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July 16, 2020

MEMORANDUM

To: Phil Hull
Environmental Officer
Niagara District Office

From: Michael Spencer
Surface Water Group Leader
Technical Support Section

RE: Former General Motors Property, St. Catharines
February 13, 2020 Surface Water Quality Sampling Results
Twelve Mile Creek and Storm Sewer Outfalls

Introduction

On February 13, 2020 Technical Support Surface Water completed surface water sampling of Twelve Mile Creek and storm sewer outfalls near the former General Motors (GM) Property at 282 to 285 Ontario Street in the City of St. Catharines as requested by the Niagara District Office. The sampling occurred during a snow melt event with runoff since the average daily temperature was above freezing (St. Catharines Met Station Id. 6137304) and the storm sewer outfalls were discharging. This memorandum provides the surface water quality results and a brief interpretation.

Lab Analysis

The surface water samples were analyzed at the Ministry lab for general chemistry, metals, volatile organic compounds, acid base neutrals (semi-volatiles), polycyclic aromatic hydrocarbons and polychlorinated biphenyls (PCB). The wide range of analysis was chosen to be consistent with previous studies completed for the former GM Property.

Sampling Location Descriptions

The Twelve Mile Creek and storm sewer outfall sampling locations are illustrated in the attached map titled "Twelve Mile Creek near GM Property St. Catharines". As well, the following is a description of the sampling locations:

TMCUS - Twelve Mile Creek upstream of the former GM Property.

TMC1 - Twelve Mile Creek adjacent to the former GM Property and appropriately 20m upstream of TMCOut1. Location across from groundwater monitoring well.

TMCOut1 - Storm sewer outfall from the former GM property.

TMCOut2 - Municipal storm sewer outfall. The former GM Property outfall beside TMCOut2 was not sampled since it was dry.

TMC2 - Twelve Mile Creek downstream of storm sewer outfalls and adjacent to the former GM Property. Located across from groundwater monitoring well.

TMCDS - Twelve Mile Creek downstream of the former GM Property and located just upstream of an old railway bridge abutment.

Based on Table 1 in the report "Utility Corridor Investigation Report, GMCL Ontario Street Plant, St. Catharines, Ontario, CH2M Hill Canada Ltd., October 2012", it is my understanding that TMCOut1 would discharge stormwater from the former GM West Plant. The storm sewer outfall that was dry and not sampled on February 13, 2020 beside TMCOut2 would discharge stormwater from the former GM East Plant.

It should be noted that a duplicate set of samples were collected at TMCDS.

Surface Water Quality Criteria

This assessment will compare the sample results to the Ministry's Provincial Water Quality Objectives (PWQO) that are contained in the Ministry document "Water Management Policies, Guidelines, Provincial Water Quality Objectives of the Ministry of the Environment, June 1994." PWQOs are numerical and narrative ambient surface water quality criteria which represent a desirable level of water quality that the Ministry strives to maintain in the surface waters of the Province. PWQOs are set at a level of water quality which is protective of all forms of aquatic life and all aspects of the aquatic life cycle during indefinite exposure to the water. In the absence of a PWQO for a specific parameter, the Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life can be used.

As well, additional PCB guidance for background criteria interpretation is provided in the following study as briefly summarized below:

(i) Tracking PCB Contamination in Ontario Great Lakes Tributaries: Development of Methodologies and Lessons Learned for Watershed Based Investigations, February 2016

Prepared by: N. Benoit, D. Boyd, Environmental Monitoring and Reporting Branch, Ministry of the Environment and Climate Change
A. Dove, D. Burniston, Water Quality Monitoring and Surveillance Division, Environment Canada

This study developed environmental triggers to differentiate potential source areas from background PCB conditions in urban areas. Background concentrations do not represent natural conditions but rather reflect typical concentrations in urban areas in the absence of known PCB sources. The study established a surface water PCB threshold at greater than 10 ng/L (ie. 10x PWQO). It identified that results at most background areas did not show evidence of a PCB source at less than 10 ng/L. However, it noted that PCB results exceeding 20 ng/L may occur in urban background areas following rain events due to increased suspended solids. PCB are typically more prevalent during runoff events in urban areas since they are hydrophobic and strongly sorb to suspended solids.

