

North Dakota State Water Commission

900 EAST BOULEVARD AVENUE, DEPT 770 • BISMARCK, NORTH DAKOTA 58505-0850
701-328-2750 • TTY 800-366-6888 • FAX 701-328-3696 • INTERNET: <http://swc.nd.gov>

July 28, 2011

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

RE: West End Devils Lake Outlet

Enclosed are the monthly discharge reports for the Devils Lake Outlet for the month of June 2011 and the summaries of the sample results and flow data. The outlet discharged continuously during the reported period.

Attached to the summaries are the tables showing average daily outlet discharge, water quality results of the samples collected from outlet, the upstream and the downstream location, the average daily stream flow data and the conductivity data obtained from the USGS gaging station at the upstream and the downstream location.

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

Sincerely,

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

OUTLET OPERATOR NAME/ADDRESS

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

MONTHLY DISCHARGE REPORT


LOCATION: AT OUTLET

FACILITY: Devils Lake Outlet Project

MONITORING PERIOD	
START DATE	END DATE
6/1/11	6/30/11

LOCATION: Benson Co, ND

Devils Lake Outlet discharged 12,549 ac-ft over 30 Days

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.21	8.71	8.59	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	NA	NA	NA	umho/cm	Continuous	Recorder
SULFATE	481	645	529	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	494.25	626.5	536.78	mg/L	4 x Week	GRAB
OUTLET DISCHARGE	134	264	211	cfs	Continuous	Recorder
SIGNATURE				7/28/11	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.

Daily Outlet Discharge

Date	Average Daily Outlet Discharge (cfs)	Total Daily Volume (cu-ft)
6/1/11	133.68	11,549,952
6/2/11	148.59	12,838,176
6/3/11	147.26	12,723,264
6/4/11	143.87	12,430,368
6/5/11	144.1	12,450,240
6/6/11	145.68	12,586,752
6/7/11	144.8	12,510,720
6/8/11	165.04	14,259,456
6/9/11	245.69	21,227,616
6/10/11	256.65	22,174,560
6/11/11	256.01	22,119,264
6/12/11	264.47	22,850,208
6/13/11	262.68	22,695,552
6/14/11	257.84	22,277,376
6/15/11	243.93	21,075,552
6/16/11	237.66	20,533,824
6/17/11	225.55	19,487,520
6/18/11	230.64	19,927,296
6/19/11	166.05	14,346,720
6/20/11	243.26	21,017,664
6/21/11	246.2	21,271,680
6/22/11	234.66	20,274,624
6/23/11	231.98	20,043,072
6/24/11	244.77	21,148,128
6/25/11	237.06	20,481,984
6/26/11	193	16,675,200
6/27/11	203.31	17,565,984
6/28/11	245.9	21,245,760
6/29/11	233.09	20,138,976
6/30/11	193.18	16,690,752
Total		546,618,240
Total		4089
Total		12549
Average Flow	211	cfs
Minimum	134	16,675,200
Maximum	264	21,245,760
Average	211	18,799,776

cu-ft
Mgal
Ac-ft

Water Quality Results of the samples collected at the outlet

Devils Lake Outlet

Date	Time	Sampler	Average Daily EC from Outlet Telemetry (µS/cm)	Lab pH	Lab Sulfate (mg/L)	7 Day Rolling Average of Sulfate for the operating period (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling average
6/1/2011	8:35	NDSWC	NA	8.46	530	530.00	-	1
6/2/2011	-	-	NA	-	-	-	-	-
6/3/2011	-	-	NA	-	-	-	-	-
6/4/2011	-	-	NA	-	-	-	-	-
6/5/2011	-	-	NA	-	-	-	-	-
6/6/2011	-	-	NA	-	-	-	-	-
6/7/2011	8:50	NDSWC	NA	8.62	608	569.00	32	7
6/8/2011	16:45	NDSWC	NA	8.71	645	626.50	-	7
6/9/2011	14:20	NDSWC	NA	8.67	555	602.67	-	7
6/10/2011	-	-	NA	-	-	-	-	-
6/11/2011	-	-	NA	-	-	-	-	-
6/12/2011	-	-	NA	-	-	-	-	-
6/13/2011	9:10	NDSWC	NA	8.58	520	582.00	-	7
6/14/2011	15:50	NDSWC	NA	8.64	541	565.25	-	7
6/15/2011	14:30	NDSWC	NA	8.59	539	538.75	-	7
6/16/2011	15:00	NDSWC	NA	8.71	529	532.25	-	7
6/17/2011	-	-	NA	-	-	-	-	-
6/18/2011	-	-	NA	-	-	-	-	-
6/19/2011	-	-	NA	-	-	-	-	-
6/20/2011	16:50	NDSWC	NA	8.68	481	522.50	-	7
6/21/2011	9:05	NDSWC	NA	8.57	500	512.25	52	7
6/22/2011	13:10	NDSWC	NA	8.21	494	501.00	-	7
6/23/2011	10:20	NDSWC	NA	8.51	502	494.25	-	7
6/24/2011	-	-	NA	-	-	-	-	-
6/25/2011	-	-	NA	-	-	-	-	-
6/26/2011	-	-	NA	-	-	-	-	-
6/27/2011	17:20	NDSWC	NA	8.59	505	500.25	-	7
6/28/2011	8:20	NDSWC	NA	8.47	500	500.25	-	7
6/29/2011	16:10	NDSWC	NA	8.68	519	506.50	-	7
6/30/2011	15:45	NDSWC	NA	8.69	496	505.00	-	7
Minimum				8.21	481.00	494.25		
Maximum				8.71	645.00	626.50		
Average				8.59	529.00	536.78		

