



North Dakota State Water Commission

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

June 29, 2010

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

RE: Devils Lake Outlet

Enclosed are the monthly discharge reports for the Devils Lake Outlet for the month of May 2010 and the summaries of the sample results and flow data. Discharge occurred on the days highlighted in yellow in the summaries.

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 701-328-4958.

Sincerely,

Bruce Engelhardt P.E.
Head, Investigations Section
BE: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
 LOCATION: Benson Co, ND

MONITORING PERIOD	
START DATE	END DATE
5/1/10	5/31/10

Devils Lake Outlet discharged 148 ac-ft over 6 Days

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.32	8.37	8.35	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1205.48	3631.73	2231.22	umho/cm	Continuous	Recorder
SULFATE	614	676	636.25	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	636.25	676	648.81	mg/L	4 x Week	GRAB
OUTLET DISCHARGE	0.02	23.99	12.42	cfs	Continuous	Recorder
SIGNATURE	<i>Bruce Engelhardt</i>					
NAME AND TITLE	BRUCE ENGELHARDT, HEAD, INVESTIGATIONS SECTION			6/30/10	701-328-4958	
COMMENT AND EXPLANATION OF ANY VIOLATIONS						
Summary of individual sample results and flow data for outlet, upstream & downstream monitoring locations attached.						

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	
5/1/2010	-	-	-	-	-	-	-	-	
5/2/2010	-	-	-	-	-	-	-	-	
5/3/2010	-	-	-	-	-	-	-	-	
5/4/2010	-	-	-	-	-	-	-	-	
5/5/2010	-	-	-	-	-	-	-	-	
5/6/2010	-	-	-	-	-	-	-	-	
5/7/2010	-	-	-	-	-	-	-	-	
5/8/2010	-	-	-	-	-	-	-	-	
5/9/2010	-	-	-	-	-	-	-	-	
5/10/2010	-	-	-	-	-	-	-	-	
5/11/2010	-	-	-	-	-	-	-	-	
5/12/2010	-	-	-	-	-	-	-	-	
5/13/2010	-	-	-	-	-	-	-	-	
5/14/2010	-	-	-	-	-	-	-	-	
5/15/2010	-	-	-	-	-	-	-	-	
5/16/2010	-	-	-	-	-	-	-	-	
5/17/2010	-	-	-	-	-	-	-	-	
5/18/2010	-	-	-	-	-	-	-	-	
5/19/2010	-	-	-	-	-	-	-	-	
5/20/2010	-	-	-	-	-	-	-	-	
5/21/2010	-	-	3631.73	-	-	-	-	-	
5/22/2010	17:00	NDSWC	3371.82	8.32	676	676	-	2	
5/23/2010	-	-	1850.38	-	-	-	-	-	
5/24/2010	8:00	NDSWC	1690.31	8.35	614	645	-	4	
5/25/2010	8:20	NDSWC	1637.60	8.37	624	638	56	5	
5/26/2010	15:00	NDSWC	1205.48	8.34	631	636.25	-	6	
5/27/2010	-	-	1857.49	-	-	-	-	-	
5/28/2010	-	-	2031.68	-	-	-	-	-	
5/29/2010	-	-	1850.35	-	-	-	-	-	
5/30/2010	-	-	2171.83	-	-	-	-	-	
5/31/2010	-	-	2372.84	-	-	-	-	-	
Minimum			1205.48	8.32	614.00	636.25			
Maximum			3631.73	8.37	676.00	676.00			
Average			2231.22	8.35	636.25	648.81			

Daily Outlet Discharge

Date	Average Daily Outlet Discharge (cfs)	Total Daily Volume (cu-ft)
5/1/10	0.00	0
5/2/10	0.00	0
5/3/10	0.00	0
5/4/10	0.00	0
5/5/10	0.00	0
5/6/10	0.00	0
5/7/10	0.00	0
5/8/10	0.00	0
5/9/10	0.00	0
5/10/10	0.00	0
5/11/10	0.00	0
5/12/10	0.00	0
5/13/10	0.00	0
5/14/10	0.00	0
5/15/10	0.00	0
5/16/10	0.00	0
5/17/10	0.00	0
5/18/10	0.00	0
5/19/10	0.00	0
5/20/10	0.00	0
5/21/10	0.02	1,600
5/22/10	2.95	255,298
5/23/10	23.66	2,044,302
5/24/10	23.99	2,073,003
5/25/10	23.81	2,056,832
5/26/10	0.10	8,271
5/27/10	0.00	0
5/28/10	0.00	0
5/29/10	0.00	0
5/30/10	0.00	0
5/31/10	0.00	0
Total		6,439,305
Total		48
Total		148
Average Flow	12.42	cfs
Minimum	0.02	1599.91
Maximum	23.99	2073002.59
Average	12.42	1073217.56

