered, recoverable, µg/L (01092)	Arsenic, water, unfiltered, µg/L (01002)	Boron, water, unfiltered, recoverable, micrograms per liter (01022)
10-29-2012	1300	2.0	437	0.24	< .005	3.66	3.3	< 3.0	5.1	180
01-03-2013	0840	1.5	535	.31	< .005	3.74	3.4	< 3.0	3.3	147
04-22-2013	1230	3.8	2,440 d	1.48	< .005	6.88	6.3	9.9	5.8	161
05-09-2013	0815	3.5	1,760	1.21	.006 n	15.4	5.3	6.9	5.7	320
05-22-2013	0915	4.8	2,590	1.73	.007 n	6.06	7.2	9.4	5.0	163
06-06-2013	0855	--	--	--	--	--	--	--	--	--
06-12-2013	1320	4.7	3,010	2.00	.005 n	6.48	6.7	10.3	5.1	139
07-08-2013	1345	3.0	1,470	1.00	< .005	4.10	5.2	6.3	6.0	100
08-26-2013	1130	3.3	1,960	1.26	< .005	3.20	5.5	8.8	6.5	128

05114000 SOURIS RIVER NEAR SHERWOOD, ND—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013

Part 6 of 6

[%, percent; ANC, acid neutralizing capacity; $CaCO_3$, calcium carbonate; N, nitrogen; P, phosphorus; ft^3/s, cubic feet per second; mg/L, milligrams per liter; mm Hg, millimeters of mercury; °C, degrees Celsius; µS/cm, microsiemens per centimeter; µg/L, micrograms per liter; <, less than; E, estimated; @, holding time exceeded; c, see result laboratory comment; d, diluted sample: method hi range exceeded; n, below the LRL and above the LT-MDL]

Date	Sample start time	Selenium, water, unfiltered, µg/L (01147)	Organic carbon, water, filtered, mg/L (00681)	Organic carbon, water, unfiltered, mg/L (00680)
10-29-2012	**1300**	0.373	15.6	15.6
01-03-2013	**0840**	.383	16.2	18.4
04-22-2013	**1230**	.919	12.0	16.4
05-09-2013	**0815**	2.36	14.1	22.1
05-22-2013	**0915**	1.01	15.4	25.3
06-06-2013	**0855**	--	--	--
06-12-2013	**1320**	1.16	13.3	15.7
07-08-2013	**1345**	.673	12.5	14.4
08-26-2013	**1130**	.529	15.8	21.8