St. Croix River Data Report
Summer 2004 Survey
August 2005
DEPLW0721

Prepared by David Miller, P.E.
Bureau of Land and Water Quality
Division of Environmental Assessment

TABLE OF CONTENTS

FIGURES

Project Description

The St. Croix River, located in eastern Maine, forms the international boundary between Canada and the United States for 68 miles. The river has a drainage area of 1631 square miles at its mouth where it flows into Passamaquoddy Bay. The river is regulated from the substantial storage of the Grand and Spednik Lakes in the upper part of the basin. The upper 50 miles of the river above the Grand Falls dam is generally pristine in nature and is classified A. The lower part of the river from Woodland Lake to tidewater is classified C.

Licensed discharges to the river include the Domtar mill and Baileyville in Woodland (Baileyville). Calais discharges to tidewater.

It was proposed to collect sufficient water quality data to update an existing water quality model, which was developed in 1986, for the St. Croix River. The study area includes the reach of the St. Croix River from the Woodland dam to the Milltown dam a distance of approximately 9.4 miles. See Figure 1 for the site map. Refer to the St. Croix River Work Plan July 2004 for the detailed design of the study.

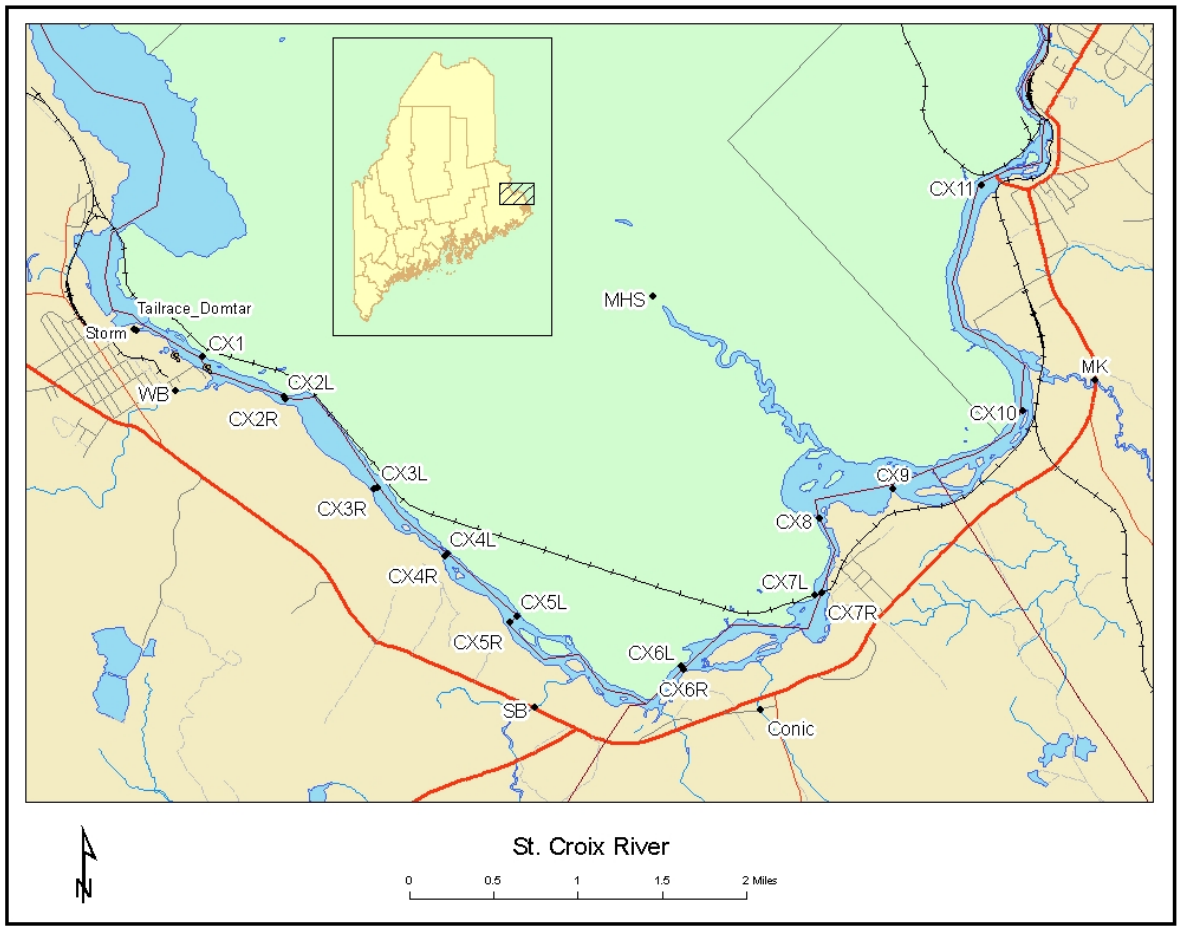


Figure 1: Site Map

This report presents the data collected during the 2004 survey. The river was sampled July 26 through 30, with the bulk of the intensive sampling being made July 27-29. Initial tributary DO[1]/temperature sampling as well as flow measurement was made on the 26th. An additional day of DO/temperature/conductivity sampling was made on the 30th. A significant rain event occurred during the morning of July 28. The main stem flow did not substantially increase until after the day's sampling was completed although most tributaries did exhibit an increase in flow during sampling.

The 2004 data are included in the appendix. See the table of contents on page 7.

Discussion

Two samples were taken at each mainstem site below the discharges (Domtar and Baileyville) and above Baring (CX2 – CX7), one toward the Canadian side (left) and one toward the US side (right) of the river. All parameters measured depicted a significant difference in value between the two locations due to the incomplete mixing of the discharges.

Figure 2 shows the average morning DO concentrations along the main stem. The DO on the US side fell below the 5 mg/l standard for class C. Figure 3 shows the average daily diurnal DO range for the survey. In general, the diurnal range is not excessive and reflects the low chl-a[2] concentrations measured in the river.

Figure 4 shows the instream CBODu[3] measurements. The results indicate significantly elevated concentrations along the US side and elevated concentrations below the rips at Baring.

Nutrient loading to the river is reflected in the ambient measurements of TP[4] and TN[5] shown in Figures 5 and 6 respectively.

[1] Dissolved oxygen
[2] A measure of phytoplankton or floating algae
[3] Ultimate carbonaceous biochemical oxygen demand, a measure of organic matter
[4] Total phosphorous
[5] Total nitrogen

