

North Dakota State Water Commission

900 EAST BOULEVARD AVENUE, DEPT 770 • BISMARCK, NORTH DAKOTA 58505-0850
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September 30, 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 August 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
8/1/10	8/31/10

LOCATION: Benson Co, ND

Devils Lake Outlet discharged 13,711 ac-ft over 31 Days

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.3	8.82	8.61	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1403	1607	1483.58	umho/cm	Continuous	Recorder
SULFATE	529	572	555.2	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	547.6	564.25	554.82	mg/L	4 x Week	GRAB
OUTLET DISCHARGE	103	289	223	cfs	Continuous	Recorder
SIGNATURE						
NAME AND TITLE	BRUCE ENGELHARDT, HEAD, INVESTIGATIONS SECTION				9/30/10	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
8/1/2010	-	-	1473	-	-	-	-	-
8/2/2010	8:00	NDSWC	1465	8.59	547	554.25	-	7
8/3/2010	9:05	NDSWC	1468	8.59	548	553	-	7
8/4/2010	-	-	1492	-	-	-	-	-
8/5/2010	11:00	NDSWC	1507	8.43	552	549	-	7
8/6/2010	9:00	NDSWC	1492	8.53	550	549.25	-	7
8/7/2010	-	-	1495	-	-	-	-	-
8/8/2010	-	-	1519	-	-	-	-	-
8/9/2010	14:50	NDSWC	1490	8.82	559	552.25	-	7
8/10/2010	8:50	NDSWC	1502	8.61	558	554.75	27	7
8/11/2010	14:00	NDSWC	1503	8.63	559	555.6	-	7
8/12/2010	8:30	NDSWC	1528	8.54	563	557.8	-	7
8/13/2010	11:45	NDSWC	1605	8.62	563	560.4	-	7
8/14/2010	-	-	1607	-	-	-	-	-
8/15/2010	-	-	1520	-	-	-	-	-
8/16/2010	-	-	1403	-	-	-	-	-
8/17/2010	8:40	NDSWC	1428	8.59	572	564.25	-	7
8/18/2010	10:00	NDSWC	1407	8.35	551	562.25	-	7
8/19/2010	14:00	NDSWC	1417	8.3	529	553.75	-	7
8/20/2010	7:30	NDSWC	1417	8.44	544	549	-	7
8/21/2010	-	-	1457	-	-	-	-	-
8/22/2010	-	-	1478	-	-	-	-	-
8/23/2010	16:00	NDSWC	1480	8.82	558	550.8	-	7
8/24/2010	9:00	NDSWC	1475	8.7	556	547.6	32	7
8/25/2010	14:30	NDSWC	1488	8.75	557	548.8	-	7
8/26/2010	7:30	NDSWC	1492	8.76	561	555.2	-	7
8/27/2010	8:25	NDSWC	1496	8.67	564	559.2	-	7
8/28/2010	-	-	1485	-	-	-	-	-
8/29/2010	-	-	1483	-	-	-	-	-
8/30/2010	14:30	NDSWC	1484	8.71	563	560.2	-	7
8/31/2010	9:30	NDSWC	1435	8.68	550	559	16	7
Minimum			1403.00	8.30	529.00	547.60	-	-
Maximum			1607.00	8.82	572.00	564.25	-	-
Average			1483.58	8.61	555.20	554.82	-	-

Daily Outlet Discharge

Date	Average Daily Outlet Discharge (cfs)	Total Daily Volume (cu-ft)
8/1/2010	273.68	23645952
8/2/2010	274.63	23728032
8/3/2010	274.98	23758272
8/4/2010	274.57	23722848
8/5/2010	267.69	23128416
8/6/2010	274.88	23749632
8/7/2010	270.57	23377248
8/8/2010	276.06	23851584
8/9/2010	279.18	24121152
8/10/2010	285.31	24650784
8/11/2010	288.61	24935904
8/12/2010	154.43	13342752
8/13/2010	227.24	19633536
8/14/2010	208.63	18025632
8/15/2010	208.28	17995392
8/16/2010	206.03	17800992
8/17/2010	102.85	8886240
8/18/2010	160.91	13902624
8/19/2010	203.67	17597088
8/20/2010	215.66	18633024
8/21/2010	208.39	18004896
8/22/2010	211.57	18279648
8/23/2010	112.80	9745920
8/24/2010	205.18	17727552
8/25/2010	209.76	18123264
8/26/2010	207.62	17938368
8/27/2010	210.60	18195840
8/28/2010	206.82	17869248
8/29/2010	206.22	17817408
8/30/2010	206.81	17868384
8/31/2010	198.85	17180640
Total		597,238,272
Total		4,467
Total		13,711
Average Flow	223 cfs	
Minimum	103	8,886,240
Maximum	289	24,935,904
Average	223	18,789,501