The study identified that Twelve Mile Creek non-source sites (ie. locations with a lack of evidence of a source) had PCB results for wet events that ranged from 1.5 to 22.4 ng/L with an average of 9.5 ug/L. PCB results for dry events ranged from 0.8 to 3.9 ng/L with an average of 2.0 ug/L.

Surface Water Quality Sample Results

The surface water quality sample results are contained in the attached table "Sample Results for Twelve Mile Creek and Storm Sewer Outfalls near Former GM Property St. Catharines." The following is a brief interpretation of the results.

(i) General Chemistry Results

All of the general chemistry results were within a common range except conductivity. The municipal storm outfall (TMCOut2) had an elevated conductivity result in comparison to the other results which generally represents an elevated dissolved solids concentration.

(ii) Metals Results

All sampling locations results exceeded the cadmium PWQO.

The former GM Property storm sewer outfall (TMCOut1) iron result (332 ug/L) slightly exceeded the PWQO (300 ug/L).

The municipal storm sewer outfall (TMCOut2) results had PWQO exceedances of aluminum, cadmium, cobalt, chromium, copper, iron and zinc.

(iii) Volatile Organic Compounds Results

All of the volatile organic compound results were either less than the method detection limit, or detections were less than PWQO, or detections did not have criteria to compare to.

(iv) Acid Base Neutrals (Semi-Volatiles) Results

All of the acid base neutral results were less than the method detection limit except at the municipal storm sewer outfall. The municipal storm sewer outfall (TMCOut2) results had two detections that were less than the PWQO.

(v) Polycyclic Aromatic Hydrocarbons Results

All of the polycyclic aromatic hydrocarbon results were less than the method detection limit except at the municipal storm outfall. The municipal storm sewer outfall (TMCOut2) results had three PWQO exceedances (chrysene, fluoranthene and phenanthrene) and two CWQG exceedances (benzo(a)pyrene and pyrene).

(vi) Polychlorinated Biphenyls Results

The PWQO for total polychlorinated biphenyl (PCB) is 1 ng/L. To differentiate potential source areas from typical background PCB conditions in urban areas, a surface water PCB threshold greater than 10 ng/L can be used. However, PCB results exceeding 20 ng/L may occur in urban background areas following rain events due to increased suspended solids. As an additional comparison, previous Twelve Mile Creek non-source sites had PCB results for wet events that ranged from 1.5 to 22.4 ng/L.

For this review the PCB congener detections were totalled to determine the total PCB result for each sampling location which are further discussed below.

The Twelve Mile Creek location upstream of the former GM Property (TMCUS) total PCB result (0.111 ng/L) was less than the PWQO. As well, the Twelve Mile Creek location adjacent to the former GM property but upstream of any storm outfalls (TMC1) total PCB result (0.066 ng/L) was also less than the PWQO.

The former GM Property storm sewer outfall (TMCOut1) total PCB result (19.5299 ng/L) exceeded the PWQO and the PCB threshold (10 ng/L). However, the result was within the range of previous Twelve Mile Creek non-source sites results for wet events (1.5 to 22.4 ng/L).

The municipal storm sewer outfall (TMCOut2) total PCB result (11.0231 ng/L) exceeded the PWQO and slightly exceeded the PCB threshold. However, the result was within the range of previous Twelve Mile Creek non-source sites results for wet events.

All of the Twelve Mile Creek PCB congener results downstream of the storm sewer outfalls but adjacent to the former GM Property (TMC2) and further downstream of the former GM Property (TMCDS) were less than the method detection limit.

Discussion of Surface Water Quality Results

There are no concerns with the general chemistry, volatile organic compound and acid base neutral (semi-volatile) results.

While there were some PWQO exceedances of metals at the former GM Property (TMCOut1) and municipal storm sewer (TMCOut2) outfalls, the downstream Twelve Mile Creek locations (TMC2 and TMCDS) did not show any impact.

There were some PWQO and CWQG exceedances of polycyclic aromatic hydrocarbon at the municipal storm sewer (TMCOut2) outfall. These exceedances may be related to increased suspended solids concentrations during runoff events.

The former GM Property (TMCOut1) and municipal storm sewer (TMCOut2) outfalls exceeded the PCB PWQO and the PCB threshold used to differentiate potential source areas from typical background PCB conditions in urban areas. However, the results were within the range of previous Twelve Mile Creek non-source sites results for wet events. As well, it is my understanding that the PCB threshold was meant to be applied to surface water bodies (ie. creeks, rivers). All of the Twelve Mile Creek PCB congener results downstream of the storm sewer outfalls (TMC2 and TMCDS) were less than the method detection limit.

