

North Dakota State Water Commission

900 EAST BOULEVARD AVENUE, DEPT 770 • BISMARCK, NORTH DAKOTA 58505-0850
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WATER DEVELOPMENT DIVISION
(701) 328-2752

November 21, 2014

North Dakota Department of Health
Division of Water Quality
918 East Divide Avenue
Bismarck, ND 58501-1947

RE: November 2014 Devils Lake Outlets Monthly Discharge and Water Quality Report

Enclosed are the monthly discharge reports for the Devils Lake Outlets for the month of November 2014 and summaries of water quality sample results and flow data. The West Outlet discharged at capacity. The East Outlet operated at 300 cfs because of water quality restrictions, through November 9th, 2014, when the outlets were shut down for the season because of freezing temperatures. (**Figure 1**).

The attached tables contain average daily outlet discharges and water quality results from samples collected from the outlets and the corresponding upstream and downstream locations. Also included are average daily stream flow data and conductivity data obtained from the USGS gaging stations located upstream and downstream of the outlets.

If you have any questions, please contact me at (701) 328-4948.

Sincerely,

Jonathan Kelsch P.E.
Head, Construction Section
JK:MSW:416-10

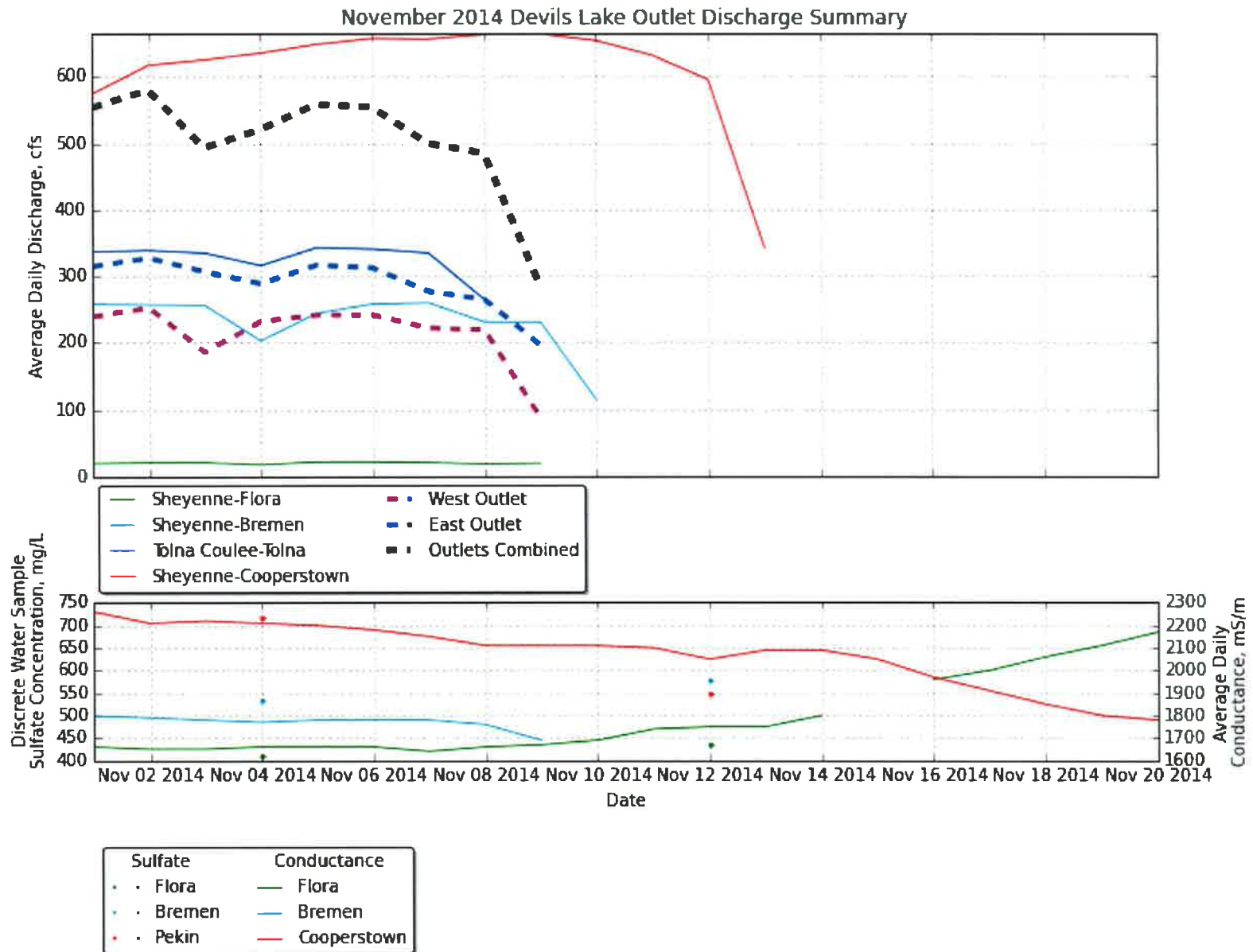


Figure 1: Devils Lake Outlet Discharge Summary

OUTLET OPERATOR NAME/ADDRESS

NAME: ND State Water Commission
 ADDRESS: 900 E Boulevard Avenue,
 Bismarck ND 58505

MONTHLY DISCHARGE REPORT


LOCATION: WEST END OUTLET

FACILITY: Devils Lake Outlet Project

MONITORING PERIOD	
START DATE	END DATE
11/1/14	11/30/14

LOCATION: Benson Co, ND

Devils Lake West Outlet discharged 3,812 ac-ft over 9 Days

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.68	8.68	8.68	SU	2 x Week	GRAB
SPECIFIC CONDUCTANCE	NA	NA	NA	µS/cm	Continuous	Recorder
SULFATE	546	546	546	mg/L	2 x Week	GRAB
7 DAY AVERAGE OF SULFATE	551	551	551	mg/L	2 x Week	GRAB
OUTLET DISCHARGE	88	252	214	cfs	Continuous	Recorder
SIGNATURE				11/4/14	701-328-4948	
NAME AND TITLE				JONATHAN KELSCH, HEAD, CONSTRUCTION SECTION		
COMMENT AND EXPLANATION OF ANY VIOLATIONS Summary of individual sample results and flow data for outlet, upstream & downstream monitoring locations attached.						

