

Appendix F

Surface Water and Sediment Monitoring Results

Table F1 Surface Water Sampling: General Chemistry and Dissolved Metals Concentrations 2006-2008

Table F2 Surface Water Sampling: General Chemistry and Total Metals Concentrations 2008

Table F3 Surface Water Sampling: Petroleum Hydrocarbon and PAH Concentrations 2006 and 2008

Table F4 Sediment Sampling at Surface Water Sample Locations: Metals, Petroleum Hydrocarbon and PAH Concentrations 2006

Table F-1: Surface Water Sampling - General Chemistry and Dissolved Metals Concentrations 2006 and 2008

Parameters	Units	CCME FWAL	SW-1		SW-2		SW-3		SW-4		SW-5		SW-6	SW-7	SW-8
			18-Jul-06	23-Aug-06	18-Jul-06	23-Aug-06	18-Jul-06	23-Aug-06	18-Jul-06	23-Aug-06	18-Jul-06	23-Aug-06	23-Aug-06	5-Sep-08	5-Sep-08
Alkalinity (Total as CaCO3)	mg/L	-	50	67	50	65	200	230	170	250	62	78	4	54	55
Chloride (Cl)	mg/L	-	37	44	28	36	28	38	30	47	38	47	41	440	440
Colour	TCU	-	320	14	56	94	15	13	21	14	32	29	110	86	68
Hardness (CaCO3)	mg/L	-	48	72	52	62	380	270	420	470	110	120	16	240	230
Nitrate (N)	mg/L	13	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Nitrite (N)	mg/L	0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<3 (1)	<3 (1)
Nitrite + Nitrate	mg/L	-	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<3	<3
Nitrogen (Ammonia Nitrogen)	mg/L	1.54 ^a	<0.5	0.15	<0.05	0.14	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	0.09	<0.05	<0.05
Total Organic Carbon (C)	mg/L	-	100	9.1	13	9	5.7	6.8	6.3	5	11	12	15	12	9.8
Orthophosphate (P)	mg/L	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
pH	pH	6.5 - 9.0	6.5	6.7	7	7.5	7.6	7.6	7.7	7.8	7.7	8.1	6.4	7.6	7.4
Silica (SiO2)	mg/L	-	6.4	6.9	4.5	5.5	4.6	5.9	6.2	8	2.2	1.6	0.5	2.3	2.3
Sulphate (SO4)	mg/L	-	3	5	7	9	210	54	260	240	47	43	4	61	58
Turbidity	NTU	-	>1000	31	10	23	4.2	4.7	2.6	1.8	1.5	1.9	2.6	1.3	2.1
Conductivity	uS/cm	-	230	270	210	250	840	600	880	990	350	380	160	1600	1600
TSS	mg/L	-	2500	57	36	6	19	23	17	6	3	<2	3		
Anion Sum	me/L	-	2.13	2.7	1.93	2.5	9.14	6.72	9.67	11.4	3.28	3.8	1.31	14.9	14.8
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	50	67	50	65	195	225	173	247	61	77	4	54	55
Calculated TDS	mg/L	-	139	149	112	142	531	360	578	658	188	212	77	831	818
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1
Cation Sum	me/L	-	2.58	2.48	1.82	2.24	8.94	6.58	9.69	11.1	3.22	3.7	1.37	13.9	13.5
Ion Balance (% Difference)	%	-	9.68	4.19	2.99	5.53	1.12	1.07	0.093	1.11	0.831	1.29	2.36	3.37	4.5
Langelier Index (@ 20C)	N/A	-	-2.11	-1.59	-1.52	-0.86	0.428	0.374	0.55	0.815	-0.424	0.123	-4.1	-0.454	-0.657
Langelier Index (@ 4C)	N/A	-	-2.36	-1.84	-1.77	-1.11	0.181	0.126	0.303	0.568	-0.674	-0.127	-4.35	-0.7	-0.903
Saturation pH (@ 20C)	N/A	-	8.61	8.29	8.52	8.36	7.17	7.23	7.15	6.99	8.12	7.98	10.5	8.05	8.06
Saturation pH (@ 4C)	N/A	-	8.86	8.54	8.77	8.61	7.42	7.47	7.4	7.23	8.37	8.23	10.8	8.3	8.3