Since these surface water quality results represent a snow melt event, it would be beneficial to complete sampling during a dry event to provide further interpretation.

Michael Spencer
Surface Water Group Leader
Technical Support Section

cc: K. Groombridge, B. Farnand, NDO
B. Koblik, TSS

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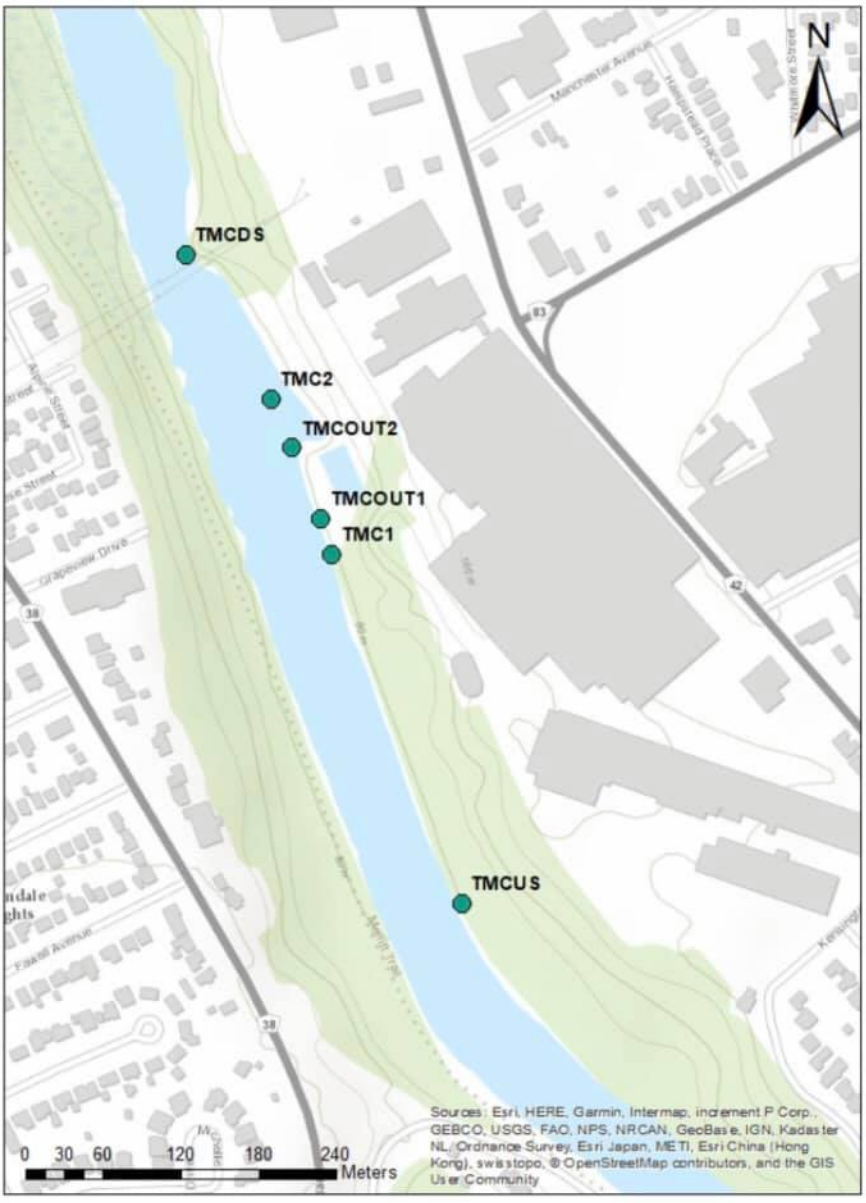
Twelve Mile Creek Sampling near GM Property St. Catharines



Sample Results for Twelve Mile Creek and Storm Sewer Outfalls near Former GM Property

General Chemistry	Units	PWQO	TMCUS	TMC1	TMCOut1	TMCOut2	TMC2	TMCDS	
Alkalinity (CaCO3)	mg/L		103	102	188	242	103	103	101
Conductivity	uS/cm		344	341	899	5370	351	348	352
pH		6.5 - 8.5	8.16	8.16	8.18	7.75	8.18	8.18	8.18