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 OUTLET (FLORA)

FACILITY: Devils Lake Outlet Project
 LOCATION: Benson Co, ND

MONITORING PERIOD	
START DATE	END DATE
6/1/11	6/30/11

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.19	8.49	8.33	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1300	1410	1353.75	umho/cm	Continuous	Recorder
SULFATE	273	370	321.63	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	294.25	365.5	318.26	mg/L	4 x Week	GRAB
FLOW, INSTREAM	259	444	307	cfs	Continuous	Recorder
SIGNATURE				7/28/11	701-328-4948	
NAME AND TITLE	JONATHAN KELSCH, HEAD, CONSTRUCTION SECTION			DATE	TELEPHONE NUMBER	
COMMENT AND EXPLANATION OF ANY VIOLATIONS						
<p>Summary of individual sample results and flow data for outlet, upstream & downstream monitoring locations attached.</p> <p>Instream samples and measurements for this summary pertain only to time periods when outlet is actually operated.</p>						

NA - Not Available

**Water Quality Results of the samples collected from the upstream location near Flora
Sheyenne River Above Devils Lake Outlet Near Flora**

Date	Time	Sampler	USGS EC (µS/cm)	Lab pH	Lab Sulfate (mg/L)	7 Day Rolling Average of Sulfate for the operating period (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling average
6/1/2011	8:55	NDSWC	1310	8.33	307	307.00	-	7
6/2/2011	-	-	-	-	-	-	-	-
6/3/2011	-	-	-	-	-	-	-	-
6/4/2011	-	-	-	-	-	-	-	-
6/5/2011	-	-	-	-	-	-	-	-
6/6/2011	-	-	-	-	-	-	-	-
6/7/2011	9:10	NDSWC	1320	8.38	345	326.00	-	7
6/8/2011	17:00	NDSWC	1340	8.49	351	348.00	-	7
6/9/2011	14:40	NDSWC	1340	8.39	287	327.67	-	7
6/10/2011	-	-	-	-	-	-	-	-
6/11/2011	-	-	-	-	-	-	-	-
6/12/2011	-	-	-	-	-	-	-	-
6/13/2011	9:30	NDSWC	1360	8.33	273	314.00	13	7
6/14/2011	16:00	NDSWC	1360	8.27	325	309.00	-	7
6/15/2011	14:20	NDSWC	1360	8.19	297	295.50	-	7
6/16/2011	15:20	NDSWC	1370	8.4	309	301.00	-	7
6/17/2011	-	-	-	-	-	-	-	-
6/18/2011	-	-	-	-	-	-	-	-
6/19/2011	-	-	-	-	-	-	-	-
6/20/2011	16:35	NDSWC	1370	8.38	288	304.75	-	7
6/21/2011	9:20	NDSWC	1380	8.31	283	294.25	14	7
6/22/2011	13:30	NDSWC	1360	8.49	304	296.00	-	7
6/23/2011	10:00	NDSWC	1360	8.27	311	296.50	-	7
6/24/2011	-	-	-	-	-	-	-	-
6/25/2011	-	-	-	-	-	-	-	-
6/26/2011	-	-	-	-	-	-	-	-
6/27/2011	17:30	NDSWC	1300	8.29	370	317.00	-	7
6/28/2011	8:45	NDSWC	1330	8.19	362	336.75	-	7
6/29/2011	16:20	NDSWC	1390	8.32	366	352.25	-	7
6/30/2011	16:00	NDSWC	1410	8.3	368	366.50	-	7
Minimum			1300.00	8.19	273.00	294.25		
Maximum			1410.00	8.49	370.00	366.50		
Average			1353.75	8.33	321.63	318.26		

**Average daily streamflow and conductivity data at the upstream location near Flora
USGS Gaging Station Data
Sheyenne River Above Devils Lake Outlet Near Flora**

Date	Streamflow (cfs)	EC (μS/cm)
6/1/11	368	1310
6/2/11	364	1330
6/3/11	364	1330
6/4/11	352	1330
6/5/11	346	1330
6/6/11	335	1320
6/7/11	318	1320
6/8/11	306	1330
6/9/11	299	1340
6/10/11	286	1340
6/11/11	275	1350
6/12/11	266	1350
6/13/11	262	1350
6/14/11	259	1360
6/15/11	265	1350
6/16/11	267	1350
6/17/11	261	1350
6/18/11	267	1350
6/19/11	264	1360
6/20/11	267	1350
6/21/11	267	1350
6/22/11	273	1360
6/23/11	277	1370
6/24/11	274	1380
6/25/11	266	1380
6/26/11	335	1320
6/27/11	444	1290
6/28/11	409	1330
6/29/11	354	1380
6/30/11	320	1410
Minimum	259.00	1290.00
Maximum	444.00	1410.00
Average	307.00	1345.67