Dissolved Aluminum (Al)	ug/L	5 to 100 ^b	6100	150	200	120	130	110	83	24	18	24	280	18	5.5
Dissolved Antimony (Sb)	ug/L	-	<4.0	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Dissolved Arsenic (As)	ug/L	5	11	3.7	1	1.1	0.9	1	0.66	0.86	0.84	0.95	1.5	<0.60	<0.60
Dissolved Barium (Ba)	ug/L	-	1200	220	150	140	130	130	52	49	27	21	15	92	96
Dissolved Beryllium (Be)	ug/L	-	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dissolved Bismuth (Bi)	ug/L	-	<20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dissolved Boron (B)	ug/L	-	<1000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Dissolved Cadmium (Cd)	ug/L	0.017 ^c	1.4	<0.017	0.078	<0.017	0.061	0.033	0.027	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017
Dissolved Chromium (Cr)	ug/L	-	24	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Cobalt (Co)	ug/L	-	27	2.8	3.1	2.7	<1.0	1.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Copper (Cu)	ug/L	2 to 4 ^c	<20	<2.0	<2.0	<2.0	170	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dissolved Iron (Fe)	ug/L	300	230000	13000	6700	8000	2000	3800	870	800	120	<100	2200	<100	<100
Dissolved Lead (Pb)	ug/L	1 to 7 ^c	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Lithium (Li)	ug/L	-	<10	2.9	1.6	2.1	9.1	8.8	16	14	4.7	4.9	1.6	12	13
Dissolved Manganese (Mn)	ug/L	-	8200	3600	7200	6300	2500	4200	940	480	680	440	180	600	640
Dissolved Molybdenum (Mo)	ug/L	-	<40	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Dissolved Nickel (Ni)	ug/L	25	<30	<3.0	<3.0	<3.0	<3.0	3.1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Dissolved Phosphorus (P)	ug/L	-	<1000	190	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Dissolved Selenium (Se)	ug/L	1	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dissolved Silver (Ag)	ug/L	0.1	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Strontium (Sr)	ug/L	-	260	160	120	150	1100	610	1300	1200	370	360	26	1400	1400
Dissolved Sulphur (S)	ug/L	-	<37000	<3700	<3700	<3700	75000	19000	88000	89000	18000	17000	<3700		
Dissolved Thallium (Tl)	ug/L	0.8	<8.0	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Dissolved Tin (Sn)	ug/L	-	<200	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Dissolved Titanium (Ti)	ug/L	-	<30	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Dissolved Uranium (U)	ug/L	-	<1.5	<0.15	<0.15	<0.15	0.79	0.49	0.57	0.63	<0.15	<0.15	<0.15	<0.15	<0.15
Dissolved Vanadium (V)	ug/L	-	<20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dissolved Zinc (Zn)	ug/L	30	290	23	26	13	17	25	6.1	5	<2.0	<2.0	3.3	<5.0	9
Dissolved Calcium (Ca)	mg/L	-	11	18	13	16	100	72	120	130	29	33	1.6	55	53
Dissolved Magnesium (Mg)	mg/L	-	4.9	6.7	4.4	5.6	30	21	28	34	7.7	9.2	2.8	26	23
Dissolved Potassium (K)	mg/L	-	1	1	1	1	5	5	2	6	1	<1	1	4.7	4.8
Dissolved Sodium (Na)	mg/L	-	9	22	16	19	28	26	26	36	25	29	22	210	200

