Ontario

# Niagara River Biomonitoring Study 2015, Caged Mussels (*Elliptio complanata*), and Semi-Permeable Membrane Devices (SPMDs)

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# Executive Summary

The Niagara River is the interconnecting channel between Lake Erie and Lake Ontario. Numerous persistent toxic and bioaccumulative contaminants from waste disposal sites, industrial outfalls, municipal point sources and non-point sources have been discharged to the Niagara River for decades. Since 1983 the Ontario Ministry of Environment, Conservation and Parks (MECP) has been committed to the biomonitoring of contaminants in the Niagara River using caged mussels (*Elliptio complanata*) and more recently using passive samplers known as semi-permeable membrane devices (SPMDs) as part of Ontario's commitment to the Niagara River Toxics Management Plan (NRTMP). These studies have provided information on suspected contaminant sources and source areas in the river between Fort Erie (FE) and downstream at the mouth of the river at Niagara-on-the-Lake (NOTL).

The water quality dataset (2005-2015; Hill, 2018) from Environment and Climate Change Canada (ECCC) Upstream/Downstream (US/DS) Niagara River Monitoring Program identified several organic contaminants which exceed water quality criteria/objectives (WQC) (e.g., hexachlorobenzene (HCB), octachlorostyrene (OCS), mirex, and total PCBs), and also show evidence of statistically significant Niagara River sources: i.e., contaminants that have higher water concentrations at NOTL compared with FE. The 2015 caged mussel and SPMD data were used to identify sources of these contaminants to the river (Table ES1). With the exception of metabolites of DDT at Fort Erie, sources of contaminants were not identified on the Canadian side of the river.

*Table ES1: Niagara River sources identified from caged mussel and/or SPMD data for compounds identified in the ECCC US/DS water quality monitoring dataset that have concentrations higher at NOTL than at FE .*

| *US/DS data suggest NR sources* | *NR sources identified by Caged Mussels and/or SPMD Data* |
|---|---|
| 1,2,3-Trichlorobenzene | Gill Creek, Pettit Flume Cove, Occidental Chemical Buffalo Ave. Plant, |
| 1,2,4-Trichlorobenzene<br>1,3,5-Trichlorobenzene<br>1,2,3,4-Tetrachlorobenzene<br>Pentachlorobenzene<br>Hexachlorobenzene[1] | Pettit Flume Cove, Bloody Run Creek, Occidental Chemical Buffalo Ave. Plant |
| α-HCH<br>γ-HCH (Lindane) | Cayuga Creek and Gill Creek |
| α-chlordane[2] | Two Mile Creek, Cayuga Creek, and Pettit Flume |
| pp-DDE[3] | Fort Erie, Gratwick Riverside Park marina, Cayuga Creek |
| Dieldrin | Two Mile Creek |
| a- Endosulfan | Two Mile Creek and Bloody Run Creek |
| Mirex | Occidental Chemical Buffalo Ave. Plant and associated sites |
| Octachlorostryene | Pettit Flume Cove, Bloody Run Creek, Occidental Chemical Buffalo Ave. Plant, Gill Creek |
| Hexachlorobutadiene | Occidental Chemical Buffalo Ave plant and Gill Creek |
| Total PCBs[4] | Two Mile Creek/Rattlesnake Creek, Occidental Chemical Buffalo Ave plant, |
| | upstream of Gratwick Riverside Park (source still to be identified), Pettit Flume Cove |

[1]HCB present at all sites in the river >WQC
[2]Low concentrations of α- chlordane were present at all stations sampled on the river
[3]pp-DDE present at all sites in the river >WQC
[4]Total PCBs present at all sites in the river >WQC

SPMD data, reported as ng/SPMD were used to estimate mean water concentrations (ng/L) using the United States Geological Survey (USGS) SPMD Water Concentration Estimator. These values were compared with the most stringent of the relevant New York State Department of Environmental Conservation (NYSDEC) guidelines, the US Environmental Protection Agency (EPA) guidelines, ECCC and/or MECP Provincial Water Quality Objectives.

In summary, SPMD data suggested that water concentrations of dieldrin, DDT metabolites (4’4,-DDE and 4’4,-DDD), mirex, HCB and total PCBs exceeded the most stringent water quality criteria at multiple stations. However, in general, organochlorinated pesticides were present at low concentrations throughout the Niagara River. Chlorinated benzenes and chlorinated industrial compounds were detected at many of the stations on the American side of the river, but, concentrations overall, with the exception of HCB and OCS at the Pettit Flume Cove, Bloody Run Creek and Occidental Chemical Co. Buffalo Ave plant, were low and below the most stringent WQC. Estimated water concentrations for total PCBs at the Occidental Chemical outfall were as high as 71 ng/L. Additionally, elevated concentrations of PCBs were present upstream of Gratwick Riverside Park. The 2018 survey will attempt to track down a source of the PCBs associated with this area. PCBs exceeded the WQC at all stations monitored in the Niagara River.

Long-term trends for caged mussel data show that at American locations that were remediated, COCs remain low (e.g., chlorinated benzenes at the Pettit Flume and 102$^{nd}$ St. Waste site; PCBs at Gill Creek). For sites that were not remediated, COCs remain consistent through time, and the sites remain a source to the river (e.g., Two Mile Creek-PCBs; Bloody Run Creek-chlorinated benzenes, dioxins and furans). The 2015 mussel, SPMD and sediment data confirm the previous survey data that showed the Pettit Flume and Bloody Run Creek to be sources of dioxins and furans to the river. Data for sediment collected downstream of the Pettit Flume cove and at Fisherman’s Park showed that dioxin contaminated sediment from the Pettit Flume is likely migrating off-site. Additionally, sediment and caged mussels collected downstream of Bloody Run Creek also show movement of dioxins and furans offsite. Without further remedial actions at these sites these trends are unlikely to change through time. Likewise, the Occidental Chemical Co. will continue to remain a source of multiple contaminants to the river (chlorinated benzenes, industrial organic compounds (OCS, HCBD), mirex and PCBs).

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# Introduction and Background

The Niagara River (64 km long), is the interconnecting channel between Lake Erie and Lake Ontario. Since 1983, the Ontario Ministry of Environment, Conservation and Parks (MECP) has been committed to both routine and specialized biomonitoring of contaminants in the river using caged mussels (*Elliptio complanata*) as part of Ontario's commitment to the Niagara River Toxic Management Plan (NRTMP). These studies have provided information on suspected contaminant sources and source areas on the American as well as the Canadian side of the river between Fort Erie and Niagara-on-the-Lake (Richman *et al*. 2011).

Numerous persistent, toxic and bioaccumulative contaminants from waste disposal sites, industry, municipal point sources and non-point sources have been discharged to the Niagara River for decades. The river was identified as an Area of Concern by the International Joint Commission in 1987. Currently, due to environmental improvements through government and local stakeholder/industry remedial actions, the Niagara River (Ontario) RAP (Remedial Action Plan) is moving towards delisting the Canadian side of the river as an AOC. On the American side of the river, sediment investigations are ongoing, and remedial actions will be taken as needed to address areas where contaminated sediments contribute to Beneficial Use Impairments. Delisting of the US AOC is not expected until 2025 or possibly later.

The biota in the river can accumulate contaminants from the water, sediment and the food chain. Since they are sensitive indicators and accumulate the contaminants at higher concentrations than are present in the water, the use of caged mussels as a biomonitor has been an effective tool to measure the presence of contaminants in the river.

The 2015 biomonitoring survey using mussels (*Elliptio complanata*) was a follow up to surveys conducted every two to three years since 1983. In 2009, passive samplers known as semi permeable membrane devices (SPMDs) were introduced at selective stations to assess their effectiveness at accumulating organic compounds. Geographic contaminant patterns matched well with the caged mussels, and additional compounds not previously detected in the mussels were measured in the passive samplers. This may be due to differences in contaminant uptake processes in the passive samplers compared with the mussels. Accordingly, SPMDs were deployed in 2012 and 2015 at a selected number of stations including a control site (Balsam Lake) to further assess their effectiveness as contaminant monitors and obtain a more complete database of the stations routinely monitored with mussels.

# Objectives

The biota in the river can accumulate contaminants from the water, sediment and the food chain. The principle behind the mussel biomonitoring program was to take mussels from a relatively uncontaminated site and place them in an environment that was known or suspected of being contaminated with persistent, bioaccumulative, toxic substances. Mussels are abundant, easily collected and transported, and sedentary, which means that their contaminant exposure is reflective of relatively local conditions. They are responsive to their surrounding environment so tissue concentrations can often reflect short-term fluctuations in contaminant concentrations which may not be detected by routine water quality monitoring (Kauss and Hamdy, 1991; Lobel *et al*., 1991; Metcalfe and Charlton, 1990; Muncaster *et al.,* 1989). *Elliptio complanata* is a filter feeder (feeding on plankton and organic detritus) and will accumulate contaminants directly from both the water column and particulate matter (Pennak, 1978). This makes it a good biomonitor since contaminants often partition between the dissolved and particulate phases.

SPMDs and other passive samplers efficiently sequester hydrophobic contaminants dissolved in the water and may be more reliable monitors than the caged mussels since the monitoring method is standardized among all stations. Biota don't always survive the exposure, or they may be stressed which can affect uptake and depuration leading to inaccurate measurements of ambient exposure concentrations. Additionally, there may be variability in the bioaccumulation due to their physical condition, sex or age (Lobel *et al*. 1991).

Deployment of SPMDs between 14-30 days has been shown to be sufficient to accumulate most hydrophobic contaminants that are environmentally relevant, although studies have suggested that depending on the contaminant, they may require a longer deployment time to be in equilibrium with the environment (Huckins *et al.* 1996; Petty *et al.* 2000). While some studies have shown agreement in geographic contaminant trends between SPMDs and mussels (Prest *et al.* 1992; Prest *et al.* 1995; Herve *et al.* 1995; Peven *et al.* 1996), others did not find a good correlation (Richardson *et al.* 2001; Degger *et al.* 2011). One explanation was that the variability in the performance of mussels had an effect on study outcomes, but these studies also highlighted the importance of the different contaminant uptake processes for SPMDs and mussels (dissolved-phase only, and both dissolved- and particulate-phase, respectively). Accordingly, it may be useful to use the two datasets in tandem to compare the relative patterns of contamination among the stations but not compare the actual concentrations between the monitors.

**The objectives of the survey in 2015 were consistent with earlier surveys and are listed below:**

- Identify contaminant sources or source areas requiring more detailed follow-up investigations based on uptake of contaminants in selected biomonitors.

- Compare results with ongoing long-term contaminant monitoring using indigenous species (i.e., young of the year (YOY) spottail shiners and emerald shiners) and identify spatial and temporal trends.

- Augment ongoing upstream/downstream Niagara River Toxics Management Plan programs by providing information on contaminants present in the river between Fort Erie and Niagara-on-the-Lake. The Environment and Climate Change Canada (ECCC) Upstream/Downstream (US/DS) water monitoring dataset (2005-2015; Hill, 2018) identified several organic contaminants which exceed the most stringent water quality criteria (WQC) and show evidence of statistically significant Niagara River sources: i.e., contaminants that have higher concentrations at Niagara-on-the-Lake compared with Fort Erie. The cage mussel and SPMD dataset will be used to identify sources of these contaminants in the river.

# Methods

## *Sample Locations*

During the week of July 7$^{th}$ 2015, mussels were deployed at sites on the Canadian and US side of the Niagara River (Figure 1; Appendix A provides site coordinates). Caged mussels were retrieved during the week of July 28$^{th}$. Historically, caged mussels deployed on the Canadian side of the river in tributaries typically did not have detectable concentrations of organochlorine (OC) pesticides or chlorinated benzene compounds. Accordingly, in 2015 SPMDs were deployed at Ushers Creek and the Chippawa Channel in place of mussels. Both mussels and SPMDs were deployed at the head and mouth of the river: Fort Erie (FE) and Niagara-on-the-Lake (NOTL).

On the US side, mussels were deployed at stations with long-term monitoring datasets (e.g., the Occidental Chemical Corp. (Buffalo Ave facility) sewer 003, Gill Creek, Two Mile Creek, Pettit Flume and Bloody Run Creek) for OC pesticides, and chlorinated benzenes and in some cases congener specific PCB analyses and/or polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans (PCDD/F). At other locations, (e.g., Gratwick Riverside Park (GRP), Cayuga Creek, Little Niagara River (LNR) and 102$^{nd}$ St. Hazardous Waste Site, mussels were only analysed for congener specific PCBs. SPMDs were deployed at most stations on the US side of the river (Appendix A).

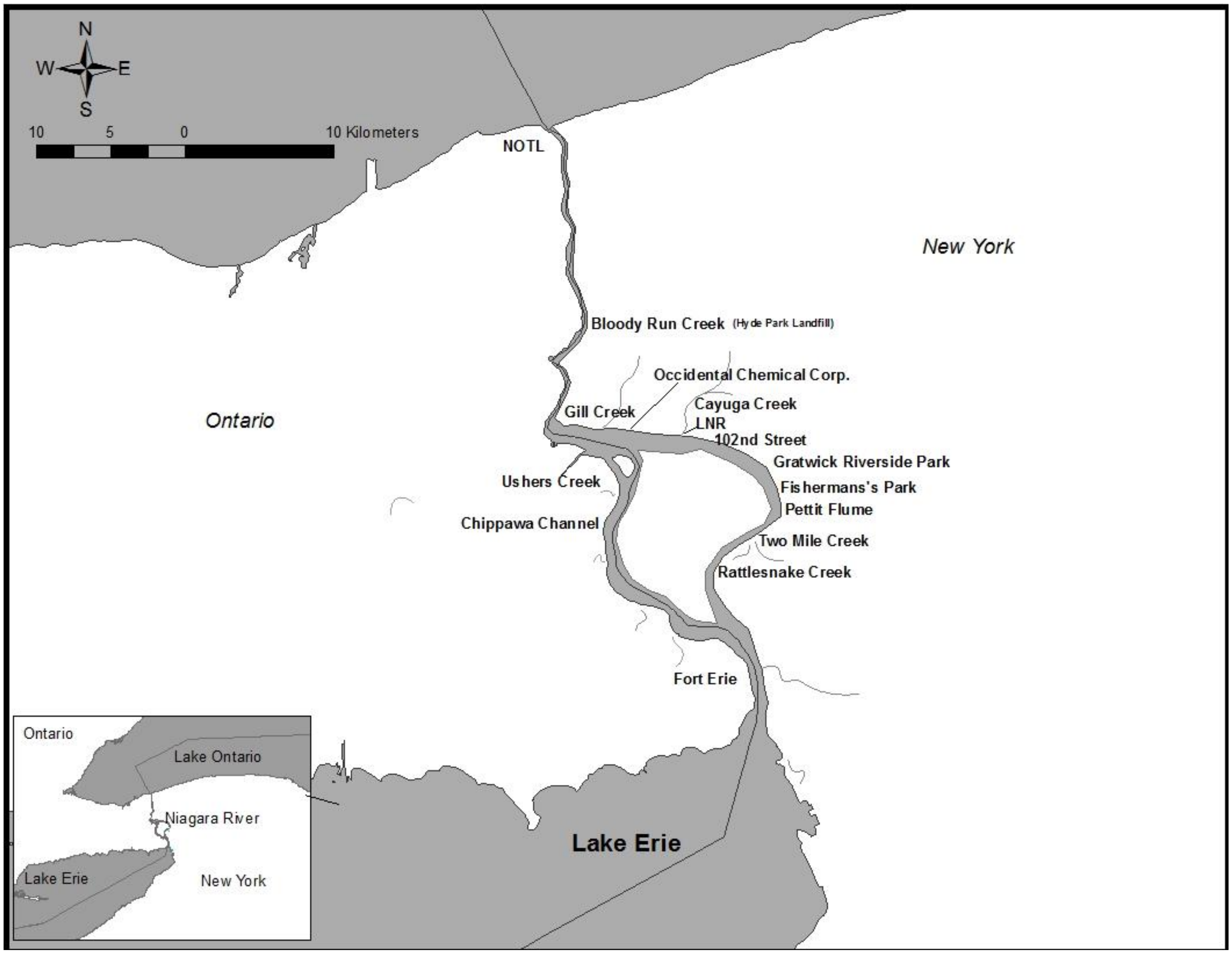


**Figure 1**: 2015 Niagara River caged mussel biomonitoring locations. Some locations have multiple sampling stations.

## *<u>Collection Methods and Ambient Measurements</u>*

### *Mussel Deployment/Retrieval and Sample Preparation*

Mussels were collected by divers from Balsam Lake, a relatively uncontaminated lake located in Victoria County, Ontario. Mussels of approximately the same size (6.5 to 7.2 cm) were selected to reduce variability due to tissue weight and mussel age. They were placed in buckets lined with clean bioassay (food-grade) polyethylene bags partially filled with lake water and then sealed with trapped air inside for transportation back to the laboratory. Rapid temperature fluctuations were avoided. Five, randomly selected mussels were submitted for analysis of contaminants to determine initial tissue contaminant concentrations. These mussels are referred to as the “Balsam Lake control mussels”.

A minimum of five clean mussels (and/or up to 28 mussels, depending on analytical requirements) were placed in clean, galvanized wire cages (about 30 cm x 36 cm x 10cm; 1 cage per station). These were anchored to the bottom using spikes or rope attached to a concrete block in water of at least 1 m depth. All caged mussels were deployed for three weeks (21 days). After the three week deployment, at 18 selected stations three randomly selected mussels were retrieved and analysed individually for percent lipid and total PCBs (polychlorinated biphenyls), organochlorine pesticides, chlorinated benzenes and industrial chlorinated compounds (Appendix A). At 18 stations, three replicates of 6 mussels each were composited and submitted for congener-specific PCBs. Additionally, at 10 stations mussels (one composite of four mussels) were submitted for dioxins and furans.

Upon retrieval, mussels were immediately shucked, excess water drained and the soft tissues weighed (Appendix C). Mussels were either wrapped individually in hexane-rinsed aluminum foil or packaged as composites, placed in plastic bags, and frozen until analysis. Mussels submitted for PCB congener-specific analysis were freeze-dried prior to analysis. In all cases, the mussels were not depurated prior to analysis.

### *Sediment*

At 16 stations located at either Bloody Run Creek, the Pettit Flume, Fisherman's Park and Two Mile Creek, surficial sediment (top 3 cm) grab samples were collected, during mussel retrieval, with a hexane rinsed mini ponar or if the sediment was hard packed (e.g., sand and gravel) a stainless steel spoon for PCDD/Fs analysis. All sediment samples were also analysed for total organic carbon and particle size (Appendix A).

### *Water Chemistry*

Water temperature, DO and conductivity measurements were collected *in situ* during deployment and retrieval of mussels at all stations using a YSI sonde (Appendix Table B).

### *SPMD Deployment*

SPMDs were obtained from Environmental Sampling Technologies (EST) who is the manufacturer of the SPMD equipment, media preparation and dialysis services. Analysis of the SPMDs for contaminants of interest was performed by AXYS Analytical Services Ltd. SPMDs were deployed at 29 stations to measure contaminant uptake from the dissolved phase in water (Appendix A). Additionally, SPMDs were deployed in Balsam Lake for three weeks to compare uptake with the Balsam Lake Control mussels. Briefly, 91.4 cm x 2.5 cm low density polyethylene lay-flat tubing was filled with 1 mL of high purity triolein then heat-sealed and stored frozen in aluminum canisters for transportation to the Niagara River. EST also spiked the SPMDs with Performance Reference Compounds (PRC). These compounds are used to measure rates of loss, which allow adjustment of the SPMD data to reflect field sampling conditions. Each SPMD was spiked with 60 ng/SPMD of PCB 14, PCB 29 and PCB 50. At each site, three SPMDs were placed on a "spider carrier" within a galvanized metal shroud and deployed by placing them in the current on the sediment using site rocks or steel pegs to hold them in place. Three field blanks were opened and exposed to the air for the duration of the deployment and retrieval to assess the impact of atmospheric contamination on the SPMDs. Two sites were on the US side and one site was on the Canadian side.

SPMDs were retrieved simultaneously with the caged mussels, placed in metal containers, and stored on ice until return to the laboratory where they were stored frozen until analysis by SGS AXYS Analytical. All SPMD data were reported in Appendix F as ng/SPMD.

## *Analytical Methods*

The mussel samples were analyzed for total-PCB and OC pesticides using the OMOE method E3136 (OMOE, 2008a; summarized in Richman and Somers, 2010). PCB congeners were analysed in biota using OMOE method E3411 and E3485 (OMOE, 2008b) and the seventeen 2,3,7,8-substituted toxic PCDD/Fs and homologue totals were analysed in mussels and sediment using the OMOE method DFPCB-E3418 (OMOE, 2008c; Richman and Somers, 2005). A select number of sediment samples were analysed for PCDD/F using a new MOECC screening method that utilizes a modified sample preparation procedure involving the QuEChERS technology in conjunction with the analysis being carried out using the same GC/HRMS system stated above and quantitation by isotope dilution (E3535) (OMOE, 2015). Particle size and TOC in sediment were analyzed by OMOE methods E3328A and E3142A (OMOE, 2008d-e; described in Richman and Milani, 2010).

All mussel data are reported on a wet weight basis with the exception of the data for congener-specific PCBs. These mussels were freeze dried prior to analysis so concentrations are reported as dry weight. The total PCB concentration (sum of the 52 congeners) for these samples were also converted to wet weight by determining the ratio of wet to dry weight for each individual sample to facilitate a comparison with historical PCB data. The water content of the mussel tissue ranged from 84-91%. All sediment data are reported on a dry weight basis.

SPMDs were analysed for PCBs, OC pesticides, chlorinated benzenes and dioxins and furans by AXYS with a combined gas chromatography/low resolution mass spectrometry (GC/LRMS) analysis (based on EPA Method 8270 OC/D, EPA Method 625, EPA Method 1613B respectively). Prior to the analysis, all parameters were co-extracted (AXYS in house method MLA-013 (fractionation only). Detailed descriptions of analytical methods can be provided upon request. All SPMD data are reported as ng/SPMD (equivalent to ng/mL triolein) unless otherwise noted.

The remaining PRC PCBs (14, 29 and 50) measured following retrieval were subtracted from the total PCB data and for the description of homologue patterns.

## *Data Analysis*

For the caged mussel data, a “W” flag represents the smallest amount of an analyte that can be reliably detected by the procedure used. Concentrations described as “trace” are flagged with a “<T”. Trace values ranged from greater than “W” to 10 times “W” for organic parameters. Data flagged as trace indicate that the presence of the

analyte is confirmed but the actual concentrations reported should be interpreted with caution. Basically, “T” indicates the limit of quantification. Both “W” and “T” are based on the precision of the analytical method which is in turn based on replicate measurements for the same analyte. For example, a  blank sample is spiked at a low concentration with an analyte. Replicates of the sample are analysed and the “W” value is set at 2/3 of the standard deviation of the replicate measurements.  Additional QA/QC includes the comparison of each sample run (which is generally 12 to 25 samples) against prepared standards.There are method blanks and recovery checks using spikes. An independent control standard is used to monitor accuracy and stability, duplicate samples are used to test within run precision, and calibration standards are used for a drift check. Details on QA/QC expectations are provided in the method manuals listed above.

In the case of PCDD/Fs and dioxin-like PCBs, a “sample run” usually consisted of 10 samples. An analyte was considered to be above the detection limit when the result met standard peak definition (usually 3-5 times signal:noise ratio) or was greater than five times a corresponding positive result determined to be present in the method blank used within that specific sample set. “W” and “T” values do not apply to these analytical procedures. Data that do not meet peak definition and/or are less than five times the method blank are flagged as “<“.

Toxicity Equivalency Factors (TEFs) have been used to express the toxicity of different dioxins and furans and dioxin-like PCBs (DL-PCBs) on a common basis. The World Health Organization (WHO) TEFs for the protection of fish were used for the calculations for both sediment and mussel value (van den Berg et al., 2006). Concentrations of individual isomers were converted to toxicity equivalents of 2,3,7,8-TCDD and then summed to yield a total toxic equivalent (TEQ). TEQs were calculated to express toxicity of the compounds as a single number to facilitate comparisons of mussel tissue and sediment dioxin/furan concentrations among stations and through time. Sediment TEQ concentrations can be compared with the Canadian Council of Ministers of the Environment (CCME) interim sediment guideline of 21.1 pg TEQ/g.

## *Using SPMDs to Estimate Water Concentrations*

The amount of accumulated chemical in the SPMDs is proportional to the ambient concentrations of the dissolved phase of the chemical. However, temperature, bio-fouling and water current velocity have been shown to affect uptake rates (Huckins *et al.* 1996; Petty *et al.* 2000; Vrana and Schuurmann 2002; Booij *et al.* 2006; Wang *et al.* 2009). Huckins *et al.* (1996) showed that sampling rates increased with ambient temperature and hydrophobicity (up to about a log $K_{ow}$ of 6), but, other studies have also shown sampling rates to decrease for compounds that have a log $K_{ow}$ of greater than 6 (Petty et al. 2000), and that temperature may not have a significant impact on uptake rates (Booij *et al.* 2003).

In the Niagara River survey, temperature generally ranged from 20 to 25 $^{o}$C at most stations (Appendix B) and there was minimal bio-fouling of the SPMDs at all sites. Although not measured, visual observations of the water currents at each station suggested that velocity likely did vary. Even if water current rates were available, the SPMDs were, at times, covered by large rocks as camouflage, which would alter the flow in the immediate vicinity of the SPMD. Differences in uptake rates due to these site by site variations in water current can affect the accurate estimates of water concentrations of the compounds of interest among the sites. However, large differences in contaminant concentrations among sites that would identify sources should not be affected by these site to site variations.

One method to account for these differences is to use Performance Reference Compounds (PRCs) which are standardized compounds added to the triolein (Huckins *et al.* 2002). The effects of environmental variables (e.g. temperature, water current) on the uptake rates of the compounds of interest can be approximated by the effects of these variables on the loss rates of the PRCs. PRCs for PCB congeners 14, 29 and 50 were added to the SPMDs and their concentrations were measured after deployment. This information was entered into the United States Geological Survey (USGS) SPMD Water Concentration Estimator.

Water concentrations estimated in this way were compared to NYSDEC, EPA, ECCC or MECP water quality criteria/objectives (WQC) (which ever was most conservative), to determine if the presence of these compounds could be potentially problematic to biota. Additionally, the SPMD estimated concentrations were compared with the US/DS measured water quality data at NOTL which was reported for July 2015 coinciding with the deployment of the SPMDs. These comparisons are useful to identify locations that could be important sources of contaminants. However, many of the contaminants are hydrophobic (e.g. PCBs), and are likely bound to sediment. Since SPMDs measure the concentration of the compounds in the dissolved phase only, they do not account for the contaminant concentrations on particulate matter. Accordingly, impacts on the benthic community and food chain effects could be underestimated if concentrations are just below or similar to the criteria since the particulate phase is unaccounted. This underestimation of possible risk is compounded because WQC tend to be based on whole water concentrations which include both the dissolved phase and particulate phase concentrations.