OUTLET OPERATOR NAME/ADDRESS

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


MONTHLY DISCHARGE REPORT

LOCATION: DOWNSTREAM OF THE OUTLET (BREMEN)

FACILITY: Devils Lake Outlet Project

LOCATION: Benson Co, ND

MONITORING PERIOD	
START DATE	END DATE
6/1/11	6/30/11

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.24	8.5	8.39	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1420	1540	1503.57	umho/cm	Continuous	Recorder
SULFATE	326	427	404.07	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	375	420.25	401.08	mg/L	4 x Week	GRAB
FLOW, INSTREAM	443	756	518.63	cfs	Continuous	Recorder
SIGNATURE				7/28/11	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. Instream samples and measurements for this summary pertain only to time periods when outlet is actually operated.						

NA - Not Available

**Water Quality Results of the samples collected from the downstream location near Bremen
Sheyenne River Below Devils Lake Outlet Near Bremen**

Date	Time	Sampler	USGS EC (µS/cm)	Lab pH	Lab Sulfate (mg/L)	7 Day Rolling Average of Sulfate for the operating period (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling average
6/1/2011	-	-	-	-	-	-	-	-
6/2/2011	-	-	-	-	-	-	-	-
6/3/2011	-	-	-	-	-	-	-	-
6/4/2011	-	-	-	-	-	-	-	-
6/5/2011	-	-	-	-	-	-	-	-
6/6/2011	-	-	-	-	-	-	-	-
6/7/2011	-	-	-	-	-	-	-	-
6/8/2011	17:50	NDSWC	1460	8.5	404	404.00	-	7
6/9/2011	15:00	NDSWC	1490	8.49	346	375.00	-	7
6/10/2011	-	-	-	-	-	-	-	-
6/11/2011	-	-	-	-	-	-	-	-
6/12/2011	-	-	-	-	-	-	-	-
6/13/2011	9:50	NDSWC	1530	8.43	413	387.67	-	7
6/14/2011	16:30	NDSWC	1530	8.45	427	397.50	-	7
6/15/2011	13:55	NDSWC	1540	8.36	427	403.25	-	7
6/16/2011	15:45	NDSWC	1540	8.5	414	420.25	-	7
6/17/2011	-	-	-	-	-	-	-	-
6/18/2011	-	-	-	-	-	-	-	-
6/19/2011	-	-	-	-	-	-	-	-
6/20/2011	16:10	NDSWC	1540	8.43	384	413.00	-	7
6/21/2011	9:55	NDSWC	1530	8.38	367	398.00	6	7
6/22/2011	14:00	NDSWC	1510	8.26	394	389.75	-	7
6/23/2011	9:32	NDSWC	1510	8.31	401	386.50	-	7
6/24/2011	-	-	-	-	-	-	-	-
6/25/2011	-	-	-	-	-	-	-	-
6/26/2011	-	-	-	-	-	-	-	-
6/27/2011	18:00	NDSWC	1440	8.36	420	395.50	-	7
6/28/2011	9:10	NDSWC	1420	8.24	420	408.75	-	7
6/29/2011	16:40	NDSWC	1490	8.36	423	416.00	-	7
6/30/2011	16:30	NDSWC	1520	8.39	417	420.00	-	7
Minimum			1420.00	8.24	346.00	375.00		
Maximum			1540.00	8.50	427.00	420.25		
Average			1503.57	8.39	404.07	401.08		

Average daily streamflow and conductivity data at the downstream location near Bremen

USGS Gaging Station Data

Sheyenne River Below Devils Lake Outlet near Bremen

Date	Streamflow (cfs)	EC (μS/cm)
6/1/11	469	1420
6/2/11	490	1420
6/3/11	491	1440
6/4/11	477	1440
6/5/11	465	1440
6/6/11	462	1440
6/7/11	462	1440
6/8/11	443	1450
6/9/11	471	1480
6/10/11	507	1510
6/11/11	503	1520
6/12/11	496	1530
6/13/11	502	1530
6/14/11	492	1540
6/15/11	492	1540
6/16/11	488	1540
6/17/11	487	1540
6/18/11	487	1540
6/19/11	448	1540
6/20/11	457	1520
6/21/11	501	1520
6/22/11	521	1500
6/23/11	510	1510
6/24/11	510	1520
6/25/11	513	1520
6/26/11	575	1500
6/27/11	701	1470
6/28/11	756	1440
6/29/11	720	1480
6/30/11	663	1510
Minimum	443.00	1420.00
Maximum	756.00	1540.00
Average	518.63	1493.00