



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>

August 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 July 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
7/1/10	7/31/10

LOCATION: Benson Co, ND

Devils Lake Outlet discharged 12,728 ac-ft over 31 Days

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.42	8.71	8.6	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	907	1853	1531.39	umho/cm	Continuous	Recorder
SULFATE	545	587	560.5	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	550	577	562.88	mg/L	4 x Week	GRAB
OUTLET DISCHARGE	3	265	207	cfs	Continuous	Recorder
SIGNATURE	<i>Bruce Engelhardt</i>					
NAME AND TITLE	BRUCE ENGELHARDT, HEAD, INVESTIGATIONS SECTION					
TELEPHONE NUMBER	701-328-4958					
DATE	8/27/10					
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
7/1/2010	-	-	1853	-	-	-	-	-
7/2/2010	8:00	NDSWC	1831	8.42	561	566.75	-	7
7/3/2010	-	-	1801	-	-	-	-	-
7/4/2010	-	-	1762	-	-	-	-	-
7/5/2010	-	-	1751	-	-	-	-	-
7/6/2010	9:00	NDSWC	1705	8.5	562	572.33	70	7
7/7/2010	14:45	NDSWC	1534	8.67	564	562.33	-	7
7/8/2010	14:30	NDSWC	1462	8.66	547	558.50	-	7
7/9/2010	8:30	NDSWC	1603	8.68	545	554.50	-	7
7/10/2010	-	-	1751	-	-	-	-	-
7/11/2010	-	-	1712	-	-	-	-	-
7/12/2010	15:25	NDSWC	1707	8.69	552	554.00	-	7
7/13/2010	16:00	NDSWC	1660	8.71	553	552.20	-	7
7/14/2010	8:40	NDSWC	1685	8.58	553	550.00	38	7
7/15/2010	-	-	1795	-	-	-	-	-
7/16/2010	-	-	1592	-	-	-	-	-
7/17/2010	-	-	1410	-	-	-	-	-
7/18/2010	-	-	1465	-	-	-	-	-
7/19/2010	15:40	NDSWC	1426	8.66	553	553.00	-	7
7/20/2010	8:50	NDSWC	1355	8.6	555	553.67	41	7
7/21/2010	-	-	1223	-	-	-	-	-
7/22/2010	13:45	NDSWC	991	8.7	580	562.67	-	7
7/23/2010	8:45	NDSWC	930	8.7	586	568.50	-	7
7/24/2010	-	-	907	-	-	-	-	-
7/25/2010	-	-	1448	-	-	-	-	-
7/26/2010	9:00	NDSWC	1494	8.53	587	577.00	-	7
7/27/2010	9:10	NDSWC	1491	8.52	553	576.50	5	7
7/28/2010	9:00	NDSWC	1465	8.49	572	575.60	-	7
7/29/2010	8:10	NDSWC	1518	8.54	545	568.60	-	7
7/30/2010	-	-	1584	-	-	-	-	-
7/31/2010	-	-	1562	-	-	-	-	-
Minimum			907.00	8.42	545.00	550.00		
Maximum			1853.00	8.71	587.00	577.00		
Average			1531.39	8.60	560.50	562.88		

Daily Outlet Discharge

Date	Average Daily Outlet Discharge (cfs)	Total Daily Volume (cu-ft)
7/1/2010	155.46	13,431,744
7/2/2010	233.19	20,147,616
7/3/2010	234.97	20,301,408
7/4/2010	232	20,044,800
7/5/2010	212.01	18,317,664
7/6/2010	216.69	18,722,016
7/7/2010	235.87	20,379,168
7/8/2010	259.93	22,457,952
7/9/2010	264.59	22,860,576
7/10/2010	237.38	20,509,632
7/11/2010	233.83	20,202,912
7/12/2010	231.88	20,034,432
7/13/2010	223.1	19,275,840
7/14/2010	120.17	10,382,688
7/15/2010	3.05	263,520
7/16/2010	32.19	2,781,216
7/17/2010	232.64	20,100,096
7/18/2010	229.86	19,859,904
7/19/2010	231.14	19,970,496
7/20/2010	241.7	20,882,880
7/21/2010	114.18	9,865,152
7/22/2010	240.6	20,787,840
7/23/2010	235.95	20,386,080
7/24/2010	233.91	20,209,824
7/25/2010	235.73	20,367,072
7/26/2010	235.37	20,335,968
7/27/2010	105.53	9,117,792
7/28/2010	241.08	20,829,312
7/29/2010	238.33	20,591,712
7/30/2010	238.01	20,564,064
7/31/2010	236.49	20,432,736
Total		554,414,112
Total		4,147
Total		12,728
Average Flow	207 cfs	
Minimum	3	263,520
Maximum	265	22,860,576
Average	207	17,876,191

