



North Dakota State Water Commission

900 EAST BOULEVARD AVENUE, DEPT 770 • BISMARCK, NORTH DAKOTA 58505-0850
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November 04, 2013

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

RE: September 2013 Devils Lake Outlets Monthly Discharge and Water Quality Report

Enclosed are the monthly discharge reports for the Devils Lake Outlets for the month of September 2013 and summaries of water quality sample results and flow data. The West End Outlet was operated at reduced capacity (200 cfs) due to a broken pump transformer. The East End was operated at full capacity (350 cfs) throughout the reporting period.

The attached tables contain average daily outlet discharges and water quality results from samples collected from the outlets and the corresponding upstream and downstream locations. Also included are average daily stream flow data and conductivity data obtained from the USGS gaging stations located upstream and downstream of the outlets.

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: WEST END OUTLET

FACILITY: Devils Lake Outlet Project

MONITORING PERIOD	
START DATE	END DATE
9/1/13	9/30/13

LOCATION: Benson Co, ND

Devils Lake West Outlet discharged 12,542 ac-ft over 30 Days

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.49	8.80	8.64	SU	2 x Week	GRAB
SPECIFIC CONDUCTANCE	NA	NA	NA	µS/cm	Continuous	Recorder
SULFATE	520	547	530	mg/L	2 x Week	GRAB
7 DAY AVERAGE OF SULFATE	522	536	529	mg/L	2 x Week	GRAB
OUTLET DISCHARGE	176	220	211	cfs	Continuous	Recorder
SIGNATURE				10/2/13	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.

Notes:

- ac-ft - Acre feet
- SU - Standard Units
- µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
- mg/L - Milligrams per liter or parts per million
- cfs - Cubic feet per second
- NA - Not available

OUTLET OPERATOR NAME/ADDRESS

NAME: ND State Water Commission
 ADDRESS: 900 E Boulevard Avenue,
 Bismarck ND 58505

MONTHLY DISCHARGE REPORT


LOCATION: EAST END OUTLET

FACILITY: Devils Lake Outlet Project

LOCATION: Ramsey, Benson, Nelson, ND

MONITORING PERIOD	
START DATE	END DATE
9/1/13	9/30/13

Devils Lake East Outlet discharged 21,545 ac-ft over 30 Days

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.44	8.69	8.57	SU	2 x Week	GRAB
SPECIFIC CONDUCTANCE	NA	NA	NA	µS/cm	Continuous	Recorder
SULFATE	896	977	930	mg/L	2 x Week	GRAB
7 DAY AVERAGE OF SULFATE	896	945	921	mg/L	2 x Week	GRAB
OUTLET DISCHARGE	345	367	362	cfs	Continuous	Recorder
SIGNATURE				10/2/13	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.						

Notes:

- ac-ft - Acre feet
- SU - Standard Units
- µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
- mg/L - Milligrams per liter or parts per million
- cfs - Cubic feet per second
- 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 WEST END OUTLET (FLORA)

FACILITY: Devils Lake Outlet Project

MONITORING PERIOD	
START DATE	END DATE
9/1/13	9/30/13

LOCATION: Benson Co, ND

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.32	8.73	8.41	SU	2 x Week	GRAB
SPECIFIC CONDUCTANCE	1,400	1,570	1,480	µS/cm	Continuous	Recorder
SULFATE	234	263	246	mg/L	2 x Week	GRAB
7 DAY AVERAGE OF SULFATE	239	256	246	mg/L	2 x Week	GRAB
FLOW, INSTREAM	27	61	47	cfs	Continuous	Recorder
SIGNATURE				10/2/13	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.

Notes:

- SU - Standard Units
- µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
- mg/L - Milligrams per liter or parts per million
- cfs - Cubic feet per second
- USGS streamflow and specific conductance data courtesy of the USGS
- USGS data are provisional and subject to revision

OUTLET OPERATOR NAME/ADDRESS

NAME: ND State Water Commission
 ADDRESS: 900 E Boulevard Avenue,
 Bismarck ND 58505


MONTHLY DISCHARGE REPORT

LOCATION: DOWNSTREAM OF THE WEST END OUTLET (BREMEN)
 UPSTREAM OF THE EAST END OUTLET

FACILITY: Devils Lake Outlet Project

LOCATION: Eddy Co, ND

MONITORING PERIOD	
START DATE	END DATE
9/1/13	9/30/13

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.43	8.76	8.55	SU	2 x Week	GRAB
SPECIFIC CONDUCTANCE	1,750	1,790	1,769	µS/cm	Continuous	Recorder
SULFATE	452	476	462	mg/L	2 x Week	GRAB
7 DAY AVERAGE OF SULFATE	452	467	460	mg/L	2 x Week	GRAB
FLOW, INSTREAM	227	272	251	cfs	Continuous	Recorder
SIGNATURE				10/2/13	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.