italics - Detection limit exceeds guideline

CCME FWAL = CCME Canadian Council of Ministers of the Environment, 1999 (updated 2003) Water Quality Guidelines, Fresh Water Aquatic Life

(1) Reporting limit for Nitrite elevated due to Chloride interference.

a. CCME FWAL guideline @ 20 degrees Celsius and pH 7.5 (see CCME guidelines and table 2, in the fact sheet for ammonia)

b. Criteria for appropriate CCME FWAL guideline based on laboratory measurements of pH and Ca²⁺ only (DOC not measured)

c. Guideline varies as a function of hardness

Table F-2: Surface Water Sampling: General Chemistry and Total Metals Concentrations 2008

Parameters	Units	CCME FWAL	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6
			5-Sep-08	5-Sep-08	5-Sep-08	5-Sep-08	5-Sep-08	5-Sep-08
Alkalinity (Total as CaCO3)	mg/L	-	88	61	66	97	51	1
Chloride (Cl)	mg/L	-	1000	860	850	790	430	24
Colour	TCU	-	14	67	26	22	90	430
Hardness (CaCO3)	mg/L	-	620	390	400	500	230	9
Nitrate (N)	mg/L	13	<0.06	<0.06	0.08	<0.06	<0.06	<0.06
Nitrite (N)	mg/L	0.06	<6 (1)	<6 (1)	<6 (1)	<6 (1)	<3 (1)	<0.06
Nitrite + Nitrate	mg/L	-	<6	<6	<6	<6	<3	<0.06
Nitrogen (Ammonia Nitrogen)	mg/L	1.54 ^a	0.1	0.06	<0.05	<0.05	<0.05	0.05
Total Organic Carbon (C)	mg/L	-	1.1	6.9	5	4.3	11	28
Orthophosphate (P)	mg/L	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
pH	pH	6.5 - 9.0	7.7	7.7	7.5	7.8	7.5	5.3
Silica (SiO2)	mg/L	-	5.5	4.3	4.6	4.4	1.9	2.1
Sulphate (SO4)	mg/L	-	150	100	100	180	61	2
Turbidity	NTU	-	5.2	5.3	0.7	0.7	1.3	0.8
Conductivity	uS/cm	-	4500	3200	3000	2800	1500	95
TSS	mg/L	-						
Anion Sum	me/L	-	33.4	27.6	27.4	27.9	14.4	0.74
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	88	61	66	96	51	1
Calculated TDS	mg/L	-	2030	1540	1530	1550	806	47
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	<1	<1	<1	<1	<1	<1
Cation Sum	me/L	-	38.2	25.4	25.1	25.3	13.4	0.81
Ion Balance (% Difference)	%	-	6.8	4.17	4.38	4.76	3.48	4.52
Langelier Index (@ 20C)	N/A	-	0.105	-0.183	-0.339	0.233	-0.581	-5.78
Langelier Index (@ 4C)	N/A	-	-0.137	-0.428	-0.584	-0.011	-0.827	-6.03
Saturation pH (@ 20C)	N/A	-	7.6	7.88	7.84	7.57	8.08	11.1
Saturation pH (@ 4C)	N/A	-	7.84	8.13	8.08	7.81	8.33	11.3
Total Aluminum (Al)	ug/L	5 to 100 ^b	43	190	35	9.1	9.5	510
Total Antimony (Sb)	ug/L	-	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Total Arsenic (As)	ug/L	5	<0.60	<0.60	<0.60	<0.60	<0.60	1.2
Total Barium (Ba)	ug/L	-	220	160	130	110	88	18
Total Beryllium (Be)	ug/L	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Total Bismuth (Bi)	ug/L	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total Boron (B)	ug/L	-	120	<100	<100	<100	<100	<100
Total Cadmium (Cd)	ug/L	0.017 ^c	0.11	0.023	0.026	<0.017	0.02	<0.017
Total Chromium (Cr)	ug/L	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Cobalt (Co)	ug/L	-	<1.0	1.2	<1.0	<1.0	<1.0	<1.0
Total Copper (Cu)	ug/L	2 to 4 ^c	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total Iron (Fe)	ug/L	300	420	740	<100	<100	<100	2400
Total Lead (Pb)	ug/L	1 to 7 ^c	<1.0	<1.0	3.6	<1.0	<1.0	<1.0
Total Lithium (Li)	ug/L	-	30	20	20	20	13	<1.0
Total Manganese (Mn)	ug/L	-	960	1100	360	57	110	380
Total Molybdenum (Mo)	ug/L	-	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Total Nickel (Ni)	ug/L	25	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total Phosphorus (P)	ug/L	-	<100	<100	<100	<100	<100	<100
Total Selenium (Se)	ug/L	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Silver (Ag)	ug/L	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total Strontium (Sr)	ug/L	-	3700	2600	2500	2500	1400	22
Total Thallium (Tl)	ug/L	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Total Tin (Sn)	ug/L	-	<20	<20	<20	<20	<20	<20
Total Titanium (Ti)	ug/L	-	<3.0	<3.0	<3.0	<3.0	<3.0	4.4
Total Uranium (U)	ug/L	-	<0.15	<0.15	<0.15	0.21	<0.15	<0.15
Total Vanadium (V)	ug/L	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total Zinc (Zn)	ug/L	30	11	11	<5.0	<5.0	<5.0	<5.0
Total Calcium (Ca)	mg/L	-	140	87	89	110	54	1.2
Total Magnesium (Mg)	mg/L	-	63	43	43	52	23	1.5
Total Potassium (K)	mg/L	-	12	8.1	8.2	9	4.8	0.7
Total Sodium (Na)	mg/L	-	590	400	390	350	200	12