Metals	Units	PWQO	TMCUS	TMC1	TMCOut1	TMCOut2	TMC2	TMCDS	
Arsenic	mg/L	0.1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Antimony	mg/L	0.02	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005
Selenium	mg/L	0.1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Silver	ug/L	0.1	0	0	0	0	0	0	0
Aluminum	ug/L	75	52.5	54.3	41.7	167	62.4	70.6	53.1
Barium	ug/L		22.5	22.5	36.2	62.7	22.7	22.7	23
Beryllium	ug/L	1100	0.0254	0.0318	0.0303	0	0.0417	0.0258	0.0265
Bismuth	ug/L		0	0	0	0	0	0	0
Calcium	mg/L		37.5	37.4	102	100	37.6	37.7	35.3
Cadmium	ug/L	0.2	0.238	0.474	0.817	0.574	0.52	0.551	0.624
Cobalt	ug/L	0.9	0.44	0.53	0.528	2.24	0.534	0.565	0.38
Chromium	ug/L	1	0.153	0.148	0.707	2.42	0.348	0.336	0
Copper	ug/L	5	2.18	2.23	4.85	35.2	2.25	2.23	1.91
Iron	ug/L	300	52.9	53.2	332	391	56.2	59.8	51.3
Hardness	mg/L		133	133	354	349	135	134	129
Potassium	mg/L		1.56	1.57	9.89	8.37	1.6	1.58	1.59
Lithium	ug/L		7.28	7.48	16.2	25.4	6.31	5.99	4.04
Magnesium	mg/L		9.65	9.62	24.1	24.1	10.1	9.67	9.83
Manganese	ug/L		3.05	3.03	31.7	67.7	3.09	3.13	2.86
Molybdenum	ug/L	40	0	0.276	1.92	0	0.0833	0.216	0.953
Sodium	mg/L		17.8	17.5	59.4	954	19.9	19.1	19.5
Nickel	ug/L	25	0.879	0.416	3.7	11.5	0.854	0.795	0.504
Lead	ug/L	25	0	0	0	0	0	0	0
Tin	ug/L		0	0	0	0	0	0	0
Strontium	ug/L		207	208	702	593	209	210	209
Titanium	ug/L		1.44	1.64	1.38	0.984	1.9	2.01	1.6
Uranium	ug/L	5	0.893	1.38	0.642	2.41	0.0885	1.05	0.586
Vanadium	ug/L	6	0.14	0.184	0.0255	0	0.192	0.219	0.32
Zinc	ug/L	30	2.38	2.22	20.2	93.3	2.76	7.07	2.49
Zirconium	ug/L	4	0	0	0	0	0	0	0