Figure 2: Average AM DO

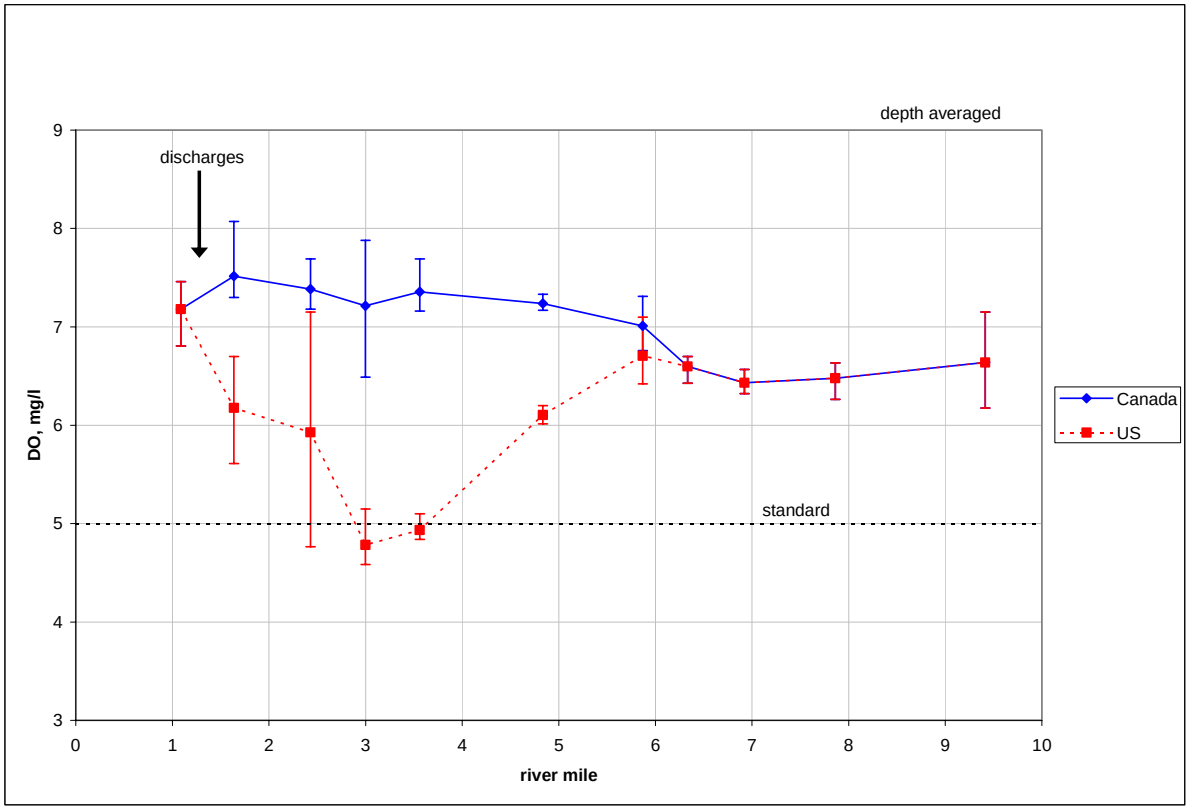


Figure 3: Average Daily Diurnal DO

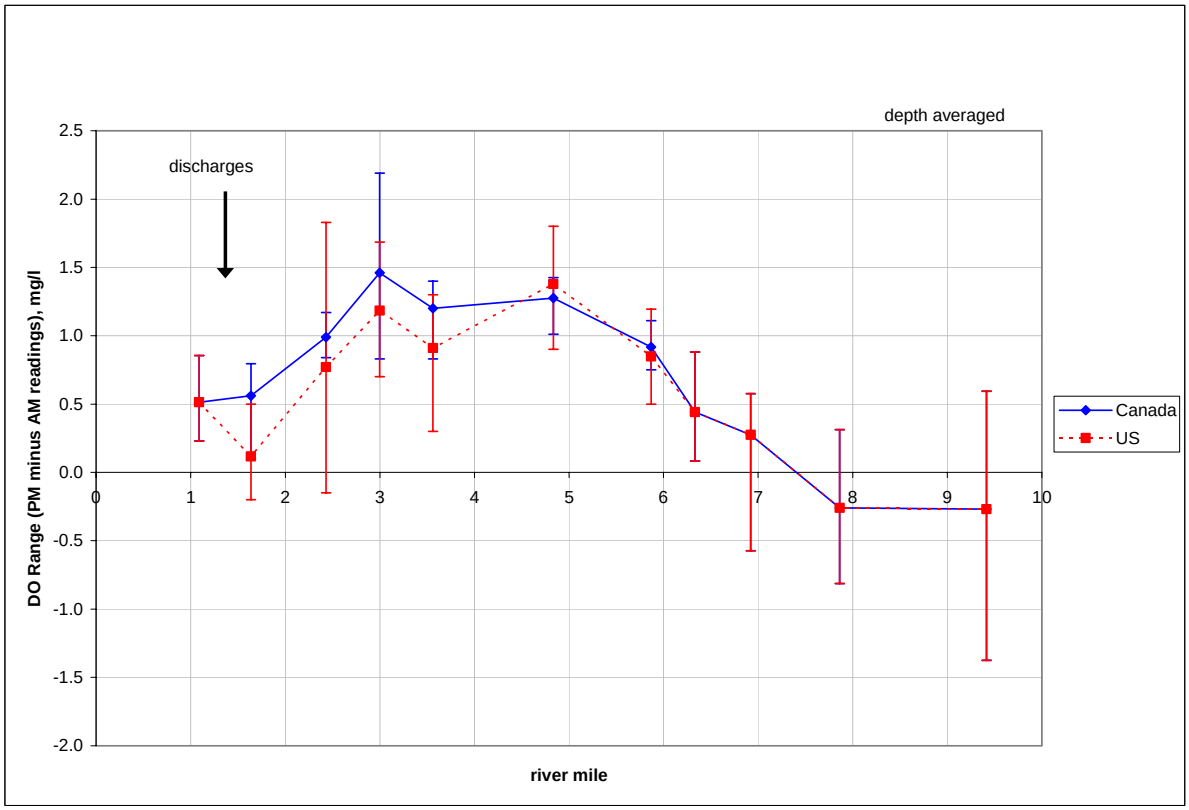


Figure 4: CBODu

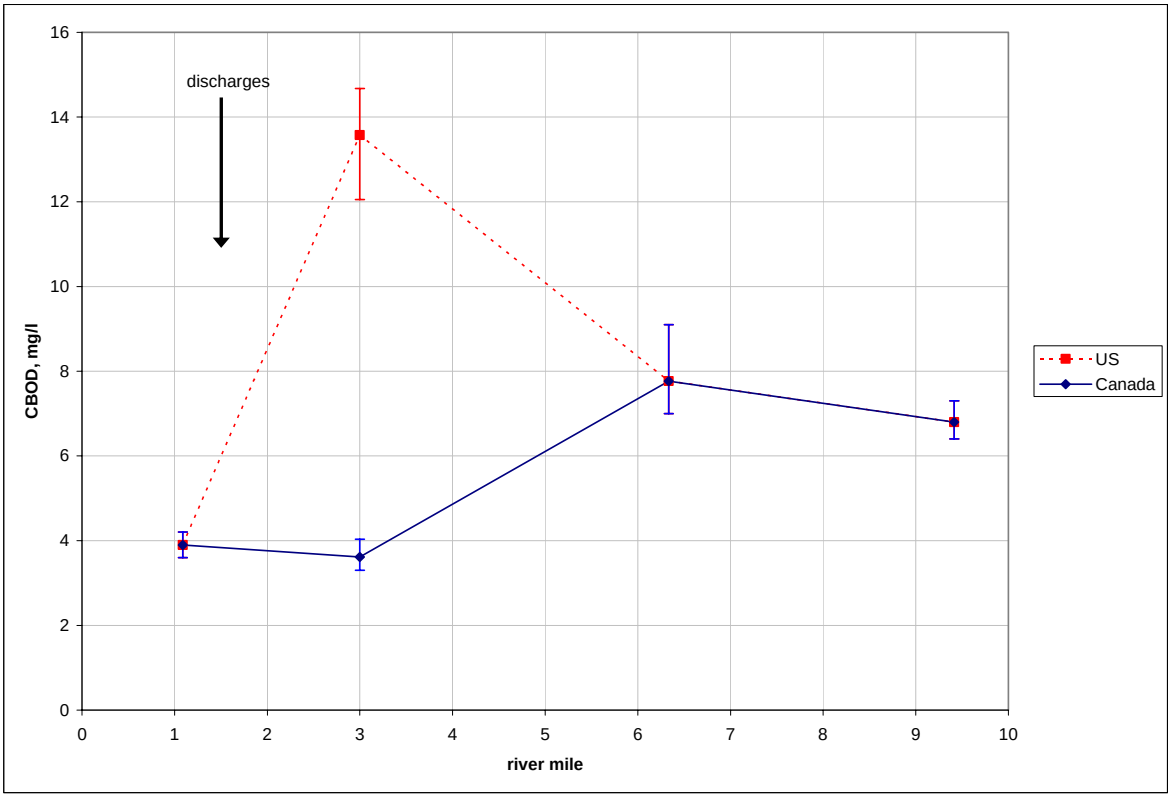


Figure 5: TP

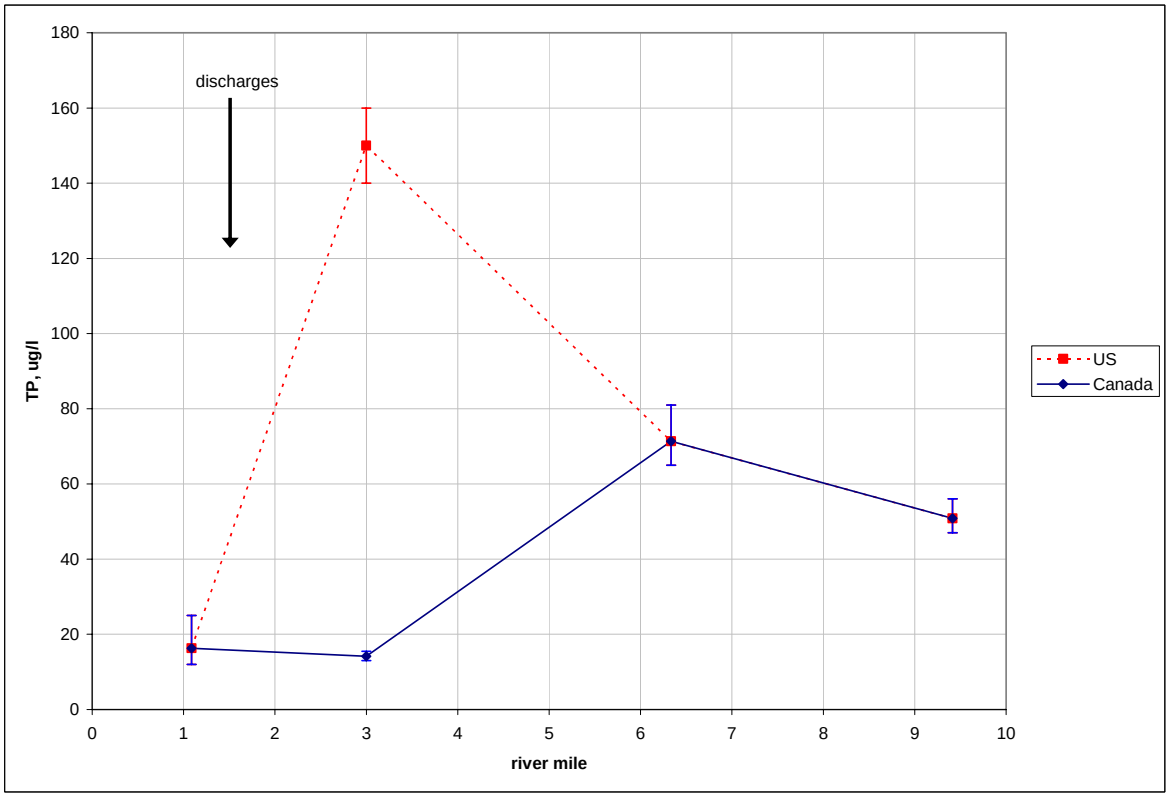
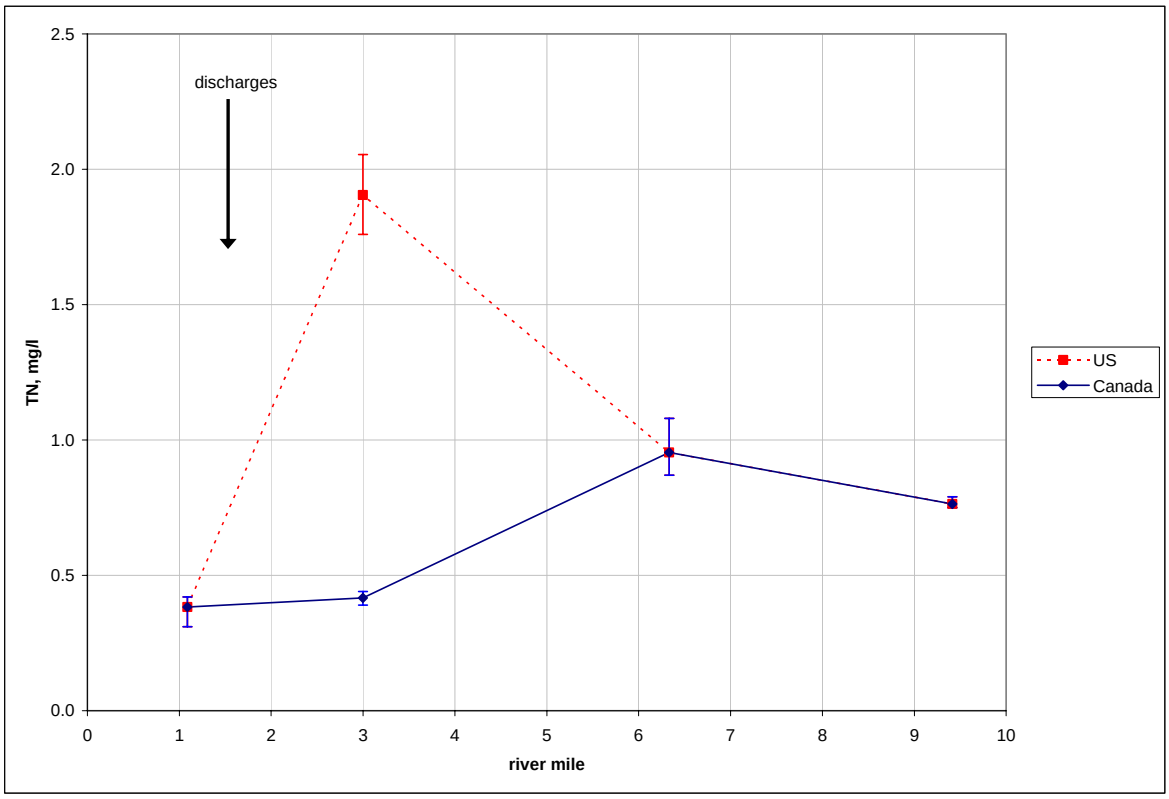


Figure 6: TN



In general, the mainstem sampling did not indicate an impact from the rain event on the second day (28th) although the TP at CX1 and CX8 were higher on that day. Tributary WB showed a large increase in phosphorous loading (suspended solids were also high) during the second day when compared to the results of the first sample day. Elevated TP and SS were also measured in the storm water pipe within the mill during the rain. The other tributaries did not show the high concentrations of TP and solids possibly because they are not located within an "urban" area and they serve as outlets from wetland areas.

It was noted that lab conductivity measurements on the Domtar effluent appeared to be low by a factor of 1000 (1.4 vs 1400 umhos/cm). Conductivity measurements made as part of toxic rule requirements over several years show the effluent to be consistently above 1000+ umhos/cm (see data on page A8).

Loading from the licensed dischargers during the survey was less than permit limits. Figures 7 and 8 show the survey BOD5 loading and discharge flow in terms of percent of permit limits.