# Results

## *Balsam Lake Control Mussels, SPMDs and SPMD Field and Lab Blanks*

### *Balsam Lake*

Trace concentrations of congener specific PCBs were not detected in the Balsam Lake mussels in 2015. This is not surprising given that the historically low tissue concentrations detected in previous surveys were close to the analytical detection limits (2006-2012: Total PCBs (sum of 52 congeners) range: 0.6 – 6 ng/g wet wt.). Atmospheric deposition was suspected as the likely PCB source to the lake in previous surveys since there was no local point source (Johnson *et al*., 2005; MacDonald and Metcalfe 1991). The corresponding PCB concentration in sediment collected in 2006 from the same area where the mussels were collected was also low at 4 ng/g dry wt.

and not indicative of a point source (Richman *et al.* 2011). Organochlorine pesticides and chlorinated compounds were all below the detection limit in the Balsam Lake mussels with the exception of trace concentrations of p,p'-DDE (2 ng/g and 4 ng/g) in two of the five mussels analysed (Appendix D1).

The mean total PCB concentration in the SPMDs was 5.2 ng/SPMD (standard deviation (SD) 0.7 ng/SPMD). The mean total PCB water concentration estimated using the USGS SPMD Water Concentration Estimator was 0.03 ng/L (SD 0.006 ng/L). For comparison, the Ontario Provincial Water Quality Objective for an unfiltered water sample is 1 ng/L. The NYSDEC Water quality Criteria used as a benchmark for the NRTMP is 0.001 ng/L. The homologue pattern for the SPMD was consistent with the profile for the caged mussels in 2006-2012 also suggesting atmospheric deposition as the sources. The SPMD data showed low concentrations of 4,4'- DDE (mean: 2 ng/SPMD; estimated water concentration was 0.01 ng/L (SD 0.002 ng/L), and low concentrations of 4,4'-DDD, HCB, trans-nonachlor (a component of the pesticide chlordane), endosulphan sulphate, and heptachlor epoxide (all means < 1.5 ng/SPMD), and dieldrin (mean 2.0 ng/SPMD) (Appendix F). Estimated water concentrations for these organochlorinated pesticides ranged from 0.001 to 0.01 ng/L (Table 1).

### *Field Blanks*

SPMD field blanks were exposed to the air at three stations for the duration of sample deployment and retrieval (Ushers Creek, Gratwick Riverside Park (GRP), and Bloody Run Creek). The detection of contaminants represents the potential for the SPMDs to adsorb contaminants from the atmosphere. The field blanks had low concentrations (< 0.2 ng/SPMD) for delta HCH, dieldrin (<0.05 ng/SPMD) and PCBs (5.2 – 6.3 ng/SPMD). The only compounds that were consistently detected in the field blanks were 1,4 dichlorobenzene (mean 12.5 ng/SPMD; SD 1.7 ng/SPMD), 1,2 dichlorobenzene, 1,3 dichlorobenzene and 1,2,3 trichlorobenzene (< 3 ng/SPMD). However, these compounds were also present in the lab blanks at similar concentrations and suggest laboratory contamination (Appendix F). SPMD data presented in this report were not blank subtracted.

The PCB homologue pattern in the field blanks was similar to the Balsam Lake SPMD pattern (Figure 2). All three field blanks and Balsam Lake had the trichlorobiphenyls as the dominant homologue. Since the concentration of total PCBs in the SPMD field blanks was similar to the Balsam Lake SPMDs, it is possible the Balsam Lake samples represented exposure to the atmosphere during deployment/retrieval rather than available PCBs in the water. However, the source of PCBs to the water is likely atmospheric as well. PCB congeners were all non-detect in the lab blanks.

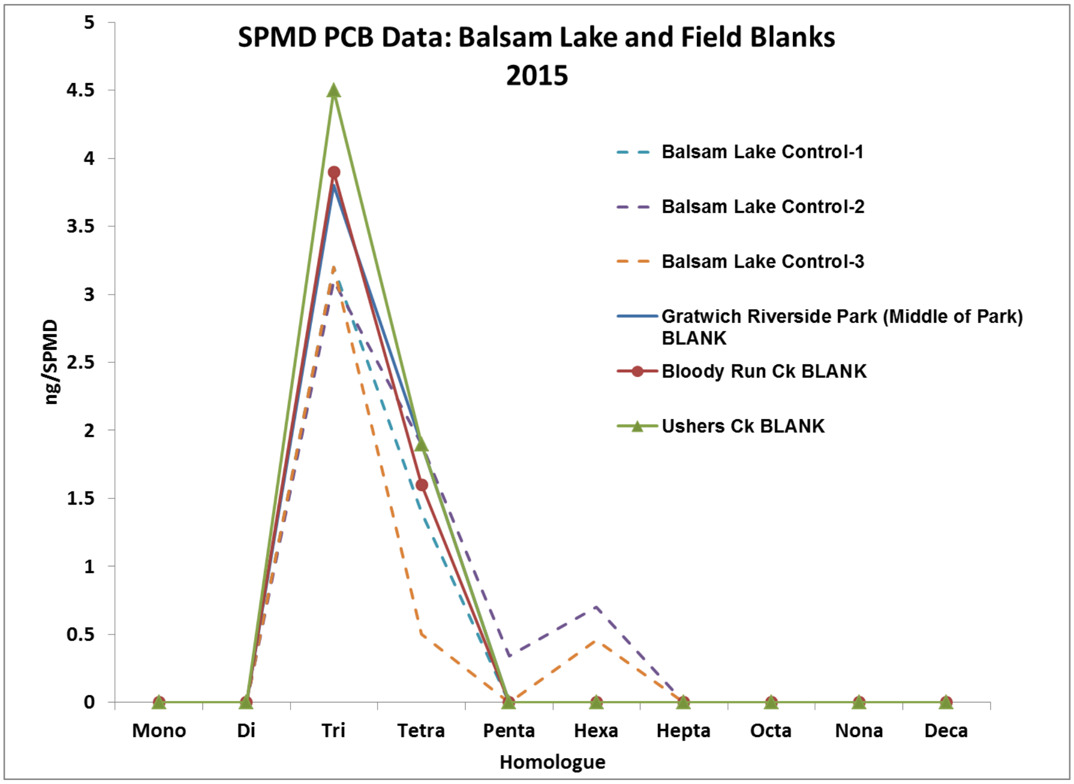


Figure 2: PCB homologue distribution patterns in SPMDs deployed in water in Balsam Lake (dashed lines), and SPMD field blanks exposed to the air during deployment and retrieval, 2015 (solid lines).

## *Caged Mussel and SPMD Data: Niagara River*

### *Organochlorine Pesticides*

With the exception of p,p'- DDE, organochlorine pesticides(OC) have not been routinely detected in caged mussels. Accordingly, the SPMD data provide the best evidence of the presence of these compounds at specific locations in the Niagara River. All raw SPMD data are provided in Appendix F. Water concentrations estimated using the USGS SPMD Water Concentration Estimator are provided in Table 1. The relative patterns of contamination among stations (i.e. locations with high or low concentrations) were consistent between the raw SPMD data (ng/SPMD) and the estimated water concentrations (ng/L).

Overall, SPMD data showed OC pesticides were present at low concentrations throughout the Niagara River, however, criteria for dieldrin, DDT metabolites (4'4,-DDE and 4'4,-DDD), α-HCH (isomer of lindane) and mirex were exceeded at multiple stations (Table 1). This is consistent with the ECCC US/DS water quality monitoring dataset (Hill, 2018) which also showed exceedances in criteria in the water at NOTL for the above chemicals (with the exception of α-HCH). Additionally ECCC found that concentrations of lindane, chlordane, α-endosulphan and mirex were higher in water at NOTL than FE indicating sources of these contaminants in the Niagara River.

**Table 1: Mean estimated water concentrations (ng/L) using 2015 SPMD data and the USGS Water Concentration Estimator.**
Concentrations were compared with Water Quality Criteria: Exceedence Fatcors (EF) represent the ratio of the water concentration estimate to the criteria.
Values that exceed the criteria were highlighted in **red** font. U/S = upstream; D/S = downstream

| Estimated Water Concentration | **Water Quality Criteria ng/L** | Agency | 2 Mile Ck. mean ng/L | SD ng/L | **Exceedence Factor (EF)** | Pettit Flume U/S mean ng/L | SD ng/L | **EF** | Pettit Flume (Outer) mean ng/L | SD ng/L | **EF** | Pettit Flume D/S mean ng/L | SD ng/L | **EF** | Fishermans Park U/S mean ng/L | SD ng/L | **EF** | Fishermans Park D/S mean ng/L | SD ng/L | **EF** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,3-Dichlorobenzene | **2500** | MECP | 0.90 | 0.23 | | 0.29 | 0.51 | | 141 | 18.0 | | 2.2 | 0.5 | | 1.9 | 0.07 | | 3.1 | 0.46 | |
| 1,4-Dichlorobenzene | **4000** | MECP | 7.8 | 0.91 | | 2.4 | 4.20 | | 300 | 69.8 | | 12.1 | 1.9 | | 7.9 | 0.42 | | 18 | 3.99 | |
| 1,2-Dichlorobenzene | **3000** | NYSDEC | 1.0 | 0.04 | | 0.43 | 0.75 | | 72 | 14.3 | | 1.6 | 0.4 | | 1.2 | 0.14 | | 2.0 | 0.70 | |
| 1,3,5-Trichlorobenzene | **650** | MECP | 0.02 | 0.00 | | 0.002 | 0.00 | | 2.9 | 0.3 | | 0.05 | 0.00 | | 0.03 | 0.00 | | 0.06 | 0.00 | |
| 1,2,4-Trichlorobenzene | **500** | MECP | 0.16 | 0.03 | | 0.08 | 0.01 | | 24 | 2.9 | | 0.27 | 0.02 | | 0.13 | 0.01 | | 0.72 | 0.01 | |
| 1,2,3-Trichlorobenzene | **900** | MECP | 0.04 | 0.01 | | | | | 12 | 1.5 | | 0.09 | 0.01 | | 0.02 | 0.00 | | 0.20 | 0.02 | |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | | | 0.03 | 0.00 | | 0.02 | 0.00 | | 6.9 | 0.6 | | 0.12 | 0.01 | | 0.06 | 0.00 | | 0.14 | 0.01 | |
| 1,2,3,4-Tetrachlorobenzene | **100** | MECP | 0.03 | 0.00 | | 0.01 | 0.00 | | 11 | 1.2 | | 0.15 | 0.01 | | 0.02 | 0.00 | | 0.17 | 0.01 | |
| Hexachlorobutadiene | **10** | NYSDEC | 0.01 | 0.00 | | | | | 0.07 | 0.01 | | 0.001 | 0.00 | | 0.001 | 0.00 | | 0.001 | 0.00 | |
| Pentachlorobenzene | **30** | MECP | 0.07 | 0.00 | | 0.04 | 0.00 | | 6.4 | 0.5 | | 0.15 | 0.02 | | 0.07 | 0.00 | | 0.25 | 0.01 | |
| Hexachlorobenzene | **0.03** | NYSDEC | **0.14** | 0.01 | 5 | **0.03** | 0.00 | 1 | **2.7** | 0.2 | 89 | **0.14** | 0.01 | 5 | **0.12** | 0.01 | 4 | **0.25** | 0.02 | 8 |
| HCH, gamma | **8** | NYSDEC | | | | | | | | | | | | | | | | | | |
| HCH, alpha | **2** | NYSDEC | | | | | | | | | | | | | | | | | | |
| HCH, beta | | | | | | | | | | | | | | | | | | | | |
| HCH, delta | | | 0.01 | 0.00 | | 0.009 | 0.00 | | 0.003 | 0.01 | | 0.003 | 0.00 | | 0.002 | 0.00 | | 0.002 | 0.00 | |
| Aldrin | **2** | NYSDEC | | | | | | | | | | | | | | | | | | |
| Octachlorostyrene | **0.006** | NYSDEC | 0.002 | 0.00 | | | | | **0.02** | 0.00 | 3 | | | | | | | | | |
| 2,4'-DDE | | | 0.01 | 0.01 | | 0.002 | 0.00 | | | | | | | | | | | | | |
| 4,4'-DDE | **0.007** | NYSDEC | **0.09** | 0.01 | 13 | **0.04** | 0.00 | 5 | **0.08** | 0.01 | 11 | **0.03** | 0.00 | 4 | **0.03** | 0.00 | 5 | **0.04** | 0.01 | 6 |
| 2,4'-DDD | | | 0.07 | 0.01 | | 0.01 | 0.01 | | 0.06 | 0.00 | | 0.008 | 0.00 | | | | | 0.007 | 0.01 | |
| 4,4'-DDD | **0.08** | NYSDEC | **0.22** | 0.01 | 3 | 0.03 | 0.00 | | **0.25** | 0.01 | 3 | 0.03 | 0.00 | | 0.03 | 0.00 | | 0.03 | 0.00 | |
| 2,4'-DDT | | | 0.03 | 0.00 | | | | | | | | | | | | | | | | |
| 4,4'-DDT | **0.011** | NYSDEC | **0.04** | 0.00 | 3 | | | | **0.02** | 0.01 | 1.4 | | | | | | | | | |
| Mirex | **0.001** | NYSDEC | **0.03** | 0.05 | 30 | | | | | | | | | | | | | | | |
| Chlordane, alpha (cis) | **2** | NYSDEC | 0.62 | 0.03 | | 0.07 | 0.00 | | 0.56 | 0.01 | | 0.09 | 0.01 | | 0.09 | 0.00 | | 0.08 | 0.01 | |
| Chlordane, gamma (trans) | **8** | NYSDEC | 0.08 | 0.00 | | 0.01 | 0.00 | | 0.07 | 0.01 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | |
| Nonachlor, trans- | | | 0.07 | 0.00 | | 0.01 | 0.00 | | 0.05 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | |
| Nonachlor, cis- | | | 0.02 | 0.00 | | 0.004 | 0.00 | | 0.01 | 0.00 | | 0.003 | 0.00 | | 0.003 | 0.00 | | 0.003 | 0.00 | |
| Heptachlor | **0.2** | NYSDEC | | | | | | | | | | | | | | | | | | |
| Heptachlor Epoxide | **0.3** | NYSDEC | 0.08 | 0.00 | | 0.03 | 0.00 | | 0.03 | 0.00 | | 0.03 | 0.00 | | 0.02 | 0.00 | | 0.01 | 0.01 | |
| alpha-Endosulphan | **3** | MECP (proposed) | 0.04 | 0.07 | | | | | | | | | | | | | | | | |
| beta-Endosulphan | | | | | | | | | | | | | | | | | | | | |
| Endosulphan Sulphate | | | 0.06 | 0.11 | | 0.01 | 0.01 | | 0.18 | 0.2 | | | | | | | | 0.02 | 0.03 | |
| Dieldrin | **0.0006** | NYSDEC | **0.23** | 0.01 | 390 | **0.06** | 0.01 | 101 | **0.08** | 0.00 | 126 | **0.04** | 0.00 | 69 | **0.05** | 0.00 | 81 | **0.04** | 0.02 | 68 |
| Endrin | **2** | NYSDEC | | | | | | | | | | | | | | | | 0.02 | 0.03 | |
| Methoxychlor | **30** | NYSDEC | 0.03 | 0.03 | | | | | | | | | | | | | | 0.01 | 0.01 | |
| Total PCB | **0.001** | NYSDEC | **8.7** | 0.58 | 8668 | **3.0** | 0.40 | 2977 | **107** | 9.1 | 106815 | **2.6** | 0.2 | 2636 | **2.9** | 0.21 | 2865 | **2.7** | 0.31 | 2651 |

**Table 1: Continued.**

| Estimated Water Concentration | Water Quality Criteria ng/L | Agency | GRP (Gratwick Riverside Park) (U/S Marina) mean ng/L | SD ng/L | EF | GRP (Marina) mean ng/L | SD ng/L | EF | GRP (U/S) mean ng/L | SD ng/L | EF | GRP (Mid) mean ng/L | SD ng/L | EF | GRP (D/S) mean ng/L | SD ng/L | EF | 102 nd St. (U/S) mean ng/L | SD ng/L | EF | LNR (Little Niagara River) (D/S 102nd St.) mean ng/L | SD ng/L | EF | Cayuga Ck. mean ng/L | SD ng/L | EF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,3-Dichlorobenzene | **2500** | MECP | 1.9 | 0.8 | | 12 | 2.5 | | 2.6 | 0.7 | | 2.4 | 0.8 | | 1.3 | 1.2 | | 2.1 | 0.4 | | 5.1 | 4.6 | | 2.0 | 1.9 | |
| 1,4-Dichlorobenzene | **4000** | MECP | 6.9 | 1.6 | | 39 | 7.8 | | 11 | 1.9 | | 11 | 1.2 | | 7.1 | 6.2 | | 8.0 | 0.5 | | 11 | 9.6 | | 8.0 | 7.0 | |
| 1,2-Dichlorobenzene | **3000** | NYSDEC | 0.56 | 0.5 | | 4.9 | 1.2 | | 1.5 | 0.50 | | 1.7 | 0.49 | | 1.1 | 0.94 | | 1.0 | 0.11 | | 0.83 | 0.73 | | 1.5 | 1.39 | |
| 1,3,5-Trichlorobenzene | **650** | MECP | 0.02 | 0.00 | | 0.16 | 0.03 | | 0.02 | 0.00 | | 0.02 | 0.00 | | 0.02 | 0.00 | | 0.02 | 0.00 | | 0.12 | 0.00 | | 0.15 | 0.01 | |
| 1,2,4-Trichlorobenzene | **500** | MECP | 0.08 | 0.00 | | 0.66 | 0.05 | | 0.10 | 0.02 | | 0.25 | 0.01 | | 0.08 | 0.01 | | 0.11 | 0.01 | | 0.81 | 0.01 | | 0.66 | 0.01 | |
| 1,2,3-Trichlorobenzene | **900** | MECP | | | | 0.07 | 0.06 | | 0.02 | 0.01 | | 0.04 | 0.00 | | 0.01 | 0.01 | | 0.00 | 0.01 | | 0.16 | 0.01 | | 0.06 | 0.02 | |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | | | 0.03 | 0.00 | | 0.20 | 0.04 | | 0.04 | 0.00 | | 0.04 | 0.00 | | 0.02 | 0.00 | | 0.11 | 0.02 | | 0.51 | 0.03 | | 0.46 | 0.03 | |
| 1,2,3,4-Tetrachlorobenzene | **100** | MECP | 0.02 | 0.00 | | 0.16 | 0.03 | | 0.03 | 0.01 | | 0.02 | 0.00 | | 0.01 | 0.00 | | 0.02 | 0.00 | | 1.7 | 0.03 | | 0.70 | 0.08 | |
| Hexachlorobutadiene | **10** | NYSDEC | | | | | | | | | | 0.001 | 0.00 | | | | | 0.001 | 0.00 | | 0.001 | 0.00 | | 0.01 | 0.01 | |
| Pentachlorobenzene | **30** | MECP | 0.05 | 0.01 | | 0.17 | 0.05 | | 0.06 | 0.00 | | 0.06 | 0.00 | | 0.05 | 0.00 | | 0.05 | 0.00 | | 1.20 | 0.07 | | 0.47 | 0.05 | |
| Hexachlorobenzene | **0.03** | NYSDEC | **0.08** | 0.01 | 3 | **0.17** | 0.05 | 6 | **0.08** | 0.00 | 3 | **0.08** | 0.00 | 3 | **0.06** | 0.01 | 2 | **0.08** | 0.00 | 3 | **0.27** | 0.01 | 9 | **0.15** | 0.03 | 5 |
| HCH, gamma | **8** | NYSDEC | | | | | | | | | | | | | | | | | | | | | | 0.45 | 0.39 | |
| HCH, alpha | **2** | NYSDEC | | | | | | | | | | | | | | | | | | | 0.09 | 0.16 | | **36** | 0.62 | 18 |
| HCH, beta | | | | | | | | | | | | | | | | | | | | | | | | 6.3 | 5.43 | |
| HCH, delta | | | | | | | | | | | | | | | | | | 0.004 | 0.01 | | 0.01 | 0.00 | | 0.61 | 0.08 | |
| Aldrin | **2** | NYSDEC | | | | | | | | | | | | | | | | | | | | | | | | |
| Octachlorostyrene | **0.006** | NYSDEC | | | | **0.01** | 0.01 | 1.4 | | | | | | | | | | | | | | | | | | |
| 2,4'-DDE | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDE | **0.007** | NYSDEC | **0.03** | 0.00 | 4 | **0.20** | 0.05 | 28 | **0.03** | 0.00 | 4 | **0.04** | 0.00 | 5 | **0.03** | 0.00 | 4 | **0.03** | 0.00 | 4 | **0.03** | 0.00 | 5 | **0.13** | 0.02 | 19 |
| 2,4'-DDD | | | | | | | | | 0.01 | 0.01 | | 0.01 | 0.01 | | 0.00 | 0.00 | | 0.01 | 0.00 | | 0.03 | 0.00 | | 0.04 | 0.01 | |
| 4,4'-DDD | **0.08** | NYSDEC | 0.03 | 0.00 | | **0.13** | 0.12 | 2 | 0.03 | 0.00 | | 0.03 | 0.00 | | 0.03 | 0.01 | | 0.03 | 0.00 | | **0.12** | 0.00 | 1.4 | **0.18** | 0.02 | 2 |
| 2,4'-DDT | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDT | **0.011** | NYSDEC | | | | | | | | | | | | | 0.001 | 0.00 | | 0.001 | 0.00 | | 0.004 | 0.00 | | | | |
| Mirex | **0.001** | NYSDEC | | | | | | | | | | | | | | | | | | | | | | | | |
| Chlordane, alpha (cis) | **2** | NYSDEC | 0.07 | 0.00 | | 0.18 | 0.03 | | 0.08 | 0.00 | | 0.08 | 0.00 | | 0.08 | 0.01 | | 0.08 | 0.00 | | 0.08 | 0.01 | | 0.26 | 0.01 | |
| Chlordane, gamma (trans) | **8** | NYSDEC | 0.01 | 0.00 | | 0.04 | 0.01 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.04 | 0.00 | |
| Nonachlor, trans- | | | 0.01 | 0.00 | | 0.02 | 0.01 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.03 | 0.00 | |
| Nonachlor, cis- | | | 0.002 | 0.00 | | 0.01 | 0.00 | | | | | 0.003 | 0.00 | | 0.002 | 0.00 | | 0.002 | 0.00 | | 0.002 | 0.00 | | 0.01 | 0.00 | |
| Heptachlor | **0.2** | NYSDEC | | | | | | | | | | | | | 0.00 | 0.00 | | | | | | | | | | |
| Heptachlor Epoxide | **0.3** | NYSDEC | 0.04 | 0.00 | | 0.01 | 0.01 | | 0.03 | 0.00 | | 0.04 | 0.00 | | 0.03 | 0.00 | | 0.03 | 0.00 | | 0.02 | 0.00 | | 0.03 | 0.00 | |
| alpha-Endosulphan | **3** | MECP (proposed) | | | | | | | | | | | | | | | | | | | | | | | | |
| beta-Endosulphan | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Endosulphan Sulphate | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dieldrin | **0.0006** | NYSDEC | **0.05** | 0.00 | 91 | **0.06** | 0.01 | 96 | **0.05** | 0.00 | 83 | **0.05** | 0.00 | 90 | **0.06** | 0.01 | 92 | **0.05** | 0.00 | 83 | **0.05** | 0.00 | 77 | **0.06** | 0.01 | 103 |
| Endrin | **2** | NYSDEC | | | | | | | | | | | | | | | | | | | | | | | | |
| Methoxychlor | **30** | NYSDEC | | | | | | | | | | | | | | | | | | | | | | | | |
| Total PCB | **0.001** | NYSDEC | **42** | 1.9 | 42137 | **47** | 15.1 | 46773 | **9.7** | 0.48 | 9723 | **7.2** | 0.33 | 7189 | **4.8** | 0.71 | 4776 | **3.9** | 0.17 | 3910 | **5.2** | 0.21 | 5196 | **2.1** | 0.44 | 2125 |