Volatile Organic Compounds	Units	PWQO	TMCUS	TMC1	TMCOut1	TMCOut2	TMC2	TMCDS	
1,2-diethylbenzene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2,4-trimethylbenzene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-diethylbenzene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2,3-trimethylbenzene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,4-diethylbenzene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3,5-trimethylbenzene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzene	ug/L	100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Isopropyl benzene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	ug/L	8	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2-ethyltoluene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
m- and p-xylene	ug/L	2, 30	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	ug/L	40	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Isopropyl toluene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Styrene	ug/L	4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	ug/L	0.8	<0.2	<0.2	<0.2	**0.4**	<0.2	<0.2	<0.2
3-ethyltoluene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
4-ethyltoluene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromofluorobenzene	ug/L		**13**	**12**	**12**	**12**	**12**	**11**	**11**
d8-toluene	ug/L		**11**	**11**	**10**	**11**	**10**	**10**	**10**
Diisopropylether	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Fluorobenzene	ug/L		**5**	**5**	**5**	**5**	**5**	**5**	**5**
Methyl isobutyl ketone	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Tert-butyl methyl ether	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Propylbenzene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Tetra-amyl-methyl ether	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,1-trichloroethane	ug/L	10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2,2-tetrachloroethane	ug/L	70	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,1,2-tetrachloroethane	ug/L	20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-trichloroethane	ug/L	800	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-dichloroethane	ug/L	200	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-dichloroethene	ug/L	40	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-dichloroethane	ug/L	100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-dichloropropane	ug/L	0.7	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
cis-1,3-dichloropropene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
trans-1,3-dichloropropene	ug/L	7	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromodichloromethane	ug/L	200	<0.2	<0.2	<0.2	**0.5**	<0.2	<0.2	<0.2
Bromomethane	ug/L	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	ug/L	60	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dibromochloromethane	ug/L		<0.2	<0.2	<0.2	**0.2**	<0.2	<0.2	<0.2
cis-1,2-dichloroethene	ug/L	200	<0.2	<0.2	**0.3**	<0.2	<0.2	<0.2	<0.2
Chloroethane	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloromethane	ug/L	700	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	ug/L		<0.2	<0.2	<0.2	**1.6**	<0.2	<0.2	<0.2
Carbon tetrachloride	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dichlorodifluoromethane	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloromethane	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
trans-1,2-dichloroethene	ug/L	200	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Trichlorofluoromethane	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	ug/L	50	<0.2	<0.2	**0.2**	**0.4**	<0.2	<0.2	<0.2
Trichloroethene	ug/L	20	<0.2	<0.2	**0.7**	<0.2	<0.2	<0.2	<0.2
Chloroethene	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-dichlorobenzene	ug/L	2.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-dichlorobenzene	ug/L	2.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,4-dichlorobenzene	ug/L	4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	ug/L	15	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-dibromoethane	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Trihalomethanes; total	ug/L		<0.2	<0.2	<0.2	**2.4**	<0.2	<0.2	<0.2
Xylenes; total	ug/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Acid Base Neutrals (Semi-Volatiles)	Units	PWQO (*CWQG*)	TMCUS	TMC1	TMCOut1	TMCOut2	TMC2	TMCDS	
Diphenylamine	ug/L	3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-dichlorophenol	ug/L	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-dinitrotoluene	ug/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-dimethylphenol	ug/L	10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-dinitrophenol	ug/L		<10	<10	<10	<10	<10	<10	<10