Figure 7: BOD5 Loading

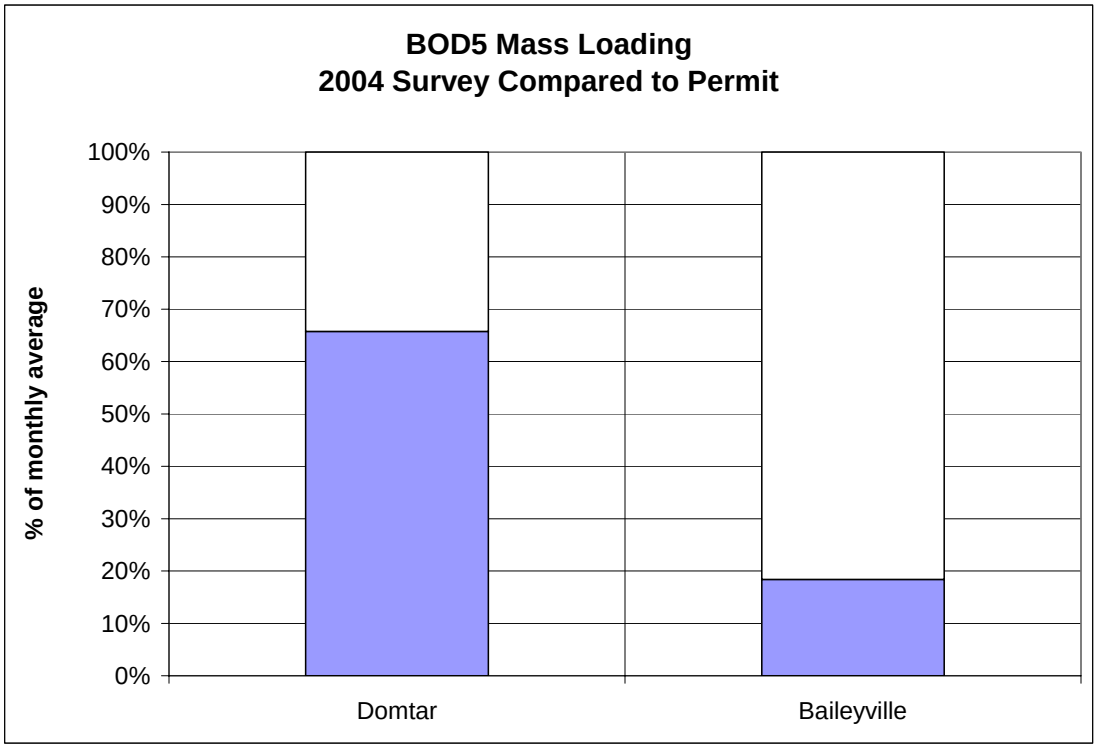
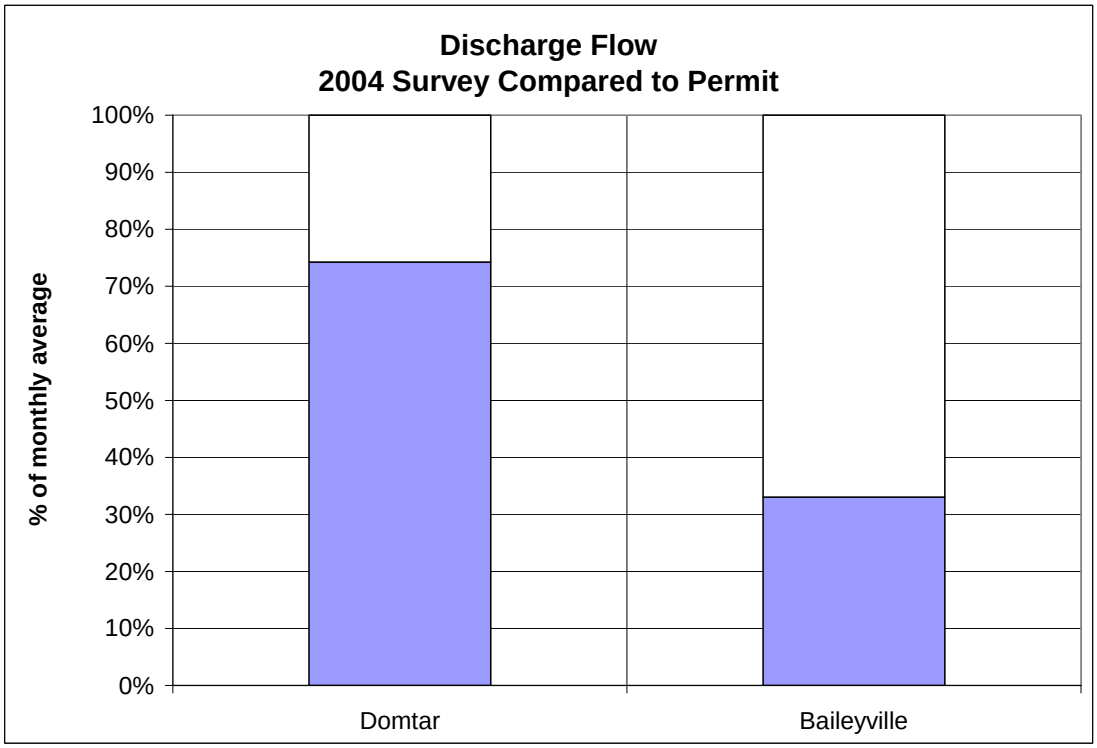


Figure 8: Discharge Flow



Appendix

Site Coordinates

Site	UTM, meters		Comment
	Northing	Easting	
Tailrace_Domtar	5001769.7	625586.2	Dam Tailrace
Storm	5001759.4	625608.1	Storm Pipe
WB	5001177.3	625976.6	Wapsaconhagan Brook
Domtar	5001511.8	625987.8	outfall
Bail	5001397.0	626293.8	outfall
CX1	5001504.9	626237.1	mainstem
CX2L	5001126.0	627021.6	mainstem Canadian side
CX2R	5001101.1	627025.1	mainstem US side
CX3L	5000259.2	627910.3	mainstem Canadian side
CX3R	5000240.2	627876.4	mainstem US side
CX4L	4999625.7	628570.4	mainstem Canadian side
CX4R	4999603.4	628547.9	mainstem US side
CX5L	4999027.0	629241.0	mainstem Canadian side
CX5R	4998970.9	629170.8	mainstem US side
SB	4998152.3	629408.7	Stoney Brook, Rt. 1 bridge
MHS	5002082.1	630543.0	Mohannas Stream, Canada
CX6L	4998547.8	630810.0	mainstem Canadian side
CX6R	4998514.5	630834.8	mainstem US side
Conic	4998139.0	631567.6	Conic Stream
CX7L	4999225.5	632087.7	mainstem Canadian side
CX7R	4999249.2	632150.2	mainstem US side
CX8	4999957.7	632129.9	mainstem
CX9	5000249.0	632830.9	mainstem
CX11	5003144.2	633677.6	mainstem
CX10	5000996.4	634073.6	mainstem
MK	5001283.6	634761.0	Magurrewock Stream, Rt.1 bridge

Site Rivermiles

site	feet	rivermile
RR bridge above Domtar	0	0
dam	3632	0.69
tailrace	3640	0.69
storm pipe	3846	0.73
Domtar discharge	5173	0.98
CX1	5746	1.09
Baileyville discharge	6074	1.15
Wapsaconhagan Brook	6509	1.23
CX2	8644	1.64
CX3	12832	2.43
CX4	15833	3.00
CX5	18802	3.56
Stony Brook	21663	4.10
CX6	25528	4.83
Conic Stream	28140	5.33
RR bridge, CX7	30988	5.87
CX8	33435	6.33
Mohannas Stream	34993	6.63
CX9	36550	6.92
CX10	41507	7.86
Magurrewock Stream	43221	8.19
CX11	49707	9.41
RR bridge	52863	10.01
Calais dam	53346	10.10

Field Measurements

Date: 07/26/04						
Station	Time	Depth m	CND umhos/cm	DO mg/l	Temp ^{o}C	% Sat
WB	15:15	mid	80	8.2	25.2	100%
SB	15:40	mid	82	4.1	23.8	49%
MK	16:20	mid	32	8.2	25.3	100%
Conic	15:53	mid	25	8.4	19.8	92%

Date:	07/27/04					
Station	Time	Depth m	CND umhos/cm	DO mg/l	Temp °C	% Sat
CX1	06:40	0	30	7.4	22.6	85%
		1	-	7.2	22.6	84%
	13:31	0	30	7.8	23.1	91%
		1	-	7.8	22.9	90%
CX2L	07:04	0	30	7.3	22.4	84%
		1	-	7.3	22.4	84%
	13:44	0	30	8.1	23.2	95%
		1	-	8.1	23.3	95%
CX2R	07:00	mid	150	6.7	22.8	78%
	13:45	0	330	6.7	24.1	80%
		1	-	6.5	24.2	78%
CX3L	07:33	mid	30	7.2	22.2	82%
	14:03	mid	31	8.3	23.2	97%
CX3R	07:23	0	30	7.2	22	82%
		1	-	7.1	22	81%
	14:00	0	170	7.0	23.9	83%
		1	-	7.0	23.8	83%
CX4L	07:53	mid	39	7.2	22.1	83%
	14:21	mid	44	8.6	23.4	101%
CX4R	07:45	0	290	5.2	22.8	60%
		1	-	5.1	22.7	59%
	14:15	mid	220	6.5	23.9	77%
CX5L	8:21	mid	39	7.4	21.9	84%
	14:34	mid	43	8.5	23.4	100%
CX5R	8:20	mid	275	4.9	22.4	56%
	14:32	mid	295	6.2	24.2	74%
CX6L	08:54	0	61	7.1	21.8	81%
		1	-	7.2	21.8	82%
	14:59	mid	77	8.5	23.5	100%
CX6R	8:50	mid	150	6.1	21.9	70%
	14:55	mid	170	7.4	23.7	87%
CX7L	09:26	mid	95	6.8	21.8	77%
	15:22	mid	96	7.8	23.1	91%
CX7R	09:20	mid	100	6.6	21.6	75%
	15:20	mid	100	7.7	23.1	90%
CX8	07:00	0	158	6.8	22	78%
		1	-	6.7	21.9	76%
		2	-	6.6	21.9	75%
	13:36	0	146	6.8	22.6	79%
		1	-	6.9	22.6	80%
		2	-	6.9	22.6	79%
CX9	07:37	0	153	6.5	22.9	76%
		1	-	6.5	22.9	76%
		2	-	6.7	22.8	78%
	13:53	0	145	6.0	22.4	69%
		1	-	6.0	22.4	69%
		2	-	6.0	22.3	69%
CX10	08:05	0	137	6.6	23.5	78%
		1	-	6.6	23.6	78%
		1.6	-	6.7	23.6	79%
	14:15	0	142	5.8	23.1	68%
		1	-	5.8	22.9	67%
CX11	08:36	0	135	7.1	23.4	83%
		1	-	7.2	23.4	85%
	14:52	0	134	5.8	23.9	68%
		1	-	5.8	23.9	69%
MHS	06:30	mid	44	6.8	20.0	74%
	15:05	mid	43	6.5	21.0	73%
WB	06:35	mid	-	8.3	18.9	89%
	13:33	mid	-	8.7	21.0	98%
SB	06:06	mid	-	4.2	19.8	46%
	13:45	mid	-	3.6	21.0	40%
MK	08:15	mid	-	7.1	21.9	81%
	14:00	mid	-	8.0	22.7	93%
Conic	08:06	mid	-	8.4	18.0	89%
	13:51	mid	-	8.4	18.9	90%
Domtar	07:10	mid	-	5.9	28.8	76%
Bail	06:20	mid	-	5.4	18.8	58%