**Table 1: Continued.**

| Estimated Water Concentration | Water Quality Criteria ng/L | Agency | LNR (D/S Cayuga Ck) mean ng/L | SD ng/L | EF | U/S Occ mean ng/L | SD ng/L | EF | Storm Sewer A mean ng/L | SD ng/L | EF | Storm Sewer B mean ng/L | SD ng/L | EF | Storm Sewer C mean ng/L | SD ng/L | EF | Occ 003 mean ng/L | SD ng/L | EF | U/S Gill Ck. (in Niagara River) mean ng/L | SD ng/L | EF | Gill Ck. (mouth) mean ng/L | SD ng/L | EF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,3-Dichlorobenzene | **2500** | MECP | 0.88 | 1.5 | | 2.1 | 0.27 | | 1.7 | 1.6 | | 1.2 | 1.2 | | 1.6 | 1.4 | | 74 | 6.4 | | 0.81 | 0.73 | | 15 | 1.5 | |
| 1,4-Dichlorobenzene | **4000** | MECP | 3.3 | 5.7 | | 7.7 | 0.33 | | 4.8 | 4.2 | | 7.3 | 1.0 | | 6.7 | 0.8 | | 46 | 2.5 | | 2.8 | 2.44 | | 34 | 2.5 | |
| 1,2-Dichlorobenzene | **3000** | NYSDEC | 0.23 | 0.40 | | 0.57 | 0.51 | | 0.62 | 0.54 | | 0.38 | 0.66 | | 0.66 | 0.57 | | 5.3 | 0.21 | | 0.48 | 0.42 | | 15.3 | 1.4 | |
| 1,3,5-Trichlorobenzene | **650** | MECP | 0.04 | 0.01 | | 0.02 | 0.00 | | 0.01 | 0.01 | | 0.03 | 0.00 | | 0.04 | 0.00 | | 0.5 | 0.05 | | 0.004 | 0.00 | | 0.1 | 0.00 | |
| 1,2,4-Trichlorobenzene | **500** | MECP | 0.13 | 0.02 | | 0.06 | 0.00 | | 0.07 | 0.01 | | 0.08 | 0.01 | | 0.12 | 0.01 | | 13 | 1.1 | | 0.02 | 0.02 | | 2.5 | 0.12 | |
| 1,2,3-Trichlorobenzene | **900** | MECP | 0.03 | 0.00 | | 0.01 | 0.01 | | 0.01 | 0.01 | | 0.01 | 0.01 | | 0.02 | 0.01 | | 1.8 | 0.13 | | 0.004 | 0.00 | | 0.6 | 0.01 | |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | | | 0.12 | 0.01 | | 0.05 | 0.00 | | 0.06 | 0.00 | | 0.07 | 0.00 | | 0.16 | 0.01 | | 2.0 | 0.12 | | 0.03 | 0.03 | | 0.3 | 0.03 | |
| 1,2,3,4-Tetrachlorobenzene | **100** | MECP | 0.19 | 0.02 | | 0.05 | 0.00 | | 0.14 | 0.01 | | 0.16 | 0.01 | | 0.22 | 0.01 | | 2.3 | 3.9 | | 0.02 | 0.00 | | 0.2 | 0.01 | |
| Hexachlorobutadiene | **10** | NYSDEC | 0.001 | 0.00 | | 0.001 | 0.00 | | 0.01 | 0.01 | | 0.01 | 0.01 | | 0.02 | 0.00 | | 7.7 | 1.8 | | 0.01 | 0.00 | | 4.7 | 0.44 | |
| Pentachlorobenzene | **30** | MECP | 0.18 | 0.02 | | 0.08 | 0.01 | | 0.16 | 0.03 | | 0.21 | 0.02 | | 0.35 | 0.03 | | 3.9 | 0.59 | | 0.02 | 0.00 | | 0.2 | 0.03 | |
| Hexachlorobenzene | **0.03** | NYSDEC | **0.08** | 0.01 | 3 | **0.07** | 0.01 | 2 | **0.06** | 0.00 | 2 | **0.07** | 0.00 | 2 | **0.42** | 0.04 | 14 | **1.7** | 0.23 | 56 | **0.03** | 0.01 | 1 | **0.1** | 0.02 | 5 |
| HCH, gamma | **8** | NYSDEC | | | | | | | | | | | | | | | | 0.1 | 0.05 | | | | | 0.6 | 0.55 | |
| HCH, alpha | **2** | NYSDEC | 1.4 | 0.17 | | 0.97 | 0.07 | | 0.47 | 0.43 | | 0.53 | 0.07 | | 0.48 | 0.01 | | 0.8 | 0.09 | | | | | **16** | 0.16 | 8 |
| HCH, beta | | | | | | | | | | | | | | | 0.43 | 0.08 | | 0.7 | 0.16 | | | | | | | |
| HCH, delta | | | 0.03 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.0 | 0.00 | | 0.01 | 0.00 | | 0.2 | 0.01 | |
| Aldrin | **2** | NYSDEC | | | | | | | | | | | | | | | | | | | | | | 0.001 | 0.00 | |
| Octachlorostyrene | **0.006** | NYSDEC | 0.001 | 0.00 | | 0.003 | 0.00 | | 0.004 | 0.00 | | 0.005 | 0.00 | | **0.06** | 0.00 | 9 | **0.2** | 0.03 | 30 | 0.004 | 0.00 | | **0.01** | 0.00 | 1.5 |
| 2,4'-DDE | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDE | **0.007** | NYSDEC | **0.05** | 0.01 | 7 | **0.03** | 0.00 | 5 | **0.02** | 0.00 | 3 | **0.02** | 0.00 | 3 | **0.02** | 0.00 | 3 | **0.03** | 0.00 | 4 | **0.01** | 0.01 | 1.1 | **0.02** | 0.00 | 2 |
| 2,4'-DDD | | | 0.02 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.003 | 0.00 | | 0.002 | 0.00 | | 0.01 | 0.00 | | | | | | | |
| 4,4'-DDD | **0.08** | NYSDEC | 0.07 | 0.01 | | 0.03 | 0.00 | | 0.02 | 0.00 | | 0.02 | 0.00 | | 0.02 | 0.00 | | 0.02 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | |
| 2,4'-DDT | | | | | | | | | | | | | | | | | | | | | 0.002 | 0.00 | | 0.002 | 0.00 | |
| 4,4'-DDT | **0.011** | NYSDEC | | | | | | | 0.003 | 0.00 | | | | | | | | | | | | | | | | |
| Mirex | **0.001** | NYSDEC | **0.03** | 0.00 | 26 | **0.01** | 0.01 | 6 | | | | | | | **0.06** | 0.01 | 61 | **0.6** | 0.26 | 591 | | | | | | |
| Chlordane, alpha (cis) | **2** | NYSDEC | 0.16 | 0.01 | | 0.12 | 0.00 | | 0.09 | 0.01 | | 0.08 | 0.01 | | 0.06 | 0.01 | | 0.1 | 0.00 | | 0.03 | 0.00 | | 0.04 | 0.00 | |
| Chlordane, gamma (trans) | **8** | NYSDEC | 0.02 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.003 | 0.00 | | 0.004 | 0.00 | |
| Nonachlor, trans- | | | 0.02 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.004 | 0.00 | | 0.005 | 0.00 | |
| Nonachlor, cis- | | | 0.01 | 0.00 | | 0.003 | 0.00 | | 0.003 | 0.00 | | 0.003 | 0.00 | | 0.003 | 0.00 | | 0.003 | 0.00 | | 0.001 | 0.00 | | 0.002 | 0.00 | |
| Heptachlor | **0.2** | NYSDEC | | | | | | | | | | | | | | | | | | | | | | | | |
| Heptachlor Epoxide | **0.3** | NYSDEC | 0.02 | 0.00 | | 0.03 | 0.00 | | 0.03 | 0.00 | | 0.03 | 0.00 | | 0.02 | 0.00 | | 0.03 | 0.00 | | 0.03 | 0.00 | | 0.03 | 0.00 | |
| alpha-Endosulphan | **3** | MECP (proposed) | | | | | | | | | | | | | | | | | | | | | | | | |
| beta-Endosulphan | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Endosulphan Sulphate | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dieldrin | **0.0006** | NYSDEC | **0.04** | 0.00 | 68 | **0.05** | 0.00 | 76 | **0.05** | 0.00 | 82 | **0.05** | 0.00 | 78 | **0.04** | 0.00 | 66 | **0.05** | 0.00 | 77 | **0.05** | 0.01 | 76 | **0.05** | 0.01 | 78 |
| Endrin | **2** | NYSDEC | | | | | | | | | | | | | | | | | | | | | | | | |
| Methoxychlor | **30** | NYSDEC | | | | | | | | | | 0.004 | 0.01 | | | | | | | | | | | | | |
| Total PCB | **0.001** | NYSDEC | **3.3** | 0.56 | 3308 | **3.6** | 0.24 | 3589 | **2.9** | 0.13 | 2932 | **2.8** | 0.22 | 2825 | **2.9** | 0.05 | 2872 | **71** | 27.00 | 71371 | **0.19** | 0.05 | 190 | **3.2** | 0.35 | 3162 |

**Table 1: Continued.**

| | | | BRC | | | BRC | | | BRC | | | FE | | | Ushers Ck. | | | Chippawa | | | NOTL | | | Balsam | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (U/S) | | | (Bloody Run Creek) | | | (D/S) | | | (Fort Erie) | | | | | | Channel | | | (Niagara on the Lake) | | | Lake | | |
| Estimated Water Concentration | **Water Quality Criteria ng/L** | Agency | mean ng/L | SD ng/L | **EF** | mean ng/L | SD ng/L | **EF** | mean ng/L | SD ng/L | **EF** | mean ng/L | SD ng/L | **EF** | mean ng/L | SD ng/L | **EF** | mean ng/L | SD ng/L | **EF** | mean ng/L | SD ng/L | **EF** | mean ng/L | SD ng/L | **EF** |
| 1,3-Dichlorobenzene | **2500** | MECP | 1.4 | 0.04 | | 0.56 | 0.79 | | 1.8 | 0.28 | | 0.46 | 0.40 | | 0.26 | 0.46 | | 0.30 | 0.52 | | 1.35 | 0.25 | | 0.95 | 0.30 | |
| 1,4-Dichlorobenzene | **4000** | MECP | 4.9 | 0.17 | | 5.6 | 0.99 | | 4.2 | 0.00 | | 4.4 | 0.23 | | 4.0 | 0.54 | | 2.7 | 2.39 | | 5.6 | 0.41 | | 4.1 | 0.71 | |
| 1,2-Dichlorobenzene | **3000** | NYSDEC | 0.55 | 0.78 | | 0.65 | 0.93 | | 1.1 | 0.01 | | 0.37 | 0.32 | | 0.69 | 0.70 | | 0.18 | 0.31 | | 0.29 | 0.50 | | 0.70 | 0.64 | |
| 1,3,5-Trichlorobenzene | **650** | MECP | | | | 0.04 | 0.03 | | 0.03 | 0.00 | | | | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | **500** | MECP | 0.07 | 0.00 | | 0.12 | 0.09 | | 0.23 | 0.00 | | | | | | | | | | | 0.07 | 0.00 | | | | |
| 1,2,3-Trichlorobenzene | **900** | MECP | | | | 0.01 | 0.01 | | 0.06 | 0.01 | | | | | | | | | | | | | | | | |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | | | 0.05 | 0.00 | | 0.32 | 0.01 | | 0.21 | 0.00 | | 0.001 | 0.00 | | 0.01 | 0.01 | | 0.001 | 0.00 | | 0.03 | 0.00 | | | | |
| 1,2,3,4-Tetrachlorobenzene | **100** | MECP | 0.09 | 0.00 | | 0.38 | 0.01 | | 0.27 | 0.00 | | 0.002 | 0.00 | | 0.003 | 0.00 | | | | | 0.06 | 0.01 | | | | |
| Hexachlorobutadiene | **10** | NYSDEC | 0.01 | 0.01 | | 0.20 | 0.02 | | 0.10 | 0.00 | | | | | | | | | | | 0.01 | 0.00 | | | | |
| Pentachlorobenzene | **30** | MECP | 0.12 | 0.00 | | 2.0 | 0.23 | | 1.0 | 0.03 | | 0.006 | 0.00 | | 0.04 | 0.01 | | 0.004 | 0.00 | | 0.05 | 0.00 | | 0.001 | 0.00 | |
| Hexachlorobenzene | **0.03** | NYSDEC | **0.26** | 0.01 | 9 | **1.2** | 0.17 | 42 | **0.80** | 0.04 | 27 | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | **0.06** | 0.01 | 2 | 0.01 | 0.00 | |
| HCH, gamma | **8** | NYSDEC | 0.06 | 0.09 | | | | | 0.172 | 0.24 | | | | | | | | | | | | | | | | |
| HCH, alpha | **2** | NYSDEC | | | | 0.10 | 0.15 | | | | | | | | | | | | | | | | | | | |
| HCH, beta | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HCH, delta | | | 0.004 | 0.01 | | 0.006 | 0.01 | | 0.004 | 0.01 | | | | | | | | | | | 0.003 | 0.01 | | | | |
| Aldrin | **2** | NYSDEC | | | | | | | | | | | | | | | | | | | | | | | | |
| Octachlorostyrene | **0.006** | NYSDEC | **0.06** | 0.00 | 9 | **0.07** | 0.01 | 11 | **0.07** | 0.00 | 12 | | | | | | | | | | **0.02** | 0.00 | 4 | | | |
| 2,4'-DDE | | | | | | | | | | | | 0.00 | | | | | | | | | | | | | | |
| 4,4'-DDE | **0.007** | NYSDEC | **0.01** | | 1.3 | **0.03** | 0.00 | 4 | **0.01** | 0.00 | 2 | **0.38** | 0.04 | 55 | **0.10** | 0.03 | 14 | **0.03** | 0.00 | 5 | **0.01** | 0.00 | 2 | **0.01** | 0.002 | 1.4 |
| 2,4'-DDD | | | | | | 0.002 | 0.00 | | 0.001 | 0.00 | | 0.02 | 0.00 | | 0.01 | 0.00 | | 0.003 | | | | | | | | |
| 4,4'-DDD | **0.08** | NYSDEC | 0.01 | 0.00 | | 0.01 | 0.00 | | 0.01 | 0.00 | | **0.10** | 0.01 | 1.2 | 0.03 | 0.01 | | 0.02 | | | 0.01 | 0.00 | | 0.001 | 0.00 | |
| 2,4'-DDT | | | 0.002 | 0.00 | | | | | 0.002 | 0.00 | | 0.01 | 0.00 | | | | | | | | | | | | | |
| 4,4'-DDT | **0.011** | NYSDEC | | | | 0.005 | 0.00 | | 0.002 | 0.00 | | **0.02** | 0.00 | 2 | 0.01 | 0.00 | | 0.004 | | | | | | | | |
| Mirex | **0.001** | NYSDEC | | | | **0.01** | 0.00 | 14 | **0.01** | 0.00 | 8 | | | | | | | | | | | | | | | |
| Chlordane, alpha (cis) | **2** | NYSDEC | 0.03 | 0.00 | | 0.03 | 0.00 | | 0.03 | 0.00 | | 0.04 | 0.00 | | 0.06 | 0.01 | | 0.02 | 0.00 | | 0.03 | 0.00 | | 0.01 | 0.01 | |
| Chlordane, gamma (trans) | **8** | NYSDEC | 0.002 | 0.00 | | 0.003 | 0.00 | | 0.003 | 0.00 | | 0.004 | 0.00 | | 0.01 | 0.00 | | 0.003 | 0.00 | | 0.003 | 0.00 | | 0.001 | 0.00 | |
| Nonachlor, trans- | | | 0.003 | 0.00 | | 0.004 | 0.00 | | 0.003 | 0.00 | | 0.003 | 0.00 | | 0.02 | 0.01 | | 0.004 | 0.00 | | 0.002 | 0.00 | | 0.002 | 0.00 | |
| Nonachlor, cis- | | | 0.001 | 0.00 | | 0.002 | 0.00 | | 0.001 | 0.00 | | 0.002 | 0.00 | | 0.003 | 0.01 | | 0.001 | 0.00 | | 0.001 | 0.00 | | | | |
| Heptachlor | **0.2** | NYSDEC | | | | | | | | | | | | | | | | | | | 0.01 | 0.01 | | | | |
| Heptachlor Epoxide | **0.3** | NYSDEC | 0.02 | 0.00 | | 0.02 | 0.01 | | 0.02 | 0.00 | | 0.02 | | | 0.01 | 0.00 | | 0.02 | 0.00 | | 0.02 | 0.00 | | 0.01 | 0.00 | |
| alpha-Endosulphan | **3** | MECP (proposed) | | | | 0.16 | 0.02 | | | | | | | | | | | | | | | | | | | |
| beta-Endosulphan | | | | | | 0.07 | 0.10 | | | | | | | | | | | | | | | | | | | |
| Endosulphan Sulphate | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dieldrin | **0.0006** | NYSDEC | **0.05** | 0.00 | 77 | **0.04** | 0.00 | 65 | **0.05** | 0.00 | 76 | **0.05** | 0.00 | 81 | **0.03** | 0.01 | 51 | **0.04** | 0.00 | 71 | **0.04** | 0.00 | 63 | **0.01** | 0.00 | 22 |
| Endrin | **2** | NYSDEC | | | | | | | | | | | | | | | | | | | | | | | | |
| Methoxychlor | **30** | NYSDEC | | | | | | | | | | | | | | | | | | | | | | | | |
| Total PCB | **0.001** | NYSDEC | **0.20** | 0.02 | 200 | **1.1** | 0.26 | 1067 | **0.52** | 0.05 | 517 | **0.12** | 0.00 | 122 | **0.09** | 0.01 | 86 | **0.08** | 0.03 | 76 | **0.41** | 0.05 | 412 | **0.03** | 0.006 | 27 |

In contract, the US/DS water quality data identified Lake Erie as a source of metabolites of DDT and dieldrin to the Niagara River, in addition to sources within the Niagara River (Hill and Klawunn 2009; Hill, 2018).

Generally, pesticides and their by-products and isomers (e.g., lindane and α-HCH; heptachlor epoxide; chlordane and trans and cis isomers), were present at the highest concentrations in SPMDs in tributaries such as Gill Creek, Two Mile Creek and Cayuga Creek suggesting that these tributaries are sources to the Niagara River (Figures 3-5). ECCC water quality data for the month of July 2015 at NOTL (concurrent with the SPMD deployment period) was compared with estimated concentrations of contaminants in SPMDs deployed at stations in this study to highlight these areas as sources. Estimated concentrations of α-HCH at Cayuga Creek were 131 times higher than concentrations measured at NOTL in the water by ECCC. Estimated concentrations of α-chlordane at Two Mile Creek and the Pettit Flume were 61 and 55 times greater than NOTL water concentrations respectively. The SPMD data indicated that historically there was also widespread use of some of these persistent compounds including DDT and dieldrin, since many of the pesticides were present at all sites at concentrations that were similar on both sides of the river.

The highest SPMD concentrations of 4,4'-DDE were present at Fort Erie (Figure 6). The Fort Erie SPMD data was consistent with the caged mussel data for 4,4'-DDE (Appendix D1) and consistent with data from earlier surveys. A likely explanation for relatively higher 4,4'-DDE concentrations at Fort Erie is that from 1952 to 1967, DDT was applied to trees and shrubs in Fort Erie every two weeks from June through to the end of September to control caddisflies (Fredeen, 1971). The area sprayed included 8 km of river bank and shrubbery and trees extending about 1 km from the river along every street. Additionally, an area extending beyond the city limits for about 1.6 km north and a large park to the south of Fort Erie were also routinely sprayed with DDT. The estimated water concentration from the SPMDs were 19 times higher than the concentrations measured in water at NOTL by the ECCC US/DS program suggesting that this area is a source of 4,4'-DDE to the river due to the historical sraying. Further investigation of the Fort Erie site will continue in 2018 for the purpose of investigating/differentiating the legacy contamination from any potential, ongoing sources of DDT and metabolites.

The highest concentration of the insecticide mirex was present in SPMDs deployed near the **Occidental Chemical Corporation** Buffalo Avenue Plant (herein referred to as Occidental and/or OCC), at their 003 sewer outfall (Figure 7). Occidental is located adjacent to the Niagara River upstream of the Niagara River's confluence with Gill Creek. The facility (formally known as Hooker Chemical Co. which began operation in 1903), has manufactured over 250 chemical products including Mirex. Permitted wastewater is discharged to the river from the 003 outfall. As well, there were at least 10 hazardous waste sites located on the property which were known to leach contaminants into the groundwater (NRTC, 1984) until the 1990s when extensive remediation was undertaken at various locations on the property to contain and reduce the movement of these contaminants. Recent monitoring using caged mussels and SPMDs at historical sewers located along the Niagara River have not detected contaminants, or they have been present at low concentrations. However, Sewer 003 is an active outfall servicing the Occidental facility and is an ongoing source of contaminants to the River (See section on chlorinated benzenes/ industrial compounds and PCBs: Figures 8-12, 15, 19-20). The presence of mirex in the Niagara River at this site suggested that mirex is possibly entering into the river either through runoff in the vicinity of the Occidental 003 sewer or directly from the sewer. A comparison of the SPMD estimated water concentration of mirex at the 003 sewer outfall with the ECCC annual mean measured concentration of mirex in the water at NOTL (from 2005-2015) showed that the mirex concentration near the sewer was 174 times greater than the concentration in water at NOTL. The 10 year annual mean water concentration at NOTL was used since the concentration for the month of July 2015 was below the detection limit.

The presence of mirex in SPMDs at the 003 sewer, in the Little Niagara River (LNR) at a station downstream of 102$^{nd}$ St. Hazardous Waste Site, and at Bloody Run Creek was consistent with historical caged mussel data collected since the 1980's (Richman *et al.* 2011). In 2012 the highest concentration of mirex in SPMDs was present in the LNR and associated stations. Occidental was the sole producer of mirex until 1976 when its use was restricted by both Canadian and U.S. legislation (Apeti and Lauenstein, 2006; Interagency Task Force on Hazardous Waste, 1979). Additionally, Hooker Chemical disposed of waste into the 102$^{nd}$ Street Hazardous Waste Site and Hyde Park Hazardous Waste Site (which contaminated Bloody Run Creek), when they were in operation.

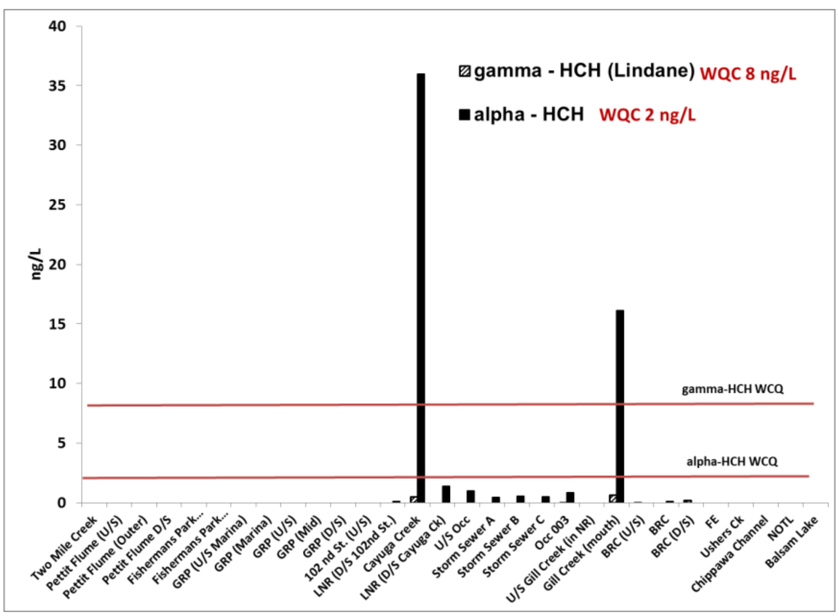


**Figure 3:** Estimated water concentrations (ng/L) for organochlorine pesticides (lindane and isomer alpha HCH) in SPMDs, Niagara River, 2015. WQC (Water Quality Criteria). **NOTE**: on all figures stations are listed from upstream to downstream. Canadian sites begin at Fort Erie (FE) and extend to the end of the X axis. GRP: Gratwick Riverside Park; LNR: Little Niagara River; BRC: Bloody Run Creek; NOTL: Niagara-on-the-Lake.

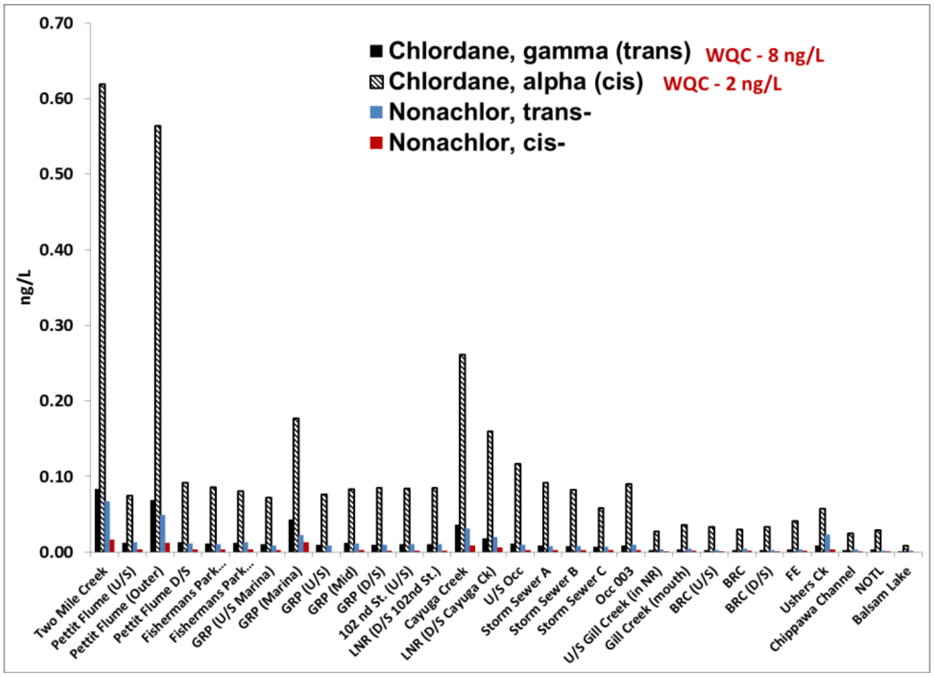


**Figure 4:** Estimated water concentrations (ng/L) for organochlorine pesticides (chlordane and isomers) in SPMDs, Niagara River, 2015**.**

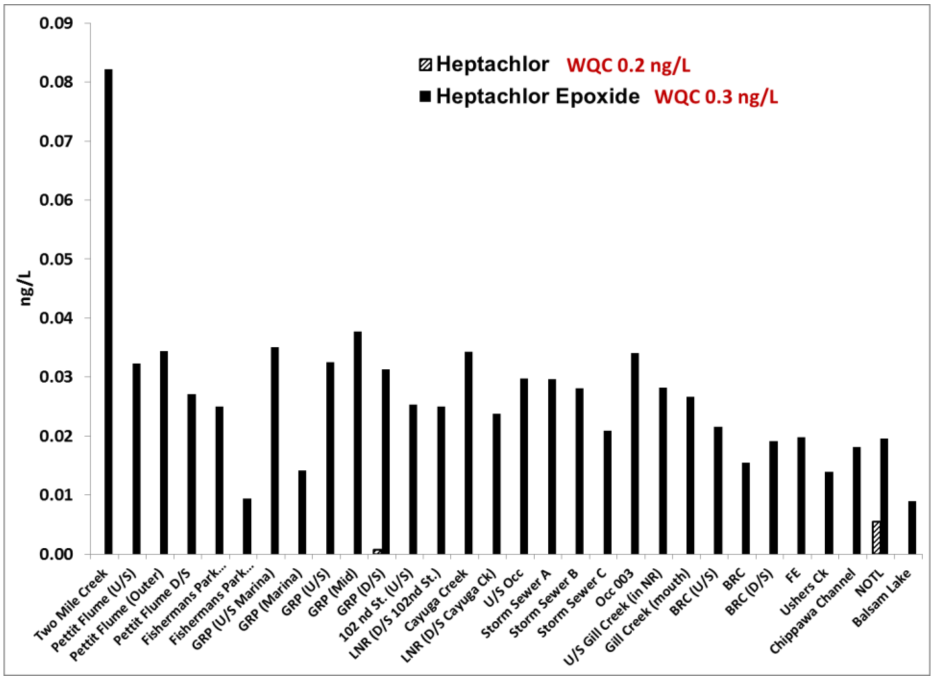


**Figure 5:** Estimated water concentrations (ng/L) for organochlorine pesticides (heptachlor and heptachlor epoxide) in SPMDs, Niagara River, 2015.