Italics - Detection limit exceeds guideline

CCME FWAL = CCME Canadian Council of Ministers of the Environment, 1999 (updated 2003) Water Quality Guidelines, Fresh Water Aquatic Life

a. CCME FWAL guideline @ 20 degrees Celsius and pH 7.5 (see CCME guidelines and table 2, in the fact sheet for ammonia)

b. Criteria for appropriate CCME FWAL guideline based on laboratory measurements of pH and Ca²⁺ only (DOC not measured)

c. Guideline varies as a function of hardness

Table F-3: Surface Water Sampling: Petroleum Hydrocarbon and PAH Concentrations - 2006 and 2008

Parameters	Units	CCME FWAL	SW-1			SW-2			SW-3			SW-4			SW-5			SW-6		SW-7	SW-8
			18-Jul-06	23-Aug-06	5-Sep-08	18-Jul-06	23-Aug-06	5-Sep-08	18-Jul-06	23-Aug-06	5-Sep-08	18-Jul-06	23-Aug-06	5-Sep-08	18-Jul-06	23-Aug-06	5-Sep-08	23-Aug-06	5-Sep-08	5-Sep-08	5-Sep-08
Benzene	mg/L	0.37	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ethylbenzene	mg/L	0.09	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Xylene (Total)	mg/L	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
C6 - C10 (less BTEX)	mg/L	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
>C10-C21 Hydrocarbons	mg/L	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
>C21-<C32 Hydrocarbons	mg/L	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Modified TPH (Tier1)	mg/L	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-Methylnaphthalene	ug/L	-	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05
2-Methylnaphthalene	ug/L	-	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05
Acenaphthene	ug/L	5.8	0.04	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Acenaphthylene	ug/L	-	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Anthracene	ug/L	0.012	0.02	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Benzo(a)anthracene	ug/L	0.018	<0.01	-	<0.01	<0.01	-	<0.01	0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Benzo(a)pyrene	ug/L	0.015	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	ug/L	-	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	ug/L	-	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	ug/L	-	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Chrysene	ug/L	-	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	0.01	-	<0.01	-	<0.01	<0.01	<0.01
Dibenzo(a,h)anthracene	ug/L	-	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Fluoranthene	ug/L	0.04	0.02	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Fluorene	ug/L	3	0.03	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	ug/L	-	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Naphthalene	ug/L	1.1	0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	-	<0.2	<0.2	<0.2
Perylene	ug/L	-	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Phenanthrene	ug/L	0.4	0.05	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01
Pyrene	ug/L	0.025	0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	<0.01	<0.01

Italics - Detection limit exceeds guideline

CCME FWAL = CCME Canadian Council of Ministers of the Environment, 1999 (updated 2007) Water Quality Guidelines, Fresh Water Aquatic Life

**Table F-4: Sediment Sampling at Surface Water Sample Locations
Metals, Petroleum Hydrocarbon, and PAH Concentrations - 2006**