Notes:

- ac-ft - Acre feet
- SU - Standard Units
- µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
- mg/L - Milligrams per liter or parts per million
- cfs - Cubic feet per second
- NA - Not available

OUTLET OPERATOR NAME/ADDRESS

NAME: ND State Water Commission
 ADDRESS: 900 E Boulevard Avenue,
 Bismarck ND 58505

MONTHLY DISCHARGE REPORT


LOCATION: EAST END OUTLET

FACILITY: Devils Lake Outlet Project

MONITORING PERIOD	
START DATE	END DATE
11/1/14	11/30/14

LOCATION: Ramsey, Benson, Nelson, ND

Devils Lake East Outlet discharged 5,172 ac-ft over 9 Days

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.63	8.63	8.63	SU	2 x Week	GRAB
SPECIFIC CONDUCTANCE	NA	NA	NA	µS/cm	Continuous	Recorder
SULFATE	933	933	933	mg/L	2 x Week	GRAB
7 DAY AVERAGE OF SULFATE	942	942	942	mg/L	2 x Week	GRAB
OUTLET DISCHARGE	197	328	290	cfs	Continuous	Recorder
SIGNATURE				11/4/14	701-328-4948	
NAME AND TITLE	JONATHAN KELSCH, HEAD, CONSTRUCTION SECTION			DATE	TELEPHONE NUMBER	

COMMENT AND EXPLANATION OF ANY VIOLATIONS

Summary of individual sample results and flow data for outlet, upstream & downstream monitoring locations attached.

Notes:

- ac-ft - Acre feet
- SU - Standard Units
- µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
- mg/L - Milligrams per liter or parts per million
- cfs - Cubic feet per second
- NA - Not available

OUTLET OPERATOR NAME/ADDRESS

NAME: ND State Water Commission
 ADDRESS: 900 E Boulevard Avenue,
 Bismarck ND 58505


MONTHLY DISCHARGE REPORT

LOCATION: UPSTREAM OF THE WEST END OUTLET (FLORA)

FACILITY: Devils Lake Outlet Project

MONITORING PERIOD	
START DATE	END DATE
11/1/14	11/30/14

LOCATION: Benson Co, ND

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.46	8.52	8.49	SU	2 x Week	GRAB
SPECIFIC CONDUCTANCE	1,640	2,170	1,786	µS/cm	Continuous	Recorder
SULFATE	408	436	422	mg/L	2 x Week	GRAB
7 DAY AVERAGE OF SULFATE	403	436	419	mg/L	2 x Week	GRAB
FLOW, INSTREAM	18	22	20	cfs	Continuous	Recorder
SIGNATURE				11/4/14	701-328-4948	
NAME AND TITLE	JONATHAN KELSCH, HEAD, CONSTRUCTION SECTION			DATE	TELEPHONE NUMBER	

COMMENT AND EXPLANATION OF ANY VIOLATIONS

Summary of individual sample results and flow data for outlet, upstream & downstream monitoring locations attached.

