

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>

October 26, 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 September 2010 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 701-328-4958.

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

MONITORING PERIOD	
START DATE	END DATE
9/1/10	9/30/10

LOCATION: Benson Co, ND

Devils Lake Outlet discharged 13,239 ac-ft over 30 Days

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.14	8.75	8.64	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1456	1578	1509.67	umho/cm	Continuous	Recorder
SULFATE	545	565	559.35	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	554.25	562	559.39	mg/L	4 x Week	GRAB
OUTLET DISCHARGE	158	281	221	cfs	Continuous	Recorder
SIGNATURE	<i>Bruce Engelhardt</i>					
NAME AND TITLE	BRUCE ENGELHARDT, HEAD, INVESTIGATIONS SECTION			10/27/10	701-328-4958	
COMMENT AND EXPLANATION OF ANY VIOLATIONS						
Summary of individual sample results and flow data for outlet, upstream & downstream monitoring locations attached.						

Daily Outlet Discharge

Date	Average Daily Outlet Discharge (cfs)	Total Daily Volume (cu-ft)
9/1/2010	221.12	19104768
9/2/2010	203.76	17604864
9/3/2010	226.56	19574784
9/4/2010	223.88	19343232
9/5/2010	218.85	18908640
9/6/2010	223.28	19291392
9/7/2010	222.15	19193760
9/8/2010	193.36	16706304
9/9/2010	217.44	18786816
9/10/2010	219.39	18955296
9/11/2010	213.12	18413568
9/12/2010	221.03	19096992
9/13/2010	218.67	18893088
9/14/2010	221.93	19174752
9/15/2010	224.55	19401120
9/16/2010	224.57	19402848
9/17/2010	226.94	19607616
9/18/2010	229.08	19792512
9/19/2010	231.33	19986912
9/20/2010	226.77	19592928
9/21/2010	226.45	19565280
9/22/2010	229.8	19854720
9/23/2010	242.37	20940768
9/24/2010	233.87	20206368
9/25/2010	236.29	20415456
9/26/2010	232.13	20056032
9/27/2010	209.78	18124992
9/28/2010	158.02	13652928
9/29/2010	217.28	18772992
9/30/2010	280.97	24275808
Total		576,697,536 cu-ft
Total		4,314 Mgal
Total		13,239 Ac-ft
Average Flow	222 cfs	
Minimum	158	13652928
Maximum	281	24275808
Average	222	19223251

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
9/1/2010	10:45	NDSWC	1468	8.58	560	559.6	-	7
9/2/2010	8:00	NDSWC	1480	8.14	562	559.8	-	7
9/3/2010	9:00	NDSWC	1456	8.7	565	560	-	7
9/4/2010	-	-	1480	-	-	-	-	-
9/5/2010	-	-	1492	-	-	-	-	-
9/6/2010	-	-	1481	-	-	-	-	-
9/7/2010	13:40	NDSWC	1474	8.75	561	562	-	7
9/8/2010	8:30	NDSWC	1469	8.62	559	561.75	-	7
9/9/2010	13:30	NDSWC	1478	8.62	561	561.5	-	7
9/10/2010	8:15	NDSWC	1519	8.61	562	560.75	-	7
9/11/2010	-	-	1578	-	-	-	-	-
9/12/2010	-	-	1571	-	-	-	-	-
9/13/2010	9:00	NDSWC	1562	8.68	558	560.2	-	7
9/14/2010	9:35	NDSWC	1576	8.66	558	559.6	24	7
9/15/2010	10:10	NDSWC	1561	8.61	545	556.8	-	7
9/16/2010	9:55	NDSWC	Malfunction	8.68	556	555.8	-	7
9/17/2010	-	-	Malfunction	-	-	-	-	-
9/18/2010	-	-	Malfunction	-	-	-	-	-
9/19/2010	-	-	Malfunction	-	-	-	-	-
9/20/2010	15:00	NDSWC	Malfunction	8.69	558	554.25	-	7
9/21/2010	9:10	NDSWC	Malfunction	8.71	559	554.5	-	7
9/22/2010	15:00	NDSWC	Malfunction	8.68	566	559.75	-	7
9/23/2010	9:00	NDSWC	Malfunction	8.68	560	560.75	-	7
9/24/2010	-	-	Malfunction	-	-	-	-	-
9/25/2010	-	-	Malfunction	-	-	-	-	-
9/26/2010	-	-	Malfunction	-	-	-	-	-
9/27/2010	8:30	NDSWC	Malfunction	8.7	560	561.25	-	7
9/28/2010	14:30	NDSWC	Malfunction	8.8	559	561.25	39	7
9/29/2010	-	-	Malfunction	-	-	-	-	-
9/30/2010	-	-	Malfunction	-	-	-	-	-
Minimum			1456.00	8.14	545.00	554.25	24.00	
Maximum			1578.00	8.75	565.00	562.00	24.00	
Average			1509.67	8.64	559.35	559.39	31.60	