Parameters	Units	ISQG (PEL)	SW-1 18-Jul-06	SW-2 18-Jul-06	SW-3 18-Jul-06	SW-4 18-Jul-06	SW-5 18-Jul-06
Aluminum (Al)	mg/kg	-	3000	12000	6700	5400	6600
Antimony (Sb)	mg/kg	-	<1	<1	<1	<1	<1
Arsenic (As)	mg/kg	5.9 (17)	12	7	4	6	9
Barium (Ba)	mg/kg	-	81	240	570	340	420
Beryllium (Be)	mg/kg	-	1	2	1	1	<1
Boron (B)	mg/kg	-	<20	<20	<20	<20	<20
Cadmium (Cd)	mg/kg	0.6 (3.5)	0.8	0.5	2.4	0.8	0.4
Calcium (Ca)	mg/kg	-	1300	14000	4800	18000	9100
Chromium (Cr)	mg/kg	37.3 (90)	9	24	16	12	22
Cobalt (Co)	mg/kg	-	20	22	18	14	19
Copper (Cu)	mg/kg	35.7 (197)	16	24	24	13	13
Iron (Fe)	mg/kg	-	20000	30000	21000	29000	48000
Lead (Pb)	mg/kg	35 (91.3)	3	11	11	6	14
Lithium (Li)	mg/kg	-	3	20	13	5	12
Magnesium (Mg)	mg/kg	-	670	6700	2400	2300	2000
Manganese (Mn)	mg/kg	-	690	11000	18000	19000	33000
Molybdenum (Mo)	mg/kg	-	<1	2	3	3	5
Nickel (Ni)	mg/kg	-	18	35	43	25	22
Phosphorus (P)	mg/kg	-	460	440	440	850	1800
Potassium (K)	mg/kg	-	<400	540	770	780	570
Selenium (Se)	mg/kg	-	1.7	1.8	1.9	3.5	1.6
Silver (Ag)	mg/kg	-	<1	<1	<1	<1	<1
Sodium (Na)	mg/kg	-	<400	<400	<400	<400	<400
Strontium (Sr)	mg/kg	-	16	40	69	230	110
Sulphur (S)	mg/kg	-	3300	<1000	2700	4400	10000
Thallium (Tl)	mg/kg	-	<0.7	<0.7	<0.7	<0.7	<0.7
Tin (Sn)	mg/kg	-	<10	<10	<10	<10	<10
Titanium (Ti)	mg/kg	-	64	67	64	57	68
Uranium (U)	mg/kg	-	<1	<1	1	2	<1
Vanadium (V)	mg/kg	-	6	21	11	8	22
Zinc (Zn)	mg/kg	123 (315)	360	190	610	390	120
Benzene	mg/kg	-	<0.003	<0.003	<0.003	<0.003	<0.003
Toluene	mg/kg	-	0.11	<0.03	0.03	0.03	<0.03
Ethylbenzene	mg/kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
Xylene (Total)	mg/kg	-	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (less BTEX)	mg/kg	-	5	<3	5	9	<3
>C10-C21 Hydrocarbons	mg/kg	-	130	<15	750	<15	28
>C21-<C32 Hydrocarbons	mg/kg	-	510	39	880	20	120
Modified TPH (Tier 1)	mg/kg	-	640	39	1600	29	150
1-Methylnaphthalene	mg/kg	-	<0.5	0.12	<0.5	<0.9	<0.4
2-Methylnaphthalene	mg/kg	0.00202 (0.201)	<0.5	0.16	<0.5	<0.9	<0.4
Acenaphthene	mg/kg	0.00671 (0.0889)	<0.5	<0.05	<0.5	<0.9	<0.4
Acenaphthylene	mg/kg	0.00587 (0.128)	<0.5	<0.05	<0.5	<0.9	<0.4
Anthracene	mg/kg	0.0469 (0.245)	<0.5	<0.05	<0.5	<0.9	<0.4
Benzo(a)anthracene	mg/kg	0.0317 (0.385)	<0.5	<0.05	<0.5	<0.9	<0.4
Benzo(a)pyrene	mg/kg	0.0319 (0.782)	<0.5	<0.05	<0.5	<0.9	<0.4
Benzo(b)fluoranthene	mg/kg	-	<0.5	<0.05	<0.5	<0.9	<0.4
Benzo(g,h,i)perylene	mg/kg	-	<0.5	<0.05	<0.5	<0.9	<0.4
Benzo(k)fluoranthene	mg/kg	-	<0.5	<0.05	<0.5	<0.9	<0.4
Chrysene	mg/kg	0.0571 (0.862)	<0.5	<0.05	<0.5	<0.9	<0.4
Dibenzo(a,h)anthracene	mg/kg	0.00622 (0.135)	<0.5	<0.05	<0.5	<0.9	<0.4
Fluoranthene	mg/kg	0.111 (2.355)	<0.5	<0.05	<0.5	<0.9	<0.4
Fluorene	mg/kg	0.0212 (0.144)	<0.5	<0.05	<0.5	<0.9	<0.4
Indeno(1,2,3-cd)pyrene	mg/kg	-	<0.5	<0.05	<0.5	<0.9	<0.4
Naphthalene	mg/kg	0.0346 (0.391)	<0.5	0.12	<0.5	<0.9	<0.4
Perylene	mg/kg	-	<0.5	<0.05	<0.5	<0.9	<0.4
Phenanthrene	mg/kg	0.0419 (0.515)	<0.5	0.1	<0.5	<0.9	<0.4
Pyrene	mg/kg	0.053 (0.875)	<0.5	<0.05	<0.5	<0.9	<0.4