cu-ft
Mgal
Ac-ft

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
5/1/10	5/31/10

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.27	8.46	8.34	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1300	1420	1372	umho/cm	Continuous	Recorder
SULFATE	299	329	311.6	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	299	311.6	304.24	mg/L	4 x Week	GRAB
FLOW, INSTREAM	148	169	156.5	cfs	Continuous	Recorder
SIGNATURE						
NAME AND TITLE	BRUCE ENGELHARDT, HEAD, INVESTIGATIONS SECTION			6/30/10	701-328-4958	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.						

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

Date	Time	Sampler	USGS EC ($\mu\text{S}/\text{cm}$)	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
5/1/2010	-	-	-	-	-	-	-	-
5/2/2010	-	-	-	-	-	-	-	-
5/3/2010	-	-	-	-	-	-	-	-
5/4/2010	8:00	NDSWC	1260	8.18	297	-	13	-
5/5/2010	14:00	NDSWC	1270	8.19	328	-	-	-
5/6/2010	8:00	NDSWC	1280	8.23	302	-	-	-
5/7/2010	-	-	-	-	-	-	-	-
5/8/2010	-	-	-	-	-	-	-	-
5/9/2010	-	-	-	-	-	-	-	-
5/10/2010	8:30	NDSWC	1280	8.21	326	-	-	-
5/11/2010	8:25	NDSWC	1290	8.22	326	-	14	-
5/12/2010	8:20	NDSWC	1300	8.18	331	-	-	-
5/13/2010	15:10	NDSWC	1310	8.27	346	-	-	-
5/14/2010	8:10	NDSWC	1320	8.28	345	-	-	-
5/15/2010	-	-	-	-	-	-	-	-
5/16/2010	-	-	-	-	-	-	-	-
5/17/2010	15:35	NDSWC	1300	8.24	328	-	-	-
5/18/2010	8:35	NDSWC	1290	8.27	326	-	-	-
5/19/2010	8:00	NDSWC	1290	8.26	323	-	12	-
5/20/2010	-	-	-	-	-	-	-	-
5/21/2010	18:00	NDSWC	1310	8.38	299	299.00	-	1
5/22/2010	10:50	NDSWC	1300	8.46	299	299.00	-	2
5/23/2010	-	-	-	-	-	-	-	-
5/24/2010	8:20	NDSWC	1420	8.27	315	304.33	-	4
5/25/2010	8:40	NDSWC	1420	8.29	316	307.25	17	5
5/26/2010	15:20	NDSWC	1410	8.3	329	311.60	-	6
5/27/2010	8:20	NDSWC	1380	8.3	314	-	-	-
5/28/2010	11:00	NDSWC	1420	8.31	313	-	-	-
5/29/2010	-	-	-	-	-	-	-	-
5/30/2010	-	-	-	-	-	-	-	-
5/31/2010	-	-	-	-	-	-	-	-
Minimum			1300.00	8.27	299.00	299.00		
Maximum			1420.00	8.46	329.00	311.60		
Average			1372.00	8.34	311.60	304.24		

Average daily streamflow and conductivity data at the upstream location near Flora

USGS Gaging Station Data		
Sheyenne River Above Devils Lake Outlet		
Date	Streamflow (cfs)	EC ($\mu\text{S}/\text{cm}$)
5/1/2010	229	1230
5/2/2010	218	1240
5/3/2010	212	1250
5/4/2010	205	1260
5/5/2010	203	1270
5/6/2010	205	1280
5/7/2010	210	1290
5/8/2010	218	1310
5/9/2010	220	1300
5/10/2010	220	1280
5/11/2010	228	1290
5/12/2010	236	1300
5/13/2010	237	1310
5/14/2010	236	1320
5/15/2010	229	1320
5/16/2010	219	1310
5/17/2010	205	1300
5/18/2010	192	1290
5/19/2010	179	1290
5/20/2010	167	1300
5/21/2010	156	1300
5/22/2010	152	1300
5/23/2010	152	1300
5/24/2010	148	1300
5/25/2010	162	1300
5/26/2010	169	1310
5/27/2010	174	1310
5/28/2010	179	1310
5/29/2010	170	1320
5/30/2010	166	1310
5/31/2010	158	1300
Minimum	148	1300
Maximum	169	1310
Average	156.50	1301.67