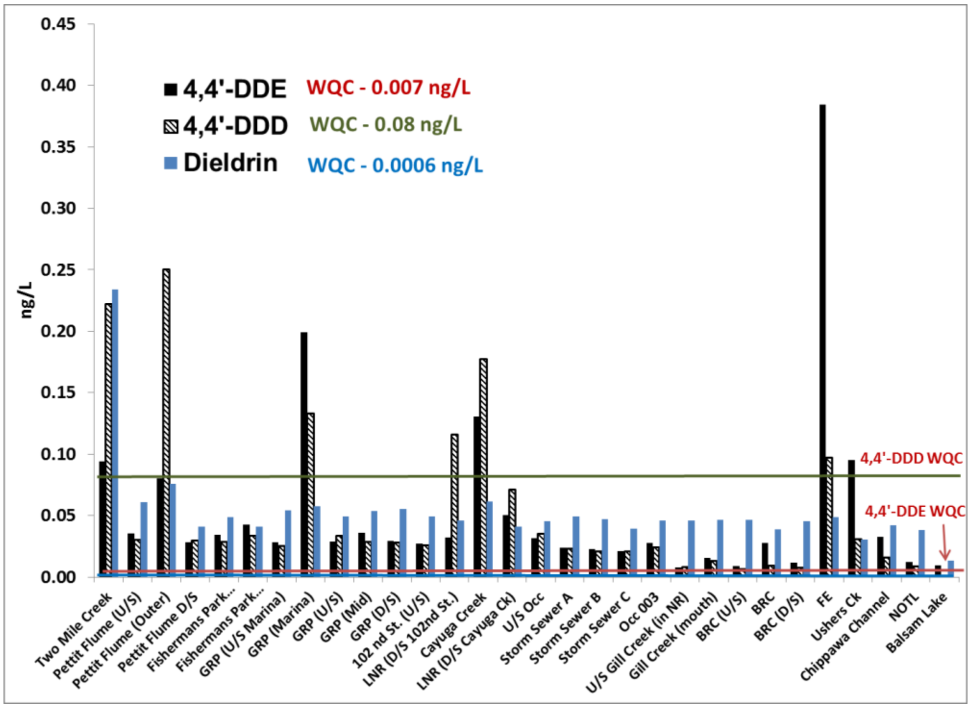


**Figure 6**: Estimated water concentrations (ng/L) for organochlorine pesticides (DDT metabolites and dieldrin) in SPMDs, Niagara River, 2015.

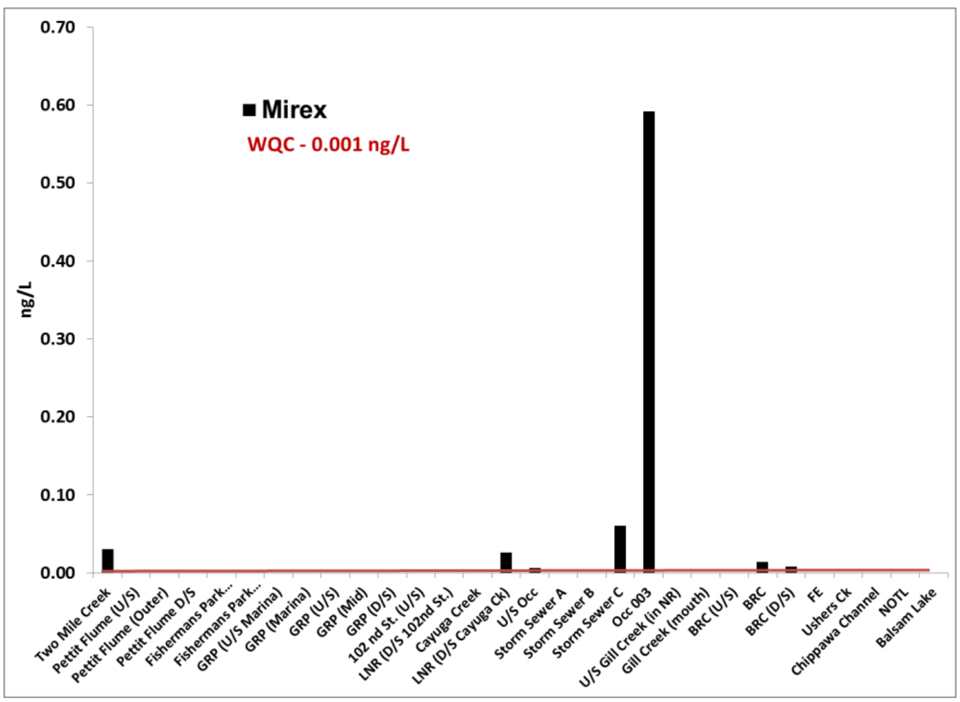


**Figure 7:** Estimated water concentrations (ng/L) for organochlorine pesticides (mirex) in SPMDs, Niagara River, 2015.

*Chlorinated Benzenes and Industrial Compounds*

The ECCC US/DS water monitoring dataset (2005-2015; Hill, 2018) identified several organic contaminants that exceed the most stringent water quality criteria and/or showed evidence of statistically significant Niagara River sources: e.g., hexachlorobenzene (HCB), pentachlorobenzene, octachlorostyrene (OCS), and hexachlorobutadiene (HCBD). Multiple sources in the river have been identified using the caged mussel and SPMD dataset. A relative comparison of chlorinated benzene concentrations among stations for both mussels and SPMDs identified the Pettit Flume, Occidental (Sewer 003), Bloody Run Creek and to a lesser extent the $102^{nd}$ St. Hazardous Waste Site as sources of these contaminants (Figures 8 –10). Sources of octachlorostyrene (OCS) were Occidental Sewer 003 and Bloody Run Creek (WQC exceeded at these locations), and hexachlorobutadiene (HCBD) sources were Occidental and Gill Creek (Figures 11-13). The WQC for hexachlorobenzene (HCB) was exceeded at all stations on the US side of the river and at NOTL on the Canadian side, however, the highest concentrations were present in both mussels and SPMDs at the Pettit Flume, Occidental Sewer 003, and Bloody Run Creek .

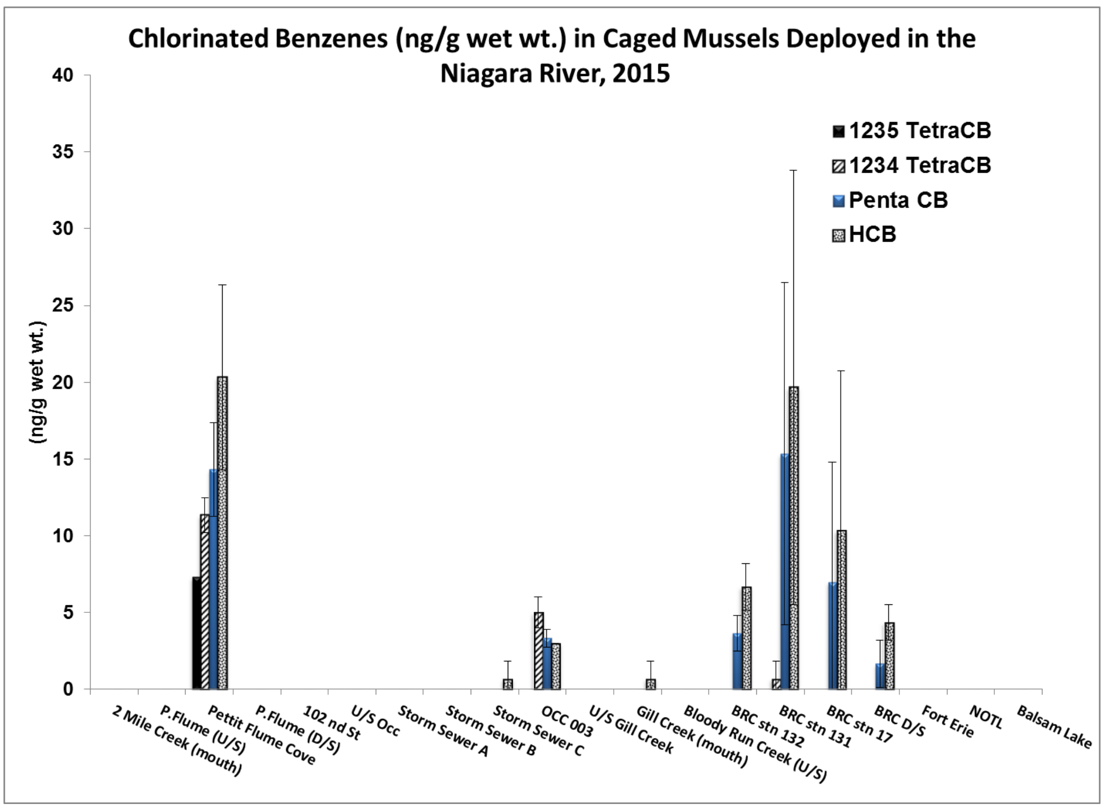


**Figure 8:** Mean (+/- SE) concentrations of chlorinated benzenes in caged mussels deployed in the Niagara River 2015).

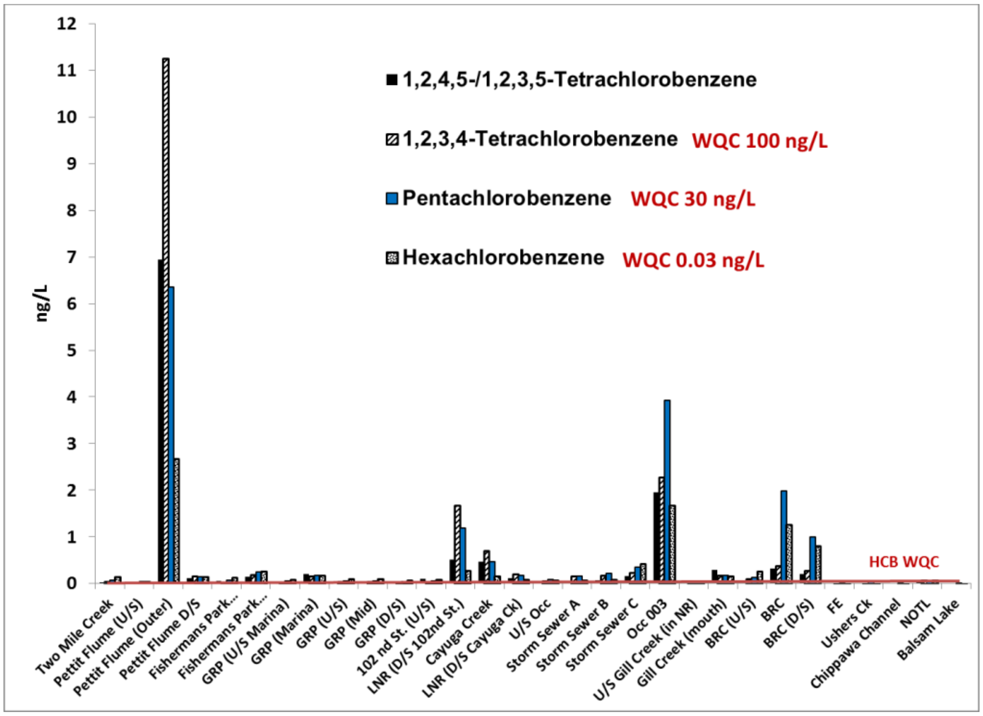


**Figure 9**: Estimated water concentrations (ng/L) for chlorinated benzenes in SPMDs deployed in the Niagara River, 2015.

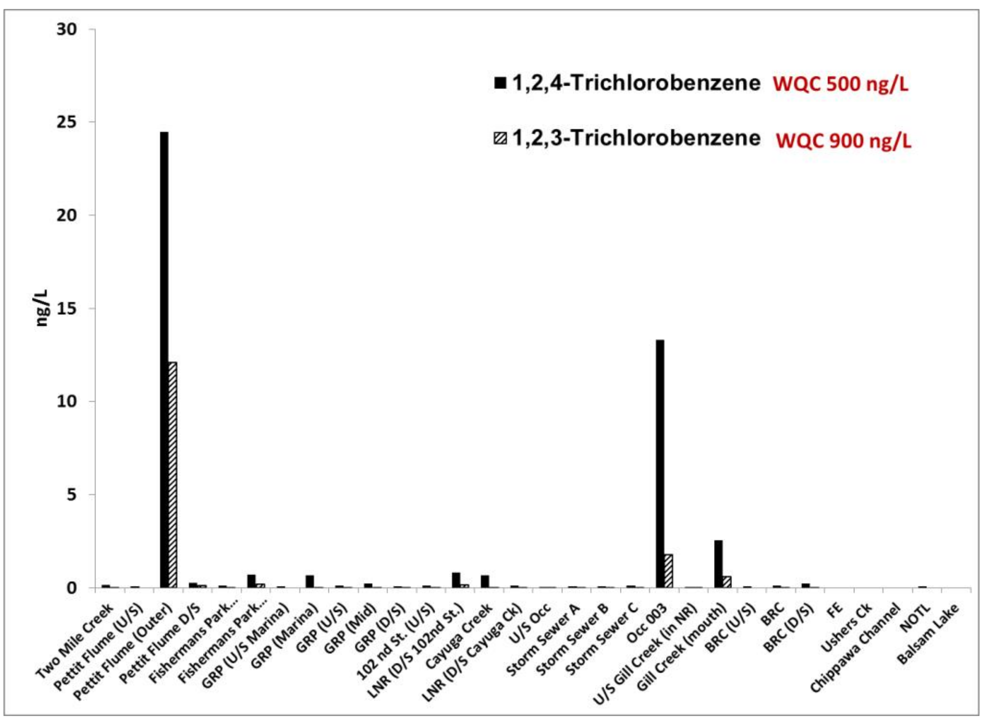


**Figure 10**: Estimated water concentrations (ng/L) for trichlorobenzenes from SPMDs deployed in the Niagara River, 2015.

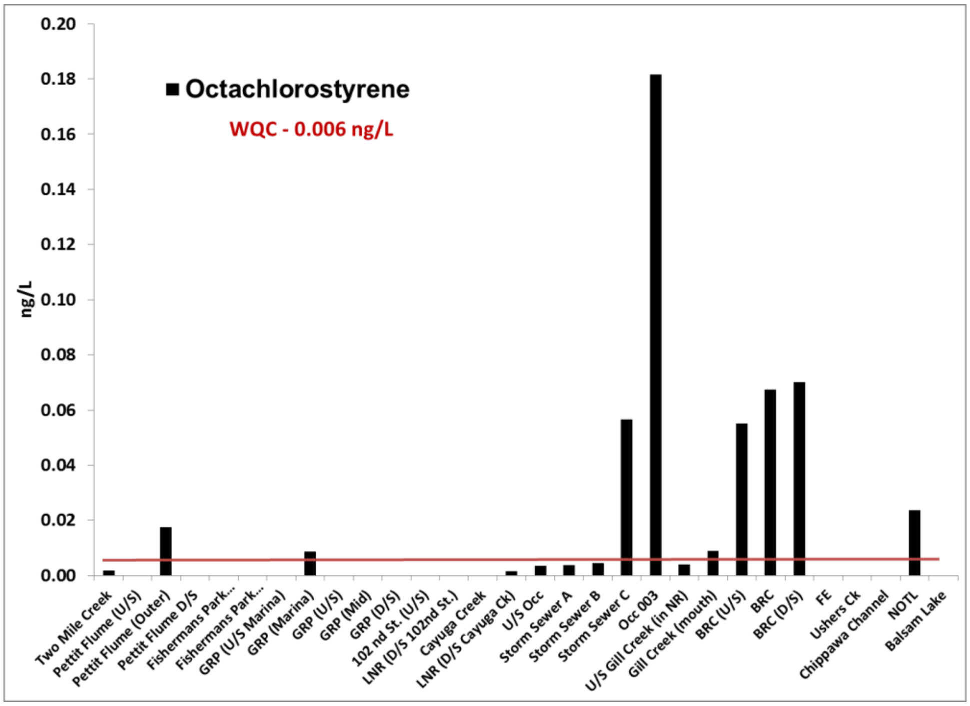


**Figure 11**: Estimated water concentrations (ng/L) for OCS from SPMDs deployed in the Niagara River, 2015.

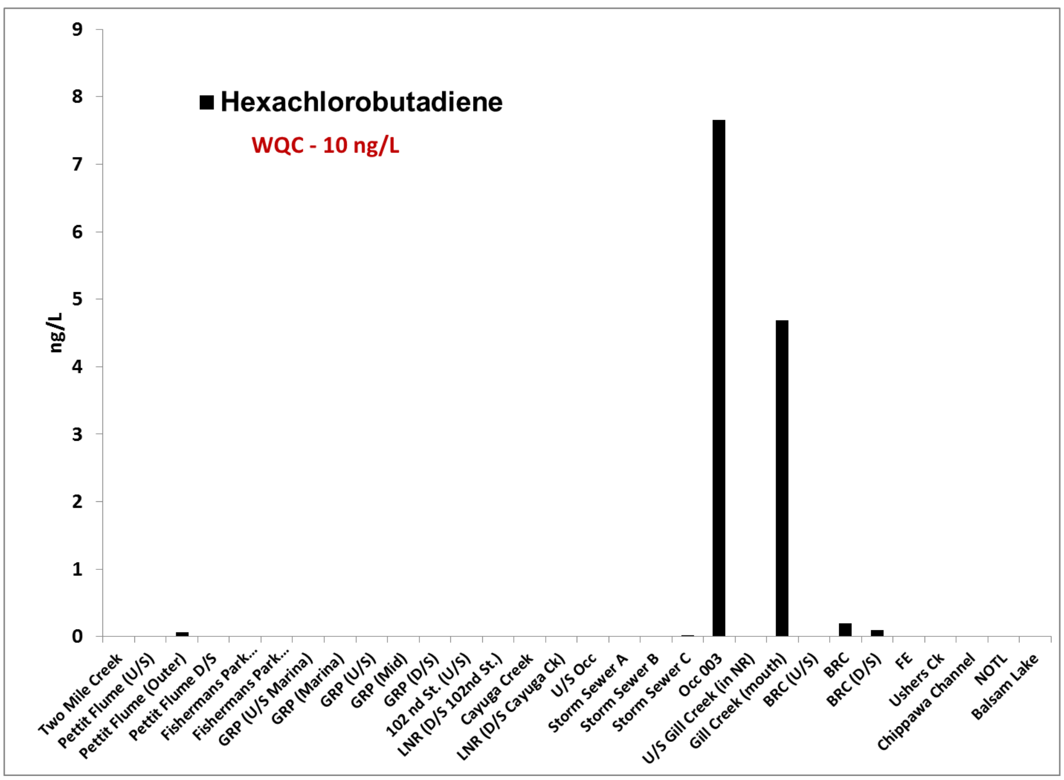


**Figure 12**: Estimated water concentrations (ng/L) for HCBD from SPMDs deployed in the Niagara River, 2015

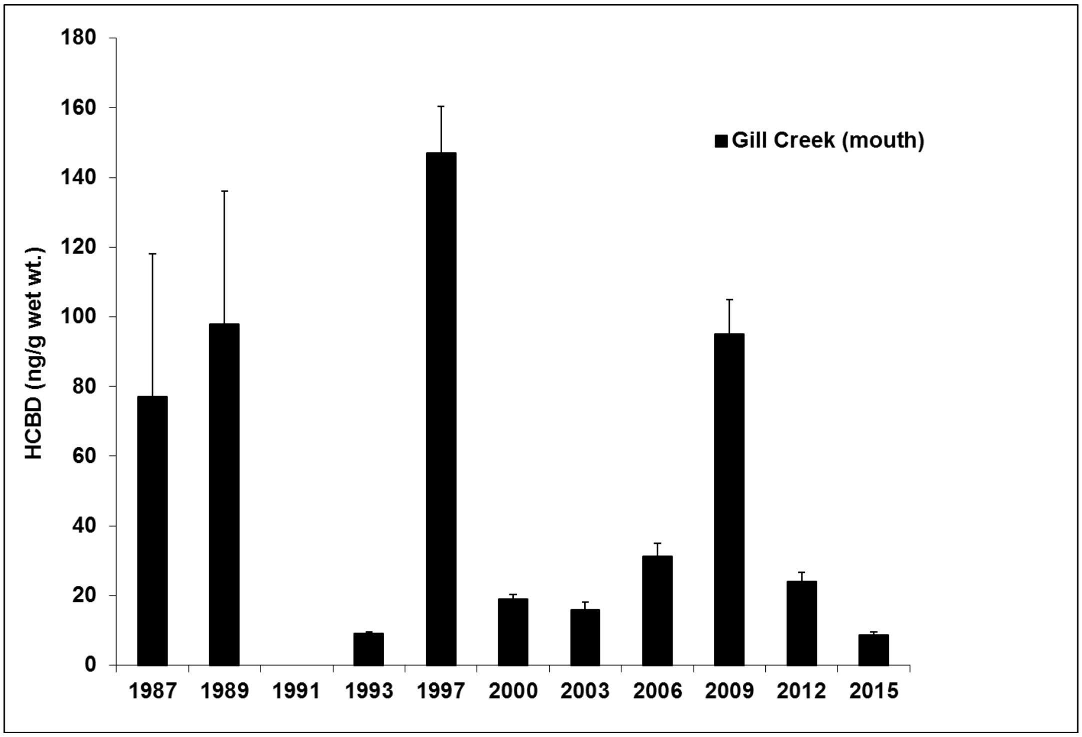


**Figure 13:** Mean (+/- SE) concentrations of HCBD in caged mussels deployed at the mouth of Gill Creek through time (1987-2015).

The ***Pettit Flume*** is a storm sewer in North Tonawanda that received waste water from the Occidental Chemical Corporation's Durez Division plant and hazardous waste site (Geologic Testing Consultants Ltd., 1984). The storm sewer discharges from the shore into a cove of the Niagara River. Remediation of the site from 1990 to 1995 included on-site containment of contaminants, removal of contaminated sediment from sewer lines, and sediment removal from the cove. The sediments were contaminated with inorganic and organic wastes including chlorinated phenols, chlorotoluene, dioxins and furans and phenol tar containing chlorinated benzenes (Interagency Task Force on Hazardous Waste, 1979; US EPA and NYSDEC, 2004). Prior to the remediation of the cove, tetrachlorobenzene, pentachlorobenzene and HCB were detected at high concentrations in mussels (Figure 14). Post remediation monitoring consistently showed that concentrations in mussels have remained low relative to pre-remediation. Nevertheless, the mussel and SPMD data continue to identify the Pettit Flume as a source of chlorinated benzenes relative to other locations in the river. The estimated water concentration based on the SPMD data for HCB at the Pettit Flume was 36 times greater than the ECCC measured water concentration in July 2015 at NOTL and 89 times greater than the most stringent water quality criteria. For pentachlorobenzene and 1,2,3,4-tetrachlorobenzene the estimated water concentrations from the SPMD data were also greater than concentrations measured in water at NOTL, however, these concentrations were 5 and 9 times lower than the water quality criteria respectively.

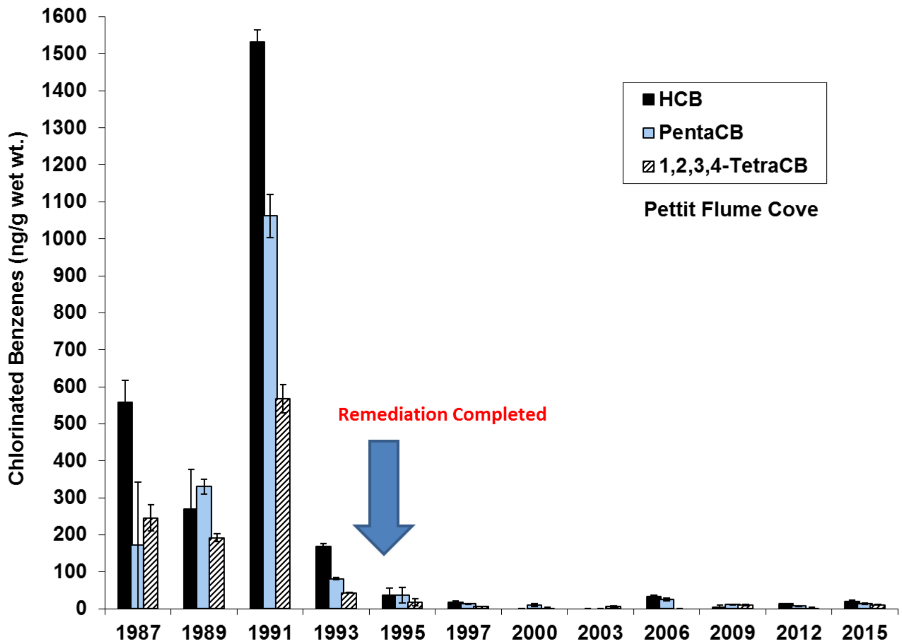


**Figure 14:** Mean (+/- SE) concentrations of organic compounds in caged mussels deployed at the Pettit Flume Cove through time (1987-2015).

***Occidental's Buffalo Avenue Plant*** first described above when referring to it as a source of mirex to the Niagara River, also discharges chlorinated benzenes and other industrial compounds in its permitted wastewater (Figures 8-12 and 15).

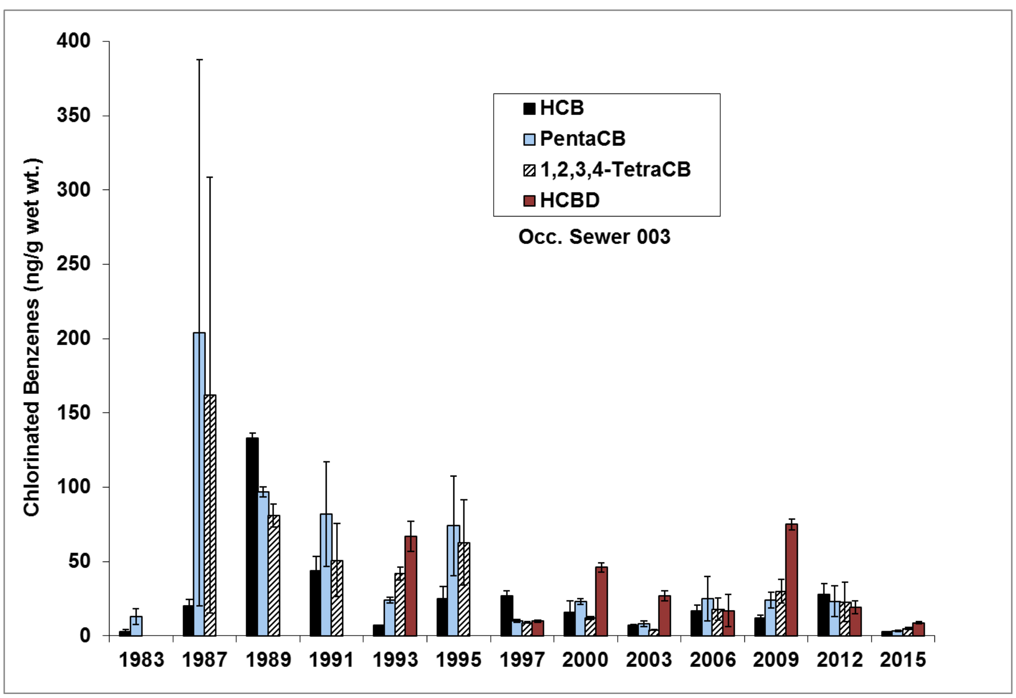


**Figure 15**: Mean (+/- SE) concentrations of chlorinated organic compounds in caged mussels deployed at the Occidental Chemical Corp. Sewer 003 through time (1983-2015).