Date:	07/28/04					
Station	Time	Depth m	CND umhos/cm	DO mg/l	Temp °C	% Sat
CX1	07:35	0	30	7.5	22.2	86%
		1	-	7.4	22.3	86%
	13:51	0	33	7.8	22.2	89%
		1	-	7.6	22.3	88%
CX2L	07:54	0	30	8.1	21.9	93%
		1	-	8.0	22.0	92%
	14:01	0	32	8.2	22.2	94%
		1	-	8.2	22.3	94%
CX2R	07:50	mid	300	6.5	22.7	75%
	14:00	mid	500	6.3	23.7	74%
CX3L	08:10	mid	29	7.7	21.6	87%
	14:17	mid	33	8.5	22.3	98%
CX3R	08:10	mid	330	5.6	22.8	65%
	14:15	mid	420	6.9	22.9	80%
CX4L	08:27	mid	37	7.9	21.6	89%
	14:28	mid	41	8.7	22.1	100%
CX4R	08:23	mid	370	4.6	22.4	53%
	14:25	mid	420	5.6	23.1	65%
CX5L	8:49	mid	44	7.7	21.5	87%
	14:40	mid	56	8.5	22.4	98%
CX5R	8:45	mid	315	4.9	22.1	56%
	14:40	mid	435	5.2	22.8	60%
CX6L	09:12	mid	74	7.3	21.4	83%
	15:04	mid	70	8.3	22.2	96%
CX6R	9:10	mid	195	6.2	21.4	70%
	15:00	mid	30	7.1	22.3	82%
CX7L	09:31	mid	94	7.1	21.4	81%
	15:24	mid	110	7.9	22.0	90%
CX7R	09:30	mid	110	7.1	21.3	80%
	15:40	mid	215	7.7	21.8	88%
CX8	07:35	0	115	6.6	21.6	75%
		1	-	6.6	21.6	74%
		2	-	6.6	21.6	75%
	15:30	0	27	7.6	21.8	87%
		1	-	7.6	21.8	86%
		2	-	7.2	21.8	82%
CX9	07:59	0	129	6.5	21.9	74%
		1	-	6.4	21.9	73%
		2	-	6.4	21.9	73%
	15:16	0	27	6.9	21.6	79%
		1	-	7.0	21.6	79%
		2	-	7.0	21.6	80%
CX10	08:19	0	116	6.5	22.0	74%
		1	-	6.5	22.1	74%
		1.6	-	6.4	22.1	73%
	14:53	0	28	6.9	21.6	78%
		1	-	6.8	21.7	77%
		2	-	6.7	21.8	76%
CX11	08:50	0	120	6.2	22.0	71%
		1	-	6.1	22.0	70%
	14:20	0	31	6.8	22.0	77%
		1	-	6.8	22.0	78%
MHS	06:51	mid	42	7.3	19.4	79%
	13:54	mid	33	7.6	19.5	83%
WB	07:15	mid	-	8.8	17.3	92%
	13:50	mid	-	8.8	18.6	94%
SB	06:00	mid	-	4.4	19.4	48%
	14:21	mid	-	5.0	18.8	54%
MK	08:55	mid	-	6.8	21.1	76%
	14:12	mid	-	7.5	21.3	85%
Conic	08:40	mid	-	8.7	17.0	90%
	14:04	mid	-	8.6	18.0	91%
Domtar	07:32	mid	-	6.2	28.6	80%

Date:	07/29/04					
Station	Time	Depth m	CND umhos/cm	DO mg/l	Temp °C	% Sat
CX1	06:29	0	32	6.9	22.0	78%
		1	-	6.8	22.0	77%
	13:41	0	27	7.7	22.8	89%
		1	-	7.7	22.8	89%
CX2L	06:40	0	32	7.3	21.8	83%
		1	-	7.3	21.8	84%
	13:53	0	26	8.0	23.7	94%
		1	-	7.9	23.6	93%
CX2R	06:33	mid	500	5.9	22.5	68%
	13:47	mid	379	6.4	25.2	78%
CX3L	06:57	mid	32	7.4	21.5	83%
	14:12	mid	28	8.2	23.7	97%
CX3R	06:53	mid	250	6.2	21.8	71%
	14:07	mid	249	6.3	25.0	76%
CX4L	07:13	mid	38	6.5	21.5	74%
	14:32	mid	35	8.7	23.9	103%
CX4R	07:07	mid	250	4.8	21.9	55%
	14:27	mid	312	5.5	25.0	67%
CX5L	8:28	mid	47	7.2	21.5	81%
	14:43	mid	40	8.6	24.1	102%
CX5R	7:25	mid	250	5.1	21.6	58%
	14:40	mid	290	6.0	25.0	73%
CX6L	07:51	0	63	7.2	21.4	82%
		1	-	7.2	21.4	82%
	15:07	0	57	8.6	24.2	103%
		1	-	8.6	24.2	102%
CX6R	7:50	mid	225	6.1	21.4	69%
	15:02	mid	151	7.9	25.0	96%
CX7L	08:15	mid	70	7.3	21.5	83%
	15:57	mid	89	8.1	23.8	96%
CX7R	08:05	mid	200	6.7	21.4	76%
	15:25	mid	113	7.2	24.1	86%
CX8	06:40	0	59*	6.5	21.4	73%
		1	-	6.4	21.4	73%
		2	-	6.4	21.4	72%
	15:15	0	139	7.6	23.9	90%
		1	-	7.3	23.7	86%
		2	-	6.3	23.7	75%
CX9	07:05	0	72*	6.3	21.4	71%
		1	-	6.3	21.4	71%
		2	-	6.4	21.4	72%
	15:00	0	127	7.1	24.0	85%
		1	-	6.9	23.5	81%
		2	-	6.7	22.8	78%
CX10	07:25	0	77*	6.4	21.4	72%
		1	-	6.4	21.4	72%
		1.6	-	6.1	21.4	68%
	14:35	0	112	6.6	23	76%
		1	-	6.3	22.9	73%
		2	-	4.5	22.8	52%
CX11	07:55	0	75*	6.5	21.2	73%
		1	-	6.3	21.2	71%
	13:51	0	121	6.4	22.3	74%
		1	-	6.0	21.8	68%
MHS	06:14	mid	53*	7.2	18.8	77%
	15:38	mid	41	7.4	21.3	83%
WB	06:45	mid	-	8.5	18.0	90%
	13:55	mid	-	8.5	20.8	95%
SB	05:51	mid	-	4.0	17.8	42%
	13:40	mid	-	4.5	20.2	50%
MK	07:05	mid	-	6.4	20.3	71%
	13:20	mid	-	7.3	22.5	85%
Conic	06:51	mid	-	8.6	18.2	91%
	14:10	mid	-	8.6	19.8	94%
Domtar	06:20	mid	-	6.1	28.3	78%
	13:45	mid	-	5.8	29	75%
Bail	14:00	mid	-	5.5	28.8	71%

*assumed - recorded on field sheet as 0.1x this value, this mete

Date: 07/30/04						
Station	Time	Depth m	CND umhos/cm	DO mg/l	Temp °C	% Sat
CX1	06:52	0	32	7.2	21.9	82%
		1	-	7.1	21.9	81%
	13:08	0	31	7.7	23.2	90%
		1	-	7.6	23.2	89%
CX2L	07:03	0	32	7.4	21.7	84%
		1	-	7.4	21.7	84%
	13:30	0	31	8.1	24.0	96%
		1	-	8.1	23.9	97%
CX2R	07:07	mid	539	5.6	23.1	66%
	13:35	0	558	5.7	25.9	70%
		1	-	6.1	25.4	74%
CX3L	07:22	mid	33	7.3	21.3	82%
	13:52	mid	33	8.5	24.6	102%
CX3R	07:25	0	416	4.9	22.3	56%
		1	-	4.6	22.2	53%
	13:55	0	310	6.3	25.7	77%
		1	-	6.9	25.4	85%
CX4L	07:40	mid	44	7.3	20.9	81%
	14:08	mid	38	8.7	25.3	106%
CX4R	07:43	0	348	4.6	21.7	53%
		1	-	4.5	21.7	52%
	14:15	0	309	6.2	26.2	77%
		1	-	6.3	26.2	78%
CX5L	7:55	mid	46	7.2	20.9	81%
	14:26	mid	41	8.6	25.6	106%
CX5R	7:59	mid	326	4.8	21.7	55%
	14:30	mid	347	6.0	26.8	75%
CX6L	08:22	0	64	7.2	21.4	82%
		1	-	7.2	21.4	82%
	14:53	0	70	8.6	26.0	106%
		1	-	8.7	25.9	107%
CX6R	08:24	0	182	6.0	21.7	68%
		1	-	6.0	21.7	68%
	14:59	0	235	7.6	26.7	94%
		1	-	7.5	26.7	94%
CX7L	08:53	mid	97	6.8	21.3	77%
	15:36	mid	101	7.9	25.4	97%
CX7R	08:46	mid	152	6.4	21.8	73%
	15:29	0	158	7.4	25.6	91%
		1	-	7.8	25.6	95%
CX8	06:47	0	156.6	6.8	21.7	77%
		1	-	6.7	21.7	77%
		2	-	6.6	21.7	75%
	13:50	0	154.4	7.4	24.4	89%
		1	-	6.6	24.3	79%
		2	-	6.3	24.1	75%
CX9	07:00	0	139.8	6.5	22.4	75%
		1	-	6.4	22.4	74%
		2	-	6.3	22.4	73%
	13:37	0	141.6	7.0	24.5	84%
		1	-	7.0	23.4	82%
		2	-	6.9	23.3	81%
CX10	07:20	0	123.8	6.8	23.0	79%
		1	-	6.8	23.0	79%
		1.6	-	6.2	23.0	72%
	13:15	0	129.8	6.7	24.1	79%
		1	-	6.6	24.0	78%
		2	-	6.3	23.9	75%
CX11	07:52	0	118.4	6.9	23.1	80%
		1	-	6.8	23.0	80%
	12:45	0	121.9	6.9	24.0	81%
		1	-	6.6	23.6	78%
MHS	06:29	mid	42	7.4	19.4	81%
	12:18	mid	41	7.5	21.7	85%
WB	06:15	mid	-	8.3	18.6	89%
	13:40	mid	-	8.4	23.0	98%
SB	06:25	mid	-	3.4	19.6	37%
	13:15	mid	-	4.4	25.1	53%
MK	07:00	mid	-	7.4	21.6	83%
	13:00	mid	-	8.0	24.7	96%
Conic	06:30	mid	-	8.9	18.5	95%
	13:10	mid	-	8.4	20.4	93%

