



North Dakota State Water Commission

900 EAST BOULEVARD AVENUE, DEPT 770 • BISMARCK, NORTH DAKOTA 58505-0850
701-328-2750 • TTY 800-366-6888 • FAX 701-328-3696 • INTERNET: <http://swc.nd.gov>

October 28, 2011

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

RE: September 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 September 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 currently undergoing restorations to regain full functionality. Because of the restoration effort, sample frequency was inadvertently reduced during the reported period.

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

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

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
9/1/11	9/30/11

LOCATION: Benson Co, ND

Devils Lake Outlet discharged 4,610 ac-ft over 30 Days

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.47	8.82	8.60	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	NA	NA	NA	umho/cm	Continuous	Recorder
SULFATE	521	573	540	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	518	564	537	mg/L	4 x Week	GRAB
OUTLET DISCHARGE	41	86	78	cfs	Continuous	Recorder
SIGNATURE				10/28/11	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.						

NA - Not Available

Daily Outlet Discharge

Date	Average Daily Outlet Discharge (cfs)	Total Daily Volume (cu-ft)
9/1/11	80	6,920,221
9/2/11	82	7,046,278
9/3/11	41	3,552,960
9/4/11	80	6,930,347
9/5/11	79	6,785,161
9/6/11	80	6,875,525
9/7/11	82	7,112,179
9/8/11	84	7,255,819
9/9/11	84	7,233,959
9/10/11	85	7,322,350
9/11/11	86	7,401,718
9/12/11	82	7,071,533
9/13/11	80	6,932,006
9/14/11	79	6,770,566
9/15/11	78	6,712,925
9/16/11	76	6,567,744
9/17/11	77	6,678,561
9/18/11	79	6,825,117
9/19/11	78	6,718,814
9/20/11	79	6,799,893
9/21/11	74	6,379,944
9/22/11	75	6,425,758
9/23/11	75	6,425,447
9/24/11	76	6,533,754
9/25/11	76	6,564,833
9/26/11	76	6,538,552
9/27/11	80	6,895,659
9/28/11	78	6,748,282
9/29/11	75	6,458,120
9/30/11	73	6,310,832
Total		200,794,855
Total		1,502
Total		4,610
Minimum	41	cfs
Maximum	86	cfs
Average	78	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
9/1/11	15:45	NDSWC	NA	8.55	522	518	--	7
9/2/11	--	--	--	--	--	--	--	--
9/3/11	--	--	--	--	--	--	--	--
9/4/11	--	--	--	--	--	--	--	--
9/5/11	--	--	--	--	--	--	--	--
9/6/11	9:45	NDSWC	NA	8.56	534	527	--	7
9/7/11	8:50	NDSWC	NA	8.58	524	527	20	7
9/8/11	15:00	NDSWC	NA	8.63	536	531	--	7
9/9/11	--	--	--	--	--	--	--	--
9/10/11	--	--	--	--	--	--	--	--
9/11/11	--	--	--	--	--	--	--	--
9/12/11	13:45	NDSWC	NA	8.6	543	534	--	7
9/13/11	14:15	NDSWC	NA	8.63	550	538	--	7
9/14/11	8:00	NDSWC	NA	8.55	540	542	102	7
9/15/11	15:00	NDSWC	NA	8.55	536	542	--	7
9/16/11	--	--	--	--	--	--	--	--
9/17/11	--	--	--	--	--	--	--	--
9/18/11	--	--	--	--	--	--	--	--
9/19/11	14:30	NDSWC	NA	8.56	534	540	--	7
9/20/11	14:00	NDSWC	NA	8.57	521	533	--	7
9/21/11	7:40	NDSWC	NA	8.49	527	530	31	7
9/22/11	--	--	--	--	--	--	--	--
9/23/11	--	--	--	--	--	--	--	--
9/24/11	--	--	--	--	--	--	--	--
9/25/11	--	--	--	--	--	--	--	--
9/26/11	--	--	--	--	--	--	--	--
9/27/11	7:50	NDSWC	NA	8.47	547	537	15	7
9/28/11	14:45	NDSWC	NA	8.82	573	560	--	7
9/29/11	17:10	NDSWC	NA	8.78	573	564	--	7
9/30/11	--	--	--	--	--	--	--	--
Minimum				8.47	521	518	15	
Maximum				8.82	573	564	102	
Average				8.60	540	537	42	