Estimated water concentrations at the 003 sewer for OCS and HCBD were 17 and 54 times higher than the measured water at NOTL. Long term monitoring data using caged mussels was consistent with the SPMD data in identifying this outfall as a source of these contaminants of concern.

***Hyde Park***: a 6.1 hectare hazardous waste disposal site, was operated by the Hooker Chemical Co. (now Occidental Chemical Corp.) from 1953 to 1975 (NRTC, 1984). Approximately 55,000 tons of halogenated wastes including chlorinated benzenes, toluenes and phenols were buried at this site (Interagency Task Force on Hazardous Waste, 1979). ***Bloody Run Creek (BRC)***, which runs adjacent to the waste site, drains storm water run-off and overburden leachate overflow from the site and discharges it into the lower Niagara River. Despite the remediation at the Hyde Park site and the upper section of the Creek throughout the early 1990's, the lower section continues to be a source of contaminants to the Niagara River. Chlorobenzenes which include 1,2,3,4-tetrachlorobenzene, pentachlorobenzene and HCB have been detected in mussels deployed at BRC site since 1987 (Figure 16 & 17). There has been variation in contaminant concentrations measured in mussels through time likely due to fluctuations in surface runoff from the contaminated soil in the gorge, but the compounds present at this site have remained consistent and bioavailable. The reason for the high concentrations of HCB and pentaCb measured in 1993 is unknown and could possibly have been related to high precipitation and increased runoff during the deployment period. Interestingly, a review of the US/DS suspended sediment data for July of 1993 also showed an increase in HCB at NOTL relative to the annual mean HCB concentration suggesting an episodic event that may have also been captured by the caged mussels (Burniston et al 2015).

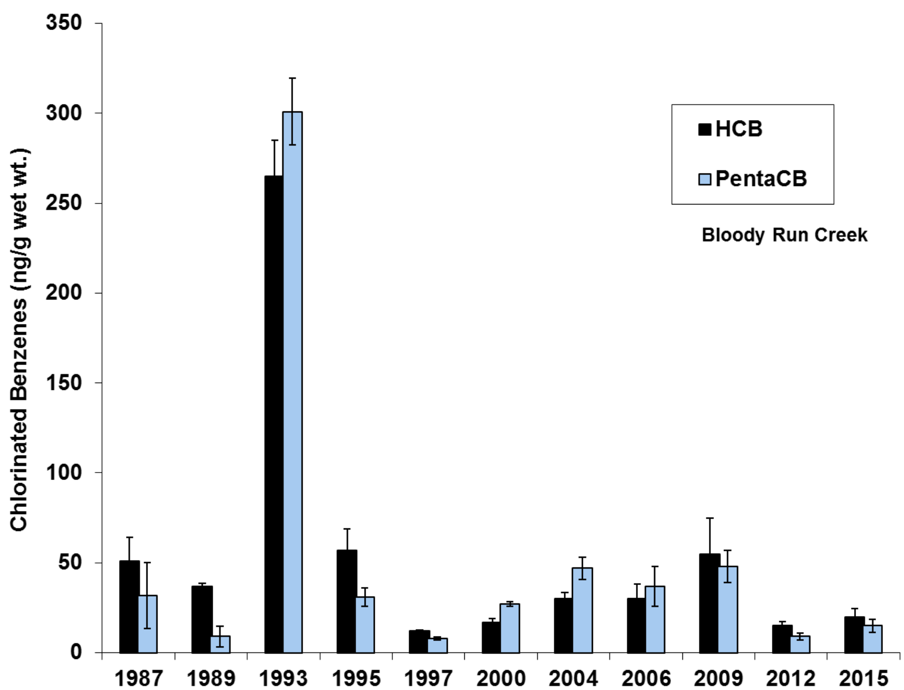


**Figure 16**: Mean (+/- SE) concentrations of chlorinated organic compounds in caged mussels deployed at Bloody Run Creek through time (1987-2015).

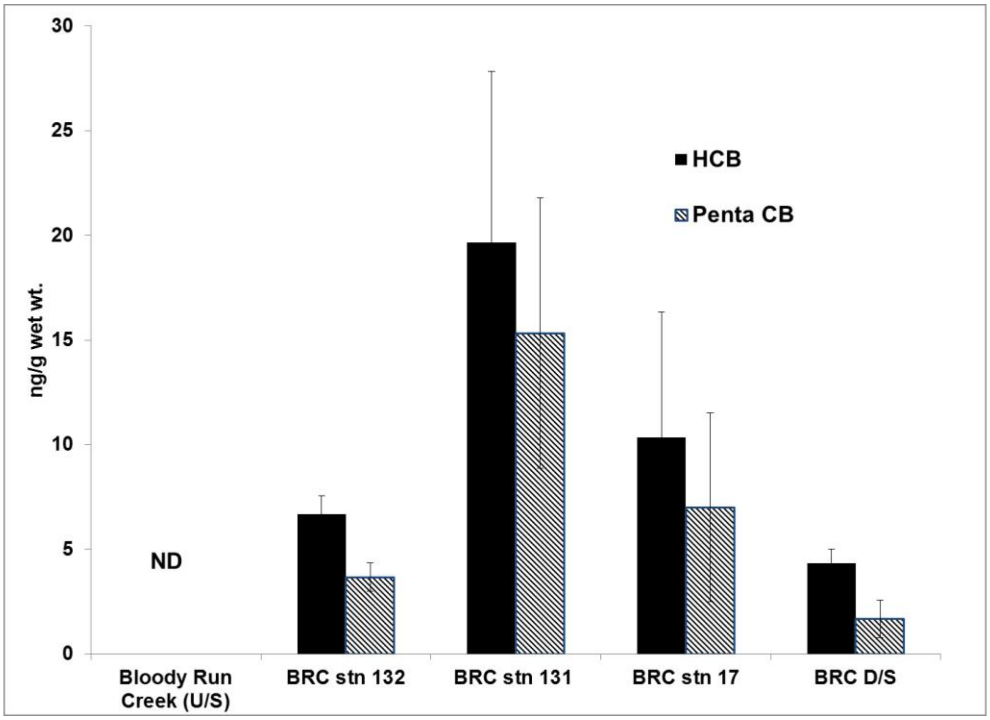


**Figure 17**: Mean (+/- SE) concentrations of hexachlorobenzene and pentachlorobenzene in caged mussels deployed at Bloody Run Creek and upstream and downstream of the contaminated area, 2015. ND (non-detect)

At the **Canadian Sites**, the highest estimated water concentrations of pentachlorobenzene (mean 0.05 ng/L; SD 0.0 ng/L), hexachlorobenzene (mean 0.06 ng/L; SD 0.01 ng/L), and 1,2,3,4-tetrachlorobenzene (mean: 0.06 ng/L; SD 0.01 ng/L), were detected in SPMDs at NOTL (Figure 18). This is consistent with the 2012 study and not surprising since contaminants detected from US sources on the upper river will be mixed with the relatively cleaner water from the Canadian side as the water passes over the falls, and then detected on the Canadian side at the mouth of the river. This is also consistent with the ECCC US/DS water quality data where contaminants with sources within the Niagara River such as the contaminants listed above were detected only at NOTL and not at the upstream (Fort Erie) site (Hill and Klawunn 2009; Hill, 2018).

Figure 18 shows an increase in pentachlorobenzene at Ushers Creek relative to Fort Erie and Chippawa Channel suggestive of a possible source. There are no industrial sources on Ushers Creek but there is a golf course. Pentachlorobenzene is present as an impurity in fungicides and in several herbicides, and pesticides currently in use in Canada (Canada.ca Fact sheet) suggesting that the golf course could be a potential source. However, to put the SPMD estimated water concentration in perspective, it is four times lower than the ECCC measured concentration at NOTL. For comparison to other identified sources in the Niagara River, the concentration at Ushers Creek is 160 times lower than concentrations estimated for the Petite Flume cove and 98 times lower than the concentration estimated at Occidental sewer 003.

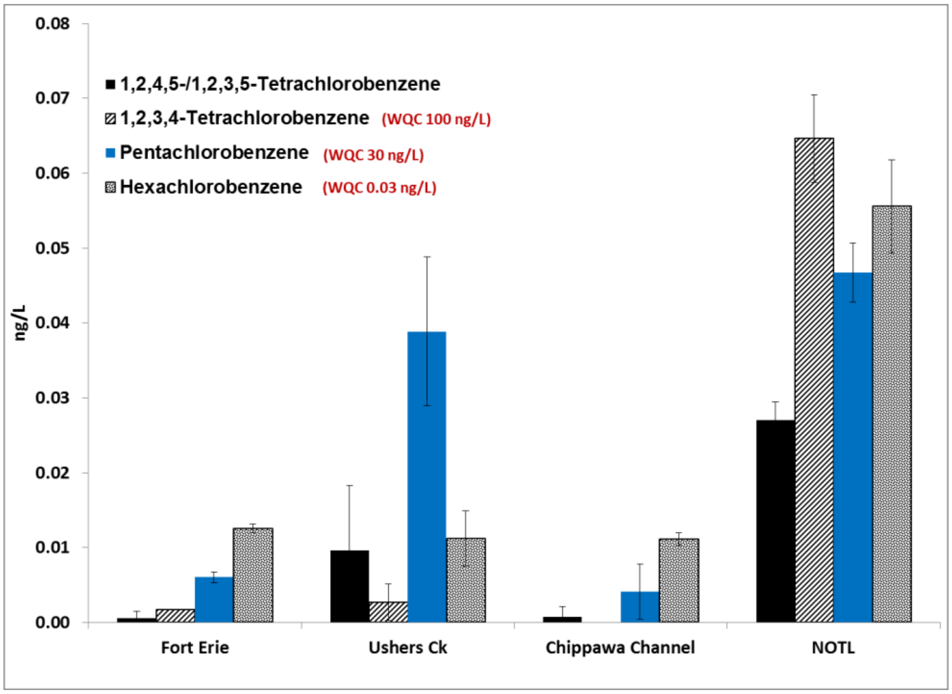


**Figure 18**: Chlorinated Benzenes in SPMDs (ng/L) (mean +/- SD) deployed on the Canadian side of the Niagara River, 2015.

### *Total PCB (Polychlorinated Biphenyls)*

The caged mussel and SPMD data identified the sites within the Niagara River that are potential sources of PCBs (Figures 19 & 20). Generally, the two datasets were consistent; however, PCBs are highly hydrophobic and depending on the Aroclor, will mostly be present in the particulate phase rather than the dissolved phase. Accordingly, the caged mussel PCB concentrations likely reflected PCB contamination in both the sediment and water column due to their feeding behaviour, while the SPMDs would only be reflecting PCBs in the dissolved-phase in water; the lower chlorinated homologues. Additionally, since mussels are live biomonitors they may react to an unfavourable environment by shutting down and thereby reduce their capacity to accumulate the contaminants compared with the SPMDs.

The 2015 data for PCBs at all sites were consistent with historical datasets identifying the same locations as sources of PCBs. Mussels and/or SPMDs identified Occidental Sewer 003 and Two Mile Creek as sources of PCBs as well as a PCB source(s) upstream of Gratwick Riverside Park. The SPMDs also had high concentrations of total PCBs at the Pettit Flume, however, a review of the data show a highly unusual congener distribution driven by mono and dichlorobiphenyls (PCB-1, 2 and 3): a pattern that was also observed in 2012 which confirms that it was not an anomaly for this site (Figure 21). The caged mussels are not analysed for these congeners so this site was not identified as a significant source using that dataset. The homologue pattern may reflect the presence of Aroclor 1221 although a source has not been determined. Listed industrial uses of A1221 were as a dielectric fluid in capacitors, in gas transmission turbines, as a plasticizer in rubber, and in adhesives.

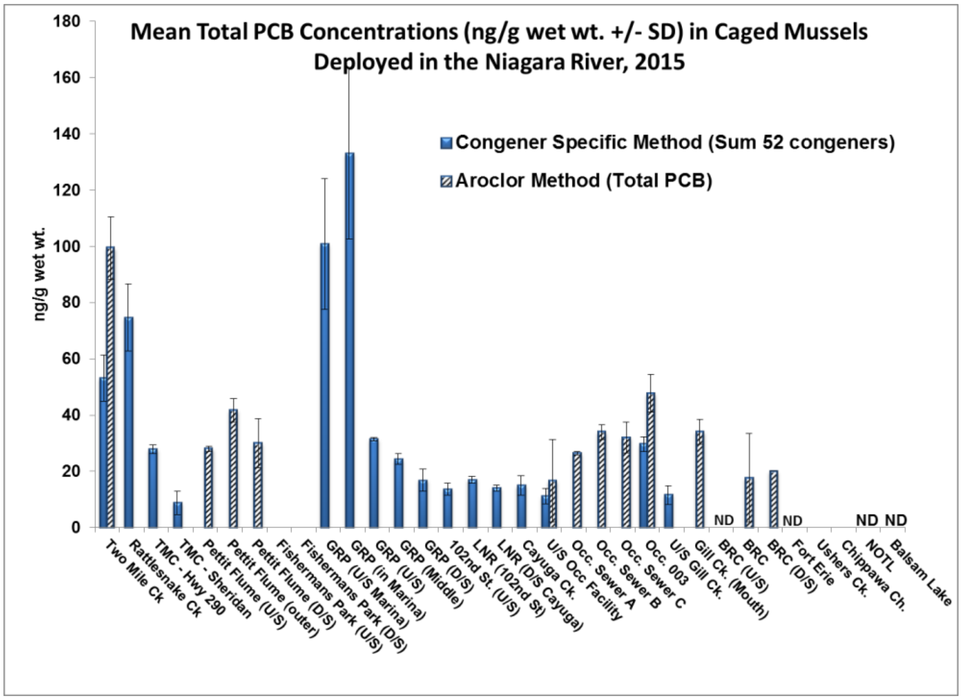


**Figure 19:** Mean (+/- SD) total PCB concentrations in caged mussels (analysis congener specific method (sum of 52 congeners ND<5 ng/g) and/or Aroclor method (ND<20 ng/g)) deployed at sites along the Niagara River in 2015. ND (non-detect). Mussels were not deployed at Fisherman's Park, Ushers Creek or Chippawa Channel.

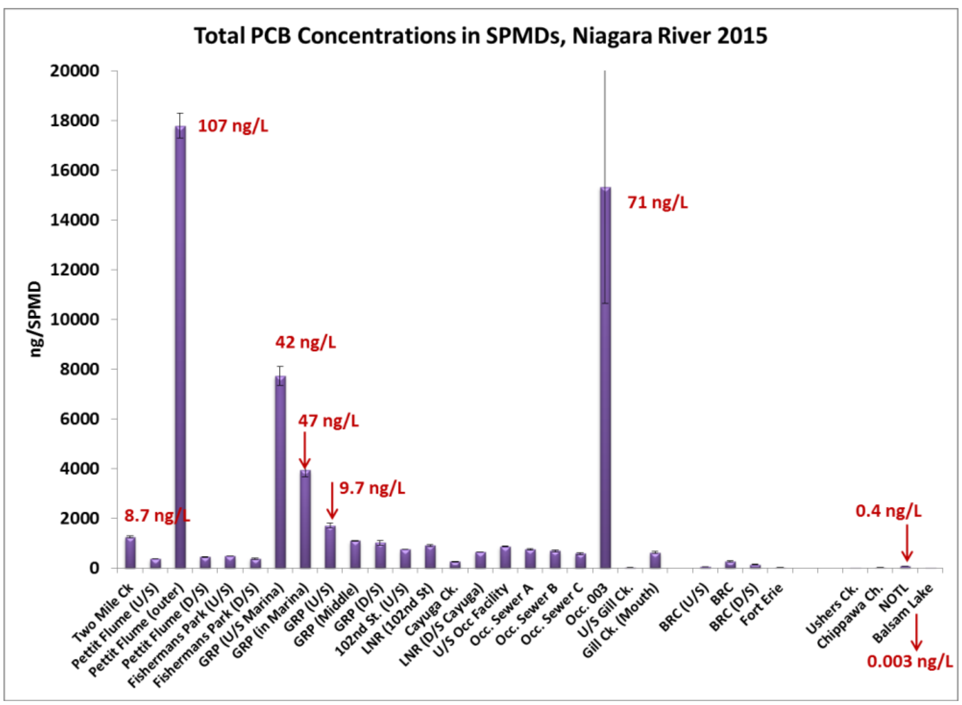


**Figure 20:** Mean (+/- SD) total PCBs (sum of 209 congeners) for SPMDs deployed in the Niagara River, 2015 with estimated water concentrations (ng/L). For reference, the WQC for total PCBs is 0.001 ng/L (NYSDEC).

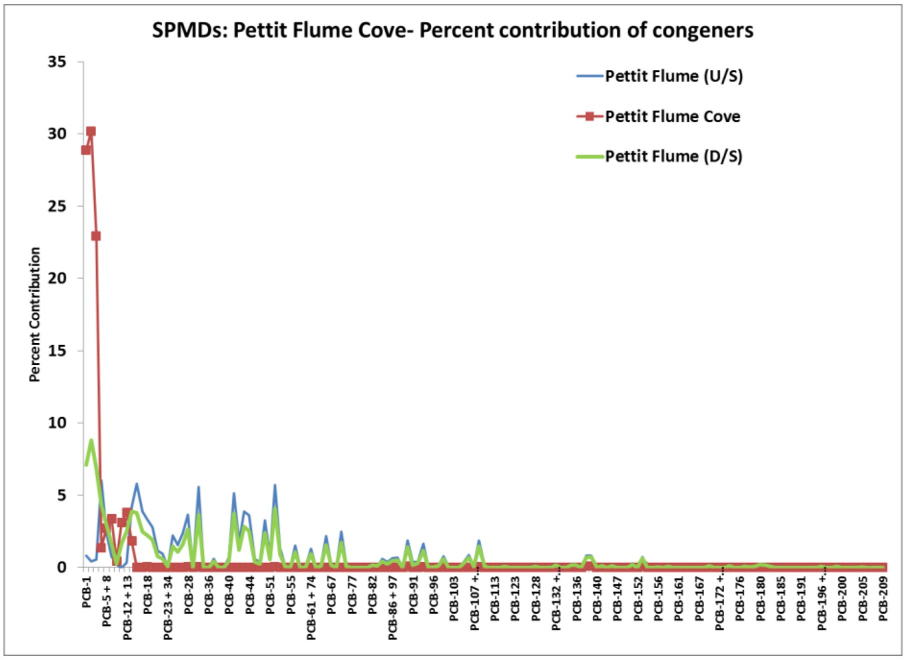


**Figure 21:** Congener pattern (percent contribution of each congener to total PCBs) for SPMDs deployed in the Pettit Flume Cove, and U/S and D/S of the cove, (208 congeners), 2015.

The congener pattern for PCBs detected in mussels and SPMDs at the OCC. Sewer 003 resembled Aroclor 1248 and was consistent with data from 2012 identifying this sewer outfall as a source of bioavailable PCBs (Figure 22).

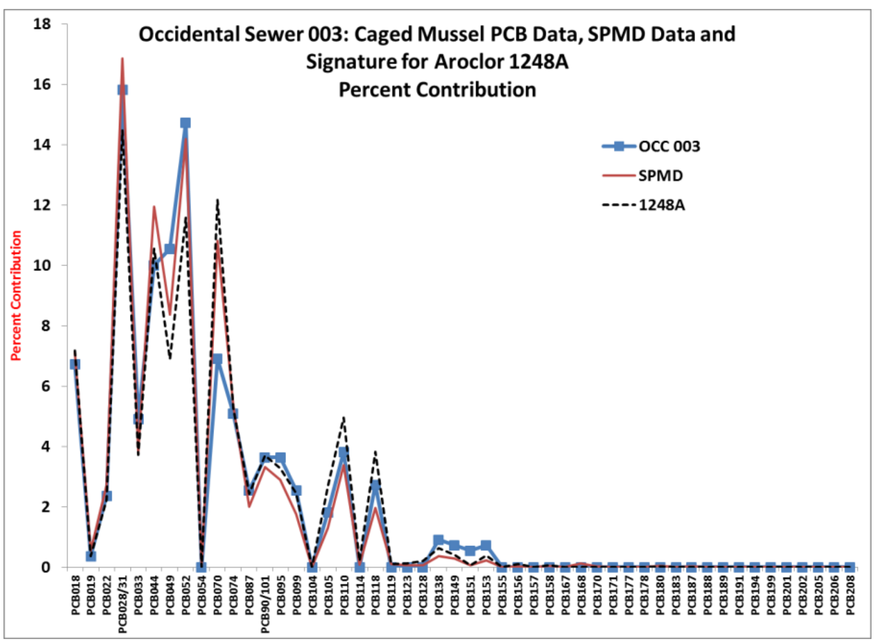


**Figure 22:** Congener pattern (percent contribution of each congener to total PCBs) for caged mussels, SPMDs and the pattern for Aroclor 1248A. The number of congeners presented for SPMDs and Aroclor 1248 were reduced to match the 52 congeners analysed in mussels.

***Gratwick Riverside Park (GRP)*** is located along the shore of the Niagara River in the city of North Tonawanda. It is 53 acres and was used, prior to the 1970's, as a landfill that accepted municipal and industrial waste as well as metallurgical slag, and phenolic waste from the Occidental Durez site. It was identified as a State Superfund site and remedial actions began in 1999. The goal of the remediation was to provide shoreline protection, install a slurry wall between the site and the river to act as a hydraulic barrier and prevent the movement of contaminants to the river, cap the site so that it can be used as a park and collect and treat contaminated groundwater. Remediation of the site was completed by 2003 (USEPA and NYDEC 2003). The 2012 SPMD and caged mussel data identified PCBs at the upper end of the Park as being higher than most other sites in the river suggesting two possibilities: 1) PCBs were still leaching into the river from the former waste site; 2) there were other sources of PCBs upstream of GRP. In the 2015 survey, additional sampling stations were located immediately upstream of GRP in a marina, and about 135 m further upstream of GRP along the Niagara River shoreline. Both SPMD and caged mussel data had PCB concentrations that were higher at these two stations than concentrations measured at the GRP station which suggested that there were sources of PCBs upstream of GRP. Mean estimated water concentrations from the SPMDs were 42 ng/L and 47 ng/L at these upstream stations compared with 9 ng/L at GRP. Concentrations continued to decrease with increasing distance downstream of the area with high PCB concentrations (Figures 19 & 20). The congener patterns in mussels and SPMDs for all the sites associated with this location were the same suggesting a common source. The pattern in the mussels somewhat reflected Aroclor 1248, although there were some differences (PCB 21/33, 44 and 70), up until congener 119, but then the higher chlorinated congeners were also elevated in the caged mussels and so in total, the pattern reflected a combination of Aroclor 1248 and possibly Aroclor 1254 (Figures 23; Appendix G). The SPMD congener data has a similar pattern to Aroclor 1248 as well (Figure 24). Fisherman's Park, about 800 m further upstream, had low concentrations of PCBs in SPMDs (mussels were not analysed for PCBs at that site) (Figure 20) which suggests that the source is likely between Fishermans Park and GRP.

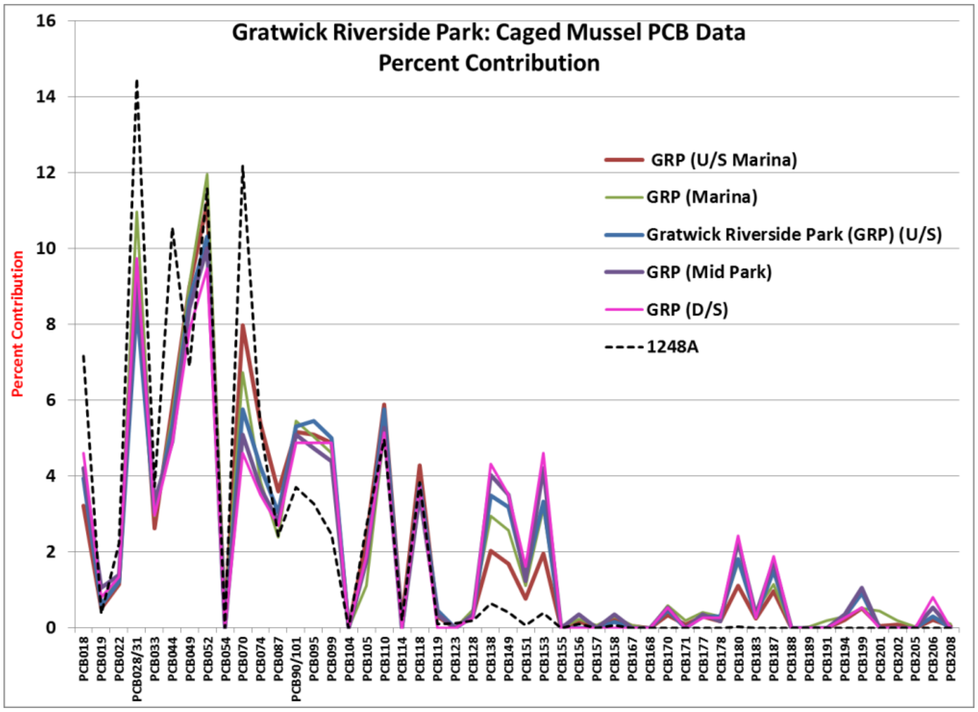


**Figure 23:** Congener patterns (percent contribution of each congener to total PCB concentration) in the caged mussels deployed along the shoreline U/S and D/S of GRP compared with the pattern for Aroclor 1248.

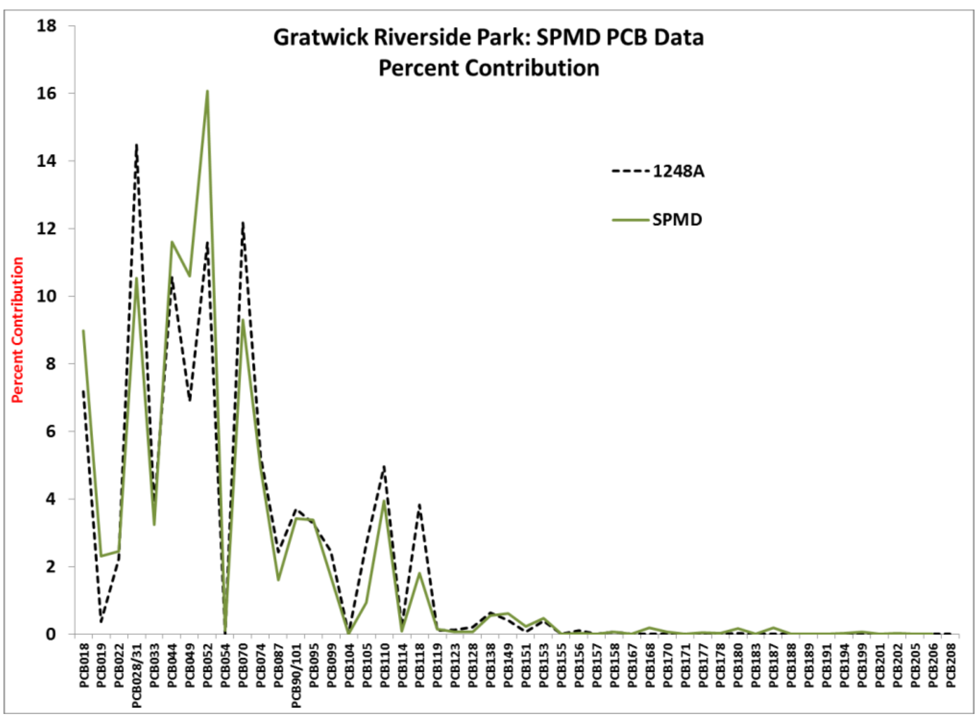


**Figure 24:** Congener patterns (percent contribution of each congener to total PCB concentration) in the SPMD deployed at the GRP station U/S of the marina compared with the pattern for Aroclor 1248.