Notes:

- SU - Standard Units
- µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
- mg/L - Milligrams per liter or parts per million
- cfs - Cubic feet per second
- USGS streamflow and specific conductance data courtesy of the USGS
- USGS data are provisional and subject to revision

OUTLET OPERATOR NAME/ADDRESS

NAME: ND State Water Commission
 ADDRESS: 900 E Boulevard Avenue,
 Bismarck ND 58505


MONTHLY DISCHARGE REPORT

LOCATION: DOWNSTREAM OF THE EAST END OUTLET (PEKIN)

FACILITY: Devils Lake Outlet Project

MONITORING PERIOD	
START DATE	END DATE
9/1/13	9/30/13

LOCATION: Nelson Co, ND

PARAMETER	MINIMUM	MAXIMUM	AVERAGE	UNITS	SAMPLING FREQUENCY	TYPE
pH	8.43	8.62	8.51	SU	2 x Week	GRAB
SPECIFIC CONDUCTANCE	NA	NA	NA	µS/cm	Continuous	Recorder
SULFATE	686	721	695	mg/L	2 x Week	GRAB
7 DAY AVERAGE OF SULFATE	688	705	694	mg/L	2 x Week	GRAB
FLOW, INSTREAM	NA	NA	NA	cfs	Continuous	Recorder
SIGNATURE				10/2/13	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.

Notes:

- SU - Standard Units
- µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
- mg/L - Milligrams per liter or parts per million
- cfs - Cubic feet per second
- NA - Not available

**Daily Outlet Discharge and Upstream and Downstream Flows
Devils Lake Outlets**

Date	Above West End Outlet - Sheyenne River near Flora		West End Outlet		Below West End Outlet/Above East End Outlet -Sheyenne River near Bremen		East End Outlet		Below East End Outlet - Tolna Coulee near Tolna		Below East End Outlet - Sheyenne River near Cooperstown	
	Average Streamflow USGS Gage (cfs)	Average Specific Conductance USGS Gage (µS/cm)	Average Daily Outlet Discharge (cfs)	Total Daily Volume (ft³)	Average Streamflow USGS Gage (cfs)	Average Specific Conductance USGS Gage (µS/cm)	Average Daily Outlet Discharge (cfs)	Total Daily Volume (ft³)	Average Streamflow USGS Gage (cfs)	Average Specific Conductance USGS Gage (µS/cm)	Average Streamflow USGS Gage (cfs)	Average Specific Conductance USGS Gage (µS/cm)
9/1/13	59	1,550	220	18,982,000	272	1,780	365	31,498,000	355	2,780	726	2,320
9/2/13	60	1,550	219	18,964,000	268	1,780	365	31,497,000	352	2,770	724	2,320
9/3/13	58	1,570	215	18,602,000	268	1,780	365	31,499,000	356	2,760	726	2,300
9/4/13	57	1,560	219	18,963,000	264	1,780	367	31,687,000	357	2,760	722	2,290
9/5/13	55	1,560	220	18,975,000	264	1,780	345	29,819,000	356	2,750	713	2,300
9/6/13	52	1,560	193	16,695,000	256	1,780	364	31,466,000	361	2,770	705	2,320
9/7/13	50	1,550	219	18,915,000	239	1,770	364	31,462,000	351	2,790	696	2,340
9/8/13	47	1,550	218	18,851,000	256	1,780	365	31,493,000	366	2,790	692	2,340
9/9/13	52	1,520	195	16,844,000	260	1,770	365	31,495,000	369	2,770	708	2,310
9/10/13	56	1,490	176	15,166,000	244	1,750	364	31,470,000	365	2,760	707	2,310
9/11/13	54	1,480	196	16,927,000	227	1,760	364	31,433,000	-	2,800	705	2,350
9/12/13	57	1,470	212	18,290,000	237	1,760	365	31,557,000	358	2,840	709	2,360
9/13/13	61	1,480	219	18,919,000	251	1,760	366	31,615,000	349	2,840	710	2,380
9/14/13	61	1,480	217	18,714,000	265	1,760	366	31,586,000	345	2,850	719	2,340
9/15/13	58	1,460	212	18,305,000	266	1,760	365	31,515,000	359	2,840	720	2,300
9/16/13	57	1,440	209	18,100,000	260	1,760	365	31,515,000	353	2,840	703	2,330
9/17/13	57	1,430	209	18,036,000	260	1,750	349	30,171,000	353	2,840	691	2,350
9/18/13	52	1,420	211	18,239,000	261	1,750	363	31,386,000	357	2,840	693	2,350
9/19/13	48	1,410	209	18,065,000	258	1,750	362	31,308,000	361	2,850	700	2,360
9/20/13	45	1,400	212	18,279,000	252	1,750	364	31,437,000	358	2,840	707	2,350
9/21/13	42	1,400	213	18,443,000	249	1,760	365	31,547,000	351	2,840	712	2,340
9/22/13	38	1,410	214	18,485,000	249	1,760	367	31,687,000	347	2,850	712	2,340
9/23/13	36	1,430	215	18,585,000	247	1,780	367	31,737,000	343	2,850	710	2,330
9/24/13	32	1,450	215	18,593,000	240	1,780	352	30,447,000	345	2,850	710	2,320
9/25/13	31	-	206	17,801,000	236	1,780	355	30,712,000	344	2,850	708	2,320
9/26/13	30	-	212	18,355,000	238	1,790	361	31,199,000	339	-	705	2,320
9/27/13	29	1,410	212	18,359,000	234	1,780	361	31,181,000	349	-	709	2,310
9/28/13	29	1,460	212	18,275,000	234	1,770	360	31,094,000	357	-	715	2,290
9/29/13	29	1,470	212	18,311,000	231	1,780	359	31,027,000	349	-	721	2,270
Minimum	27	1400	176	15,166,000	227	1750	345	29,819,000	339	2750	691	2270
Maximum	61	1570	220	18,982,000	272	1790	367	31,737,000	369	2850	726	2380
Average	47	1480	211	18,210,600	251	1769	362	31,282,867	354	2813	710	2324
			Total (ft³)	546,318,000			Total (ft³)	938,486,000				
			Total (Mgal)	4,086			Total (Mgal)	7,020				
			Total (Ac-ft)	12,542			Total (Ac-ft)	21,545				