italics - Detection limit exceeds guideline

ISQG (PEL) = CCME Interim Sediment Quality Guidelines for Freshwater Aquatic Life and (Probable Effect Level), update 2002

Figure F1
pH change over time at each monitoring location
(Nov. 2006 to Sep. 2008)

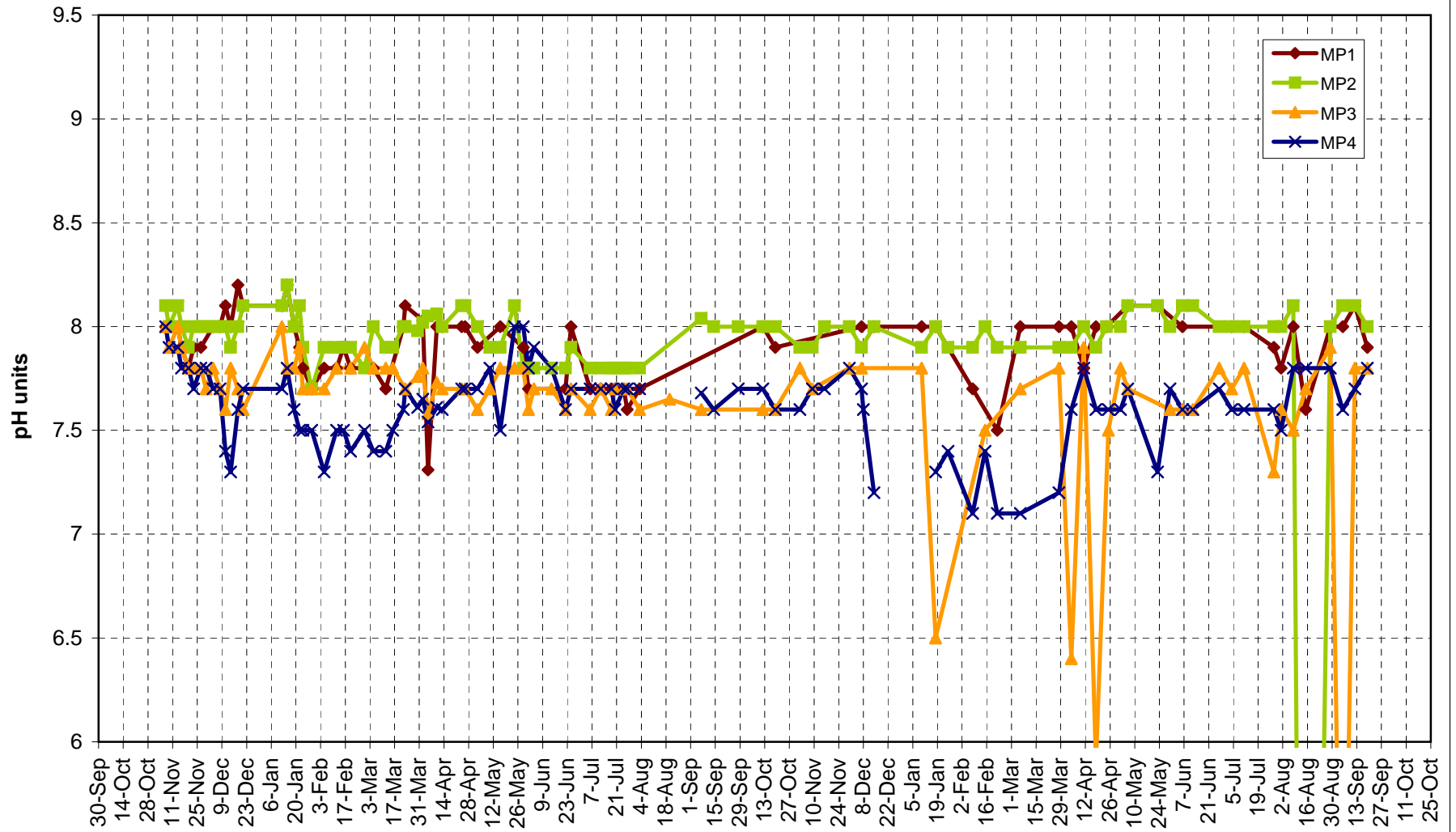


Figure F2
Iron change over time at each monitoring location
(Nov. 2006 to Sept. 2008)