2,6-dichlorophenol	ug/L	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,6-dinitrotoluene	ug/L	6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4,6-dinitro-o-cresol	ug/L	0.2	<10	<10	<10	<10	<10	<10	<10
4-bromophenyl-phenyl ether	ug/L	0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-chlorophenyl-phenyl ether	ug/L	0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-nitrophenol	ug/L	50	<0.5	<0.5	<0.5	**0.9**	<0.5	<0.5	<0.5
Bis(2-chloroethyl)ether	ug/L	200	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroisopropyl)ether	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Butylbenzylphthalate	ug/L	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis-2-ethylhexylphthalate	ug/L		<10	<10	<10	<10	<10	<10	<10
Camphene	ug/L	2	<0.5	<0.5	<0.5	**0.6**	<0.5	<0.5	<0.5
Di-n-butylphthalate	ug/L	19	<10	<10	<10	<10	<10	<10	<10
Di-n-octylphthalate	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diphenyl ether	ug/L	0.03	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m-cresol	ug/L	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
N-nitroso-di-n-propylamine	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-cresol	ug/L	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
p-chloro-m-cresol	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
p-cresol	ug/L	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol	ug/L	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-chloronaphthalene	ug/L	0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1-methylnaphthalene	ug/L	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-chloronaphthalene	ug/L	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-methylnaphthalene	ug/L	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
5-nitroacenaphthene	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	ug/L	*5.8*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	ug/L	0.0008	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)anthracene	ug/L	0.0004	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	ug/L	*0.015*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)fluoranthene	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Biphenyl	ug/L	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	ug/L	0.0002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	ug/L	0.0001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzo(a,h)anthracene	ug/L	0.002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	ug/L	0.0008	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	ug/L	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	ug/L	0.00002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indole	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	ug/L	7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perylene	ug/L	0.00007	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	ug/L	0.03	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	ug/L	*0.025*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-chlorophenol	ug/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,4-trichlorophenol	ug/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,4,5-tetrachlorophenol	ug/L	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,4,6-tetrachlorophenol	ug/L	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,5-trichlorophenol	ug/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,5,6-tetrachlorophenol	ug/L	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-trichlorophenol	ug/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-trichlorophenol	ug/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	ug/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Polycyclic Aromatic Hydrocarbons	Units	PWQO (*CWQG*)	TMCUS	TMC1	TMCOut1	TMCOut2	TMC2	TMCDS	
1-methylnaphthalene	ng/L	2000	<10	<10	<10	<50	<10	<10	<10
2-methylnaphthalene	ng/L	2000	<10	<10	<10	<50	<10	<10	<10
Acenaphthene	ng/L	*5800*	<10	<10	<10	<50	<10	<10	<10
Acenaphthylene	ng/L		<10	<10	<10	<50	<10	<10	<10
Anthracene	ng/L	0.8	<10	<10	<10	<50	<10	<10	<10
Benz(a)anthracene	ng/L	0.4	<20	<20	<20	<100	<20	<20	<20
Benzo(a)pyrene	ng/L	*15*	<1	<1	<1	**33**	<1	<1	<1
Benzo(b)fluoranthene	ng/L		<10	<10	<10	**55**	<10	<10	<10
Benzo(e)pyrene	ng/L		<10	<10	<10	<50	<10	<10	<10
Benzo(k)fluoranthene	ng/L		<10	<10	<10	<50	<10	<10	<10
Chrysene	ng/L	0.1	<10	<10	<10	**93**	<10	<10	<10
Dibenz(a,h)anthracene	ng/L	2	<20	<20	<20	<100	<20	<20	<20
Fluoranthene	ng/L	0.8	<10	<10	<10	**210**	<10	<10	<10
Fluorene	ng/L	200	<10	<10	<10	<50	<10	<10	<10
Benzo(g,h,i)perylene	ng/L	0.02	<20	<20	<20	<100	<20	<20	<20
Indeno(1,2,3-c,d)pyrene	ng/L		<20	<20	<20	<100	<20	<20	<20
Naphthalene	ng/L	7000	<10	<10	<10	<50	<10	<10	<10
Perylene	ng/L	0.7	<10	<10	<10	<50	<10	<10	<10
Phenanthrene	ng/L	30	<10	<10	<10	**130**	<10	<10	<10
Pyrene	ng/L	*25*	<10	<10	<10	**180**	<10	<10	<10