***Two Mile Creek*** has been identified by NYSDEC as a PCB contaminated site due to historic and ongoing active sources (e.g., runoff from landfills, inactive hazardous waste sites, storm sewers and industries located upstream) (Niagara River Secretariat 2002). Mussels were deployed at three sites in Two Mile Creek: At the head of the river at Sheridan Rd., downstream of Hwy 290, and at the mouth of the creek upstream of Niagara Street. Congener patterns in the mussels were similar within the creek at all three sites, although there were some differences likely due to the multiple sources at different locations along the length of the creek (Figure 25). The congener pattern most resembled Aroclor 1254 compared with the other Aroclors, although the increase in percent contribution for higher chlorinated congeners suggests input from Aroclor 1260 as well. The mean total PCB concentration for the station located at the head of the creek was lower than at the two downstream stations (sum of 52 congeners, total PCBs: 8.8 ng/g wet wt., SD 4.2 ng/g) compared with 28 ng/g wet wt. (SD 1.5 ng/g) at station Hwy 290 and a range from 44 to 60 ng/g (wet wt.) for mussels deployed at the creek mouth.

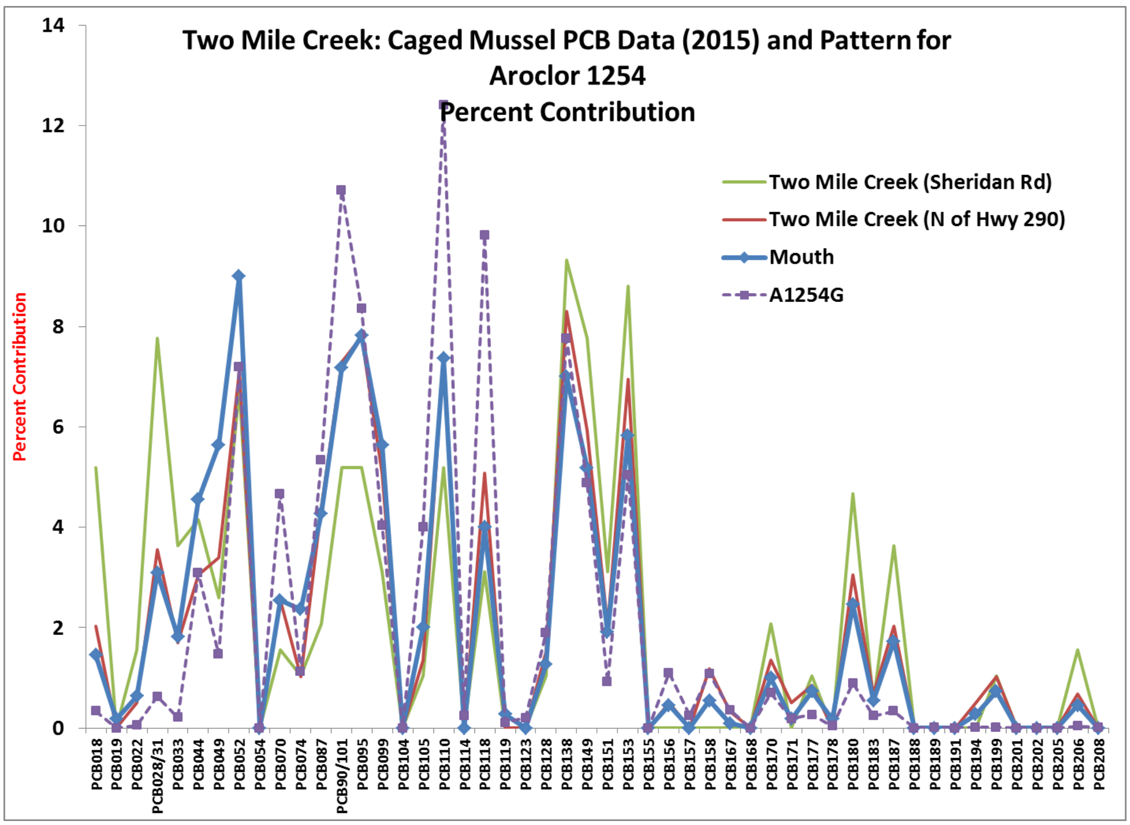


**Figure 25:** Congener patterns (percent contribution of each congener to total PCB concentration) in the caged mussels deployed along Two Mile Creek (2015) compared with the pattern for Aroclor 1254.

The mouth of Two Mile Creek has also been monitored since 1987 using caged mussels analysed by the Aroclor method. Mussels analysed using this method had higher concentrations than the congener specific method discussed above (mean Aroclor method: 99

ng/g SD 11 ng/g), however, there has been no change through time in mussel tissue concentrations regardless of the analytical method (Figure 26). This is not unexpected since there has not been any remediation at the mouth of the creek.

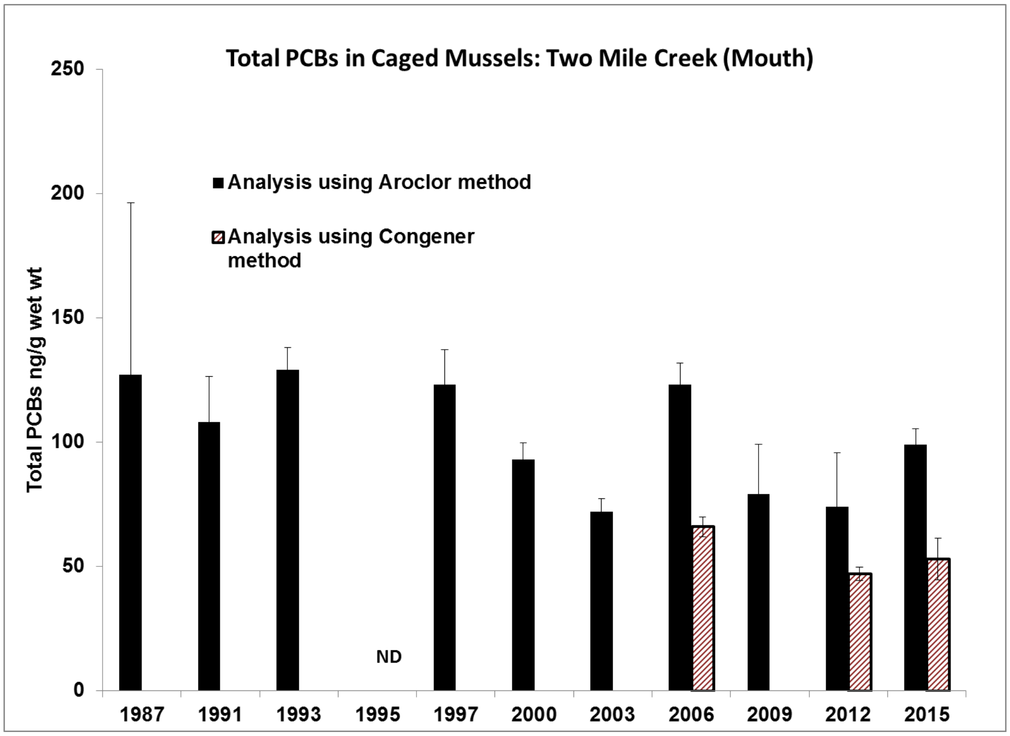


**Figure 26:** Mean (+/- SE) total PCB concentrations (Aroclor analytical method (ng/g wet wt.) in caged mussels deployed at the mouth of Two Mile Creek through time (1987-2015) and congener specific method (2006-2015).

A PCB contaminated tributary, Rattlesnake Creek, flows intermittently into the lower portion of Two Mile Creek (caged mussels sum of 52 congeners: 75 ng/g wet wt. SD 12 ng/g). These data were consistent with the data from 2009 (82 ng/g wet wt. SD 3 ng/g). The congener pattern for mussels deployed in Rattlesnake Creek is different from the pattern at the mouth of Two Mile Creek suggesting another distinct source within this watershed (Figure 27). Mussels deployed in Rattlesnake Creek had a higher percent contribution from the lower chlorinated congeners (e.g., PCB-31 to 52) than Two Mile Creek, and a lower percent contribution from the higher chlorinated congeners compared with Two Mile Creek (e.g., most congeners from PCB-110 to PCB-208). The unusual pattern for the lower chlorinated congeners (high percent contribution from PCB-44, 49 and 52) and low contribution from PCB -110, 118, 138, 149, makes it difficult to match the Rattlesnake Creek PCBs with any specific Aroclor. The pattern may be a reflection of PCB volatilization and/or dechlorination. This unusual pattern for PCB-44 to 52, was replicated in mussels at the mouth of Two Mile Creek and provides a line of evidence that suggested that Rattlesnake Creek is a possible source of PCBs to Two Mile Creek. The similarity in the congener pattern in the Two Mile Creek SPMDs with Rattlesnake Creek mussels (2009 and 2015) (Figure 27) provides a second line of evidence, and suggested the need for a PCB track-down study to determine the contributions and loadings of various PCB sources within the watershed to Two Mile Creek.

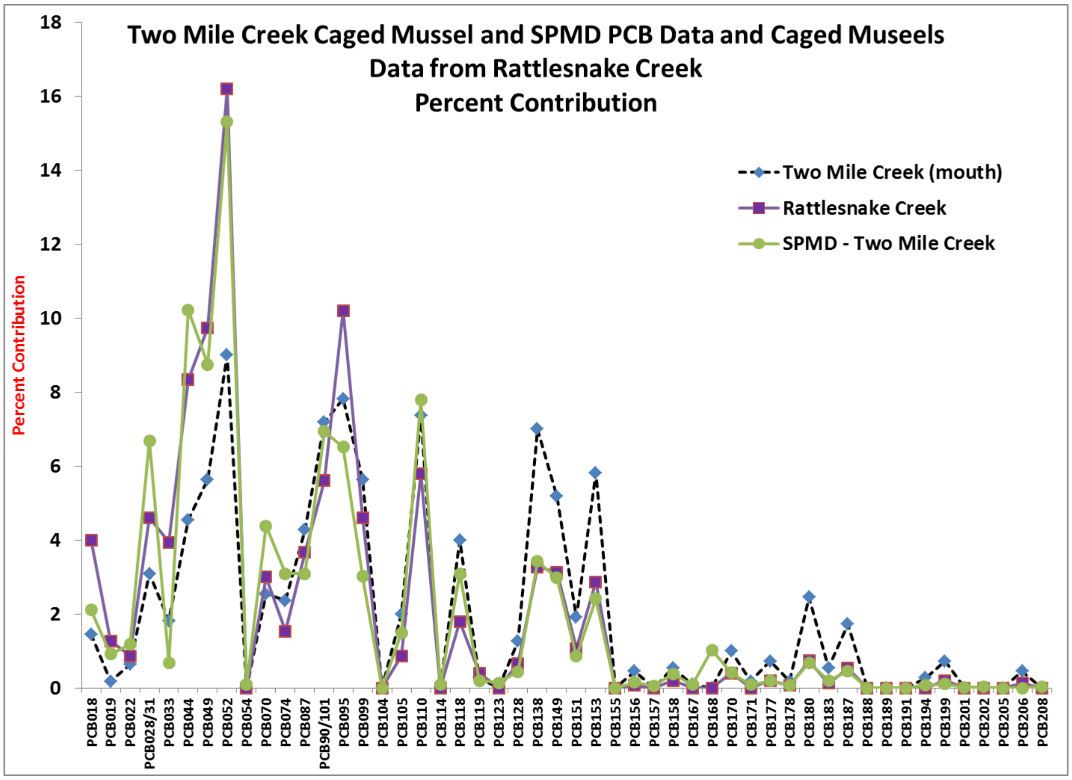


**Figure 27:** PCB congener patterns (percent contribution of each congener to total PCB) in caged mussels deployed in Rattlesnake Creek and Two Mile Creek, and the SPMD deployed at the mouth of Two Mile Creek, 2015. The number of congeners presented for SPMDs were reduced to match the 52 congeners analysed in mussels.

***Gill Creek*****:** Gill Creek discharges into the Niagara River just above Niagara Falls on the U.S. side. The creek received contaminants from the Olin Chemical Corporation (Buffalo Avenue Plant) and the E. I. Dupont Company upstream of the mouth. Additionally, NYSDEC identified over 100 sources of contaminants within the watershed. Gill creek was a major contributor of PCBs to the Niagara River; estimated to have contributed as much as 20% of the total PCB load (USEPA and NYSDEC, 1994). Remediation of PCB contaminated sediment in Gill Creek upstream of the mouth was completed in 1992. Additional sediment remediation was completed further upstream in 1998. Concentrations of total PCBs in caged mussels deployed at these two sites have decreased post remediation and remain consistently low through time (2015 mean: 34 ng/g +/- SE 2.5 ng/g wet wt.) (Figure 28).

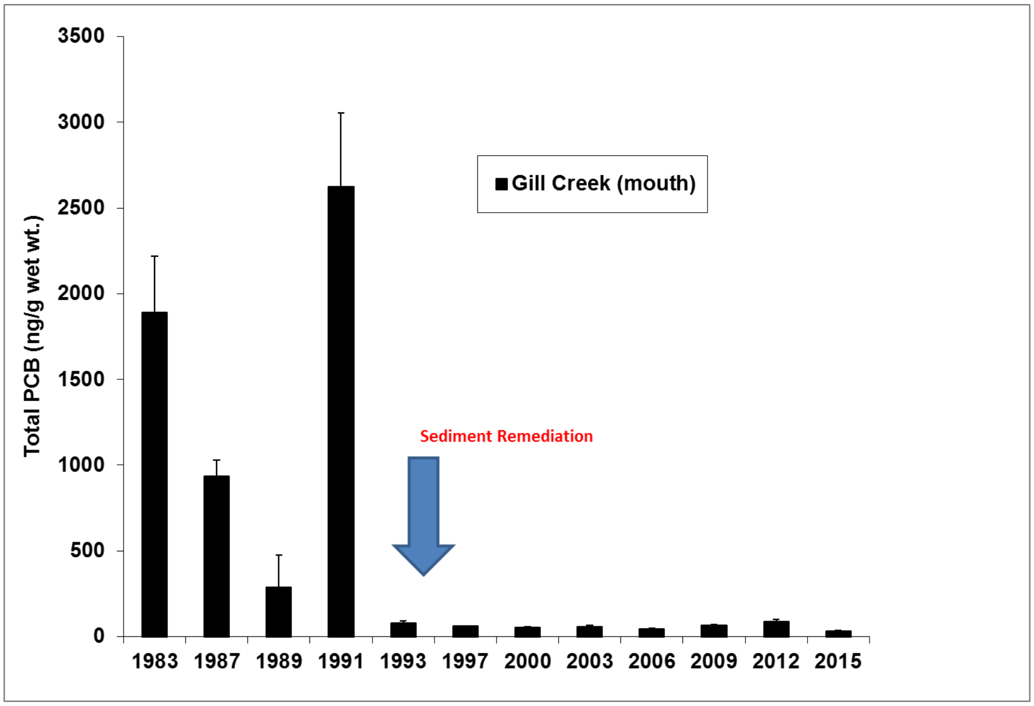


**Figure 28:** Mean (+/- SE) total PCB concentrations (Aroclor analytical method (ng/g wet wt.) in caged mussels deployed at the mouth of Gill Creek through time (1983-2015).

***Canadian Sites***: Total PCB concentrations (measured using the congener specific method) in caged mussels deployed at Fort Erie were below the detection limit, and at NOTL ranged from 1.4 to 2.3 ng/g (wet wt.). NOTL had the highest PCB concentrations in SPMDs compared with the other Canadian sites (Figure 29; Appendix F). The higher PCB concentration at NOTL was likely due to the contributions of PCBs from the US side as discussed earlier for OCS, tetra, penta, and hexachlorobenzene since PCB concentrations in mussels, and estimated water concentrations from the SPMDs deployed at Canadian sites have historically been lower than those reported at US sites suspected of being sources (Figures 20).

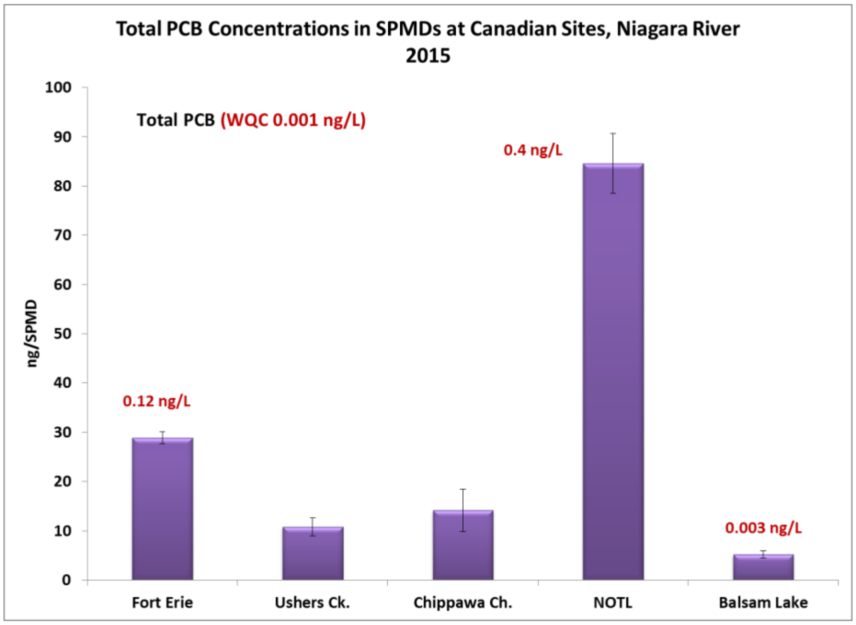


**Figure 29:** Mean +/- SD total PCBs (sum of 209 congeners) for SPMDs (**ng/SPMD**) deployed on the Canadian side of the Niagara River, 2015 with estimated water concentrations (ng/L) compared with the most stringent water quality criteria (WQC).

### *Polychlorinated dibenzo-p-dioxins and Polychlorinated dibenzofurans*

***Pettit Flume and Fisherman's Park:*** In contrast to the reductions in chlorinated benzenes in mussels, high concentrations of dioxins and furans have been measured in sediment and mussels deployed in the cove consistently since 1993 suggesting the presence of a source that had eluded the remediation in the early 1990's and additional sediment remedial efforts in 2000 (US EPA and NYSDEC 2002). The sediment collected in 2015 from the cove was highly contaminated with dioxins and furans with a TEQ of 8,830 pg/g (Appendix D3). Sediment collected in previous surveys (1993-2012) had total TEQ concentrations that ranged from 3800 to 48,000 pg/g (Richman *et al.* 2011) (Figure 30; Appendix E). The CCME interim sediment guideline is 21.1 pg TEQ/g for comparison.The dioxin and furan isomer patterns in sediments from the cove were unique to the cove when compared to other sites in the Niagara River (i.e., concentration of octachlorodioxin was low relative to other isomers). The Pettit Flume outfall is identified as the source of contamination since sediment collected from a site immediately upstream of the cove in past surveys (1993-2015) has typically had low PCDD/F contamination (total TEQ ranged from 10 to 37 pg/g) and isomer patterns in the upstream sediment samples did not match the unique Pettit Flume profile (Richman 2013).

The continued presence of contaminants in the cove was possibly due, in part, to residual contamination in the sewer system. Camera inspections (authorized by Occidental) of the sewer line in 2008 and 2009 identified sediment deposits throughout the sewer. Chemical analysis of the sediment detected contaminants associated with the waste deposited in the cove. A decision to manually vacuum the sediment deposits and line portions of the sewer with resin coated liner tubes to prevent further infiltration of contaminated water and sediment was announced by NYSDEC in October 2013 (NYSDEC Fact Sheet 2013). Some of this work was completed in 2014 and may have led to the lower concentrations measured in the sediment in 2015. However, the sediment contamination of the cove has proven to be heterogeneous and additional data would be required to confirm that a decrease in surface sediment concentration was consistent throughout the area. PCDD/Fs were also measured in caged mussels deployed in the cove suggesting that they are bioavailable (Appendix D3).

Further remediation of the dioxin contaminated cove sediment has not been announced to date. However, PCDD/Fs at high concentrations (840 pg TEQ/g) and isomer patterns consistent with those observed in cove sediments were also found in sediment collected from stations located at the downstream end of the cove and at Fisherman's Park about 0.5 km downstream of the cove. Data collected since 2000 has been consistent in showing that contaminated sediment may be migrating out of the cove into the Niagara River (Figure 30).

***Bloody Run Creek (BRC)***: Sediment collected from the shoreline of the Niagara River in the vicinity of Bloody Run Creek between 1993 and 2015 had consistently high concentrations of PCDD/Fs although concentrations have increased and decreased randomly confirming the heterogeneous spatial pattern of contamination along the shoreline (Appendix E; Figure 31). The TEQ has ranged from 3,300 pg TEQ/G to 120,000 pg TEQ/g. In 2015 additional sediment stations located along the shoreline in the vicinity of BRC and upstream and downstream of the historical stations were sampled. Some of these samples were analysed using a new MECP screening method used to identify areas that may be contaminated with PCDD/F. All historical sampling locations had sediment analysed using the routine method (Appendix D3). The dioxins and isomer patterns found in Bloody Run Creek sediments were distinct from those seen at other sites in the Niagara River with lower concentrations of octachlorodioxin relative to the 1,2,3,4,6,7,8-heptachlorodioxin. Furthermore, all the tetra dioxin was in the form of 2,3,7,8-TCDD, the most toxic form of dioxin. The unique congener pattern present in the sediment was also present in the SPMDs and caged mussels demonstrating bioavailability of the contaminants.

Sediment collected in 2012 from the "upstream" reference site (about 90 m upstream of BRC) had a relatively high TEQ (346 pg TEQ/g), compared to previous years, and the congener pattern was consistent with the BRC pattern and not the typical "upstream pattern" characteristic of this station. These data suggested that our sampling location was either not consistent with previous surveys or possibly, the BRC footprint was larger than previously suspected. Accordingly, additional sampling locations were added to the 2015 survey. In 2015 the historical upstream station had a total TEQ which was lower than 2012 (88 pg TEQ/g), but the congener pattern was a combination of the contaminated site and patterns more typical of upstream conditions (Figure 32). Given the range in PCDD/F concentrations through time it is possibly that sediment in this area is mobile due to frequent resuspension and settling because of the large fluctuation in water levels when the reservoir is closed and reopened on a daily basis.

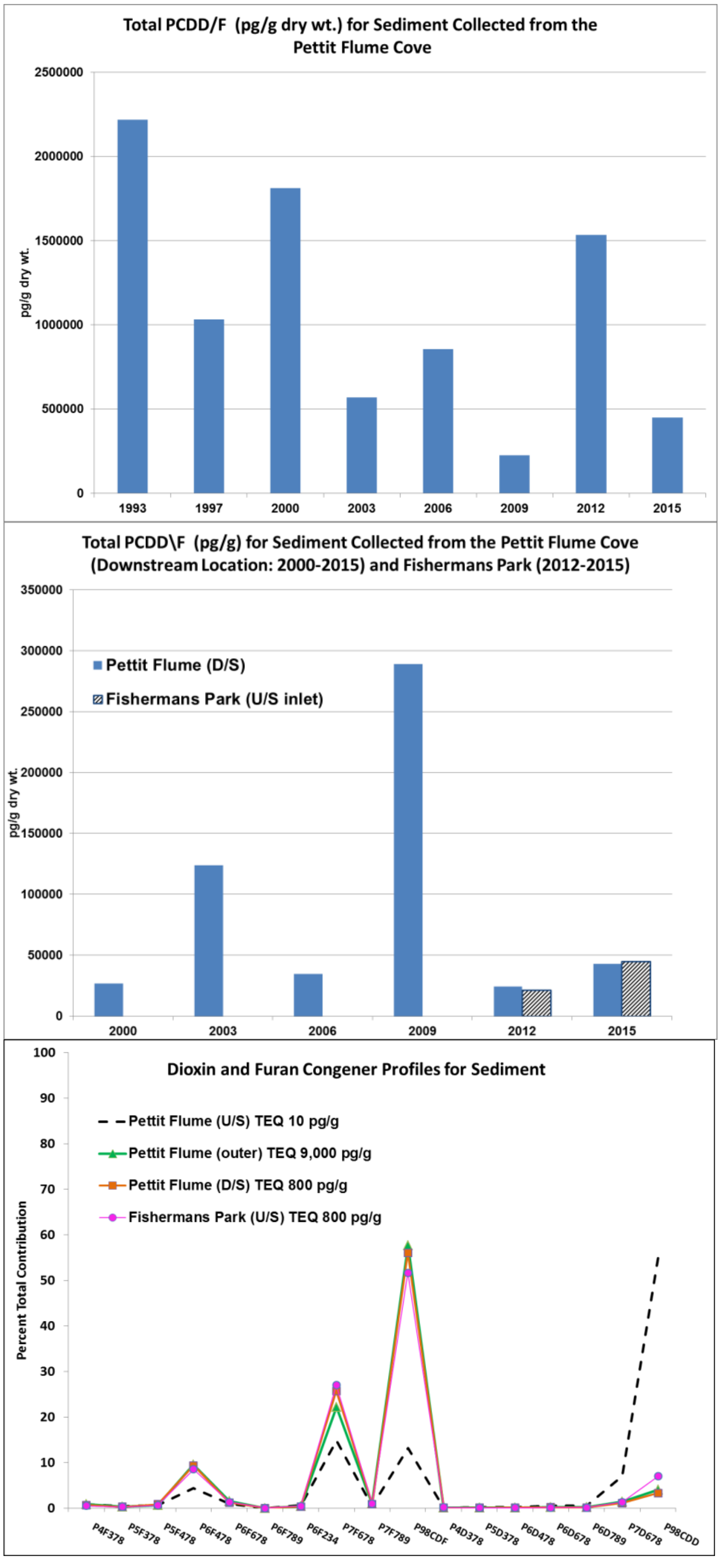


**Figure 30:** Total PCDD/F trend through time data for the Pettit Flume cove and Fisherman's Park and congener patterns in sediment collected from the Pettit Flume and Fisherman's Park, 2015. Sediment was not collected from Fisherman's Park prior to 2012.