Notes:

- cfs - cubic feet per second
- µS/cm - Microsiemens per Centimeter at 25 degrees Celsius
- ft³ - cubic feet
- Mgal - Millions of Gallons
- Ac ft - Acre Feet
- USGS streamflow and specific conductance data are preliminary and courtesy of the USGS
- NC - Not calculated

Sheyenne River Upstream of West End Outlet near Flora
Monthly Water Quality Summary
Devils Lake Outlet Discharge Report

Date	Time	Specific Conductance USGS Gage (μ S/cm)	pH	Sulfate (mg/L)	7 Day Rolling Average of Sulfate (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling Average
9/1/13	-	-	-	-	-	-	-
9/2/13	-	-	-	-	-	-	-
9/3/13	8:35	1,560	8.33	249	249	85	7
9/4/13	-	-	-	-	-	-	-
9/5/13	9:00	1,550	8.38	263	256	NA	7
9/6/13	-	-	-	-	-	-	-
9/7/13	-	-	-	-	-	-	-
9/8/13	-	-	-	-	-	-	-
9/9/13	-	-	-	-	-	-	-
9/10/13	8:00	1,490	8.32	240	252	NA	7
9/11/13	-	-	-	-	-	-	-
9/12/13	-	-	-	-	-	-	-
9/13/13	-	-	-	-	-	-	-
9/14/13	-	-	-	-	-	-	-
9/15/13	-	-	-	-	-	-	-
9/16/13	-	-	-	-	-	-	-
9/17/13	8:25	1,430	8.32	243	243	66	7
9/18/13	-	-	-	-	-	-	-
9/19/13	10:00	1,410	8.33	234	239	NA	-
9/20/13	-	-	-	-	-	-	-
9/21/13	-	-	-	-	-	-	-
9/22/13	-	-	-	-	-	-	-
9/23/13	-	-	-	-	-	-	-
9/24/13	7:55	1,450	8.43	244	239	NA	7
9/25/13	10:27	1,450	8.73	247	242	NA	7
9/26/13	-	-	-	-	-	-	-
9/27/13	-	-	-	-	-	-	-
9/28/13	-	-	-	-	-	-	-
9/29/13	-	-	-	-	-	-	-
9/30/13	-	-	-	-	-	-	-
Minimum		1,410	8.32	234	239	66	
Maximum		1,560	8.73	263	256	85	
Average		1,477	8.41	246	246	76	