Polychlorinated Biphenyls	Units	PWQO	TMCUS	TMC1	TMCOut1	TMCOut2	TMC2	TMCDS	
PCB congeners; total	**ng/L**	**1**	**0.111**	**0.066**	**19.5299**	**11.0231**	**<mdl**	**<mdl**	**<mdl**
2-monochloroPCB(1)	pg/L		<7.6	<6.2	<5.1	**31**	<4	<3.9	<2.2
4-monochloroPCB(3)	pg/L		<4.6	<5	<3.5	**24**	<4.5	<4	<2
2,3'-dichloroPCB(6)	pg/L		<11	<9	<8.3	**57**	<9	<10	<5
2,4'-dichloroPCB(8)	pg/L		<23	<18	<17	**180**	<17	<15	<15
4,4'-dichloroPCB(15)	pg/L		<11	<17	**150**	**81**	<13	<11	<16
2,2',3-trichloroPCB(16)	pg/L		<11	<9.1	<14	**170**	<6.6	<9.3	<6.4
2,2',5-trichloroPCB(18)	pg/L		<15	<16	**170**	**490**	<14	<15	<15
2,2',6-trichloroPCB(19)	pg/L		<7	<6	**960**	**81**	<6.4	<5.9	<4
2,3,4'-trichloroPCB(22)	pg/L		<6.2	<7.8	<7.9	**190**	<6.4	<5.8	<5.9
2,4',5-trichloroPCB(31)	pg/L		<14	<17	**73**	**510**	<15	<14	<11
3,4,4'-trichloroPCB(37)	pg/L		<7	<9.8	**18**	**150**	<4.8	<5.1	<4.8
2,2',3,3'-tetrachloroPCB(40)	pg/L		<6	<3.1	**820**	**99**	<3	<3.5	<4
2,2',3,4-tetrachloroPCB(41)	pg/L		<6	<5.1	**41**	**77**	<3	<2.5	<4
2,2',3,5'-tetrachloroPCB(44)	pg/L		<14	<15	**2000**	**750**	<11	<9.4	<11
2,2',4,5'-tetrachloroPCB(49)	pg/L		<9.3	<10	**1400**	**530**	<8.5	<6.1	<6.3
2,2',5,5'-tetrachloroPCB(52)	pg/L		<18	<27	**3200**	**930**	<13	<16	<15
2,2',6,6'-tetrachloroPCB(54)	pg/L		<4	<2	**25**	<3.5	<2	<2	<2
2,3,4,4'-tetrachloroPCB(60)	pg/L		<3.8	<7.6	<5.3	**120**	<2.6	<2.3	<1.7
2,3',4,4'-tetrachloroPCB(66)	pg/L		<7.6	<19	**150**	**510**	<7.3	<6.4	<5
2,3',4',5-tetrachloroPCB(70)	pg/L		<10	<24	**56**	**540**	<7.6	<8.1	<7.8
2,4,4',5-tetrachloroPCB(74)	pg/L		<5.7	<10	<18	**270**	<4.3	<3.8	<3.1
3,3',4,4'-tetrachloroPCB(77)	pg/L		<3	<3.8	**19**	**58**	<1.6	<1.2	<1.1
3,4,4',5-tetrachloroPCB(81)	pg/L		<1.7	<1.2	**3.9**	**4.1**	<0.9	<0.76	<0.5
PeCIPCB(84)+PeCI(90)+PeCI(101)	pg/L		<17	<38	**1300**	**560**	<13	<12	<11
2,2',3,4,4'-pentachloroPCB(85)	pg/L		<2.9	<8.3	**220**	**120**	<2.9	<2.6	<1.2
2,2',3,4,5'-pentachloroPCB(87)	pg/L		<4.9	<12	**330**	**210**	<3.7	<3.5	<3.9
2,2',3,5',6-pentachloroPCB(95)	pg/L		<10	<19	**1300**	**400**	<8.7	<7.8	<8.6
2,2',3',4,5-pentachloroPCB(97)	pg/L		<4.1	<10	**330**	**160**	<2.7	<3.1	<2.9
2,2',4,4',5-pentachloroPCB(99)	pg/L		<3.9	<12	**400**	**190**	<3.7	<3.5	<2.8
2,2',4,6,6'-pentachloroPCB(104)	pg/L		<0.95	<1.3	<3	<3	<1	<0.9	<0.7
2,3,3',4,4'-pentachloroPCB(105)	pg/L		<6	<12	**29**	**140**	<2.7	<3.6	<2.8
2,3,3',4',6-pentachloroPCB(110)	pg/L		<12	<30	**940**	**430**	<8.3	<10	<8.8
2,3,4,4',5-pentachloroPCB(114)	pg/L		<2	<3.1	**5.6**	**19**	<1	<1	<0.8
2,3',4,4',5-pentachloroPCB(118)	pg/L		<8.8	**22**	**89**	**290**	<5.6	<6.3	<5.1
2,3',4,4',6-pentachloroPCB(119)	pg/L		<0.98	<0.8	**9.3**	**8.8**	<0.9	<0.7	<0.5
2',3,4,4',5-pentachloroPCB(123)	pg/L		<2.8	<4.1	**19**	**31**	<1.2	<1.4	<0.8
3,3',4,4',5-pentachloroPCB(126)	pg/L		<3.8	<2	<2	**5.2**	<1	<1	<0.9
2,2',3,3',4,4'-hexachloroPCB(128)	pg/L		<6.5	<6.1	**43**	**58**	<2.3	<1.5	<1.5