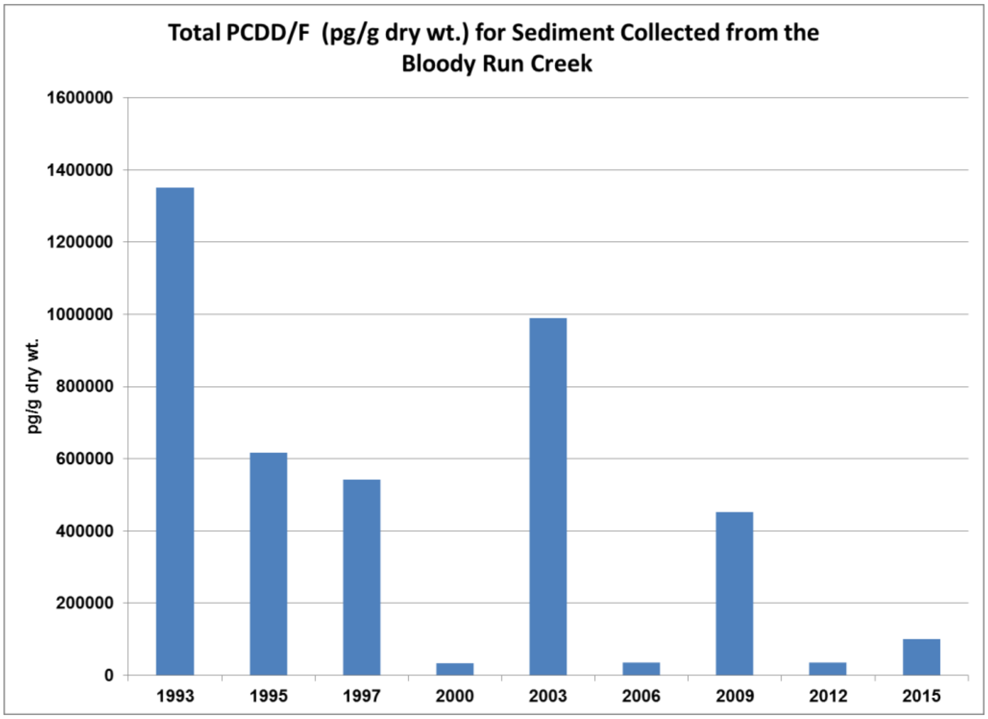


**Figure 31:** PCDD/F trend through time data for sediment collected from the Niagara River shoreline associated with Bloody Run Creek.

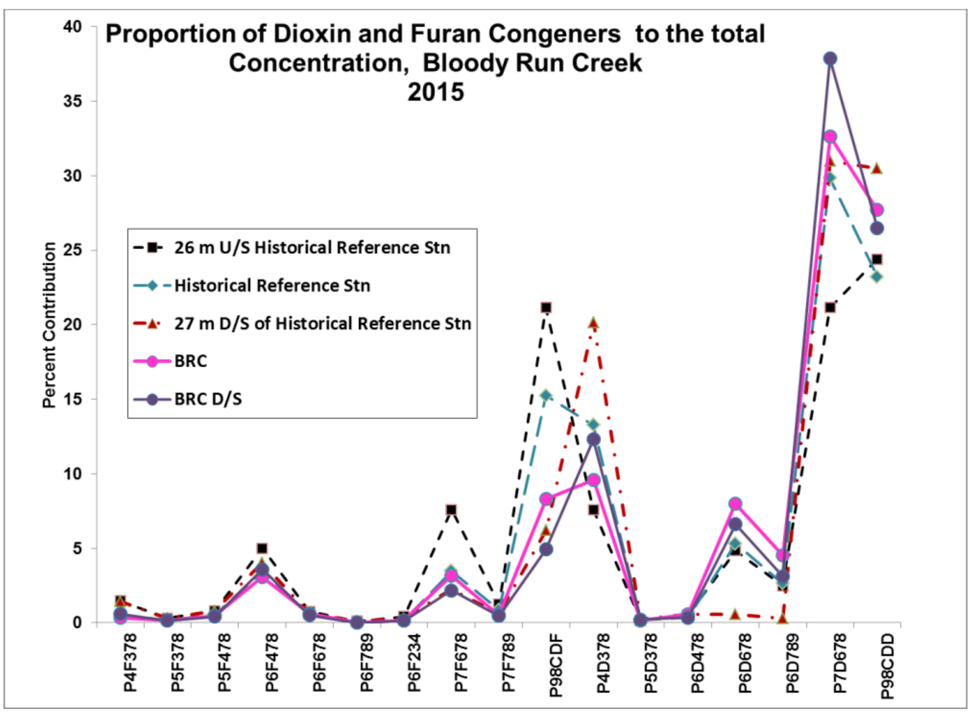


**Figure 32**: PCDD/F congener patterns in sediment collected from the Niagara River shoreline associated with Bloody Run Creek, 2015.

## Conclusions & Recommendations

- The ECCC US/DS water monitoring data (2005-2015) (Hill et al. 2018) identified specific contaminants of concern that were suspected of having Niagara River sources since contaminant concentrations were higher at NOTL than Fort Erie. The deployment of caged mussels and SPMDs in 2015 in the nearshore provided data that identified sources of organic compounds to the Niagara River. These included:

    - Tributaries - Two Mile Creek (PCBs, 4,4'-DDD, heptachlor epoxide, α-chlordane, dieldrin), Cayuga Creek (PCBs, 4,4'-DDD, 4,4'-DDE, α-HCH), and Gill Creek (α-HCH, HCBD).
    - The Pettit Flume cove (4,4'-DDD, α-chlordane, PCBs, trichlorobenzenes, 1,2,3,4 – tetrachlorobenzene, 1,2,4,5/1,2,3,5-tetrachlorobenzene, pentachlorobenzene, HCB, and dioxins and furans).
    - Bloody Run Creek (1,2,3,4 – tetrachlorobenzene, pentachlorobenzene, HCB, OCS, and dioxins and furans).
    - Occidental Chemcial Corp. (PCBs, trichlorobenzenes,1,2,3,4 – tetrachlorobenzene, 1,2,4,5/1,2,3,5-tetrachlorobenzene, pentachlorobenzene, HCB, OCS, HCBD, mirex).
    - GRP marina and upstream of the marina – PCB, 4,4'-DDD, 4,4'-DDE.
    - With the exception of 4,4'-DDD and 4,4'-DDE at Fort Erie, no sources of organic contaminants were identified on the Canadian side of the river.

- Overall, water concentration estimates from SPMD data for most compounds on both side of the river were below Water Quality Criteria with the exception of PCBs, dieldrin, metabolites of DDT, HCB, mirex. Many of the contaminants being monitored are hydrophobic and are likely bound to sediment and may not be completely available for accumulation by the SPMDs. Accordingly, impacts on the benthic community and food chain cannot be fully assessed from this monitoring tool.

- High concentrations of PCBs in SPMDs deployed at the OCC Sewer 003 in 2012 and 2015 (estimated at 143 ng/L and 71 ng/L respectively) suggested that this outfall may be an important source of PCBs to the river. It is recommended that the discharge history of this outfall be reviewed to investigate whether the SPMD data reflects intermittent occurrences, or ongoing, long-term PCB discharges.

- High PCB concentrations were present in SPMDs deployed at two locations upstream of the Gratwick Riverside Park Hazardous Waste Site suggesting that there is/are upstream source(s) of PCBs to the river. The biomonitoring study conducted in 2018 investigated the area between Fisherman's Park and GRP in an attempt to track down the source.

- Dioxin contaminated sediment samples collected from Fisherman's Park in both 2012 and 2015 suggested movement and transport of contaminated sediment from the Pettit Flume cove. Following source control of PCDD/F to the cove, a full site characterization of PCDD/F contamination in the cove is recommended followed by a review of potential sediment remedial options.

- A follow-up assessment of the high concentrations of metabolites of DDT at Fort Erie on the Canadian side of the Niagara River is recommended for 2018.

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# Appendices

## Appendix A: Station Location

| Station Location | Station # | Northing | Easting | Total PCB | Congener | Dioxins | Sediment | SPMDs |
|---|---|---|---|---|---|---|---|---|
| | | | | OC pesticides | Specific PCBs | Furans | | |
| | | | | Chlorinated Benzenes | | | | |
| **Canadian sites** | | | | | | | | |
| Balsam Lake (Control) | 18 01 0001 | 4938157 | 674831 | | | | | |
| Fort Erie (FE) | 05 02 203 | 4754908 | 670305 | √ | √ | | | √ |
| Ushers Creek | 05 15 06 | 4767068 | 659995 | | | | | √ |
| Chippawa Channel | 05 02 51 | 4768226 | 661232 | | | | | √ |
| Niagara on the Lake (NOTL) | 05 11 09 | 4790824 | 657471 | √ | √ | | | √ |
| | | | | | | | | |
| **American Sites** | | | | | | | | |
| Two Mile Creek | 05 02 197 | 4764036 | 670595 | √ | √ | | | √ |
| Rattlesnake Creek | 05 15 38 | 4763739 | 670555 | | √ | | | |
| Two Mile Creek (Near Sheridan Rd) (historical – 2006) | 05 15 36 | 4760793 | 671510 | | √ | | Dioxin | |
| Two Mile Creek (N of Hwy 290) | 05 15 42 | 4762540 | 671147 | | √ | | Dioxin | |
| Pettit Flume - U/S | 05 02 185 | 4766739 | 672260 | √ | | √ | Dioxin | √ |
| Pettit Flume - Site B | 05 02 186 | 4766806 | 672236 | √ | | √ | Dioxin | √ |
| Pettit Flume - D/S | 05 02 187 | 4766795 | 672170 | √ | | √ | Dioxin | √ |
| Fisherman's Park - U/S | 05 02 01 | 4767294 | 671992 | | | √ | Dioxin | √ |
| Fishermans's Park - D/S | 05 02 02 | 4767371 | 671979 | | | √ | Dioxin | √ |
| Gratwick Riverside Park (GRP) - U/S of Marina | 05 02 213 | 4768157 | 671730 | | √ | | | √ |
| Gratwick Riverside Park - U/S - in Marina | 05 02 122 | 4768307 | 671761 | | √ | | | √ |
| Gratwick Riverside Park - U/S | 05 02 31 | 4768285 | 671655 | | √ | | | √ |
| Gratwick Riverside Park - mid stn | 05 02 214 | 4768683 | 671282 | | √ | | | √ |
| Gratwick Riverside Park - D/S | 05 02 199 | 4769277 | 670593 | | √ | | | √ |
| 102nd Street Upstream site (at outfall) | 05 02 215 | 4770806 | 667256 | | √ | | | √ |
| Little Niagara River (LNR) (D/S 102nd St. waste site) | 05 02 095 | 4771208 | 666639 | | √ | | | √ |
| Cayuga Creek | 05 15 31 | 4771997 | 665978 | | √ | | | √ |
| LNR (D/S Cayuga Creek) | 05 02 96 | 4771057 | 665523 | | √ | | | √ |
| U/S of Occidental Chem. Co. | 05 02 97 | 4770936 | 662808 | √ | √ | | | √ |
| D/S of Storm Sewer (A) | 05 02 46 | 4770825 | 662238 | √ | | | | √ |
| D/S of Storm Sewer (B) | 05 02 94 | 4771020 | 662329 | √ | | | | √ |
| D/S of Storm Sewer (C) | 05 02 43 | 4770883 | 662101 | √ | | | | √ |
| Occidental 003 | 05 02 42 | 4771074 | 662219 | √ | √ | | | √ |
| Niagara River - U/S Gill Creek | 05 02 98 | 4771388 | 661048 | √ | | | | √ |
| Gill Creek - Mouth | 05 02 37 | 4771395 | 660686 | √ | √ | | | √ |
| Bloody Run Creek (BRC) - "New" U/S | 11 02 0026 | 4777883 | 659105 | | | | Dioxin | |
| Bloody Run Creek - U/S | 11 02 0018 | 4777914 | 659122 | √ | | √ | Dioxin | √ |
| BRC: 27 m D/S of station 18 | 11 02 0027 | 4777908 | 659127 | | | | Dioxin | |
| BRC: 25M U/S of stn. 132 | 11 02 0028 | 4777940 | 659144 | | | | Dioxin | |
| BRC: Btwn stn 132 and stn 17 | 11 02 0030 | 4777965 | 659169 | | | | Dioxin | |
| BRC: on shore 10m E of Stn 0017 | 11 02 0029 | 4777978 | 659186 | | | | Dioxin | |
| Bloody Run Creek | 11 02 0017 | 4777974 | 659171 | √ | | √ | | |
| Bloody Run Creek | 11 02 0131 | 4777962 | 659155 | √ | | √ | | |
| Bloody Run Creek | 11 02 0132 | 4777965 | 659160 | √ | | √ | Dioxin | √ |
| Bloody Run Creek - "New" D/S 18 m U/S stn 25 | 11 02 0031 | 4777993 | 659191 | | | | Dioxin | |
| Bloody Run Creek - D/S | 11 02 0025 | 4778024 | 659199 | √ | | √ | Dioxin | √ |

## Appendix B

**2015 Niagara River Biomonitoring**
**Field Water Quality Measurements**

Sonde = YSI 600 QS

*Dissolved oxygen sensor calibrated before every measurement*

*Conductivity values are temperature compensated, except where noted*

| Station Name | Station # | Depth (m) | Date | Cond. (µs/cm) (uncompensated) | Cond. (µs/cm) (Temp. compensated to 25°C) | Temp. (°C) | DO (%) | DO (mg/L) |
|---|---|---|---|---|---|---|---|---|
| Fisherman's Park U/S | 05 02 0001 | 0.9 | 07-Jul-15 | 267 | 285.96 | 21.5 | 102 | 9.0 |
| | | | 28-Jul-15 | 277 | 284.57 | 23.6 | 80.4 | 6.9 |
| Fisherman's Park D/S | 05 02 0002 | 0.9 | 07-Jul-15 | 271 | 294.50 | 20.8 | 87.8 | 7.8 |
| | | | 28-Jul-15 | 283 | 290.73 | 23.6 | 71.4 | 6.1 |
| Pettit Flume U/S | 05 02 0185 | 1.2 | 07-Jul-15 | 260 | 281.97 | 20.9 | 98.3 | ---- |
| | | | 28-Jul-15 | 278 | 282.29 | 24.2 | 97.7 | ---- |
| Pettit Flume D/S | 05 02 0187 | 0.6 | 07-Jul-15 | 263 | 284.63 | 21.0 | 97.3 | ---- |
| | | | 28-Jul-15 | 279 | 282.22 | 24.4 | 100.8 | 8.4 |
| Pettit Flume (Outer Site B) | 05 02 0186 | 1.0 | 07-Jul-15 | 506 | 542.05 | 21.5 | 93.9 | 8.3 |
| | | | 28-Jul-15 | 484 | 501.14 | 23.2 | 112.6 | 9.6 |
| Two Mile Creek (mouth) | 05 02 0197 | 0.9 | 07-Jul-15 | 1570 | 1609.76 | 23.7 | 88.8 | 7.5 |
| | | | 28-Jul-15 | 1312 | 1319.52 | 24.7 | 64.6 | 5.4 |
| Two Mile Creek (near Hwy 290) | 05 15 0042 | 0.5 | 07-Jul-15 | 1512 | 1517.77 | 24.8 | >190 | ---- |
| | | | 28-Jul-15 | 965 | 934.81 | 26.7 | 107.3 | 8.6 |
| Two Mile Creek (near Sheridan) | 05 15 0036 | 0.5 | 07-Jul-15 | 1803 | 1687.57 | 28.6 | 200? | ---- |
| | | | 28-Jul-15 | 1969 | 1785.78 | 30.4 | 164.1? | 12.3 |
| Rattlesnake Creek | 05 15 0038 | 0.2 | 07-Jul-15 | 1704 | 1810.65 | 21.9 | 61.3 | 5.4 |
| | | | 28-Jul-15 | 2020 | 2023.85 | 24.9 | 20.2 | 1.7 |
| Gratwick Riverside Park U/S | 05 02 0031 | 0.8 | 08-Jul-15 | 267 | 291.96 | 20.5 | 96.8 | 8.7 |
| | | | 29-Jul-15 | 282 | 286.91 | 24.1 | 98.3 | 8.3 |
| GRP (upstream of marina) | 05 02 0213 | 1.2 | 08-Jul-15 | 266 | 290.87 | 20.5 | 99.3 | 8.9 |
| | | | 29-Jul-15 | 281 | 286.44 | 24.0 | 107.8 | 9.1 |
| U/S GRP in Marina | 05 02 0122 | 1.7 | 08-Jul-15 | 299 | 321.61 | 21.3 | 84.8 | 7.5 |
| | | | 29-Jul-15 | *Not measured.* | | | | |
| GRP middle of the park | 05 02 0214 | 0.9 | 08-Jul-15 | 271 | 290.90 | 21.4 | 101.9 | 9.0 |
| | | | 29-Jul-15 | 285 | 288.29 | 24.4 | 124.6 | 10.4 |
| GRP D/S | 05 02 0199 | 0.6 | 08-Jul-15 | 279 | 299.48 | 21.4 | 114 | 10.1 |
| | | | 29-Jul-15 | 286 | 286.54 | 24.9 | 120.3 | 10.0 |
| 102nd St. U/S | 05 02 0093 | 0.6 | 08-Jul-15 | 299 | 315.80 | 22.2 | 154 | 13.5 |
| | | | 29-Jul-15 | 293 | 289.15 | 25.7 | 137 | 11.2 |
| Outfall U/S end of 102nd St. | 05 02 0215 | 0.4 | 08-Jul-15 | 541 | 645.20 | 16.5 | 76.9 | 7.5 |
| | | | 29-Jul-15 | 354 | 368.71 | 22.9 | 90.6 | 7.8 |
| Little Niagara River (near 102nd St.) | 05 02 0095 | 0.8 | 08-Jul-15 | 299 | 312.66 | 22.7 | 160 | 13.9 |
| | | | 29-Jul-15 | 298 | 289.74 | 26.5 | 152 | 12.2 |
| Little Niagara River (D/S Cayuga Crk.) | 05 02 0096 | 0.7 | 08-Jul-15 | 345 | 364.39 | 22.2 | 126 | 11.0 |
| | | | 29-Jul-15 | *Not measured.* | | | | |
| Cayuga Crk. (within Crk.) | 05 15 0031 | 0.8 | 08-Jul-15 | 1194 | 1253.54 | 22.5 | 53.7 | 4.6 |
| | | | 29-Jul-15 | 593 | 573.39 | 26.8 | 70.9 | 5.7 |

## 2015 Niagara River Biomonitoring

**Field Water Quality Measurements continued**

| Station Name | Station # | Depth (m) | Date | Cond. (µs/cm) (uncompensated) | Cond. (µs/cm) (Temp. compensated to 25°C) | Temp. (°C) | DO (%) | DO (mg/L) |
|---|---|---|---|---|---|---|---|---|
| U/S of Occidental | 05 02 0097 | 0.7 | 09-Jul-15 | 267 | 293.79 | 20.2 | 88.5 | 8.0 |
| | | | 30-Jul-15 | 296 | 298.27 | 24.6 | 96.4 | 8.0 |
| Occidental D/S Storm Sewer A | 05 02 0046 | 0.5 | 09-Jul-15 | 264 | 289.89 | 20.3 | 88.2 | 8.0 |
| | | | 30-Jul-15 | 291 | 292.11 | 24.8 | 98.3 | 8.2 |
| Occidental D/S Storm Sewer B | 05 02 0094 | 0.5 | 09-Jul-15 | 263 | 290.00 | 20.1 | 88.9 | 8.0 |
| | | | 30-Jul-15 | 291 | 293.23 | 24.6 | 96.6 | 8.0 |
| Occidental D/S Storm Sewer C | 05 02 0044 | 0.5 | 09-Jul-15 | 261 | 288.40 | 20.0 | 91 | 8.2 |
| | | | 30-Jul-15 | 290 | 292.22 | 24.6 | 97.1 | 8.1 |
| Occidental Sewer 003 | 05 02 0042 | 0.6 | 09-Jul-15 | 320 | 345.61 | 21.1 | 88 | 7.8 |
| | | | 30-Jul-15 | 298 | 298.00 | 25.0 | 102 | 8.4 |
| 350 m U/S Gill Creek mouth (in the Niagara River) | 05 02 0098 | 0.5 | 09-Jul-15 | 248 | 275.77 | 19.7 | 95.1 | 8.7 |
| | | | 30-Jul-15 | 271 | 275.71 | 24.1 | 109.9 | 9.2 |
| Gill Creek (mouth) | 05 02 0037 | 1.5 | 09-Jul-15 | 266 | 293.92 | 20.0 | 92 | 8.4 |
| | | | 30-Jul-15 | 289 | 292.90 | 24.3 | 105.9 | 8.9 |
| Bloody Run Creek | 11 02 0017 | 0.7 | 10-Jul-15 | 244 | 274.22 | 19.2 | 120 | 11.1 |
| | | | 31-Jul-15 | Not measured. | | | | |
| Bloody Run Creek | 11 02 0132 | 0.7 | 10-Jul-15 | 244 | 274.81 | 19.1 | 119 | 11.0 |
| | | | 31-Jul-15 | *Not measured.* | | | | |
| Bloody Run Creek | 11 02 0131 | 0.7 | 10-Jul-15 | 246 | 277.65 | 19.0 | 115 | 10.7 |
| | | | 31-Jul-15 | Not measured. | | | | |
| Bloody Run Creek U/S | 11 02 0018 | 0.4 | 10-Jul-15 | 243 | 274.27 | 19.0 | 115 | 10.7 |
| | | | 31-Jul-15 | *Not measured. Found in correct location, but high and dry.* | | | | |
| Bloody Run Creek D/S | 11 02 0025 | 0.7 | 10-Jul-15 | 244 | 274.81 | 19.1 | 115.3 | 10.6 |
| | | | 31-Jul-15 | *Not measured.* | | | | |
| Fort Erie | 05 02 0203 | 0.8 | 10-Jul-15 | 247 | 272.36 | 20.1 | 128 | 11.8 |
| | | | 31-Jul-15 | 260 | 268.15 | 23.4 | 142.7 | 12.15 |
| Ushers Creek | 05 15 0006 | 0.7 | 10-Jul-15 | 249 | 278.06 | 19.5 | 108 | 10.0 |
| | | | 31-Jul-15 | 269 | 274.21 | 24.0 | 127.9 | 10.8 |
| Chippawa Channel | 05 02 0051 | 0.7 | 10-Jul-15 | 246 | 274.13 | 19.6 | 110 | 10.1 |
| | | | 31-Jul-15 | 265 | 272.77 | 23.5 | 118.3 | 10.1 |
| Niagara on the Lake | 11 02 0009 | 1.0 | 10-Jul-15 | 251 | 277.93 | 19.9 | 109 | 10.0 |
| | | | 31-Jul-15 | *Not measured.* | | | | |
| Balsam Lake Control | 18 01 0001 | 1.6 | 13-Jul-15 | 136 | 138.10 | 24.2 | 98 | 8.2 |
| | | | 04-Aug-15 | 119 | 125.94 | 22.1 | 92.2 | 8.0 |