Notes:

- SU - Standard Units
- µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
- mg/L - Milligrams per liter or parts per million
- cfs - Cubic feet per second
- USGS streamflow and specific conductance data courtesy of the USGS
- USGS data are provisional and subject to revision

OUTLET OPERATOR NAME/ADDRESS

NAME: ND State Water Commission
 ADDRESS: 900 E Boulevard Avenue,
 Bismarck ND 58505


MONTHLY DISCHARGE REPORT

LOCATION: DOWNSTREAM OF THE WEST END OUTLET (BREMEN)
 UPSTREAM OF THE EAST END OUTLET

FACILITY: Devils Lake Outlet Project

MONITORING PERIOD	
START DATE	END DATE
11/1/14	11/30/14

LOCATION: Eddy Co, ND

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.58	8.66	8.62	SU	2 x Week	GRAB
SPECIFIC CONDUCTANCE	1,690	1,800	1,770	µS/cm	Continuous	Recorder
SULFATE	535	579	557	mg/L	2 x Week	GRAB
7 DAY AVERAGE OF SULFATE	545	579	562	mg/L	2 x Week	GRAB
FLOW, INSTREAM	115	260	231	cfs	Continuous	Recorder
SIGNATURE				11/4/14	701-328-4948	
NAME AND TITLE	JONATHAN KELSCH, HEAD, CONSTRUCTION SECTION			DATE	TELEPHONE NUMBER	
COMMENT AND EXPLANATION OF ANY VIOLATIONS						
Summary of individual sample results and flow data for outlet, upstream & downstream monitoring locations attached.						

Notes:

- SU - Standard Units
- µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
- mg/L - Milligrams per liter or parts per million
- cfs - Cubic feet per second
- USGS streamflow and specific conductance data courtesy of the USGS
- USGS data are provisional and subject to revision

OUTLET OPERATOR NAME/ADDRESS

NAME: ND State Water Commission
 ADDRESS: 900 E Boulevard Avenue,
 Bismarck ND 58505


MONTHLY DISCHARGE REPORT

LOCATION: DOWNSTREAM OF THE EAST END OUTLET (PEKIN)

FACILITY: Devils Lake Outlet Project

MONITORING PERIOD	
START DATE	END DATE
11/1/14	11/30/14

LOCATION: Nelson Co, ND

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.52	8.60	8.56	SU	2 x Week	GRAB
SPECIFIC CONDUCTANCE	NA	NA	NA	µS/cm	Continuous	Recorder
SULFATE	549	719	634	mg/L	2 x Week	GRAB
7 DAY AVERAGE OF SULFATE	549	711	630	mg/L	2 x Week	GRAB
FLOW, INSTREAM	NA	NA	NA	cfs	Continuous	Recorder
SIGNATURE				11/4/14	701-328-4948	
NAME AND TITLE	JONATHAN KELSCH, HEAD, CONSTRUCTION SECTION			DATE	TELEPHONE NUMBER	
COMMENT AND EXPLANATION OF ANY VIOLATIONS						
Summary of individual sample results and flow data for outlet, upstream & downstream monitoring locations attached.						

Notes:

- SU - Standard Units
- µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
- mg/L - Milligrams per liter or parts per million
- cfs - Cubic feet per second
- NA - Not available