Notes:

μ S/cm - Microsiemens per Centimeter at 25 degrees Celsius
mg/L - Milligrams per liter or parts per million
NA - Not Analyzed
USGS specific conductance data courtesy of the USGS
USGS data are provisional and subject to revision
Italic font denotes preliminary result



**West End Outlet
Monthly Water Quality Summary
Devils Lake Outlet Discharge Report**

Date	Time	pH	Sulfate (mg/L)	7 Day Rolling Average of Sulfate (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling Average
9/1/13	-	-	-	-	-	-
9/2/13	-	-	-	-	-	-
9/3/13	8:50	8.49	524	524	16	7
9/4/13	-	-	-	-	-	-
9/5/13	8:40	8.67	547	536	NA	7
9/6/13	-	-	-	-	-	-
9/7/13	-	-	-	-	-	-
9/8/13	-	-	-	-	-	-
9/9/13	-	-	-	-	-	-
9/10/13	8:11	8.58	520	534	NA	7
9/11/13	-	-	-	-	-	-
9/12/13	-	-	-	-	-	-
9/13/13	-	-	-	-	-	-
9/14/13	-	-	-	-	-	-
9/15/13	-	-	-	-	-	-
9/16/13	-	-	-	-	-	-
9/17/13	8:35	8.61	522	522	23	7
9/18/13	-	-	-	-	-	-
9/19/13	9:45	8.71	534	528	NA	7
9/20/13	-	-	-	-	-	-
9/21/13	-	-	-	-	-	-
9/22/13	-	-	-	-	-	-
9/23/13	-	-	-	-	-	-
9/24/13	8:12	8.64	525	530	NA	7
9/25/13	10:40	8.80	537	532	NA	7
9/26/13	-	-	-	-	-	-
9/27/13	-	-	-	-	-	-
9/28/13	-	-	-	-	-	-
9/29/13	-	-	-	-	-	-
9/30/13	-	-	-	-	-	-
Minimum		8.49	520	522	16	
Maximum		8.80	547	536	23	
Average		8.64	530	529	19.5	

Notes:

mg/L - Milligrams per liter or parts per million
 NA - Not Analyzed
 Italic font denotes preliminary result



**Sheyenne River Downstream of West End Outlet/Upstream of East End Outlet near Bremen
Monthly Water Quality Summary
Devils Lake Outlet Discharge Report**

Date	Time	Specific Conductance USGS Gage (μS/cm)	pH	Sulfate (mg/L)	7 Day Rolling Average of Sulfate (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling Average
9/1/13	-	-	-	-	-	-	-
9/2/13	-	-	-	-	-	-	-
9/3/13	8:15	1,780	8.43	452	452	98	7
9/4/13	-	-	-	-	-	-	-
9/5/13	9:20	0	8.57	476	464	NA	7
9/6/13	-	-	-	-	-	-	-
9/7/13	-	-	-	-	-	-	-
9/8/13	-	-	-	-	-	-	-
9/9/13	-	-	-	-	-	-	-
9/10/13	7:40	1,760	8.46	454	465	NA	7
9/11/13	-	-	-	-	-	-	-
9/12/13	-	-	-	-	-	-	-
9/13/13	-	-	-	-	-	-	-
9/14/13	-	-	-	-	-	-	-
9/15/13	-	-	-	-	-	-	-
9/16/13	-	-	-	-	-	-	-
9/17/13	7:40	1,750	8.50	453	453	75	7
9/18/13	-	-	-	-	-	-	-
9/19/13	10:20	0	8.56	455	454	NA	7
9/20/13	-	-	-	-	-	-	-
9/21/13	-	-	-	-	-	-	-
9/22/13	-	-	-	-	-	-	-
9/23/13	-	-	-	-	-	-	-
9/24/13	7:30	1,780	8.55	470	463	NA	7
9/25/13	10:00	1,780	8.76	476	467	NA	7
9/26/13	-	-	-	-	-	-	-
9/27/13	-	-	-	-	-	-	-
9/28/13	-	-	-	-	-	-	-
9/29/13	-	-	-	-	-	-	-
9/30/13	-	-	-	-	-	-	-
Minimum		0	8.43	452	452	75	
Maximum		1,780	8.76	476	467	98	
Average		1,264	8.55	462	460	87	