NA - Not Available

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
9/1/11	9/30/11

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.31	8.57	8.46	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1,140	1,490	1,405	umho/cm	Continuous	Recorder
SULFATE	268	411	324	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	273	406	313	mg/L	4 x Week	GRAB
FLOW, INSTREAM	27	91	52	cfs	Continuous	Recorder
SIGNATURE				10/28/11	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>						

**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)
9/1/11	53	NA
9/2/11	51	1,450
9/3/11	49	1,450
9/4/11	48	1,440
9/5/11	48	1,440
9/6/11	45	1,440
9/7/11	42	1,440
9/8/11	40	1,450
9/9/11	38	1,460
9/10/11	37	1,460
9/11/11	36	1,460
9/12/11	35	1,450
9/13/11	34	1,440
9/14/11	33	1,440
9/15/11	32	1,440
9/16/11	30	1,450
9/17/11	28	1,450
9/18/11	27	1,450
9/19/11	27	1,450
9/20/11	38	1,430
9/21/11	67	1,470
9/22/11	85	1,450
9/23/11	91	1,460
9/24/11	84	1,440
9/25/11	75	1,410
9/26/11	72	1,400
9/27/11	83	1,370
9/28/11	87	1,390
9/29/11	75	1,350
9/30/11	69	1,340
Minimum	27	1,340
Maximum	91	1,470
Average	52	1,442

NA - Not available

**Water Quality Results of the samples collected from the upstream location near Flora
 Shyenne 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
9/1/11	16:00	NDSWC	NA	8.31	278	279	--	7
9/2/11	--	--	--	--	--	--	--	--
9/3/11	--	--	--	--	--	--	--	--
9/4/11	--	--	--	--	--	--	--	--
9/5/11	--	--	--	--	--	--	--	--
9/6/11	9:30	NDSWC	1,440	8.39	272	278	--	7
9/7/11	8:30	NDSWC	1,440	8.43	268	273	53	7
9/8/11	15:15	NDSWC	1,450	8.57	281	274	--	7
9/9/11	--	--	--	--	--	--	--	--
9/10/11	--	--	--	--	--	--	--	--
9/11/11	--	--	--	--	--	--	--	--
9/12/11	14:00	NDSWC	1,450	8.54	275	274	--	7
9/13/11	14:30	NDSWC	1,440	8.5	280	276	--	7
9/14/11	8:15	NDSWC	1,140	8.48	280	279	18	7
9/15/11	15:15	NDSWC	1,440	8.46	411	312	--	7
9/16/11	--	--	--	--	--	--	--	--
9/17/11	--	--	--	--	--	--	--	--
9/18/11	--	--	--	--	--	--	--	--
9/19/11	14:45	NDSWC	1,450	8.47	407	345	--	7
9/20/11	14:15	NDSWC	1,420	8.46	401	375	--	7
9/21/11	8:00	NDSWC	1,490	8.44	405	406	50	7
9/22/11	--	--	--	--	--	--	--	--
9/23/11	--	--	--	--	--	--	--	--
9/24/11	--	--	--	--	--	--	--	--
9/25/11	--	--	--	--	--	--	--	--
9/26/11	--	--	--	--	--	--	--	--
9/27/11	8:10	NDSWC	1,380	8.46	312	359	17	7
9/28/11	16:50	NDSWC	1,390	8.45	346	329	--	7
9/29/11	17:20	NDSWC	1,340	8.49	314	324	--	7
9/30/11	--	--	--	--	--	--	--	--
Minimum			1,140	8.31	268	273	17	
Maximum			1,490	8.57	411	406	53	
Average			1,405	8.46	324	313	35	