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
5/1/10	5/31/10

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.33	8.41	8.37	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1390	1410	1397.5	umho/cm	Continuous	Recorder
SULFATE	319	386	347.25	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	319	347.25	327.72	mg/L	4 x Week	GRAB
FLOW, INSTREAM	177	207	191	cfs	Continuous	Recorder
SIGNATURE					701-328-4958	
NAME AND TITLE	BRUCE ENGELHARDT, HEAD, INVESTIGATIONS SECTION			6/30/10		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.						

**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
5/1/2010	-	-	-	-	-	-	-	-
5/2/2010	-	-	-	-	-	-	-	-
5/3/2010	-	-	-	-	-	-	-	-
5/4/2010	7:40	NDSWC	1270	8.17	312	-	17	-
5/5/2010	14:30	NDSWC	1300	8.24	315	-	-	-
5/6/2010	8:30	NDSWC	1300	8.23	312	-	-	-
5/7/2010	-	-	-	-	-	-	-	-
5/8/2010	-	-	-	-	-	-	-	-
5/9/2010	-	-	-	-	-	-	-	-
5/10/2010	7:55	NDSWC	1350	8.22	339	-	-	-
5/11/2010	8:00	NDSWC	1350	8.24	342	-	17	-
5/12/2010	8:05	NDSWC	1350	8.19	348	-	-	-
5/13/2010	15:40	NDSWC	1360	8.3	356	-	-	-
5/14/2010	8:40	NDSWC	1390	8.29	352	-	-	-
5/15/2010	-	-	-	-	-	-	-	-
5/16/2010	-	-	-	-	-	-	-	-
5/17/2010	15:10	NDSWC	1410	8.26	358	-	-	-
5/18/2010	8:10	NDSWC	1380	8.26	356	-	-	-
5/19/2010	7:30	NDSWC	1380	8.3	348	-	18	-
5/20/2010	-	-	-	-	-	-	-	-
5/21/2010	17:30	NDSWC	1390	8.38	319	319.00	-	1
5/22/2010	18:00	NDSWC	1390	8.41	319	319.00	-	2
5/23/2010	-	-	-	-	-	-	-	-
5/24/2010	8:50	-	-	-	-	319.00	-	4
5/25/2010	9:10	NDSWC	1410	8.35	365	334.33	26	5
5/26/2010	15:50	NDSWC	1400	8.33	386	347.25	-	6
5/27/2010	8:00	NDSWC	1390	8.32	364	-	-	-
5/28/2010	10:30	NDSWC	1400	8.34	337	-	-	-
5/29/2010	-	-	-	-	-	-	-	-
5/30/2010	-	-	-	-	-	-	-	-
5/31/2010	-	-	-	-	-	-	-	-
Minimum			1390.00	8.33	319.00	319.00		
Maximum			1410.00	8.41	386.00	347.25		
Average			1397.50	8.37	347.25	327.72		

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

USGS Gaging Station Data		
Sheyenne River Below Devils Lake Outlet		
Date	Streamflow (cfs)	EC (μ S/cm)
5/1/10	258	1230
5/2/10	248	1240
5/3/10	243	1270
5/4/10	237	1280
5/5/10	238	1290
5/6/10	234	1310
5/7/10	245	1320
5/8/10	247	1350
5/9/10	250	1360
5/10/10	253	1350
5/11/10	254	1340
5/12/10	261	1350
5/13/10	272	1360
5/14/10	270	1390
5/15/10	264	1400
5/16/10	254	1410
5/17/10	243	1400
5/18/10	227	1390
5/19/10	214	1380
5/20/10	198	1380
5/21/10	186	1370
5/22/10	177	1370
5/23/10	188	1390
5/24/10	192	1410
5/25/10	207	1410
5/26/10	196	1430
5/27/10	193	1390
5/28/10	199	1390
5/29/10	197	1400
5/30/10	181	1390
5/31/10	171	1370
Minimum	177	1370
Maximum	207	1430
Average	191.00	1396.67