2,2',3,3',5,6'-hexachloroPCB(135)	pg/L		<4.2	<5.5	**54**	**46**	<1.9	<1.4	<1.9
2,2',3,4,4',5-hexachloroPCB(137)	pg/L		<1.7	<3.3	**11**	**16**	<2	<0.7	<0.5
2,2',3,4,4',5'-hexachloroPCB(138)	pg/L		<21	**32**	**210**	**290**	<6.8	<7.5	<6.1
2,2',3,4,5,5'-hexachloroPCB(141)	pg/L		<4.6	<6.9	**53**	**61**	<2	<1.4	<1.1
2,2',3,4',5',6-hexachloroPCB(149)	pg/L		<13	<35	**340**	**300**	<6.8	<6.4	<8.5
2,2',3,5,5',6-hexachloroPCB(151)	pg/L		<8	<12	**110**	**86**	<3	<2.6	<2.1
2,2',4,4',6,6'-hexachloroPCB(155)	pg/L		<1.1	<0.74	<0.8	**6.8**	<0.41	<0.8	<0.36
2,3,3',4,4',5-hexachloroPCB(156)	pg/L		**7.7**	<4.4	**6.5**	**37**	<2	<0.97	<1
2,3,3',4,4',5'-hexachloroPCB(157)	pg/L		<4.2	<2.7	**8.1**	**13**	<2	<0.7	<0.44
22'33'45(129)+233'44'6-HxClPCB(158)	pg/L		<6.2	<7.7	**37**	**51**	<2.4	<1.4	<1.1
2,3',4,4',5,5'-hexachloroPCB(167)	pg/L		<4.2	<2	**6.6**	**14**	<1	<0.81	<0.59
22'44'55'(153)+23'44'5'6-HxClPCB(168)	pg/L		<16	<29	**190**	**260**	<6	<5.8	<6.5
3,3',4,4',5,5'-hexachloroPCB(169)	pg/L		<2	<2	<1	<4	<2	<0.9	<0.6
2,2',3,3',4,4',5-heptachloroPCB(170)	pg/L		**27**	<8	**59**	**82**	<1.6	<1.9	<2.9
2,2',3,3',4,4',6-heptachloroPCB(171)	pg/L		<4.7	<2.8	**15**	**18**	<0.9	<0.5	<1.2
2,2',3,3',4,5,6'-heptachloroPCB(174)	pg/L		<9.9	<8.6	**60**	**63**	<2.2	<2	<2.5
2,2',3,3',4',5,6-heptachloroPCB(177)	pg/L		<6.4	<4.2	**36**	**38**	<1.5	<1.4	<1.2
2,2',3,3',5,5',6-heptachloroPCB(178)	pg/L		<3	<3.2	**13**	**19**	<0.8	<1.1	<0.52
2,2',3,4,4',5',6-heptachloroPCB(183)	pg/L		<4.4	<4.7	**33**	**36**	<1	<0.87	<1.3
2,2',3,4',5,5',6-heptachloroPCB(187)	pg/L		<7.8	**12**	**70**	**89**	<1.8	<2.2	<2
2,2',3,4',5,6,6'-heptachloroPCB(188)	pg/L		<2	<0.88	<0.52	<2	<0.5	<0.4	<0.3
2,3,3',4,4',5,5'-heptachloroPCB(189)	pg/L		<2.9	<1.6	<3	<5.1	<1.2	<0.5	<0.5
2,3,3',4,4',5',6-heptachloroPCB(191)	pg/L		<2.2	<1.2	<2.7	<4	<0.7	<0.4	<0.3
22'344'55'(180)+233'4'55'6-HpClPCB(193)	pg/L		**40**	<14	**120**	**170**	<3.5	<2.9	<4
2,2',3,3',4,4',5,5'-octachloroPCB(194)	pg/L		**16**	<4.2	**30**	**47**	<2	<2.8	<2.7
2,2',3,3',4,5,5',6'-octachloroPCB(199)	pg/L		**16**	<6	**31**	**56**	<2.1	<1.7	<2.5
2,2',3,3',4,5,6,6'-octachloroPCB(200)	pg/L		<4	<0.6	<4.4	**7.4**	<0.9	<0.6	<0.5
2,2',3,3',4,5',6,6'-octachloroPCB(201)	pg/L		<2.4	<1.9	<3.5	<6.7	<0.9	<0.6	<0.5
2,2',3,3',5,5',6,6'-octachloroPCB(202)	pg/L		<2.2	<2	<6	**9.7**	<0.94	<0.6	<0.4
2,2',3,4,4',5,5',6-octachloroPCB(203)	pg/L		**12**	<4.7	**33**	**53**	<2.5	<1.4	<1.8
2,3,3',4,4',5,5',6-octachloroPCB(205)	pg/L		<2.1	<1.1	<2	**5.1**	<1	<0.9	<0.6
22'33'44'55'6-nonachloroPCB(206)	pg/L		<6.3	<1.9	<7.5	**24**	<2	<1	<0.77
22'33'44'566'-nonachloroPCB(207)	pg/L		<1.4	<0.7	<1.3	<4.7	<1	<0.6	<0.4
22'33'455'66'-nonachloroPCB(208)	pg/L		<1.6	<2	<1.4	<6.3	<1.1	<0.7	<0.44
DecachloroPCB(209)	pg/L		<1.9	<2.9	<2.5	<7.5	<2.5	<2	<2.5
244'-triClPCB(28)+2'34-triClPCB(33)	pg/L		<26	<33	<66	**850**	<23	<21	<22
2,2'-dichloroPCB(4)+2,6-dichloroPCB(10)	pg/L		<18	<28	<26	**57**	<11	<12	<13