NA - Not Available

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
9/1/11	9/30/11

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.13	8.85	8.55	SU	4 x Week	GRAB
SPECIFIC CONDUCTANCE	1,580	1,700	1,648	umho/cm	Continuous	Recorder
SULFATE	411	476	447	mg/L	4 x Week	GRAB
7 DAY AVERAGE OF SULFATE	404	466	443	mg/L	4 x Week	GRAB
FLOW, INSTREAM	111	179	139	cfs	Continuous	Recorder
SIGNATURE	 JONATHAN KELSCH, HEAD, CONSTRUCTION SECTION			10/28/11	701-328-4948	
NAME AND TITLE				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 downstream location near Bremen
USGS Gaging Station Data
Sheyenne River Below Devils Lake Outlet near Bremen**

Date	Streamflow (cfs)	EC (µS/cm)
9/1/11	149	1,620
9/2/11	144	1,620
9/3/11	126	1,630
9/4/11	117	1,610
9/5/11	135	1,640
9/6/11	137	1,640
9/7/11	133	1,650
9/8/11	129	1,650
9/9/11	127	1,660
9/10/11	125	1,660
9/11/11	123	1,670
9/12/11	122	1,670
9/13/11	118	1,670
9/14/11	117	1,680
9/15/11	116	1,680
9/16/11	117	1,690
9/17/11	117	1,690
9/18/11	116	1,690
9/19/11	111	1,700
9/20/11	133	1,660
9/21/11	147	1,640
9/22/11	161	1,670
9/23/11	176	1,640
9/24/11	179	1,630
9/25/11	170	1,620
9/26/11	162	1,610
9/27/11	160	1,600
9/28/11	172	1,580
9/29/11	168	1,580
9/30/11	155	1,580
Minimum	111	1,580
Maximum	179	1,700
Average	139	1,644

**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 (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
9/1/11	16:30	NDSWC	1,630	8.13	411	404	--	7
9/2/11	--	--	--	--	--	--	--	--
9/3/11	--	--	--	--	--	--	--	--
9/4/11	--	--	--	--	--	--	--	--
9/5/11	--	--	--	--	--	--	--	--
9/6/11	9:00	NDSWC	1,640	8.5	436	418	--	7
9/7/11	8:00	NDSWC	1,650	8.52	423	423	65	7
9/8/11	15:45	NDSWC	1,660	8.63	453	437	--	7
9/9/11	--	--	--	--	--	--	--	--
9/10/11	--	--	--	--	--	--	--	--
9/11/11	--	--	--	--	--	--	--	--
9/12/11	14:30	NDSWC	1,670	8.62	448	440	--	7
9/13/11	15:00	NDSWC	1,680	8.59	438	441	--	7
9/14/11	8:50	NDSWC	1,670	8.55	458	449	56	7
9/15/11	15:45	NDSWC	1,680	8.58	476	455	--	7
9/16/11	--	--	--	--	--	--	--	--
9/17/11	--	--	--	--	--	--	--	--
9/18/11	--	--	--	--	--	--	--	--
9/19/11	15:15	NDSWC	1,700	8.58	467	460	--	7
9/20/11	14:45	NDSWC	1,650	8.85	460	465	--	7
9/21/11	8:30	NDSWC	1,660	8.53	460	466	56	7
9/22/11	--	--	--	--	--	--	--	--
9/23/11	--	--	--	--	--	--	--	--
9/24/11	--	--	--	--	--	--	--	--
9/25/11	--	--	--	--	--	--	--	--
9/26/11	--	--	--	--	--	--	--	--
9/27/11	8:35	NDSWC	1,610	8.52	449	455	31	7
9/28/11	16:10	NDSWC	1,580	8.52	446	448	--	7
9/29/11	16:40	NDSWC	1,590	8.54	436	444	--	7
9/30/11	--	--	--	--	--	--	--	--
Minimum			1,580	8.13	411	404	31	
Maximum			1,700	8.85	476	466	65	
Average			1,648	8.55	447	443	52	