**Daily Outlet Discharge and Upstream and Downstream Flows
Devils Lake Outlets**

Date	Above West End Outlet - Sheyenne River near Flora		West End Outlet		Below West End Outlet/Above East End Outlet - Sheyenne River near Bremen		East End Outlet		Below East End Outlet - Tolna Coulee near Tolna		Below East End Outlet - Sheyenne River near Cooperstown		Sum of Outlets	
	Average Streamflow USGS Gage (cfs)	Average Specific Conductance USGS Gage (µS/cm)	Average Daily Outlet Discharge (cfs)	Total Daily Volume (ft³)	Average Streamflow USGS Gage (cfs)	Average Specific Conductance USGS Gage (µS/cm)	Average Daily Outlet Discharge (cfs)	Total Daily Volume (ft³)	Average Streamflow USGS Gage (cfs)	Average Specific Conductance USGS Gage (µS/cm)	Average Streamflow USGS Gage (cfs)	Average Specific Conductance USGS Gage (µS/cm)	Average Daily Outlet Discharge (cfs)	Total Daily Volume (ft³)
11/1/14	20	1,660	239	20,667,000	258	1,800	315	27,211,000	337	3,040	575	2,260	554	47,878,000
11/2/14	21	1,650	252	21,808,000	257	1,790	328	28,304,000	339	3,030	617	2,210	580	50,112,000
11/3/14	21	1,650	186	16,096,000	256	1,780	307	26,516,000	335	3,020	625	2,220	493	42,612,000
11/4/14	18	1,660	232	20,017,000	203	1,770	289	24,979,000	316	3,030	635	2,210	521	44,996,000
11/5/14	22	1,660	242	20,884,000	244	1,780	317	27,367,000	343	3,010	648	2,200	558	48,251,000
11/6/14	22	1,660	242	20,868,000	258	1,780	313	27,013,000	341	3,020	657	2,180	554	47,881,000
11/7/14	21	1,640	222	19,185,000	260	1,780	278	23,990,000	335	3,020	656	2,150	500	43,175,000
11/8/14	19	1,660	220	18,967,000	231	1,760	265	22,905,000	265	3,030	663	2,110	485	41,872,000
11/9/14	20	1,670	88	7,571,000	231	1,690	197	17,002,000	-	-	664	2,110	284	24,573,000
11/10/14	-	1,690	-	-	115	-	-	-	-	-	654	2,110	-	-
11/11/14	-	1,740	-	-	-	-	-	-	-	-	632	2,100	-	-
11/12/14	-	1,750	-	-	-	-	-	-	-	-	596	2,050	-	-
11/13/14	-	1,750	-	-	-	-	-	-	-	-	343	2,090	-	-
11/14/14	-	1,800	-	-	-	-	-	-	-	-	-	2,090	-	-
11/15/14	-	-	-	-	-	-	-	-	-	-	-	2,050	-	-
11/16/14	-	1,960	-	-	-	-	-	-	-	-	-	1,970	-	-
11/17/14	-	2,000	-	-	-	-	-	-	-	-	-	1,910	-	-
11/18/14	-	2,060	-	-	-	-	-	-	-	-	-	1,850	-	-
11/19/14	-	2,110	-	-	-	-	-	-	-	-	-	1,800	-	-
11/20/14	-	2,170	-	-	-	-	-	-	-	-	-	1,780	-	-
11/21/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/22/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/23/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/24/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/25/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/26/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/27/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/28/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/29/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11/30/14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Minimum	18	1,640	88	7,571,000	115	1,690	197	17,002,000	265	3,010	343	1,780	284	24,573,000
Maximum	22	2,170	252	21,808,000	260	1,800	328	28,304,000	343	3,040	664	2,260	580	50,112,000
Average	20	1,786	214	18,451,444	231	1,770	290	25,031,889	326	3,025	613	2,073	503	43,483,333
Notes:			Total (Mgal)	1,242			Total (Mgal)	1,685					Total (Mgal)	2,927
			Total (Ac-ft)	3,812			Total (Ac-ft)	5,172					Total (Ac-ft)	8,984

cfs - cubic feet per second
µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
ft³ - cubic feet
Mgal - Millions of Gallons
Ac ft - Acre Feet
USGS streamflow and specific conductance data are preliminary and courtesy of the USGS
NC - Not calculated



**Sheyenne River Upstream of West End Outlet near Flora
Monthly Water Quality Summary
Devils Lake Outlet Discharge Report**

Date	Time	Specific Conductance USGS Gage (μ S/cm)	pH	Sulfate (mg/L)	7 Day Rolling Average of Sulfate (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling Average
11/1/14	-	-	-	-	-	-	-
11/2/14	-	-	-	-	-	-	-
11/3/14	-	-	-	-	-	-	-
11/4/14	8:10	1,650	8.52	408	403	7	7
11/5/14	-	-	-	-	-	-	-
11/6/14	-	-	-	-	-	-	-
11/7/14	-	-	-	-	-	-	-
11/8/14	-	-	-	-	-	-	-
11/9/14	-	-	-	-	-	-	-
11/10/14	-	-	-	-	-	-	-
11/11/14	-	-	-	-	-	-	-
11/12/14	8:10	1,750	8.46	436	436	NA	7
11/13/14	-	-	-	-	-	-	-
11/14/14	-	-	-	-	-	-	-
11/15/14	-	-	-	-	-	-	-
11/16/14	-	-	-	-	-	-	-
11/17/14	-	-	-	-	-	-	-
11/18/14	-	-	-	-	-	-	-
11/19/14	-	-	-	-	-	-	-
11/20/14	-	-	-	-	-	-	-
11/21/14	-	-	-	-	-	-	-
11/22/14	-	-	-	-	-	-	-
11/23/14	-	-	-	-	-	-	-
11/24/14	-	-	-	-	-	-	-
11/25/14	-	-	-	-	-	-	-
11/26/14	-	-	-	-	-	-	-
11/27/14	-	-	-	-	-	-	-
11/28/14	-	-	-	-	-	-	-
11/29/14	-	-	-	-	-	-	-
11/30/14	-	-	-	-	-	-	-
Minimum		1,650	8.46	408	403	7	
Maximum		1,750	8.52	436	436	7	
Average		1,700	8.49	422	419	7	