Chemical Data

Station	Date	Time	Color	Lab Cnd umhos/cm	SS mg/l	VSS mg/l	TKN mg/l	NH3 mg/l	NOx mg/l	TP ppb	PO4 ppb	Chl-a ppb	Chl-a corr. ppb	BOD5 mg/l	TBOD mg/l	NBOD mg/l	CBOD mg/l	final NOx
CX1	07/27/04	6:40	44	-	-	-	0.3	0.02	0.01	12	1	2.8J	2.9	-	4.7	0.78	3.9	0.19
	07/28/04	7:35	41	-	1.5J	1J	0.4	0.01	0.02	25	1	2.8J	3.5	-	5.1	0.87	4.2	0.22
	07/29/04	6:29	41	-	-	-	0.4	0.01	0.02	12	1	2.5J	2.4	-	4.2	0.61	3.6	0.16
CX4L	07/27/04	7:53	45	-	-	-	0.3	0.03	0.04	15	2	2.4J	2.4	-	5.1	0.95	4.1	0.26
	dupe	7:58	45	-	-	-	0.4	0.03	0.04	16	2	2.3J	1.9	-	4.4#	0.61#	3.8#	0.18#
	dupe lab	7:58	-	-	-	-	-	-	-	-	-	-	-	-	4.8**	0.65**	4.2**	0.19**
	07/28/04	8:27	41	-	1.3J	0.4J	0.4	0.02	0.02	13	2	2.2J	2.7	-	4.2	0.82	3.3	0.21
	07/29/04	7:13	43	-	-	-	0.4	0.02	0.04	14	2	2.1J	2.1	-	4.2	0.74	3.5	0.21
CX4R	07/27/04	7:45	110	-	-	-	1.1	0.24	0.66	140	42	2.9J	2.7	-	13.7#	1.91#	11.8#	1.1#
	lab dupe	7:45	-	-	-	-	-	-	-	-	-	-	-	-	14.65**	2.34**	12.3**	1.2**
	07/28/04	8:23	120	-	5	3	1.1	0.29	0.9	150	59	3.4J	3.7	-	16.7**	2.17**	14.6**	1.4**
	dupe	-	110	-	3	1.6J	1.2	0.28	0.91	170	56	2.7J	2.9	-	16.4	2.12	14.3	1.4
	dupe lab	-	-	-	-	-	-	-	-	-	-	-	-	-	17.2**	2.12**	15.1**	1.4**
	07/29/04	7:07	120	-	-	-	1.1	0.24	0.8	150	54	3.0J	2.4	-	15.7	1.73	14.0	1.2
CX8	07/27/04	7:00	70	-	-	-	0.6	0.05	0.31	68	18	2.7J	2.4	-	8.1	1.04	7.0	0.55
	07/28/04	7:35	65	-	3	2	0.7	0.05	0.38	81	20	3.0J	2.1	-	10.0	0.91	9.1	0.59
	07/29/04	6:40	65	-	-	-	0.6	0.04	0.27	65	17	3.4J	2.7	-	8.0	0.78	7.2	0.45
CX11	07/27/04	8:36	75	-	-	-	0.5	0.03	0.25	56	12	2.2J	2.1	-	8.2	0.95	7.3	0.47
	07/28/04	8:50	65	-	0.9J	0.6J	0.5	0.03	0.25	47	11	2.1J	2.1	-	7.3	0.87	6.4	0.45
	07/29/04	7:55	70	-	-	-	0.5	0.04	0.29	49	15	2.2J	2.1	-	7.5	0.82	6.7	0.48
	dupe	7:55	70	-	-	-	0.5	0.04	0.29	50	15	2.3J	2.4	-	7.5	0.82	6.7	0.48
WB	07/27/04	6:35	180	-	-	-	0.8	0.01	0.01	25	2	2.5J	2.4	-	13.3	0.65	12.6	0.16
	07/28/04	7:15	70	-	47	3	0.7	0.08	0.07	110	10	2.8J	2.7	-	9.6	1.34	8.3	0.38
MHS	07/28/04	6:51	240	-	6	4	0.9	0.02	0.03	36	3	2.1J	2.1	-	12.7	0.82	11.9	0.22
Tailrace	07/27/04	Comp.	45	-	-	-	0.3	0.02	0.01	11	1	3.6J	3.5	-	4.8	0.56	4.3	0.14
SB	07/28/04	6:00	125	-	3	1.2J	0.7	0.02	0.05	36	2	5.8J	4	-	11.3	1.17	10.1	0.32
Storm	07/28/04	8:05	16	-	72	15	0.6	0.04	0.05	200	2	3.2J	3.5	-	9.6	1.00	8.6	0.28
Conic	07/28/04	8:40	75	-	2	1.4J	0.4	<0.01	0.13	28	3	1.8J	2.1	-	7.1	0.74	6.4	0.30
MK	07/29/04	7:05	55	-	-	-	0.5	<0.01	<0.01	15	2	5.2J	4.0	-	7.0	0.97	6.0	0.23
	dupe	7:06	55	-	-	-	0.5	<0.01	<0.01	16	1	4.9J	4.0	-	6.8	0.80	6.0	0.19
Domtar	07/27/04	Comp.	420	1.4##	-	-	4.2	1.3*	3.7	740	220	-	-	18.7	57.9	11.7	46.2	6.4
	dupe	Comp.	420	1.42##	-	-	4.3	1.2*	3.7	770	210	-	-	19.0	52.9	11.7	41.2	6.4
	07/28/04	Comp.	420	1.4##	26	17	4.1	1.0*	3.8	760	190	-	-	19.5	54.9	7.8	47.1	5.6
	07/29/04	Comp.	360	1.48##	-	-	6	3.5*	1.4	740	240	-	-	28.6	62.6	19.1	43.6	5.8
Bail	07/27/04	Comp.	24	635	-	-	20	16*	1.7	1200	1000	-	-	20.7	82.7	69.3	13.4	17.7
	07/28/04	Comp.	25	639	2	2	18	18*	0.85	1400	1200	-	-	13.0	82.7	68.2	14.5	16.6
	dupe	Comp.	25	639	2	2	18	18	0.85	1400	1200	-	-	10.9	80.7	71.7	9.1	17.4
	07/29/04	Comp.	26	631	-	-	18	16*	1.4	1900	1800	-	-	17.3	87.2	73.6	13.6	18.4

*NPDES required distillation not performed
J = approximate
**BODu started on July 30
#results mislabeled, assumed correct as shown
##as reported, believed to be off by factor of 1000

Supplemental Domtar Conductance

Domtar Discharge* CND, umhos/cm	date
1810	2/21/2000
2800	5/22/2000
2220	8/21/2000
1670	11/13/2000
1638	12/13/2000
2030	1/25/2001
1480	7/16/2001
2275	9/17/2001
1788	12/17/2001
1780	7/22/2002
1812	10/17/2002
1956	11/11/2002
2024	4/15/2003
1576	5/27/2003
1700	7/28/2003

*from toxics program

Discharge Data

Domtar

	Eff Flow	Eff BOD5		Eff. Temp	Eff. DO	TSS
	MGD	mg/l	lbs	°C	mg/l	
07/26/04	29.1			-	-	
07/27/04	29.5			28.8	5.9	
07/28/04	31.8	20.5*	4744**	28.6	6.2	4969**
07/29/04	28.4			28.65	6.0	
07/30/04	29.7			-	-	

*weekly max for July

**monthly average lbs

Baileyville

	Eff Flow	Eff BOD5		Eff. Temp	Eff. DO	TSS
	MGD	mg/l	lbs	°C		
07/26/04	0.15	-	-	19	-	-
07/27/04	0.147	7	8.6	18	-	8
07/28/04	0.270	-	-	18	-	-
07/29/04	0.174	-	-	18	-	-
07/30/04	0.250	-	-	19	-	-

Secchi Depths

Station	Date	Time	Secchi (m)
CX1	07/27/04	PM	*
	07/29/04	PM	*
	07/30/04	PM	*
CX2L-CX7L	07/27/04	PM	*
	07/29/04	PM	*
	07/30/04	PM	*
CX2R-CX7R	07/30/04	PM	*
CX8	07/27/04	13:36	2.18
	07/28/04	15:30	1.84
	07/29/04	15:15	>2
	07/30/04	13:50	>2
CX9	07/27/04	13:53	1.91
	07/28/04	15:16	1.95
	07/29/04	15:00	1.78
	07/30/04	13:37	2.2
CX10	07/27/04	14:15	>1.35
	07/28/04	14:53	>1.41
	07/29/04	14:35	>2
	07/30/04	13:15	>2
CX11	07/27/04	14:52	>1.91
	07/28/04	14:20	1.90
	07/29/04	13:51	>1
	07/30/04	12:45	2.27

*bottom visable

Survey Flows

Flow/Stage Measurements

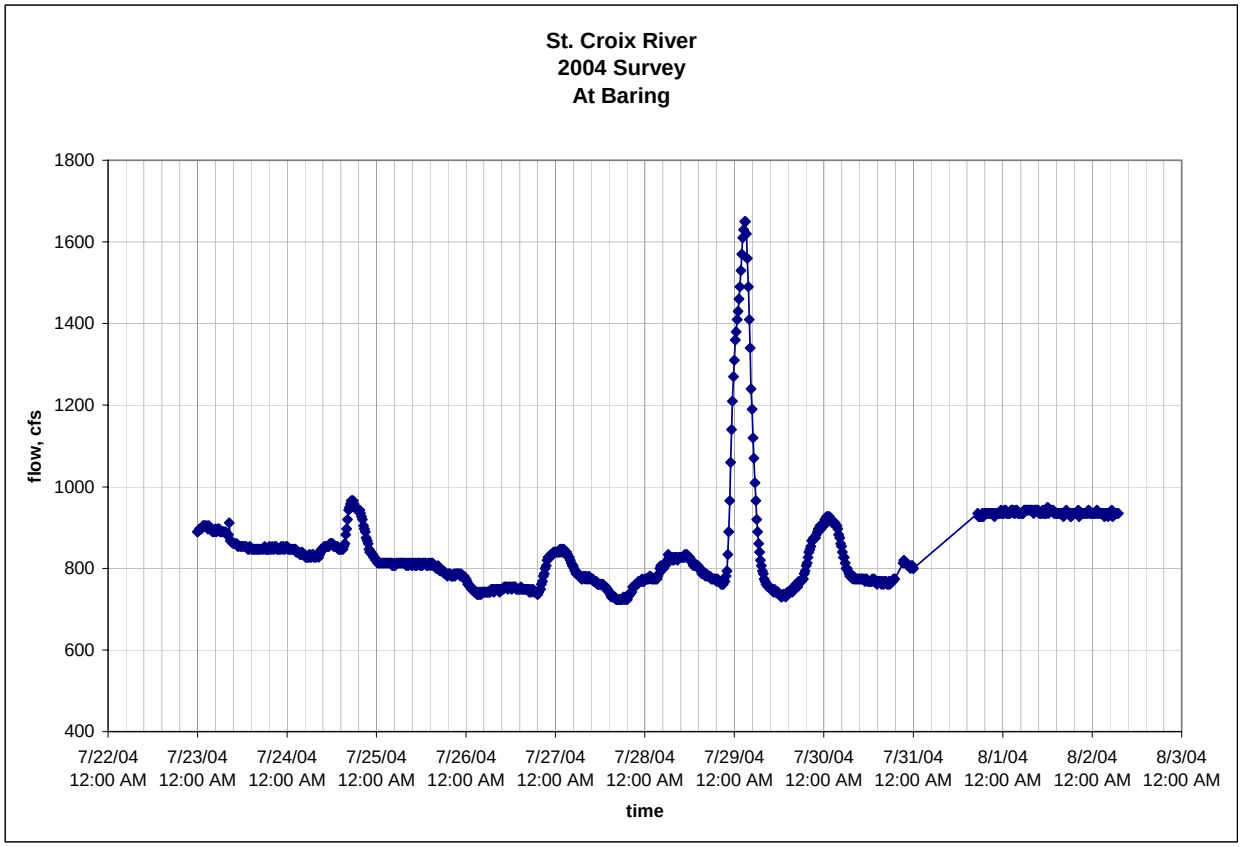
		Flows, cfs (stage)				7Q10
	DA	7/27/2004	7/28/2004	7/29/2004	7/30/2004	cfs
Stoney Brook	4.3	0.6		-	-	0.13
Wapsaconhagan Brook, Cedar Street	21.8	5.0		-	-	1.21
Conic Stream	2.1	0.1	heavy rain	-	-	0.05
Magurrewock Stream, Rt. 1	29.6	14.9 (4.27)		-	-	1.27
Mohannas Stream, Canada	?	-		-	-	?
St. Croix, Baring	1374	772	816*	944**	810	547***