Notes:

μ S/cm - Microsiemens per Centimeter at 25 degrees Celsius
mg/L - Milligrams per liter or parts per million
NA - Not Analyzed
USGS specific conductance data courtesy of the USGS
USGS data are provisional and subject to revision
Italic font denotes preliminary result



**East End Outlet
Monthly Water Quality Summary
Devils Lake Outlet Discharge Report**

Date	Time	pH	Sulfate (mg/L)	7 Day Rolling Average of Sulfate (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling Average
9/1/13	-	-	-	-	-	-
9/2/13	-	-	-	-	-	-
9/3/13	10:10	8.44	896	896	<5	7
9/4/13	-	-	-	-	-	-
9/5/13	10:30	8.64	922	909	NA	7
9/6/13	-	-	-	-	-	-
9/7/13	-	-	-	-	-	-
9/8/13	-	-	-	-	-	-
9/9/13	-	-	-	-	-	-
9/10/13	9:25	8.53	957	940	NA	7
9/11/13	-	-	-	-	-	-
9/12/13	-	-	-	-	-	-
9/13/13	-	-	-	-	-	-
9/14/13	-	-	-	-	-	-
9/15/13	-	-	-	-	-	-
9/16/13	-	-	-	-	-	-
9/17/13	9:45	8.52	900	900	11	7
9/18/13	-	-	-	-	-	-
9/19/13	11:30	8.63	954	927	NA	7
9/20/13	-	-	-	-	-	-
9/21/13	-	-	-	-	-	-
9/22/13	-	-	-	-	-	-
9/23/13	-	-	-	-	-	-
9/24/13	9:25	8.51	903	929	NA	7
9/25/13	8:23	8.69	977	945	NA	7
9/26/13	-	-	-	-	-	-
9/27/13	-	-	-	-	-	-
9/28/13	-	-	-	-	-	-
9/29/13	-	-	-	-	-	-
9/30/13	-	-	-	-	-	-
Minimum		8.44	896	896	11	
Maximum		8.69	977	945	11	
Average		8.57	930	921	11	

Notes:

mg/L - Milligrams per liter or parts per million
 NA - Not Analyzed due to operation constraints
 Italic font denotes preliminary result



**Sheyenne River Downstream of East End Outlet near Pekin
Monthly Water Quality Summary
Devils Lake Outlet Discharge Report**

Date	Time	pH	Sulfate (mg/L)	7 Day Rolling Average of Sulfate (mg/L)	Total Suspended Solids (mg/L)	No. of days included in the 7 day Rolling Average
9/1/13	-	-	-	-	-	-
9/2/13	-	-	-	-	-	-
9/3/13	10:30	8.44	689	689	52	7
9/4/13	-	-	-	-	-	-
9/5/13	1:10	8.55	721	705	NA	7
9/6/13	-	-	-	-	-	-
9/7/13	-	-	-	-	-	-
9/8/13	-	-	-	-	-	-
9/9/13	-	-	-	-	-	-
9/10/13	9:50	8.46	687	704	NA	7
9/11/13	-	-	-	-	-	-
9/12/13	-	-	-	-	-	-
9/13/13	-	-	-	-	-	-
9/14/13	-	-	-	-	-	-
9/15/13	-	-	-	-	-	-
9/16/13	-	-	-	-	-	-
9/17/13	10:15	8.43	690	690	51	7
9/18/13	-	-	-	-	-	-
9/19/13	12:00	8.55	686	688	NA	-
9/20/13	-	-	-	-	-	-
9/21/13	-	-	-	-	-	-
9/22/13	-	-	-	-	-	-
9/23/13	-	-	-	-	-	-
9/24/13	9:50	8.51	697	692	NA	7
9/25/13	8:00	8.62	697	693	NA	7
9/26/13	-	-	-	-	-	-
9/27/13	-	-	-	-	-	-
9/28/13	-	-	-	-	-	-
9/29/13	-	-	-	-	-	-
9/30/13	-	-	-	-	-	-
Minimum		8.43	686	688	51	
Maximum		8.62	721	705	52	
Average		8.51	695	694	52	

Notes:

mg/L - Milligrams per liter or parts per million
 NA - Not Analyzed
 Italic font denotes preliminary result