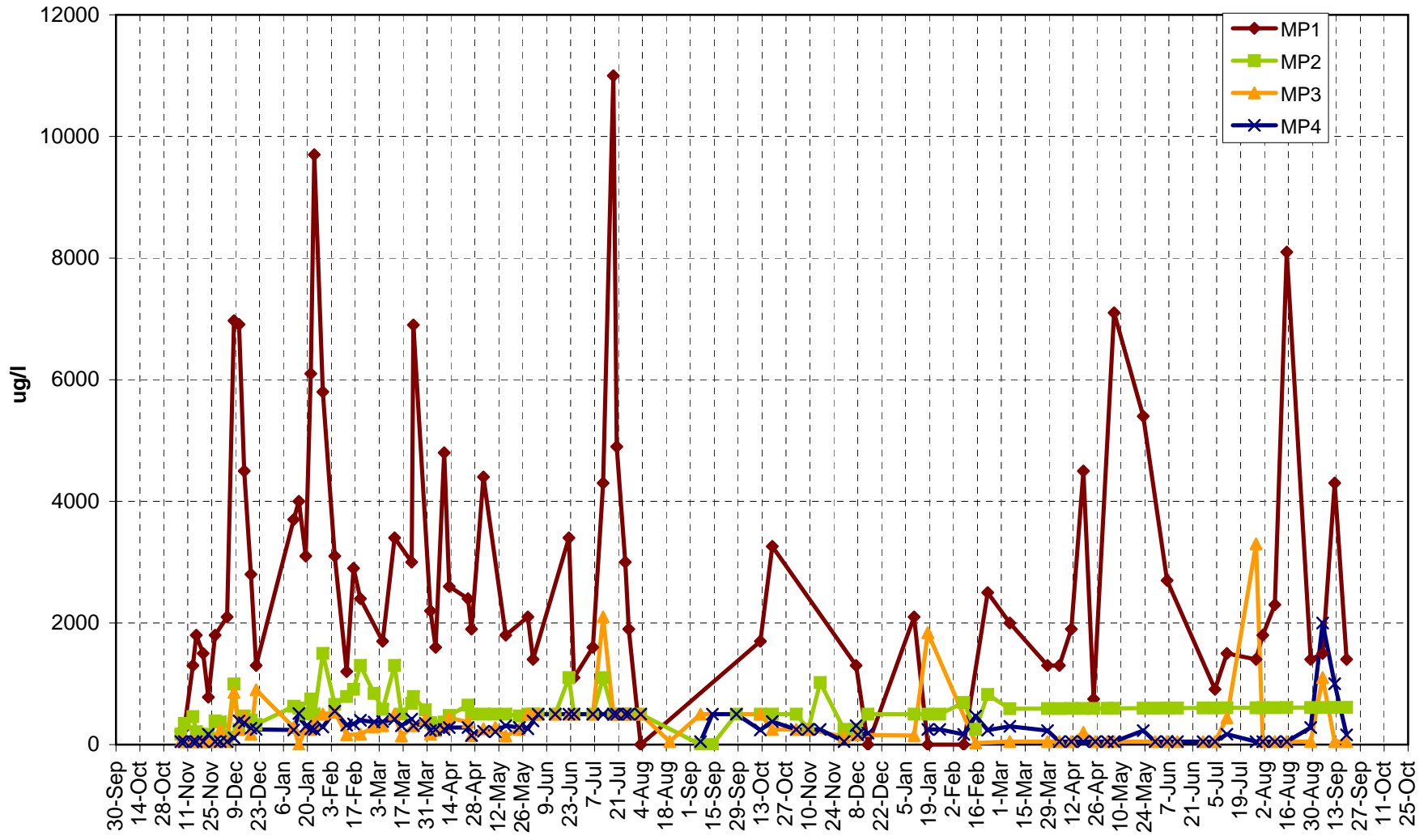


Figure F3
Zinc change over time at each monitoring location
(Nov. 2006 to Sept. 2008)