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
7/1/10	7/31/10

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.12	8.42	8.35	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1280	1480	1384.38	umho/cm	Continuous	Recorder
SULFATE	249	277	260.19	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	250.5	318.5	264.64	mg/L	4 x Week	GRAB
FLOW, INSTREAM	35	157	63.68	cfs	Continuous	Recorder
SIGNATURE	<i>Bruce Engelhardt</i>					
NAME AND TITLE	BRUCE ENGELHARDT, HEAD, INVESTIGATIONS SECTION			8/27/10	701-328-4958	
COMMENT AND EXPLANATION OF ANY VIOLATIONS	Summary of individual sample results and flow data for outlet, upstream & downstream monitoring locations attached. 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
Shenoye 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
7/1/2010	-	-	-	-	-	-	-	-
7/2/2010	8:15	NDSWC	1330	8.12	269	318.50	-	7
7/3/2010	-	-	-	-	-	-	-	-
7/4/2010	-	-	-	-	-	-	-	-
7/5/2010	-	-	-	-	-	-	-	-
7/6/2010	9:15	NDSWC	1280	8.3	254	283.33	17	7
7/7/2010	15:00	NDSWC	1290	8.39	250	257.67	-	7
7/8/2010	14:45	NDSWC	1300	8.36	249	255.50	-	7
7/9/2010	8:45	NDSWC	1300	8.37	249	250.50	-	7
7/10/2010	-	-	-	-	-	-	-	-
7/11/2010	-	-	-	-	-	-	-	-
7/12/2010	15:35	NDSWC	1350	8.35	260	252.40	-	7
7/13/2010	16:10	NDSWC	1360	8.35	266	254.80	-	7
7/14/2010	9:00	NDSWC	1360	8.32	263	257.40	25	7
7/15/2010	-	-	-	-	-	-	-	-
7/16/2010	-	-	-	-	-	-	-	-
7/17/2010	-	-	-	-	-	-	-	-
7/18/2010	-	-	-	-	-	-	-	-
7/19/2010	15:50	NDSWC	1380	8.42	251	260.00	-	7
7/20/2010	9:05	NDSWC	1380	8.39	258	257.33	-	7
7/21/2010	-	-	-	-	-	-	-	-
7/22/2010	14:00	NDSWC	1450	8.36	264	257.67	-	7
7/23/2010	9:00	NDSWC	1460	8.34	264	259.25	-	7
7/24/2010	-	-	-	-	-	-	-	-
7/25/2010	-	-	-	-	-	-	-	-
7/26/2010	8:45	NDSWC	1480	8.37	277	265.75	-	7
7/27/2010	9:25	NDSWC	1480	8.42	275	270.00	24	7
7/28/2010	8:42	NDSWC	1470	8.32	261	268.20	-	7
7/29/2010	7:50	NDSWC	1480	8.38	253	266.00	-	7
7/30/2010	-	-	-	-	-	-	-	-
7/31/2010	-	-	-	-	-	-	-	-
Minimum			1280.00	8.12	249.00	250.50	-	-
Maximum			1480.00	8.42	277.00	318.50	-	-
Average			1384.38	8.35	260.19	264.64	-	-

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

USGS Gaging Station Data		
Near Flora		
Date	Streamflow (cfs)	EC (µS/cm)
7/1/2010	157	1350
7/2/2010	137	1330
7/3/2010	131	1310
7/4/2010	118	1300
7/5/2010	106	1290
7/6/2010	97	1290
7/7/2010	87	1290
7/8/2010	79	1290
7/9/2010	72	1300
7/10/2010	66	1320
7/11/2010	60	1330
7/12/2010	56	1340
7/13/2010	54	1350
7/14/2010	52	1360
7/15/2010	48	1360
7/16/2010	45	1370
7/17/2010	48	1370
7/18/2010	47	1370
7/19/2010	44	1380
7/20/2010	40	1390
7/21/2010	35	1420
7/22/2010	42	1460
7/23/2010	42	1460
7/24/2010	40	1470
7/25/2010	39	1470
7/26/2010	38	1480
7/27/2010	35	1480
7/28/2010	38	1480
7/29/2010	42	1480
7/30/2010	40	1480
7/31/2010	39	1500
Minimum	35.00	1290.00
Maximum	157.00	1500.00
Average	63.68	1382.90