Notes:

μ S/cm - Microsiemens per Centimeter at 25 degrees Celsius
mg/L - Milligrams per liter or parts per million
NA - Not Analyzed
USGS specific conductance data courtesy of the USGS
USGS data are provisional and subject to revision
Italic font denotes preliminary result

**West End Outlet
Monthly Water Quality Summary
Devils Lake Outlet Discharge Report**

Date	Time	pH	Sulfate (mg/L)	7 Day Rolling Average of Sulfate (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling Average
11/1/14	-	-	-	-	-	-
11/2/14	-	-	-	-	-	-
11/3/14	-	-	-	-	-	-
11/4/14	8:25	8.68	546	551	15	7
11/5/14	-	-	-	-	-	-
11/6/14	-	-	-	-	-	-
11/7/14	-	-	-	-	-	-
11/8/14	-	-	-	-	-	-
11/9/14	-	-	-	-	-	-
11/10/14	-	-	-	-	-	-
11/11/14	-	-	-	-	-	-
11/12/14	-	-	-	-	-	-
11/13/14	-	-	-	-	-	-
11/14/14	-	-	-	-	-	-
11/15/14	-	-	-	-	-	-
11/16/14	-	-	-	-	-	-
11/17/14	-	-	-	-	-	-
11/18/14	-	-	-	-	-	-
11/19/14	-	-	-	-	-	-
11/20/14	-	-	-	-	-	-
11/21/14	-	-	-	-	-	-
11/22/14	-	-	-	-	-	-
11/23/14	-	-	-	-	-	-
11/24/14	-	-	-	-	-	-
11/25/14	-	-	-	-	-	-
11/26/14	-	-	-	-	-	-
11/27/14	-	-	-	-	-	-
11/28/14	-	-	-	-	-	-
11/29/14	-	-	-	-	-	-
11/30/14	-	-	-	-	-	-
Minimum		8.68	546	551	15	
Maximum		8.68	546	551	15	
Average		8.68	546	551	15	

Notes:

mg/L - Milligrams per liter or parts per million

NA - Not Analyzed

Italic font denotes preliminary result

**Sheyenne River Downstream of West End Outlet/Upstream of East End Outlet near Bremen
Monthly Water Quality Summary
Devils Lake Outlet Discharge Report**

Date	Time	Specific Conductance USGS Gage (µS/cm)	pH	Sulfate (mg/L)	7 Day Rolling Average of Sulfate (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling Average
11/1/14	-	-	-	-	-	-	-
11/2/14	-	-	-	-	-	-	-
11/3/14	-	-	-	-	-	-	-
11/4/14	7:40	1,780	8.66	535	545	20	7
11/5/14	-	-	-	-	-	-	-
11/6/14	-	-	-	-	-	-	-
11/7/14	-	-	-	-	-	-	-
11/8/14	-	-	-	-	-	-	-
11/9/14	-	-	-	-	-	-	-
11/10/14	-	-	-	-	-	-	-
11/11/14	-	-	-	-	-	-	-
11/12/14	7:45	-	8.58	579	579	NA	7
11/13/14	-	-	-	-	-	-	-
11/14/14	-	-	-	-	-	-	-
11/15/14	-	-	-	-	-	-	-
11/16/14	-	-	-	-	-	-	-
11/17/14	-	-	-	-	-	-	-
11/18/14	-	-	-	-	-	-	-
11/19/14	-	-	-	-	-	-	-
11/20/14	-	-	-	-	-	-	-
11/21/14	-	-	-	-	-	-	-
11/22/14	-	-	-	-	-	-	-
11/23/14	-	-	-	-	-	-	-
11/24/14	-	-	-	-	-	-	-
11/25/14	-	-	-	-	-	-	-
11/26/14	-	-	-	-	-	-	-
11/27/14	-	-	-	-	-	-	-
11/28/14	-	-	-	-	-	-	-
11/29/14	-	-	-	-	-	-	-
11/30/14	-	-	-	-	-	-	-
Minimum		1,780	8.58	535	545	20	
Maximum		1,780	8.66	579	579	20	
Average		1,780	8.62	557	562	20	