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
8/1/10	8/31/10

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
PH	8.02	8.44	8.32	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1310	1510	1457.5	umho/cm	Continuous	Recorder
SULFATE	216	279	233.5	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	221	259.5	236.4	mg/L	4 x Week	GRAB
FLOW, INSTREAM	22	41	31.32	cfs	Continuous	Recorder
SIGNATURE	<i>Bruce Engelhardt</i>					
NAME AND TITLE	BRUCE ENGELHARDT, HEAD, INVESTIGATIONS SECTION			9/30/10	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

Date	Time	Sampler	USGS EC (μ S/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
8/1/2010	-	-	-	-	-	-	-	-
8/2/2010	8:20	NDSWC	1510	8.36	249	259.50	-	7
8/3/2010	9:20	NDSWC	1510	8.35	249	253.00	-	7
8/4/2010	-	-	-	-	-	-	-	-
8/5/2010	11:20	NDSWC	1500	8.36	232	243.33	-	7
8/6/2010	9:15	NDSWC	1500	8.36	233	240.75	-	7
8/7/2010	-	-	-	-	-	-	-	-
8/8/2010	-	-	-	-	-	-	-	-
8/9/2010	15:00	NDSWC	1510	8.35	217	232.75	-	7
8/10/2010	9:15	NDSWC	1500	8.3	220	225.50	50	7
8/11/2010	14:20	NDSWC	1460	8.29	233	227.00	-	7
8/12/2010	8:45	NDSWC	1450	8.31	236	227.80	-	7
8/13/2010	12:05	NDSWC	1480	8.28	279	237.00	-	7
8/14/2010	-	-	-	-	-	-	-	-
8/15/2010	-	-	-	-	-	-	-	-
8/16/2010	-	-	-	-	-	-	-	-
8/17/2010	9:00	NDSWC	1360	8.34	241	247.25	-	7
8/18/2010	10:15	NDSWC	1310	8.36	244	250.00	-	7
8/19/2010	14:15	NDSWC	1410	8.17	242	251.50	-	7
8/20/2010	7:30	NDSWC	1420	8.28	219	236.50	-	7
8/21/2010	-	-	-	-	-	-	-	-
8/22/2010	-	-	-	-	-	-	-	-
8/23/2010	16:30	NDSWC	1460	8.39	238	236.80	-	7
8/24/2010	9:25	NDSWC	1450	8.42	233	235.20	63	7
8/25/2010	14:45	NDSWC	1470	8.19	220	230.40	-	7
8/26/2010	7:45	NDSWC	1470	8.02	220	226.00	-	7
8/27/2010	8:40	NDSWC	1470	8.41	216	225.40	-	7
8/28/2010	-	-	-	-	-	-	-	-
8/29/2010	-	-	-	-	-	-	-	-
8/30/2010	14:40	NDSWC	1460	8.37	218	221.40	-	7
8/31/2010	9:50	NDSWC	1450	8.44	231	221.00	75	7
Minimum			1310.00	8.02	216.00	221.00	-	-
Maximum			1510.00	8.44	279.00	259.50	-	-
Average			1457.50	8.32	233.50	236.40	-	-

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

USGS Gaging Station Data		
Near Flora		
Date	Streamflow (cfs)	EC (µS/cm)
8/1/2010	37	1510
8/2/2010	37	1520
8/3/2010	36	1520
8/4/2010	36	1520
8/5/2010	35	1510
8/6/2010	34	1500
8/7/2010	35	1510
8/8/2010	34	1500
8/9/2010	33	1500
8/10/2010	30	1500
8/11/2010	36	1470
8/12/2010	36	1460
8/13/2010	31	1480
8/14/2010	39	1480
8/15/2010	41	1420
8/16/2010	33	1380
8/17/2010	30	1360
8/18/2010	29	1330
8/19/2010	31	1410
8/20/2010	36	1430
8/21/2010	34	1440
8/22/2010	32	1450
8/23/2010	30	1460
8/24/2010	24	1460
8/25/2010	25	1460
8/26/2010	25	1470
8/27/2010	23	1480
8/28/2010	23	1480
8/29/2010	22	1470
8/30/2010	22	1460
8/31/2010	22	1450
Minimum	22.00	1330.00
Maximum	41.00	1520.00
Average	31.32	1464.19