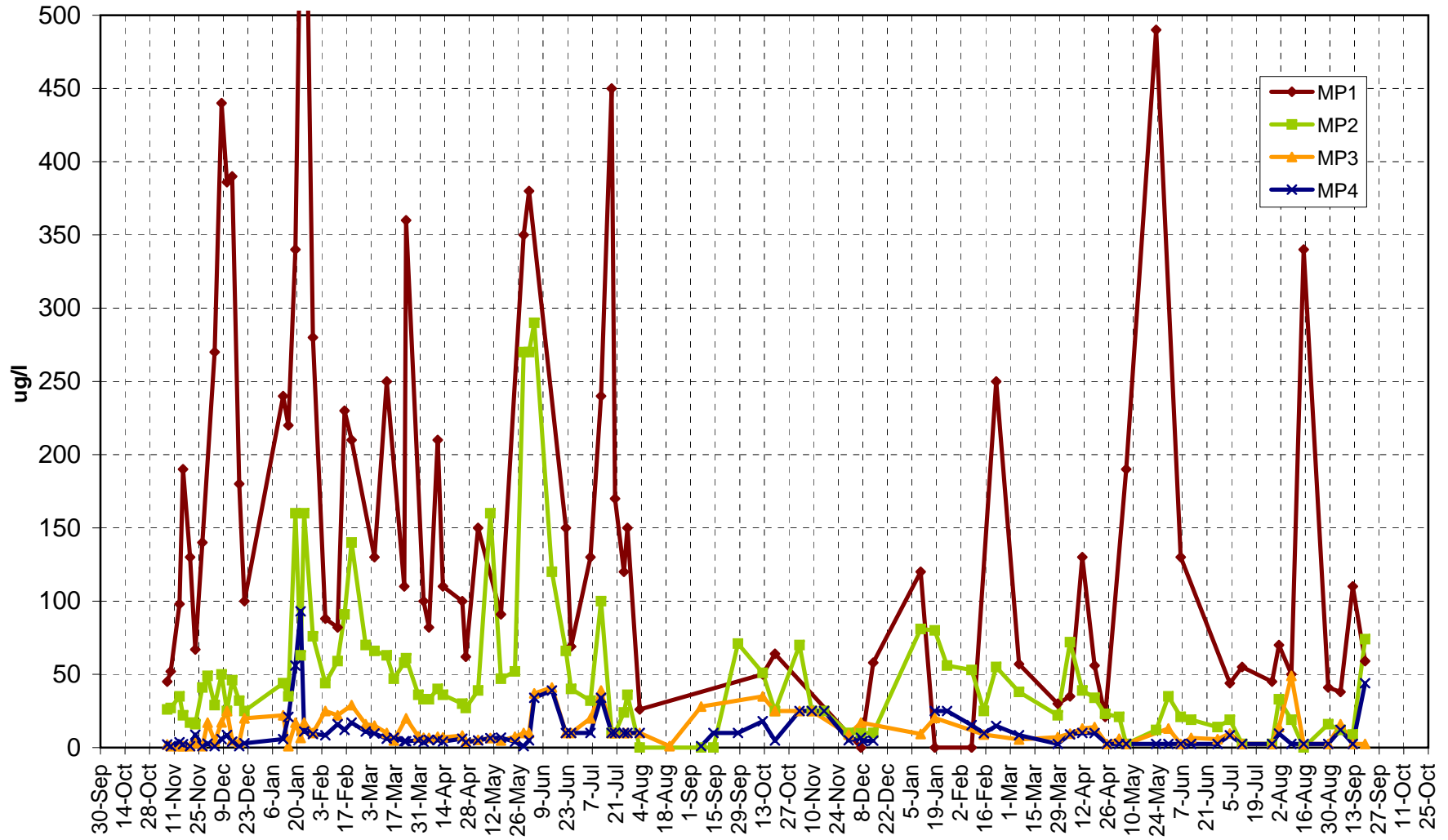


Figure F4
TSS change over time at each monitoring location
(Nov. 2006 to Sept. 2008)