Notes:
 µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
 mg/L - Milligrams per liter or parts per million
 NA - Not Analyzed
 USGS specific conductance data courtesy of the USGS
 USGS data are provisional and subject to revision
 Italic font denotes preliminary result

**East End Outlet
Monthly Water Quality Summary
Devils Lake Outlet Discharge Report**

Date	Time	pH	Sulfate (mg/L)	7 Day Rolling Average of Sulfate (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling Average
11/1/14	-	-	-	-	-	-
11/2/14	-	-	-	-	-	-
11/3/14	-	-	-	-	-	-
11/4/14	9:32	8.63	933	942	46	7
11/5/14	-	-	-	-	-	-
11/6/14	-	-	-	-	-	-
11/7/14	-	-	-	-	-	-
11/8/14	-	-	-	-	-	-
11/9/14	-	-	-	-	-	-
11/10/14	-	-	-	-	-	-
11/11/14	-	-	-	-	-	-
11/12/14	-	-	-	-	-	-
11/13/14	-	-	-	-	-	-
11/14/14	-	-	-	-	-	-
11/15/14	-	-	-	-	-	-
11/16/14	-	-	-	-	-	-
11/17/14	-	-	-	-	-	-
11/18/14	-	-	-	-	-	-
11/19/14	-	-	-	-	-	-
11/20/14	-	-	-	-	-	-
11/21/14	-	-	-	-	-	-
11/22/14	-	-	-	-	-	-
11/23/14	-	-	-	-	-	-
11/24/14	-	-	-	-	-	-
11/25/14	-	-	-	-	-	-
11/26/14	-	-	-	-	-	-
11/27/14	-	-	-	-	-	-
11/28/14	-	-	-	-	-	-
11/29/14	-	-	-	-	-	-
11/30/14	-	-	-	-	-	-
Minimum		8.63	933	942	-	
Maximum		8.63	933	942	-	
Average		8.63	933	942	-	

Notes:

mg/L - Milligrams per liter or parts per million
 NA - Not Analyzed due to operation constraints
 Italic font denotes preliminary result

**Sheyenne River Downstream of East End Outlet near Pekin
Monthly Water Quality Summary
Devils Lake Outlet Discharge Report**

Date	Time	pH	Sulfate (mg/L)	7 Day Rolling Average of Sulfate (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling Average
11/1/14	-	-	-	-	-	-
11/2/14	-	-	-	-	-	-
11/3/14	-	-	-	-	-	-
11/4/14	10:05	8.60	719	711	23	7
11/5/14	-	-	-	-	-	-
11/6/14	-	-	-	-	-	-
11/7/14	-	-	-	-	-	-
11/8/14	-	-	-	-	-	-
11/9/14	-	-	-	-	-	-
11/10/14	-	-	-	-	-	-
11/11/14	-	-	-	-	-	-
11/12/14	9:45	8.52	549	549	NA	7
11/13/14	-	-	-	-	-	-
11/14/14	-	-	-	-	-	-
11/15/14	-	-	-	-	-	-
11/16/14	-	-	-	-	-	-
11/17/14	-	-	-	-	-	-
11/18/14	-	-	-	-	-	-
11/19/14	-	-	-	-	-	-
11/20/14	-	-	-	-	-	-
11/21/14	-	-	-	-	-	-
11/22/14	-	-	-	-	-	-
11/23/14	-	-	-	-	-	-
11/24/14	-	-	-	-	-	-
11/25/14	-	-	-	-	-	-
11/26/14	-	-	-	-	-	-
11/27/14	-	-	-	-	-	-
11/28/14	-	-	-	-	-	-
11/29/14	-	-	-	-	-	-
11/30/14	-	-	-	-	-	-
Minimum		8.52	549	549	23	
Maximum		8.60	719	711	23	
Average		8.56	634	630	23	

Notes:

mg/L - Milligrams per liter or parts per million

NA - Not Analyzed

Italic font denotes preliminary result

Bold font denotes sample sulfate concentration exceeds 750 mg/L