*no large increase until after sampling completed

**peaked at 1650 cfs at 3:00 AM

***calculated based on entire gage record

St. Croix River Flow



DO Cross Checks

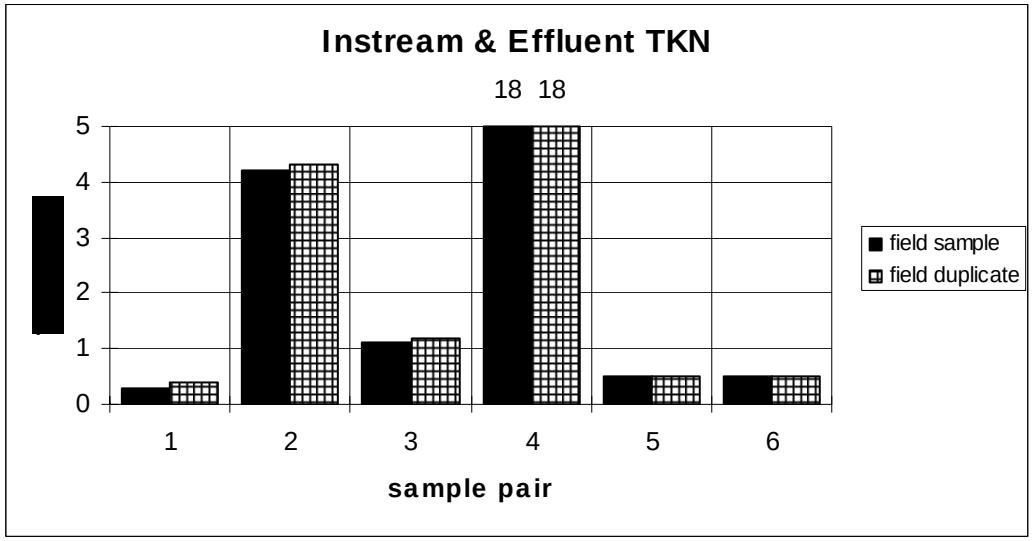
meter:	#1L	#1L backup	#1R	#1R backup	#2	#2 backup	#3	#3 backup	Domtar	Domtar trestle
day 0, PM start	-	-	7.2	-	7.1	-	7.2	-	-	-
day 1, AM	6.0	6.1	5.8	-	6.0	5.9	5.8	5.7	-	-
day 1, mid	6.6	6.8	6.8	-	-	-	6.5	-	-	-
day 1, PM start	6.8	7.0	6.8	-	6.8	6.8	7.1	-	-	-
day 1, PM finish	7.6	7.5	7.5	-	-	-	7.6	-	7.6	-
day 2, AM	6.5	6.7	6.7	-	6.8	6.6	6.5	-	-	-
day 2, mid	6.7	6.8	6.9	-	-	-	-	-	6.5	
day 2, PM start	6.9	7.0	7.1	-	7.1	-	6.9	-	6.7	-
day 2, PM finish	7.1	7.1	7.3	-	-	-	7.1	-	7.1	7.2
day 3, AM	6.2	6.1	6.0	-	6.0	-		5.9	6.2	-
day 3, mid	6.9*	6.5	6.3	-	6.5	-	6.3	-	6.4	6.7
day3, PM start	7.3	-	7.5	-	**	-	7.3	-	7.3	-
day 3, PM finish	7.5	-	7.7	-	**	-	7.4	-	7.5	-
day 4, AM	6.4	-	-	-	6.4	6.5	6.4	-	6.3	-
day 4, mid	7.4	-	-	-	7.5	***	-	-	7.5	-
day 4, PM start, B	7.7	-	-	-	-	-	7.7	-	-	-
day 4, PM start, M	7.7	-	-	-	7.7	-	-	-	7.6	-
day 4, PM finish, B	7.7	-	-	-	-	-	7.4	-	7.5	-
day 4, PM finish, M	7.4	-	-	-	7.2	-	-	-	-	-

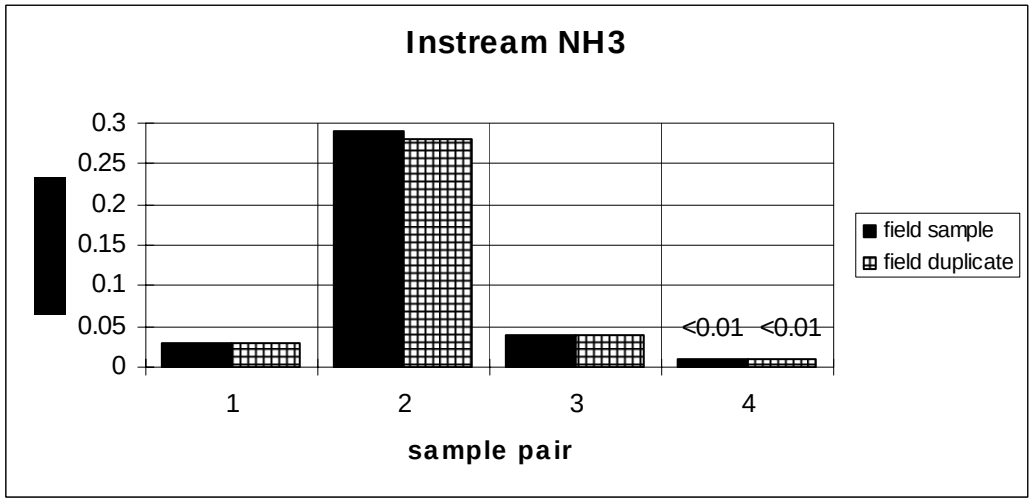
* #1L membrane changed after AM run

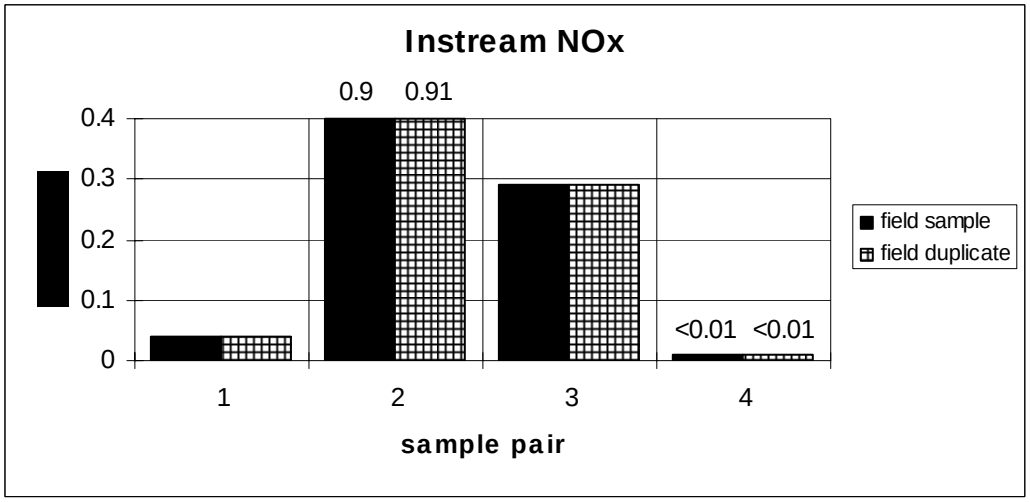
** #2 meter QC'ed after the afternoon run and checked within limits with #1L meter