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
9/1/10	9/30/10

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	7.95	8.5	8.32	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1220	1470	1325.29	umho/cm	Continuous	Recorder
SULFATE	145	274	252.94	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	208.6	264.5	246.71	mg/L	4 x Week	GRAB
FLOW, INSTREAM	22	128	64.47	cfs	Continuous	Recorder
SIGNATURE	<i>Bruce Engelhardt</i>					
NAME AND TITLE	BRUCE ENGELHARDT, HEAD, INVESTIGATIONS SECTION			10/27/10	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 (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
9/1/2010	11:15	NDSWC	1450	7.95	217	220.4	-	7
9/2/2010	8:12	NDSWC	1450	8.05	232	222.8	-	7
9/3/2010	9:15	NDSWC	1440	8.33	145	208.6	-	7
9/4/2010	-	-	-	-	-	-	-	-
9/5/2010	-	-	-	-	-	-	-	-
9/6/2010	-	-	-	-	-	-	-	-
9/7/2010	14:20	NDSWC	1430	8.5	274	217	75	7
9/8/2010	8:15	NDSWC	1470	8.36	260	227.75	-	7
9/9/2010	13:45	NDSWC	1380	8.38	262	235.25	-	7
9/10/2010	8:00	NDSWC	1410	8.39	262	264.5	-	7
9/11/2010	-	-	-	-	-	-	-	-
9/12/2010	-	-	-	-	-	-	-	-
9/13/2010	8:45	NDSWC	1230	8.36	245	260.6	-	7
9/14/2010	10:05	NDSWC	1220	8.36	247	255.2	22	7
9/15/2010	10:45	NDSWC	1240	8.33	240	251.2	-	7
9/16/2010	10:10	NDSWC	1230	8.37	242	247.2	-	7
9/17/2010	-	-	-	-	-	-	-	-
9/18/2010	-	-	-	-	-	-	-	-
9/19/2010	-	-	-	-	-	-	-	-
9/20/2010	15:20	NDSWC	1260	8.38	256	246.25	-	7
9/21/2010	10:30	NDSWC	1270	8.38	254	248	26	7
9/22/2010	15:15	NDSWC	1270	8.35	273	256.25	-	7
9/23/2010	8:45	NDSWC	1270	8.36	267	262.5	-	7
9/24/2010	-	-	-	-	-	-	-	-
9/25/2010	-	-	-	-	-	-	-	-
9/26/2010	-	-	-	-	-	-	-	-
9/27/2010	8:15	NDSWC	1270	8.27	324	279.5	-	7
9/28/2010	14:50	NDSWC	1240	8.32	300	291	27	7
9/29/2010	-	-	-	-	-	-	-	-
9/30/2010	-	-	-	-	-	-	-	-
Minimum			1220.00	7.95	145.00	208.60	22.00	
Maximum			1470.00	8.50	274.00	264.50	75.00	
Average			1325.29	8.32	252.94	246.71	37.50	

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

USGS Gaging Station Data		
Near Flora		
Date	Streamflow (cfs)	EC (µS/cm)
9/1/2010	22	1460
9/2/2010	25	1440
9/3/2010	25	1440
9/4/2010	25	1440
9/5/2010	26	1450
9/6/2010	27	1440
9/7/2010	28	1440
9/8/2010	36	1450
9/9/2010	41	1390
9/10/2010	51	1380
9/11/2010	71	1330
9/12/2010	83	1270
9/13/2010	100	1230
9/14/2010	94	1220
9/15/2010	84	1230
9/16/2010	80	1230
9/17/2010	72	1250
9/18/2010	62	1260
9/19/2010	57	1260
9/20/2010	53	1260
9/21/2010	48	1270
9/22/2010	44	1270
9/23/2010	51	1260
9/24/2010	92	1230
9/25/2010	122	1230
9/26/2010	128	1260
9/27/2010	123	1260
9/28/2010	91	1240
9/29/2010	83	1230
9/30/2010	90	1230
Minimum	22	1220
Maximum	128	1460
Average	64.47	1311.67

