



North Dakota State Water Commission

900 EAST BOULEVARD AVENUE, DEPT 770 • BISMARCK, NORTH DAKOTA 58505-0850
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November 23, 2011

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

RE: October 2011 West End Devils Lake Outlet Monthly Discharge and Water Quality Reports

Enclosed are the monthly discharge reports for the Devils Lake Outlet for the month of October 2011 and the summaries of the sample results and flow data. The outlet discharged continuously throughout the reported period but discharges remained limited. The outlet is undergoing restorations to regain full functionality. A replacement pump was installed on October 14, 2011 to restore a maximum discharge rate near 125 cubic feet per second. Because of the time constraints on staff related to restoration effort, sample frequency was reduced during the reported period.

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

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

Sincerely,

Jonathan Kelsch P.E.
Head, Construction Section
JK:MSW: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
10/1/11	10/31/11

LOCATION: Benson Co, ND

Devils Lake Outlet discharged 5,711 ac-ft over 31 Days

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.47	8.81	8.60	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	NA	NA	NA	umho/cm	Continuous	Recorder
SULFATE	544	610	565	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	552	591	566	mg/L	4 x Week	GRAB
OUTLET DISCHARGE	34	113	93	cfs	Continuous	Recorder
SIGNATURE				11/23/11	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)
10/1/11	77	6,637,152
10/2/11	80	6,880,140
10/3/11	80	6,873,248
10/4/11	80	6,876,669
10/5/11	80	6,867,626
10/6/11	78	6,720,101
10/7/11	76	6,540,191
10/8/11	72	6,172,977
10/9/11	74	6,342,162
10/10/11	64	5,500,028
10/11/11	34	2,896,924
10/12/11	76	6,530,519
10/13/11	70	6,073,956
10/14/11	86	7,422,303
10/15/11	113	9,782,436
10/16/11	111	9,574,115
10/17/11	109	9,402,457
10/18/11	112	9,625,064
10/19/11	113	9,725,550
10/20/11	111	9,607,774
10/21/11	110	9,523,035
10/22/11	110	9,475,740
10/23/11	110	9,497,436
10/24/11	111	9,541,077
10/25/11	111	9,610,482
10/26/11	109	9,371,857
10/27/11	111	9,584,296
10/28/11	107	9,202,010
10/29/11	105	9,056,693
10/30/11	104	8,947,495
10/31/11	103	8,922,960
Total		248,784,473
Total		1,861
Total		5,711
Minimum	34	cfs
Maximum	113	cfs
Average	93	cfs

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
10/1/11	--	--	--	--	--	--	--	--
10/2/11	--	--	--	--	--	--	--	--
10/3/11	--	--	--	--	--	--	--	--
10/4/11	7:30	NDSWC	NA	8.47	544	563	--	7
10/5/11	14:30	NDSWC	NA	8.58	591	569	--	7
10/6/11	8:45	NDSWC	NA	8.51	588	574	--	7
10/7/11	--	--	--	--	--	--	--	--
10/8/11	--	--	--	--	--	--	--	--
10/9/11	--	--	--	--	--	--	--	--
10/10/11	13:45	NDSWC	NA	8.5	610	583	--	7
10/11/11	13:30	NDSWC	NA	8.56	574	591	--	7
10/12/11	7:45	NDSWC	NA	8.48	557	582	--	7
10/13/11	--	--	--	--	--	--	--	--
10/14/11	--	--	--	--	--	--	--	--
10/15/11	--	--	--	--	--	--	--	--
10/16/11	--	--	--	--	--	--	--	--
10/17/11	8:30	NDSWC	NA	8.68	562	564	--	7
10/18/11	--	--	--	--	--	--	--	--
10/19/11	8:10	NDSWC	NA	8.52	558	560	--	7
10/20/11	--	--	--	--	--	--	--	--
10/21/11	--	--	--	--	--	--	--	--
10/22/11	--	--	--	--	--	--	--	--
10/23/11	--	--	--	--	--	--	--	--
10/24/11	14:00	NDSWC	NA	8.66	551	555	--	7
10/25/11	8:20	NDSWC	NA	8.51	556	555	--	7
10/26/11	8:20	NDSWC	NA	8.77	551	553	--	7
10/27/11	14:15	NDSWC	NA	8.81	551	552	--	7
10/28/11	--	--	--	--	--	--	--	--
10/29/11	--	--	--	--	--	--	--	--
10/30/11	--	--	--	--	--	--	--	--
10/31/11	9:00	NDSWC	NA	8.76	552	553	--	7
Minimum				8.47	544	552	NS	
Maximum				8.81	610	591	NS	
Average				8.60	565	566	NS	