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
7/1/10	7/31/10

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
PH	8.23	8.54	8.45	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1670	1820	1742.5	umho/cm	Continuous	Recorder
SULFATE	462	550	495.69	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	461.5	516.2	489.92	mg/L	4 x Week	GRAB
FLOW, INSTREAM	85	433	315.21	cfs	Continuous	Recorder
SIGNATURE	<i>Bruce Engelhardt</i>				701-328-4958	
NAME AND TITLE	BRUCE ENGELHARDT, HEAD, INVESTIGATIONS SECTION		8/27/10		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
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 the operating period (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling average
7/1/2010	-	-	-	-	-	-	-	-
7/2/2010	9:00	NDSWC	1680	8.23	462	461.50	-	7
7/3/2010	-	-	-	-	-	-	-	-
7/4/2010	-	-	-	-	-	-	-	-
7/5/2010	-	-	-	-	-	-	-	-
7/6/2010	9:45	NDSWC	1670	8.35	467	466.00	27	7
7/7/2010	15:20	NDSWC	1700	8.49	468	465.67	-	7
7/8/2010	15:10	NDSWC	1680	8.5	473	467.50	-	7
7/9/2010	9:10	NDSWC	1740	8.48	475	470.75	-	7
7/10/2010	-	-	-	-	-	-	-	-
7/11/2010	-	-	-	-	-	-	-	-
7/12/2010	15:50	NDSWC	1750	8.52	498	476.20	-	7
7/13/2010	16:30	NDSWC	1740	8.52	497	482.20	-	7
7/14/2010	9:30	NDSWC	1770	8.44	497	488.00	31	7
7/15/2010	-	-	-	-	-	-	-	-
7/16/2010	-	-	-	-	-	-	-	-
7/17/2010	-	-	-	-	-	-	-	-
7/18/2010	-	-	-	-	-	-	-	-
7/19/2010	16:10	NDSWC	1710	8.54	512	502.00	-	7
7/20/2010	9:35	NDSWC	1710	8.51	513	507.33	-	7
7/21/2010	-	-	-	-	-	-	-	-
7/22/2010	14:20	NDSWC	1690	8.44	488	504.33	-	7
7/23/2010	9:20	NDSWC	1800	8.43	489	500.50	-	7
7/24/2010	-	-	-	-	-	-	-	-
7/25/2010	-	-	-	-	-	-	-	-
7/26/2010	8:30	NDSWC	1800	8.45	550	510.00	-	7
7/27/2010	9:50	NDSWC	1820	8.48	512	509.75	21	7
7/28/2010	8:20	NDSWC	1800	8.39	515	510.80	-	7
7/29/2010	7:30	NDSWC	1820	8.38	515	516.20	-	7
7/30/2010	-	-	-	-	-	-	-	-
7/31/2010	-	-	-	-	-	-	-	-
Minimum			1670.00	8.23	462.00	461.50		
Maximum			1820.00	8.54	550.00	516.20		
Average			1742.50	8.45	495.69	489.92		

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

USGS Gaging Station Data		
near Bremen		
Date	Streamflow (cfs)	EC (μS/cm)
7/1/2010	433	1660
7/2/2010	395	1650
7/3/2010	402	1670
7/4/2010	399	1670
7/5/2010	390	1680
7/6/2010	382	1690
7/7/2010	374	1710
7/8/2010	366	1720
7/9/2010	359	1730
7/10/2010	353	1740
7/11/2010	346	1750
7/12/2010	339	1750
7/13/2010	341	1750
7/14/2010	324	1750
7/15/2010	194	1760
7/16/2010	85	1710
7/17/2010	147	1520
7/18/2010	291	1740
7/19/2010	315	1740
7/20/2010	315	1740
7/21/2010	269	1740
7/22/2010		
7/23/2010		
7/24/2010	308	1800
7/25/2010	306	1810
7/26/2010	305	1820
7/27/2010	273	1810
7/28/2010	230	1770
7/29/2010	289	1820
7/30/2010	306	1810
7/31/2010	305	1810
Minimum	85.00	1520.00
Maximum	433.00	1820.00
Average	315.21	1735.17