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
9/1/10	9/30/10

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.38	8.63	8.56	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1590	1830	1737.65	umho/cm	Continuous	Recorder
SULFATE	456	534	499.41	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	468.25	531.2	505.75	mg/L	4 x Week	GRAB
FLOW, INSTREAM	284	462	356.6	cfs	Continuous	Recorder
SIGNATURE				10/27/10	701-328-4958	
NAME AND TITLE	BRUCE ENGELHARDT, HEAD, INVESTIGATIONS 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.						

**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
9/1/2010	11:40	NDSWC	1820	8.62	533	531.2	-	7
9/2/2010	8:40	NDSWC	1820	8.38	525	529.8	-	7
9/3/2010	9:45	NDSWC	1830	8.62	534	529.6	-	7
9/4/2010	-	-	-	-	-	-	-	-
9/5/2010	-	-	-	-	-	-	-	-
9/6/2010	-	-	-	-	-	-	-	-
9/7/2010	14:50	NDSWC	1760	8.63	514	526.5	34	7
9/8/2010	7:45	NDSWC	1800	8.57	519	523	-	7
9/9/2010	14:15	NDSWC	1790	8.57	522	522.25	-	7
9/10/2010	7:30	NDSWC	1720	8.58	523	519.5	-	7
9/11/2010	-	-	-	-	-	-	-	-
9/12/2010	-	-	-	-	-	-	-	-
9/13/2010	8:25	NDSWC	1690	8.54	477	511	-	7
9/14/2010	10:40	NDSWC	1690	8.55	458	499.8	23	7
9/15/2010	11:10	NDSWC	1680	8.53	456	487.2	-	7
9/16/2010	10:30	NDSWC	1690	8.56	463	475.4	-	7
9/17/2010	-	-	-	-	-	-	-	-
9/18/2010	-	-	-	-	-	-	-	-
9/19/2010	-	-	-	-	-	-	-	-
9/20/2010	15:40	NDSWC	1740	8.6	496	468.25	-	7
9/21/2010	11:10	NDSWC	1750	8.6	493	477	25	7
9/22/2010	15:45	NDSWC	1760	8.62	521	493.25	-	7
9/23/2010	8:15	NDSWC	1760	8.6	516	506.5	-	7
9/24/2010	-	-	-	-	-	-	-	-
9/25/2010	-	-	-	-	-	-	-	-
9/26/2010	-	-	-	-	-	-	-	-
9/27/2010	8:00	NDSWC	1650	8.5	483	503.25	-	7
9/28/2010	15:30	NDSWC	1590	8.53	457	494.25	25	7
9/29/2010	-	-	-	-	-	-	-	-
9/30/2010	-	-	-	-	-	-	-	-
Minimum			1590.00	8.38	456.00	468.25	23.00	
Maximum			1830.00	8.63	534.00	531.20	34.00	
Average			1737.65	8.56	499.41	505.75	26.75	

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

USGS Gaging Station Data		
near Bremen		
9/1/2010	288	1820
9/2/2010	288	1820
9/3/2010	285	1830
9/4/2010	284	1830
9/5/2010	285	1830
9/6/2010	291	1810
9/7/2010	307	1760
9/8/2010	307	1800
9/9/2010	329	1770
9/10/2010	370	1720
9/11/2010	365	1740
9/12/2010	376	1710
9/13/2010	396	1680
9/14/2010	413	1650
9/15/2010	408	1670
9/16/2010	396	1690
9/17/2010	389	1700
9/18/2010	373	1710
9/19/2010	360	1730
9/20/2010	354	1740
9/21/2010	346	1750
9/22/2010	335	1760
9/23/2010	358	1730
9/24/2010	419	1670
9/25/2010	439	1660
9/26/2010	452	1640
9/27/2010	462	1640
9/28/2010	378	1610
9/29/2010	317	1580
9/30/2010	328	1600
Minimum	284	1580
Maximum	462	1830
Average	356.60	1721.67