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
8/1/10	8/31/10

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.04	8.68	8.47	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1720	1860	1806	umho/cm	Continuous	Recorder
SULFATE	470	535	512.55	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	483	531.4	510.42	mg/L	4 x Week	GRAB
FLOW, INSTREAM	171	303	272.39	cfs	Continuous	Recorder
SIGNATURE	<i>Bruce Engelhardt</i>					
NAME AND TITLE	BRUCE ENGELHARDT, HEAD, INVESTIGATIONS SECTION			9/30/10	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 downstream location near Bremen
Shenoye 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 operating period (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling average
8/1/2010	-	-	-	-	-	-	-	-
8/2/2010	9:45	NDSWC	1860	8.48	510	513.00	-	7
8/3/2010	9:45	NDSWC	1790	8.49	515	513.75	-	7
8/4/2010	-	-	-	-	-	-	-	-
8/5/2010	11:50	NDSWC	1810	8.48	516	513.67	-	7
8/6/2010	9:45	NDSWC	1780	8.56	517	514.50	-	7
8/7/2010	-	-	-	-	-	-	-	-
8/8/2010	-	-	-	-	-	-	-	-
8/9/2010	15:20	NDSWC	1830	8.56	519	516.75	-	7
8/10/2010	9:40	NDSWC	1820	8.46	526	519.50	34	7
8/11/2010	15:00	NDSWC	1770	8.04	517	519.00	-	7
8/12/2010	9:20	NDSWC	1820	8.05	521	520.00	-	7
8/13/2010	12:40	NDSWC	1780	8.38	508	516.20	-	7
8/14/2010	-	-	-	-	-	-	-	-
8/15/2010	-	-	-	-	-	-	-	-
8/16/2010	-	-	-	-	-	-	-	-
8/17/2010	9:35	NDSWC	1810	8.54	530	519.00	-	7
8/18/2010	10:45	NDSWC	1780	8.5	473	506.00	-	7
8/19/2010	14:45	NDSWC	1720	8.49	470	495.25	-	7
8/20/2010	8:00	NDSWC	1780	8.49	474	486.75	-	7
8/21/2010	-	-	-	-	-	-	-	-
8/22/2010	-	-	-	-	-	-	-	-
8/23/2010	17:00	NDSWC	1830	8.68	518	493.00	-	7
8/24/2010	10:20	NDSWC	1780	8.52	480	483.00	-	7
8/25/2010	15:15	NDSWC	1850	8.63	534	495.20	50	7
8/26/2010	8:15	NDSWC	1840	8.23	532	507.60	-	7
8/27/2010	9:00	NDSWC	1840	8.59	535	519.80	-	7
8/28/2010	-	-	-	-	-	-	-	-
8/29/2010	-	-	-	-	-	-	-	-
8/30/2010	15:00	NDSWC	1810	8.58	524	521.00	-	7
8/31/2010	10:45	NDSWC	1820	8.62	532	531.40	32	7
Minimum	-	-	1720.00	8.04	470.00	483.00	-	-
Maximum	-	-	1860.00	8.68	535.00	531.40	-	-
Average	-	-	1806.00	8.47	512.55	510.42	-	-

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

USGS Gaging Station Data		
near Bremen		
8/1/2010	290	1820
8/2/2010	290	1820
8/3/2010	289	1820
8/4/2010	289	1820
8/5/2010	288	1820
8/6/2010	284	1810
8/7/2010	287	1820
8/8/2010	288	1820
8/9/2010	287	1820
8/10/2010	286	1800
8/11/2010	296	1750
8/12/2010	277	1780
8/13/2010	234	1750
8/14/2010	275	1780
8/15/2010	287	1760
8/16/2010	288	1780
8/17/2010	260	1810
8/18/2010	171	1780
8/19/2010	200	1730
8/20/2010	258	1800
8/21/2010	286	1820
8/22/2010	294	1820
8/23/2010	263	1830
8/24/2010	187	1790
8/25/2010	248	1830
8/26/2010	281	1840
8/27/2010	289	1840
8/28/2010	285	1840
8/29/2010	290	1830
8/30/2010	303	1820
8/31/2010	294	1820
Minimum	171.00	1730.00
Maximum	303.00	1840.00
Average	272.39	1805.48