NA - Not Available
NS - Not Sampled

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
10/1/11	10/31/11

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.39	8.72	8.54	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1,360	1,460	1,409	umho/cm	Continuous	Recorder
SULFATE	288	345	318	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	291	342	315	mg/L	4 x Week	GRAB
FLOW, INSTREAM	44	80	51	cfs	Continuous	Recorder
SIGNATURE				11/23/11	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

**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)
10/1/11	77	1,360
10/2/11	69	1,370
10/3/11	64	1,380
10/4/11	59	1,380
10/5/11	55	1,390
10/6/11	51	1,400
10/7/11	49	1,410
10/8/11	46	1,420
10/9/11	46	1,420
10/10/11	48	1,420
10/11/11	49	1,430
10/12/11	46	1,440
10/13/11	46	1,440
10/14/11	47	1,440
10/15/11	47	1,440
10/16/11	46	1,440
10/17/11	45	1,440
10/18/11	44	1,460
10/19/11	44	1,460
10/20/11	44	1,460
10/21/11	44	1,450
10/22/11	44	1,450
10/23/11	45	1,440
10/24/11	45	1,440
10/25/11	46	1,440
10/26/11	51	1,440
10/27/11	53	1,440
10/28/11	53	1,430
10/29/11	54	1,430
10/30/11	56	1,430
10/31/11	80	1,440
Minimum	44	1,360
Maximum	80	1,460
Average	51	1,427

**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
10/1/11	--	--	--	--	--	--	--	--
10/2/11	--	--	--	--	--	--	--	--
10/3/11	--	--	--	--	--	--	--	--
10/4/11	7:45	NDSWC	1,360	8.39	308	311	--	7
10/5/11	14:45	NDSWC	1,360	8.5	326	317	--	7
10/6/11	8:30	NDSWC	1,370	8.45	323	319	--	7
10/7/11	--	--	--	--	--	--	--	--
10/8/11	--	--	--	--	--	--	--	--
10/9/11	--	--	--	--	--	--	--	--
10/10/11	14:00	NDSWC	1,380	8.47	327	325	--	7
10/11/11	13:45	NDSWC	1,390	8.55	317	322	--	7
10/12/11	8:05	NDSWC	1,400	8.45	306	317	--	7
10/13/11	--	--	--	--	--	--	--	--
10/14/11	--	--	--	--	--	--	--	--
10/15/11	--	--	--	--	--	--	--	--
10/16/11	--	--	--	--	--	--	--	--
10/17/11	8:15	NDSWC	1,440	8.66	312	309	--	7
10/18/11	--	--	--	--	--	--	--	--
10/19/11	8:25	NDSWC	1,460	8.49	312	312	--	7
10/20/11	--	--	--	--	--	--	--	--
10/21/11	--	--	--	--	--	--	--	--
10/22/11	--	--	--	--	--	--	--	--
10/23/11	--	--	--	--	--	--	--	--
10/24/11	14:15	NDSWC	1,440	8.59	288	300	--	7
10/25/11	8:35	NDSWC	1,440	8.43	294	291	21	7
10/26/11	8:00	NDSWC	1,430	8.67	345	309	--	7
10/27/11	14:30	NDSWC	1,430	8.71	339	317	--	7
10/28/11	--	--	--	--	--	--	--	--
10/29/11	--	--	--	--	--	--	--	--
10/30/11	--	--	--	--	--	--	--	--
10/31/11	8:45	NDSWC	1,420	8.72	343	342	--	7
Minimum			1,360	8.39	288	291	21	
Maximum			1,460	8.72	345	342	21	
Average			1,409	8.54	318	315	21	