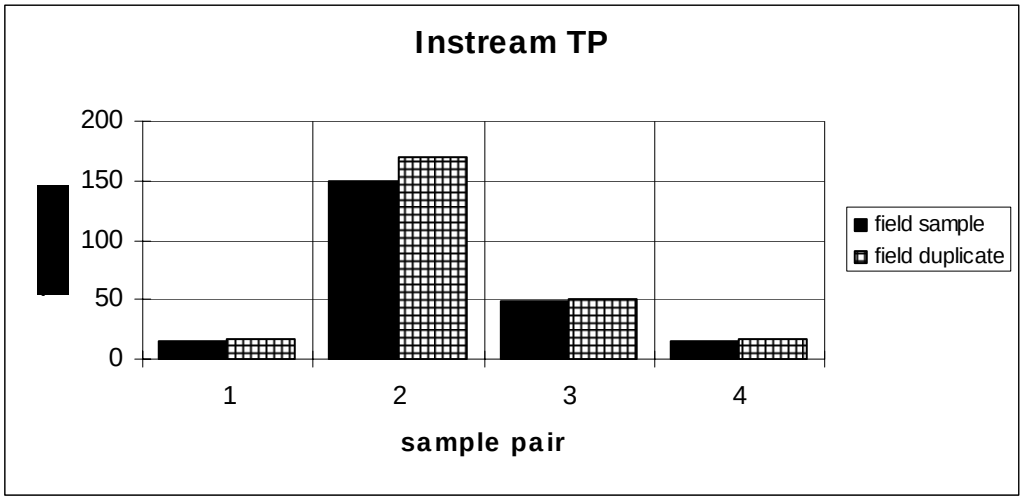
*** #2 backup varying widely, discarded

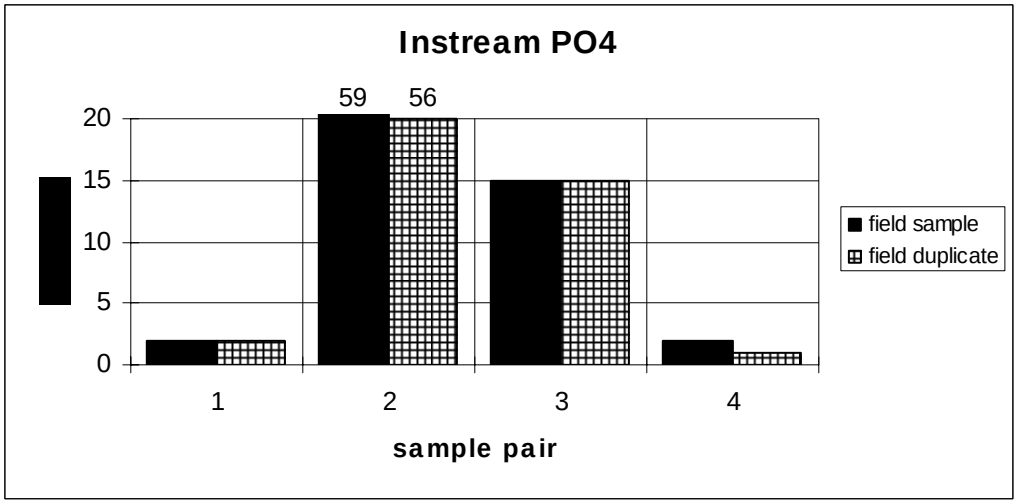
Field Duplicate Comparisons

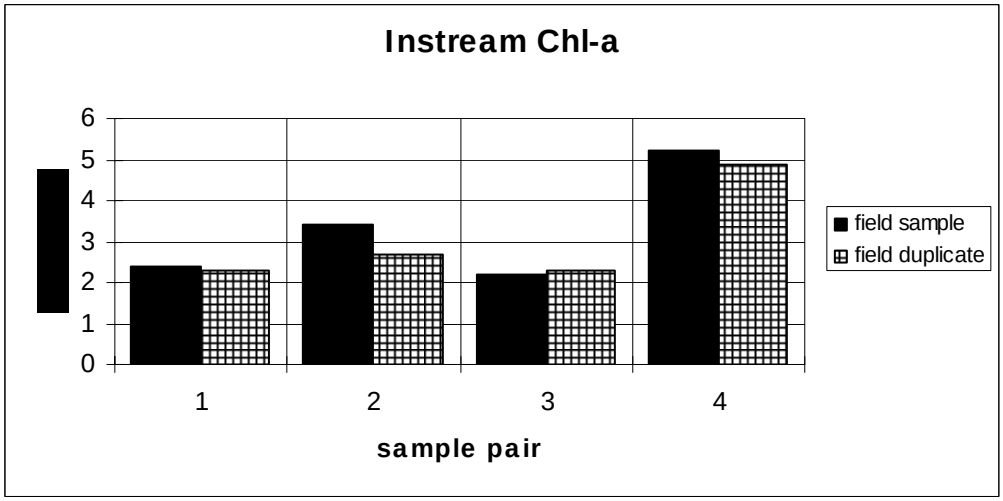


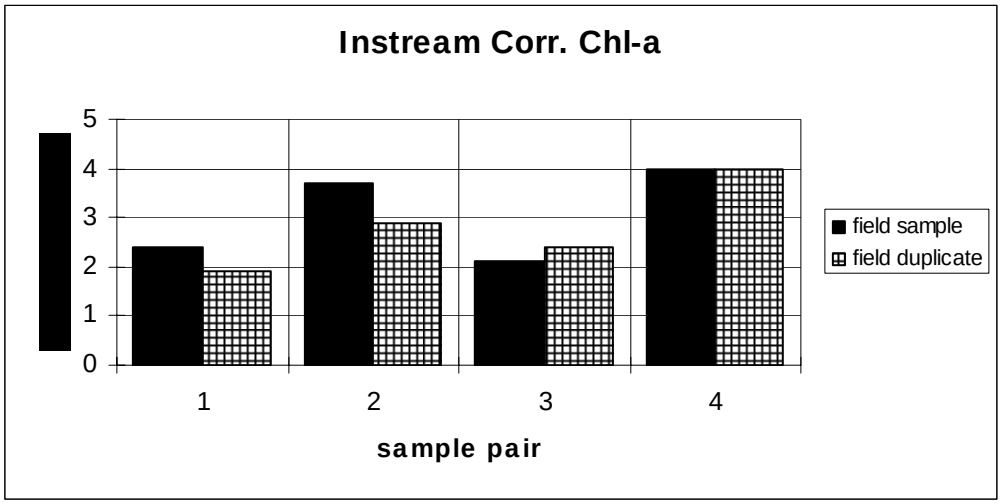


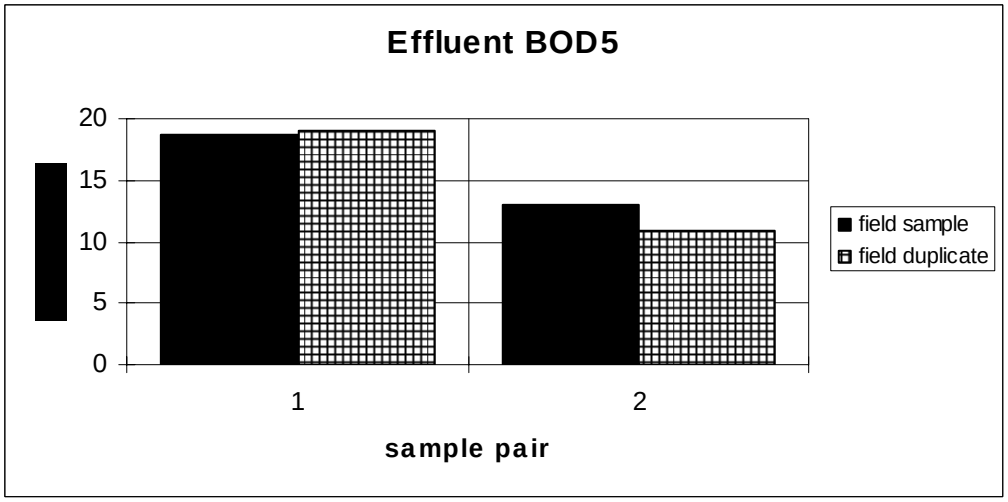


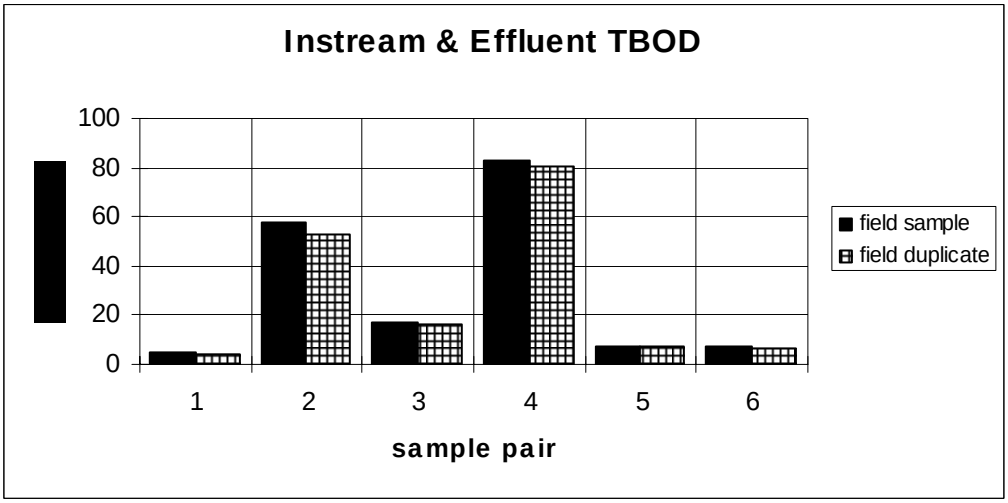

Instream TP
200
150
100
50
0
1
2
3
4
sample pair
field sample
field duplicate

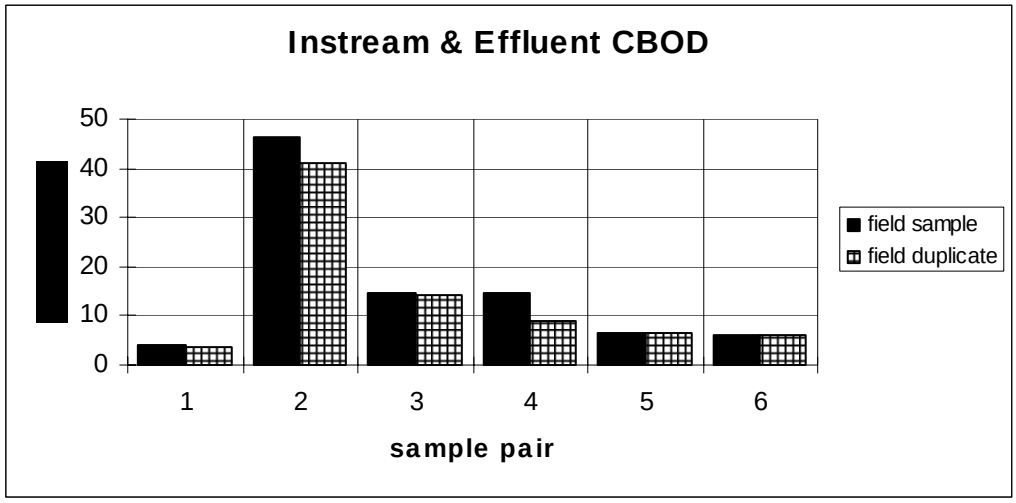

Instream PO4
59
56
20
15
10
5
0
1
2
3
4
sample pair
field sample
field duplicate

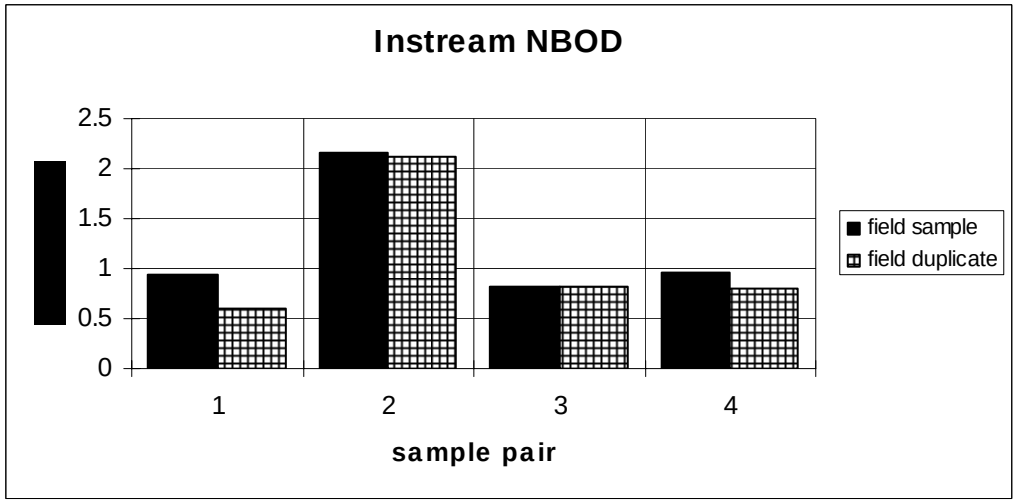

Instream Chl-a
6
5
4
3
2
1
0
1
2
3
4
sample pair
field sample
field duplicate

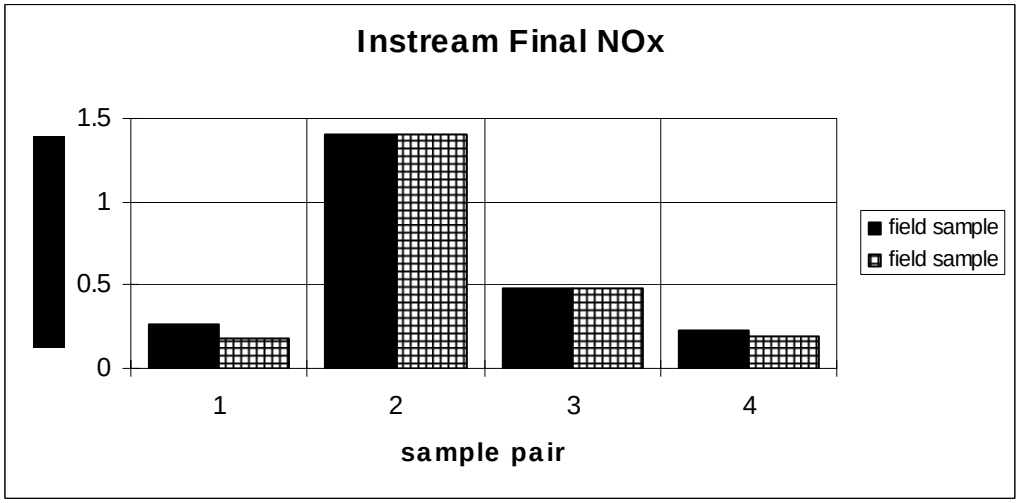

Instream Corr. Chl-a
5
4
3
2
1
0
1
2
3
4
sample pair
field sample
field duplicate