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
10/1/11	10/31/11

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.46	8.83	8.61	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1,590	1,710	1,657	umho/cm	Continuous	Recorder
SULFATE	449	498	473	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	444	491	472	mg/L	4 x Week	GRAB
FLOW, INSTREAM	95	166	139	cfs	Continuous	Recorder
SIGNATURE				11/23/11	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

**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)
10/1/11	150	1,580
10/2/11	143	1,600
10/3/11	137	1,610
10/4/11	132	1,620
10/5/11	126	1,640
10/6/11	125	1,660
10/7/11	121	1,670
10/8/11	113	1,670
10/9/11	113	1,670
10/10/11	119	1,660
10/11/11	95	1,670
10/12/11	99	1,670
10/13/11	113	1,680
10/14/11	112	1,680
10/15/11	135	1,700
10/16/11	149	1,710
10/17/11	148	1,710
10/18/11	148	1,710
10/19/11	150	1,710
10/20/11	153	1,720
10/21/11	154	1,710
10/22/11	151	1,720
10/23/11	151	1,690
10/24/11	153	1,690
10/25/11	156	1,690
10/26/11	160	1,700
10/27/11	159	1,700
10/28/11	160	1,690
10/29/11	160	1,700
10/30/11	162	1,690
10/31/11	166	1,690
Minimum	95	1,580
Maximum	166	1,720
Average	139	1,678

**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
10/1/11	--	--	--	--	--	--	--	--
10/2/11	--	--	--	--	--	--	--	--
10/3/11	--	--	--	--	--	--	--	--
10/4/11	8:15	NDSWC	1,600	8.5	449	444	--	7
10/5/11	15:15	NDSWC	1,620	8.55	474	453	--	7
10/6/11	8:00	NDSWC	1,630	8.54	475	466	--	7
10/7/11	--	--	--	--	--	--	--	--
10/8/11	--	--	--	--	--	--	--	--
10/9/11	--	--	--	--	--	--	--	--
10/10/11	14:30	NDSWC	1,640	8.57	478	469	--	7
10/11/11	14:15	NDSWC	1,640	8.61	459	472	--	7
10/12/11	8:40	NDSWC	1,650	8.51	482	474	--	7
10/13/11	--	--	--	--	--	--	--	--
10/14/11	--	--	--	--	--	--	--	--
10/15/11	--	--	--	--	--	--	--	--
10/16/11	--	--	--	--	--	--	--	--
10/17/11	7:45	NDSWC	1,710	8.72	480	474	--	7
10/18/11	--	--	--	--	--	--	--	--
10/19/11	8:55	NDSWC	1,710	8.5	498	489	--	7
10/20/11	--	--	--	--	--	--	--	--
10/21/11	--	--	--	--	--	--	--	--
10/22/11	--	--	--	--	--	--	--	--
10/23/11	--	--	--	--	--	--	--	--
10/24/11	14:45	NDSWC	1,680	8.61	483	491	--	7
10/25/11	9:15	NDSWC	1,680	8.46	484	488	23	7
10/26/11	7:30	NDSWC	1,700	8.73	460	476	--	7
10/27/11	15:00	NDSWC	1,590	8.83	464	473	--	7
10/28/11	--	--	--	--	--	--	--	--
10/29/11	--	--	--	--	--	--	--	--
10/30/11	--	--	--	--	--	--	--	--
10/31/11	8:15	NDSWC	1,690	8.79	461	467	--	7
Minimum			1,590	8.46	449	444	23	
Maximum			1,710	8.83	498	491	23	
Average			1,657	8.61	473	472	23	