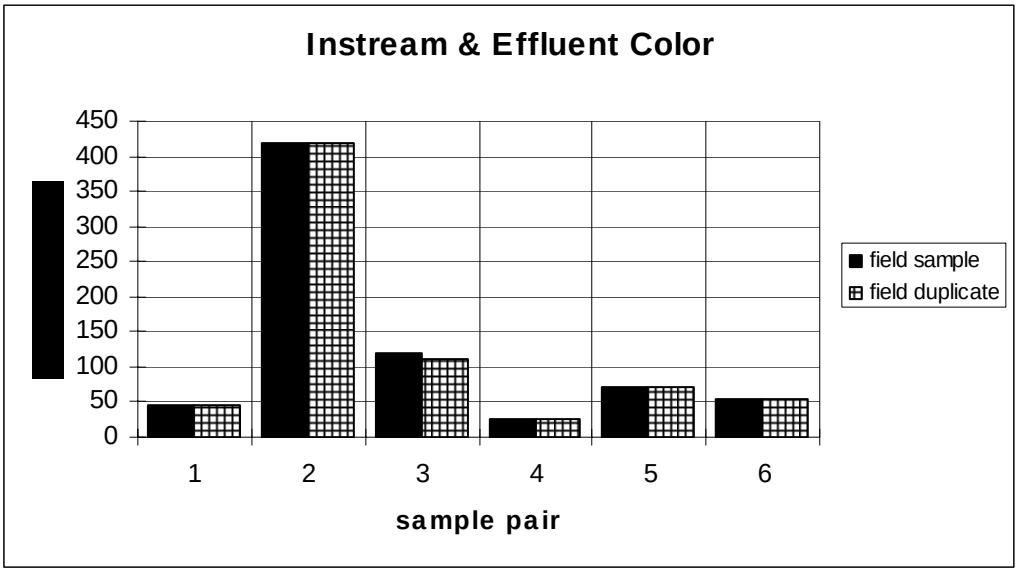

Effluent BOD5
20
15
10
5
0
1
2
sample pair
field sample
field duplicate

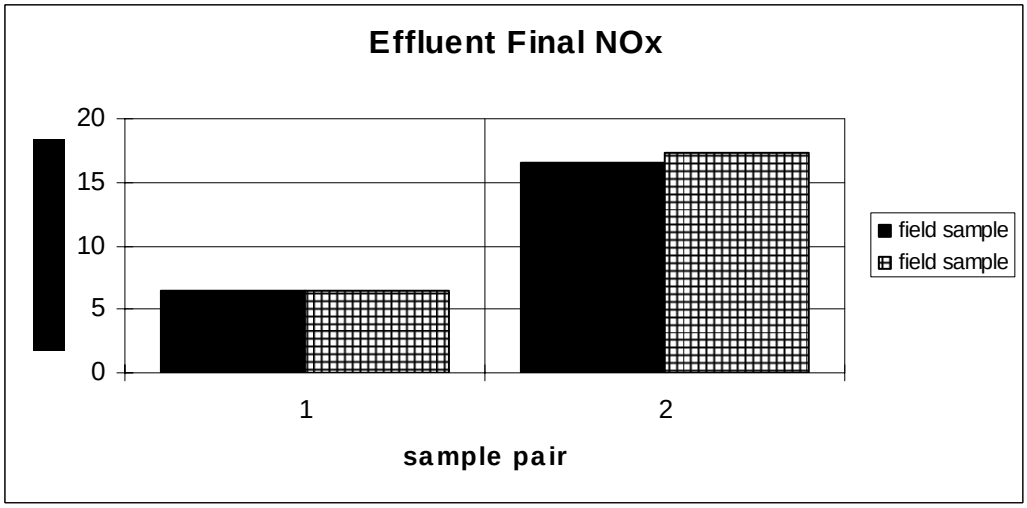

Instream & Effluent TBOD
100
80
60
40
20
0
1
2
3
4
5
6
sample pair
field sample
field duplicate

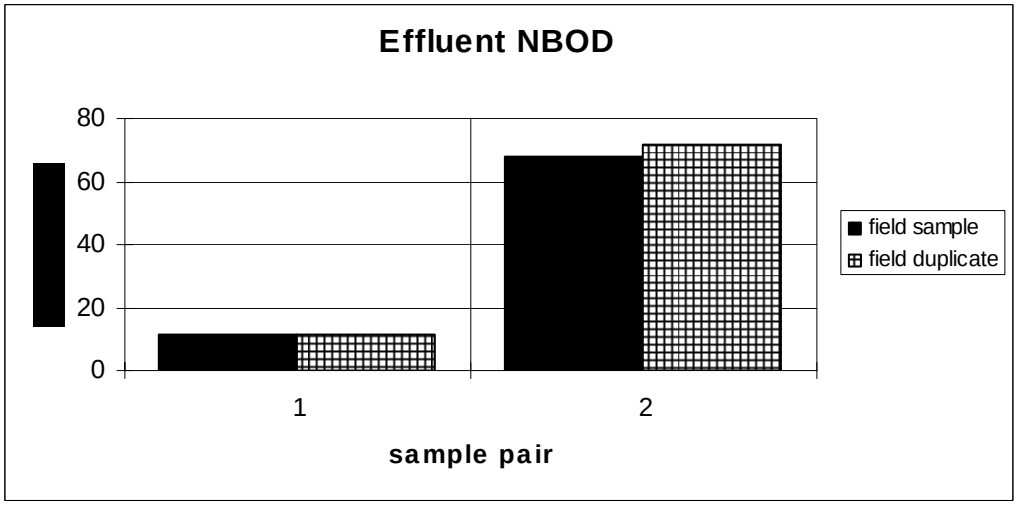

Instream & Effluent CBOD
50
40
30
20
10
0
1
2
3
4
5
6
sample pair
field sample
field duplicate

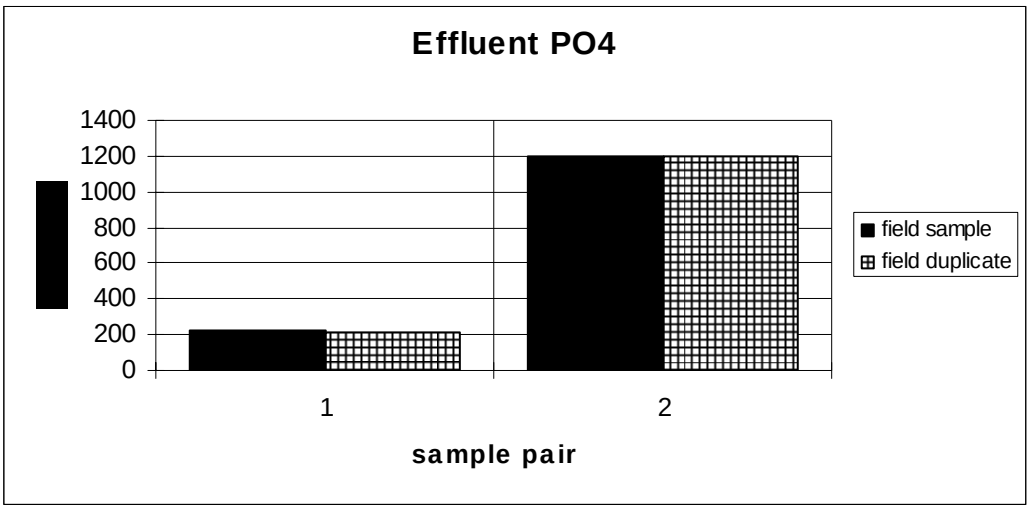

Instream NBOD
2.5
2
1.5
1
0.5
0
1
2
3
4
sample pair
field sample
field duplicate

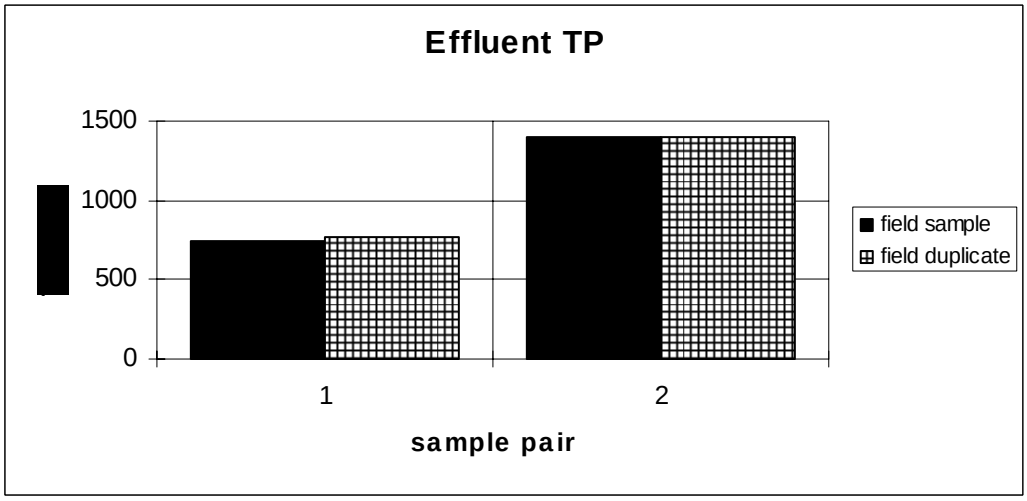

Instream Final NOx
1.5
1
0.5
0
1
2
3
4
sample pair
field sample
field sample

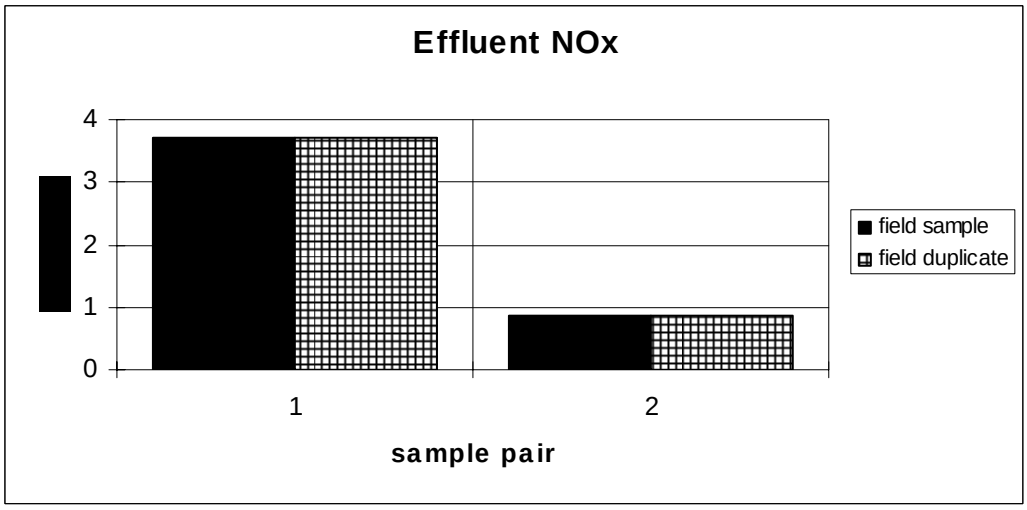

Instream & Effluent Color
450
400
350
300
250
200
150
100
50
0
1
2
3
4
5
6
sample pair
field sample
field duplicate

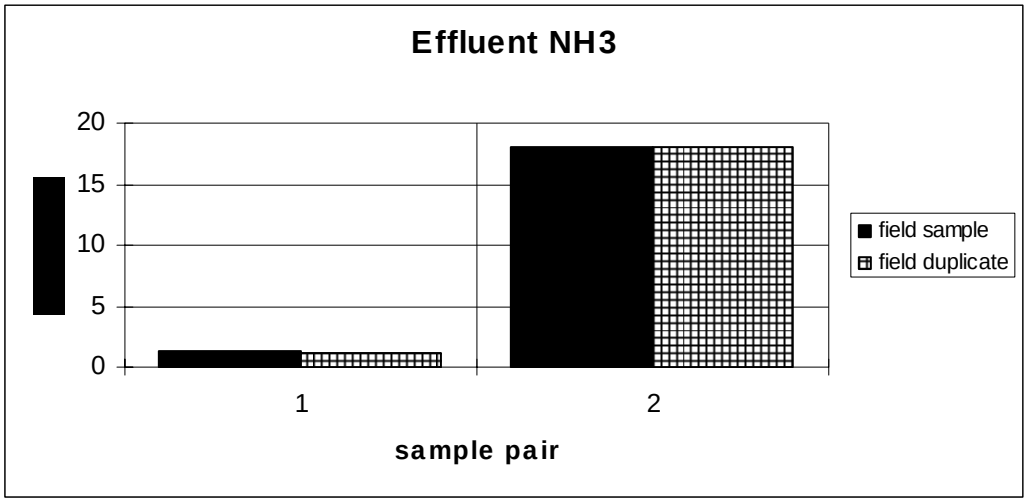

Effluent Final NOx
20
15
10
5
0
1
2
sample pair
field sample
field sample


Effluent NBOD
80
60
40
20
0
1
2
sample pair
field sample
field duplicate


Effluent PO4
1400
1200
1000
800
600
400
200
0
1
2
sample pair
field sample
field duplicate


Effluent TP
1500
1000
500
0
1
2
sample pair
field sample
field duplicate


Effluent NOx
4
3
2
1
0
1
2
sample pair
field sample
field duplicate


Effluent NH3
20
15
10
5
0
1
2
sample pair
field sample
field duplicate