## Appendix Table C: 2015 Niagara River Biomonitoring

### Mussel Weights

| Station Name | Station # | Deployed | Retrieved | GL15XXXX | # Mussels | Wet Weight (g, tared) | Dry Weight (g, tared) | percent dry | percent water |
|---|---|---|---|---|---|---|---|---|---|
| Fisherman's Park (U/S) | 1 | 07-Jul-15 | 28-JUL-2015 | 1089 | 4 | 22.74 | 0 | | |
| Fisherman's Park (D/S) | 2 | 07-Jul-15 | 28-JUL-2015 | 1090 | 4 | 25.81 | 0 | | |
| Pettit Flume (U/S) | 185 | 07-Jul-15 | 28-JUL-2015 | 1091 | 1 | 5.65 | 0 | | |
| Pettit Flume (U/S) | 185 | 07-Jul-15 | 28-JUL-2015 | 1092 | 1 | 5.81 | 0 | | |
| Pettit Flume (U/S) | 185 | 07-Jul-15 | 28-JUL-2015 | 1093 | 1 | 6.3 | 0 | | |
| Pettit Flume (U/S) | 185 | 07-Jul-15 | 28-JUL-2015 | 1094 | 4 | 26.7 | 0 | | |
| Pettit Flume (D/S) | 187 | 07-Jul-15 | 28-JUL-2015 | 1095 | 1 | 6.08 | 0 | | |
| Pettit Flume (D/S) | 187 | 07-Jul-15 | 28-JUL-2015 | 1096 | 1 | 6.08 | 0 | | |
| Pettit Flume (D/S) | 187 | 07-Jul-15 | 28-JUL-2015 | 1097 | 1 | 5.88 | 0 | | |
| Pettit Flume (D/S) | 187 | 07-Jul-15 | 28-JUL-2015 | 1098 | 4 | 28.23 | 0 | | |
| Pettit Flume Cove | 186 | 07-Jul-15 | 28-JUL-2015 | 1099 | 1 | 6.28 | 0 | | |
| Pettit Flume Cove | 186 | 07-Jul-15 | 28-JUL-2015 | 1100 | 1 | 8.27 | 0 | | |
| Pettit Flume Cove | 186 | 07-Jul-15 | 28-JUL-2015 | 1101 | 1 | 9.84 | 0 | | |
| Pettit Flume Cove | 186 | 07-Jul-15 | 28-JUL-2015 | 1102 | 4 | 30.89 | 0 | | |
| Two Mile Creek (mouth) | 197 | 07-Jul-15 | 28-JUL-2015 | 1103 | 1 | 5.44 | 0 | | |
| Two Mile Creek (mouth) | 197 | 07-Jul-15 | 28-JUL-2015 | 1104 | 1 | 8.16 | 0 | | |
| Two Mile Creek (mouth) | 197 | 07-Jul-15 | 28-JUL-2015 | 1105 | 1 | 6.82 | 0 | | |
| Two Mile Creek (mouth) | 197 | 07-Jul-15 | 28-JUL-2015 | 1106 | 6 | 44.86 | 6.43 | 14 | 86 |
| Two Mile Creek (mouth) | 197 | 07-Jul-15 | 28-JUL-2015 | 1107 | 6 | 45.83 | 6.29 | 14 | 86 |
| Two Mile Creek (mouth) | 197 | 07-Jul-15 | 28-JUL-2015 | 1108 | 6 | 44.26 | 6.78 | 15 | 85 |
| Rattlesnake Creek | 38 | 07-Jul-15 | 28-JUL-2015 | 1109 | 6 | 41.33 | 6.38 | 15 | 85 |
| Rattlesnake Creek | 38 | 07-Jul-15 | 28-JUL-2015 | 1110 | 6 | 39.88 | 5.91 | 15 | 85 |
| Rattlesnake Creek | 38 | 07-Jul-15 | 28-JUL-2015 | 1111 | 6 | 38.07 | 5.50 | 14 | 86 |
| Two Mile Creek (N of Hwy 290) | 42 | 07-Jul-15 | 28-JUL-2015 | 1112 | 6 | 40.93 | 5.35 | 13 | 87 |
| Two Mile Creek (N of Hwy 290) | 42 | 08-Jul-15 | 29-JUL-2015 | 1113 | 6 | 43.25 | 6.44 | 15 | 85 |
| Two Mile Creek (N of Hwy 290) | 42 | 08-Jul-15 | 29-JUL-2015 | 1114 | 6 | 45.35 | 6.61 | 15 | 85 |
| Two Mile Creek (Sheridan Rd) | 36 | 08-Jul-15 | 29-JUL-2015 | 1115 | 6 | 37.22 | 5.00 | 13 | 87 |
| Two Mile Creek (Sheridan Rd) | 36 | 08-Jul-15 | 29-JUL-2015 | 1116 | 6 | 35.38 | 5.02 | 14 | 86 |
| Two Mile Creek (Sheridan Rd) | 36 | 08-Jul-15 | 29-JUL-2015 | 1117 | 6 | 38.59 | 5.26 | 14 | 86 |
| Gratwick Riverside Park (GRP) (U/S) | 31 | 08-Jul-15 | 29-JUL-2015 | 1118 | 6 | 39.86 | 5.65 | 14 | 86 |
| Gratwick Riverside Park (GRP) (U/S) | 31 | 08-Jul-15 | 29-JUL-2015 | 1119 | 6 | 42.43 | 5.94 | 14 | 86 |
| Gratwick Riverside Park (GRP) (U/S) | 31 | 08-Jul-15 | 29-JUL-2015 | 1120 | 6 | 42.62 | 6.27 | 15 | 85 |
| GRP (U/S Marina) | 213 | 08-Jul-15 | 29-JUL-2015 | 1121 | 6 | 40.79 | 5.20 | 13 | 87 |
| GRP (U/S Marina) | 213 | 08-Jul-15 | 29-JUL-2015 | 1122 | 6 | 38.39 | 5.02 | 13 | 87 |
| GRP (U/S Marina) | 213 | 08-Jul-15 | 29-JUL-2015 | 1123 | 6 | 38.56 | 4.89 | 13 | 87 |
| GRP (Marina) | 122 | 08-Jul-15 | 29-JUL-2015 | 1124 | 6 | 45.2 | 6.14 | 14 | 86 |
| GRP (Marina) | 122 | 08-Jul-15 | 29-JUL-2015 | 1125 | 6 | 46.05 | 6.83 | 15 | 85 |
| GRP (Marina) | 122 | 08-Jul-15 | 29-JUL-2015 | 1126 | 6 | 49.59 | 7.57 | 15 | 85 |
| GRP (Mid Park) | 214 | 08-Jul-15 | 29-JUL-2015 | 1127 | 6 | 43.66 | 6.08 | 14 | 86 |
| GRP (Mid Park) | 214 | 08-Jul-15 | 29-JUL-2015 | 1128 | 6 | 45.83 | 6.02 | 13 | 87 |
| GRP (Mid Park) | 214 | 08-Jul-15 | 29-JUL-2015 | 1129 | 6 | 43.66 | 5.03 | 12 | 88 |
| GRP (D/S) | 199 | 08-Jul-15 | 29-JUL-2015 | 1130 | 6 | 41.53 | 5.44 | 13 | 87 |
| GRP (D/S) | 199 | 08-Jul-15 | 29-JUL-2015 | 1131 | 6 | 40.85 | 6.04 | 15 | 85 |
| GRP (D/S) | 199 | 08-Jul-15 | 29-JUL-2015 | 1132 | 4 | 26.72 | 3.51 | 13 | 87 |
| 102nd St. (U/S) | 93 | 08-Jul-15 | 29-JUL-2015 | 1133 | 6 | 48.13 | 5.82 | 12 | 88 |
| 102nd St. (U/S) | 93 | 08-Jul-15 | 29-JUL-2015 | 1134 | 6 | 45.82 | 5.79 | 13 | 87 |
| 102nd St. (U/S) | 93 | 08-Jul-15 | 29-JUL-2015 | 1135 | 6 | 41.48 | 5.69 | 14 | 86 |
| 102 nd St (@outfall U/S of landfill) | 215 | 08-Jul-15 | 29-JUL-2015 | 1136 | 1 | 6.68 | 0 | | |
| 102 nd St (@outfall U/S of landfill) | 215 | 08-Jul-15 | 29-JUL-2015 | 1137 | 1 | 5.77 | 0 | | |
| 102 nd St (@outfall U/S of landfill) | 215 | 08-Jul-15 | 29-JUL-2015 | 1138 | 1 | 6.66 | 0 | | |
| Little Niagara River (LNR) (D/S 102nd St.) | 95 | 08-Jul-15 | 29-JUL-2015 | 1139 | 6 | 46.85 | 6.16 | 13 | 87 |
| Little Niagara River (LNR) (D/S 102nd St.) | 95 | 08-Jul-15 | 29-JUL-2015 | 1140 | 6 | 39.71 | 5.45 | 14 | 86 |
| Little Niagara River (LNR) (D/S 102nd St.) | 95 | 08-Jul-15 | 29-JUL-2015 | 1141 | 6 | 40.45 | 5.87 | 15 | 85 |
| LNR D/S Cayuga Creek | 96 | 08-Jul-15 | 29-JUL-2015 | 1142 | 6 | 41.76 | 6.34 | 15 | 85 |
| LNR D/S Cayuga Creek | 96 | 09-Jul-15 | 30-JUL-2015 | 1143 | 6 | 44.85 | 6.91 | 15 | 85 |
| LNR D/S Cayuga Creek | 96 | 09-Jul-15 | 30-JUL-2015 | 1144 | 6 | MISSING | 6.15 | | |
| Cayuga Creek | 31 | 09-Jul-15 | 30-JUL-2015 | 1145 | 6 | 45.18 | 6.98 | 15 | 85 |
| Cayuga Creek | 31 | 09-Jul-15 | 30-JUL-2015 | 1146 | 6 | 44.61 | 6.76 | 15 | 85 |
| Cayuga Creek | 31 | 09-Jul-15 | 30-JUL-2015 | 1147 | 6 | 45.13 | 6.70 | 15 | 85 |

## Appendix Table C: 2015 Niagara River Biomonitoring

**Mussel Weights: Continued**

| Station Name | Station # | Deployed | Retrieved | GL15XXXX | # Mussels | Wet Weight (g, tared) | Dry Weight (g, tared) | percent dry | percent water |
|---|---|---|---|---|---|---|---|---|---|
| U/S Occidental Chem. | 97 | 09-Jul-15 | 30-JUL-2015 | 1148 | 6 | 41.63 | 6.04 | 15 | 85 |
| U/S Occidental Chem. | 97 | 09-Jul-15 | 30-JUL-2015 | 1149 | 6 | 38.72 | 4.92 | 13 | 87 |
| U/S Occidental Chem. | 97 | 09-Jul-15 | 30-JUL-2015 | 1150 | 6 | 42.77 | 5.22 | 12 | 88 |
| U/S Occidental Chem. | 97 | 09-Jul-15 | 30-JUL-2015 | 1151 | 1 | 7.52 | 0 | | |
| U/S Occidental Chem. | 97 | 09-Jul-15 | 30-JUL-2015 | 1152 | 1 | 8.84 | 0 | | |
| U/S Occidental Chem. | 97 | 09-Jul-15 | 30-JUL-2015 | 1153 | 1 | 5.17 | 0 | | |
| Storm Sewer A (D/S) | 46 | 09-Jul-15 | 30-JUL-2015 | 1154 | 1 | 5.78 | 0 | | |
| Storm Sewer A (D/S) | 46 | 09-Jul-15 | 30-JUL-2015 | 1155 | 1 | 7.82 | 0 | | |
| Storm Sewer A (D/S) | 46 | 09-Jul-15 | 30-JUL-2015 | 1156 | 1 | 7.27 | 0 | | |
| Storm Sewer B (D/S) | 94 | 09-Jul-15 | 30-JUL-2015 | 1157 | 1 | 5.76 | 0 | | |
| Storm Sewer B (D/S) | 94 | 09-Jul-15 | 30-JUL-2015 | 1158 | 1 | 6.12 | 0 | | |
| Storm Sewer B (D/S) | 94 | 09-Jul-15 | 30-JUL-2015 | 1159 | 1 | 7.03 | 0 | | |
| Storm Sewer C (D/S) | 44 | 09-Jul-15 | 30-JUL-2015 | 1160 | 1 | 7.09 | 0 | | |
| Storm Sewer C (D/S) | 44 | 09-Jul-15 | 30-JUL-2015 | 1161 | 1 | 6.58 | 0 | | |
| Storm Sewer C (D/S) | 44 | 09-Jul-15 | 30-JUL-2015 | 1162 | 1 | 5.81 | 0 | | |
| OCC 003 | 42 | 09-Jul-15 | 30-JUL-2015 | 1163 | 6 | 37.12 | 6.10 | 16 | 84 |
| OCC 003 | 42 | 09-Jul-15 | 30-JUL-2015 | 1164 | 6 | 38.62 | 6.01 | 16 | 84 |
| OCC 003 | 42 | 09-Jul-15 | 30-JUL-2015 | 1165 | 6 | 34.53 | 5.77 | 17 | 83 |
| OCC 003 | 42 | 09-Jul-15 | 30-JUL-2015 | 1166 | 1 | 6.6 | 0 | | |
| OCC 003 | 42 | 09-Jul-15 | 30-JUL-2015 | 1167 | 1 | 6.41 | 0 | | |
| OCC 003 | 42 | 09-Jul-15 | 30-JUL-2015 | 1168 | 1 | 6.26 | 0 | | |
| Gill Creek (U/S mouth) | 98 | 09-Jul-15 | 30-JUL-2015 | 1169 | 1 | 7.51 | 0 | | |
| Gill Creek (U/S mouth) | 98 | 09-Jul-15 | 30-JUL-2015 | 1170 | 1 | 5.76 | 0 | | |
| Gill Creek (U/S mouth) | 98 | 09-Jul-15 | 30-JUL-2015 | 1171 | 1 | 6.56 | 0 | | |
| Gill Creek (mouth) | 37 | 09-Jul-15 | 30-JUL-2015 | 1172 | 6 | 40.62 | 5.32 | 13 | 87 |
| Gill Creek (mouth) | 37 | 10-Jul-15 | 31-JUL-2015 | 1173 | 6 | 37.99 | 5.10 | 13 | 87 |
| Gill Creek (mouth) | 37 | 10-Jul-15 | 31-JUL-2015 | 1174 | 6 | 41.81 | 5.87 | 14 | 86 |
| Gill Creek (mouth) | 37 | 10-Jul-15 | 31-JUL-2015 | 1175 | 1 | 5.91 | 0 | | |
| Gill Creek (mouth) | 37 | 10-Jul-15 | 31-JUL-2015 | 1176 | 1 | 6.19 | 0 | | |
| Gill Creek (mouth) | 37 | 10-Jul-15 | 31-JUL-2015 | 1177 | 1 | 7.93 | 0 | | |
| Bloody Run Creek (BRC) D/S | 25 | 10-Jul-15 | 31-JUL-2015 | 1178 | 1 | 5.18 | 0 | | |
| Bloody Run Creek (BRC) D/S | 25 | 10-Jul-15 | 31-JUL-2015 | 1179 | 1 | 6.41 | 0 | | |
| Bloody Run Creek (BRC) D/S | 25 | 10-Jul-15 | 31-JUL-2015 | 1180 | 1 | 6.7 | 0 | | |
| Bloody Run Creek (BRC) D/S | 25 | 10-Jul-15 | 31-JUL-2015 | 1181 | 4 | 28.68 | 0 | | |
| Bloody Run Creek | 17 | 10-Jul-15 | 31-JUL-2015 | 1182 | 1 | 6.73 | 0 | | |
| Bloody Run Creek | 17 | 10-Jul-15 | 31-JUL-2015 | 1183 | 1 | 6.91 | 0 | | |
| Bloody Run Creek | 17 | 10-Jul-15 | 31-JUL-2015 | 1184 | 1 | 6.4 | 0 | | |
| Bloody Run Creek | 17 | 10-Jul-15 | 31-JUL-2015 | 1185 | 4 | 30.13 | 0 | | |
| BRC (7TH + 8TH POBT FROM S) | 131 | 10-Jul-15 | 31-JUL-2015 | 1186 | 1 | 7.68 | 0 | | |
| BRC (7TH + 8TH POBT FROM S) | 131 | 10-Jul-15 | 31-JUL-2015 | 1187 | 1 | 5.88 | 0 | | |
| BRC (7TH + 8TH POBT FROM S) | 131 | 10-Jul-15 | 31-JUL-2015 | 1188 | 1 | 6.82 | 0 | | |
| BRC (7TH + 8TH POBT FROM S) | 131 | 10-Jul-15 | 31-JUL-2015 | 1189 | 4 | 25.31 | 0 | | |
| BRC (U/S) | 18 | 10-Jul-15 | 31-JUL-2015 | 1233 | 1 | 6.12 | 0 | | |
| BRC (U/S) | 18 | 10-Jul-15 | 31-JUL-2015 | 1234 | 1 | 6.02 | 0 | | |
| BRC (U/S) | 18 | 10-Jul-15 | 31-JUL-2015 | 1235 | 1 | 6.48 | 0 | | |
| BRC (U/S) | 18 | 10-Jul-15 | 31-JUL-2015 | 1236 | 4 | 25.54 | 0 | | |
| BRC (4th_5th pole) U/S stn 131 | 132 | 10-Jul-15 | 31-JUL-2015 | 1237 | 1 | 8.63 | 0 | | |
| BRC (4th_5th pole) U/S stn 131 | 132 | 10-Jul-15 | 31-JUL-2015 | 1238 | 1 | 6.79 | 0 | | |
| BRC (4th_5th pole) U/S stn 131 | 132 | 10-Jul-15 | 31-JUL-2015 | 1239 | 1 | 7.61 | 0 | | |
| BRC (4th_5th pole) U/S stn 131 | 132 | 10-Jul-15 | 31-JUL-2015 | 1240 | 4 | 29.77 | 0 | | |
| Fort Erie | 203 | 10-Jul-15 | 31-JUL-2015 | 1241 | 1 | 6.31 | 0 | | |
| Fort Erie | 203 | 10-Jul-15 | 31-JUL-2015 | 1242 | 1 | 7.74 | 0 | | |
| Fort Erie | 203 | 10-Jul-15 | 31-JUL-2015 | 1243 | 1 | 6.34 | 0 | | |
| Fort Erie | 203 | 10-Jul-15 | 31-JUL-2015 | 1244 | 6 | 42.19 | 6.62 | 16 | 84 |
| Fort Erie | 203 | 10-Jul-15 | 31-JUL-2015 | 1245 | 6 | 43.98 | 6.25 | 14 | 86 |
| Fort Erie | 203 | 10-Jul-15 | 31-JUL-2015 | 1246 | 6 | 49.9 | 6.73 | 13 | 87 |
| NOTL | 9 | 10-Jul-15 | 31-JUL-2015 | 1247 | 1 | 8.74 | 0 | | |
| NOTL | 9 | 10-Jul-15 | 31-JUL-2015 | 1248 | 1 | 6.33 | 0 | | |
| NOTL | 9 | 10-Jul-15 | 31-JUL-2015 | 1249 | 1 | 7.33 | 0 | | |
| NOTL | 9 | 10-Jul-15 | 31-JUL-2015 | 1250 | 6 | 45.84 | 6.27 | 14 | 86 |
| NOTL | 9 | 10-Jul-15 | 31-JUL-2015 | 1251 | 6 | 38.76 | 5.73 | 15 | 85 |
| NOTL | 9 | 10-Jul-15 | 31-JUL-2015 | 1252 | 6 | 41.24 | 5.93 | 14 | 86 |
| Balsam Lake Control | 1 | | 10-Jul-15 | 1253 | 1 | 7.85 | 0 | | |
| Balsam Lake Control | 1 | | 10-Jul-15 | 1254 | 1 | 7.97 | 0 | | |
| Balsam Lake Control | 1 | | 10-Jul-15 | 1255 | 1 | 8.27 | 0 | | |
| Balsam Lake Control | 1 | | 10-Jul-15 | 1256 | 6 | 42.18 | 5.43 | 13 | 87 |
| Balsam Lake Control | 1 | | 10-Jul-15 | 1257 | 6 | 43.52 | 5.73 | 13 | 87 |
| Balsam Lake Control | 1 | | 10-Jul-15 | 1258 | 6 | 47.16 | 5.58 | 12 | 88 |
| Balsam Lake Control | 1 | | 10-Jul-15 | 1259 | 1 | 8.67 | 0 | | |
| Balsam Lake Control | 1 | | 10-Jul-15 | 1260 | 1 | 7.9 | 0 | | |

Appendix D1: Tissue concentrations (ng/g wet wt.) of organic compounds in caged mussels, Niagara River, 2015. <W= no measurable response; <T= measurable trace amount;
PS1=PCB resembled mixture of Aroclor 1248,1254,1260; PS40= resemble Aroclor 1254 AND 1260; MCP= max poss. Conc'n due to chromatographic overlap

| Station Description | BOW | Stn type | Stn No | Samp No | Retrieval Date | Lipid | cis-nonachlor | DDT & Metabolites | | Aldrin | a-BHC (hexachlorocyclo-hexane) | b-BHC (hexachlorocyclo-hexane) | | g-BHC (hexachlorocyclo-hexane) | a-Chlordane | g-Chlordane | Heptachlor | Mirex | Oxychlordane |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % | ng/g wet | ng/g wet | | ng/g wet | ng/g wet | ng/g wet | | ng/g wet | ng/g wet | ng/g wet | ng/g wet | ng/g wet | ng/g wet |
| | | | | | | | <=W | <=W | | <=W | <=W | <=W | | <=W | <=W | <=W | <=W | <=W | <=W |
| | | | | | | | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| **American Sites** | | | | | | | | | | | | | | | | | | | |
| Two Mile Creek (mouth) | 5 | 2 | 197 | GL151103 | 28-JUL-2015 | 0.96 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Two Mile Creek (mouth) | 5 | 2 | 197 | GL151104 | 28-JUL-2015 | 1.1 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Two Mile Creek (mouth) | 5 | 2 | 197 | GL151105 | 28-JUL-2015 | 1.1 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Pettit Flume (U/S) | 5 | 2 | 185 | GL151091 | 28-JUL-2015 | 0.84 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Pettit Flume (U/S) | 5 | 2 | 185 | GL151092 | 28-JUL-2015 | 0.92 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Pettit Flume (U/S) | 5 | 2 | 185 | GL151093 | 28-JUL-2015 | 0.9 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Pettit Flume Cove | 5 | 2 | 186 | GL151099 | 28-JUL-2015 | 1.1 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Pettit Flume Cove | 5 | 2 | 186 | GL151100 | 28-JUL-2015 | 1.4 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Pettit Flume Cove | 5 | 2 | 186 | GL151101 | 28-JUL-2015 | 0.87 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Pettit Flume (D/S) | 5 | 2 | 187 | GL151095 | 28-JUL-2015 | 0.99 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Pettit Flume (D/S) | 5 | 2 | 187 | GL151096 | 28-JUL-2015 | 0.83 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Pettit Flume (D/S) | 5 | 2 | 187 | GL151097 | 28-JUL-2015 | 0.91 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| 102 nd St (@outfall U/S of landfill) | 5 | 2 | 215 | GL151136 | 29-JUL-2015 | 1.1 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| 102 nd St (@outfall U/S of landfill) | 5 | 2 | 215 | GL151137 | 29-JUL-2015 | 1.1 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| 102 nd St (@outfall U/S of landfill) | 5 | 2 | 215 | GL151138 | 29-JUL-2015 | 0.91 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| U/S Occidental Chem. | 5 | 2 | 97 | GL151151 | 30-JUL-2015 | 0.78 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| U/S Occidental Chem. | 5 | 2 | 97 | GL151152 | 30-JUL-2015 | 0.66 | 2 | **3** | <T | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| U/S Occidental Chem. | 5 | 2 | 97 | GL151153 | 30-JUL-2015 | 0.88 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Storm Sewer A (D/S) | 5 | 2 | 46 | GL151154 | 30-JUL-2015 | 0.95 | 2 | **4** | <T | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Storm Sewer A (D/S) | 5 | 2 | 46 | GL151155 | 30-JUL-2015 | 0.79 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Storm Sewer A (D/S) | 5 | 2 | 46 | GL151156 | 30-JUL-2015 | 1 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Storm Sewer B (D/S) | 5 | 2 | 94 | GL151157 | 30-JUL-2015 | 0.98 | 2 | **3** | <T | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Storm Sewer B (D/S) | 5 | 2 | 94 | GL151158 | 30-JUL-2015 | 1.1 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Storm Sewer B (D/S) | 5 | 2 | 94 | GL151159 | 30-JUL-2015 | 1.1 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Storm Sewer C (D/S) | 5 | 2 | 44 | GL151160 | 30-JUL-2015 | 1.2 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Storm Sewer C (D/S) | 5 | 2 | 44 | GL151161 | 30-JUL-2015 | 0.84 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Storm Sewer C (D/S) | 5 | 2 | 44 | GL151162 | 30-JUL-2015 | 0.89 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| OCC 003 | 5 | 2 | 42 | GL151166 | 30-JUL-2015 | 0.82 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| OCC 003 | 5 | 2 | 42 | GL151167 | 30-JUL-2015 | 0.72 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| OCC 003 | 5 | 2 | 42 | GL151168 | 30-JUL-2015 | 0.9 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Gill Creek (U/S mouth) | 5 | 2 | 98 | GL151169 | 30-JUL-2015 | 0.79 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Gill Creek (U/S mouth) | 5 | 2 | 98 | GL151170 | 30-JUL-2015 | 1 | 2 | **3** | <T | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Gill Creek (U/S mouth) | 5 | 2 | 98 | GL151171 | 30-JUL-2015 | 1 | 2 | **3** | <T | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Gill Creek (mouth) | 5 | 2 | 37 | GL151175 | 31-JUL-2015 | 1.1 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Gill Creek (mouth) | 5 | 2 | 37 | GL151176 | 31-JUL-2015 | 0.99 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Gill Creek (mouth) | 5 | 2 | 37 | GL151177 | 31-JUL-2015 | 0.79 | 2 | 2 | | 1 | 1 | **2** | <T | 1 | 2 | 2 | 1 | 5 | 2 |
| BRC (U/S) | 11 | 2 | 18 | GL151233 | 31-JUL-2015 | 0.53 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| BRC (U/S) | 11 | 2 | 18 | GL151235 | 31-JUL-2015 | 0.66 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| BRC (U/S) | 11 | 2 | 18 | GL151235 | 31-JUL-2015 | 0.57 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| BRC (4th_5th pole) U/S stn 131 | 11 | 2 | 132 | GL151237 | 31-JUL-2015 | 0.58 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| BRC (4th_5th pole) U/S stn 131 | 11 | 2 | 132 | GL151238 | 31-JUL-2015 | 0.74 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| BRC (4th_5th pole) U/S stn 131 | 11 | 2 | 132 | GL151239 | 31-JUL-2015 | 0.65 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| BRC (7TH + 8TH POBT FROM S) | 11 | 2 | 131 | GL151186 | 31-JUL-2015 | 0.8 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| BRC (7TH + 8TH POBT FROM S) | 11 | 2 | 131 | GL151187 | 31-JUL-2015 | 1.2 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| BRC (7TH + 8TH POBT FROM S) | 11 | 2 | 131 | GL151188 | 31-JUL-2015 | 0.84 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Bloody Run Creek | 11 | 2 | 17 | GL151182 | 31-JUL-2015 | 0.92 | 2 | **4** | <T | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Bloody Run Creek | 11 | 2 | 17 | GL151183 | 31-JUL-2015 | 1.3 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Bloody Run Creek | 11 | 2 | 17 | GL151184 | 31-JUL-2015 | 1.2 | 2 | **4** | <T | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Bloody Run Creek (BRC) D/S | 11 | 2 | 25 | GL151178 | 31-JUL-2015 | 0.9 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Bloody Run Creek (BRC) D/S | 11 | 2 | 25 | GL151179 | 31-JUL-2015 | 0.72 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Bloody Run Creek (BRC) D/S | 11 | 2 | 25 | GL151180 | 31-JUL-2015 | 0.87 | 2 | **3** | <T | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| **Canadian Sites** | | | | | | | | | | | | | | | | | | | |
| Fort Erie | 11 | 2 | 203 | GL151241 | 31-JUL-2015 | 0.71 | 2 | **4** | <T | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Fort Erie | 11 | 2 | 203 | GL151241 | 31-JUL-2015 | 0.72 | 2 | **16** | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Fort Erie | 11 | 2 | 203 | GL151241 | 31-JUL-2015 | 0.62 | 2 | **3** | <T | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| NOTL | 11 | 2 | 9 | GL151247 | 31-JUL-2015 | 0.48 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| NOTL | 11 | 2 | 9 | GL151248 | 31-JUL-2015 | 0.8 | 2 | **3** | <T | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| NOTL | 11 | 2 | 9 | GL151249 | 31-JUL-2015 | 0.65 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Balsam Lake | 18 | 1 | 1 | GL151253 | 06-JUL-2015 | 0.89 | 2 | **4** | <T | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Balsam Lake | 18 | 1 | 1 | GL151254 | 06-JUL-2015 | 0.58 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Balsam Lake | 18 | 1 | 1 | GL151255 | 06-JUL-2015 | 0.74 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Balsam Lake | 18 | 1 | 1 | GL151259 | 06-JUL-2015 | 0.81 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |
| Balsam Lake | 18 | 1 | 1 | GL151260 | 06-JUL-2015 | 0.62 | 2 | 2 | | 1 | 1 | 1 | | 1 | 2 | 2 | 1 | 5 | 2 |

Appendix D1: Tissue concentrations (ng/g wet wt.) of organic compounds in caged mussels, Niagara River, 2015. <W= no measurable response; <T= measurable trace amount;
PS1=PCB resembled mixture of Aroclor 1248,1254,1260; PS40= resemble Aroclor 1254 AND 1260; MCP= max poss. Conc'n due to chromatographic overlap

| Station Description | op-DDT | Total PCB | | Photomirex | pp-DDD | pp-DDE | | pp-DDT | Toxaphene | Total Technical Chlordane | trans-nonachlor | Hexachloro-butadiene | | 1,2,3-trichlorobenzene | | 1,2,3,4-tetrachlorobenzene | | 1,2,3,5-tetrachlorobenzene | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ng/g wet | ng/g wet | | ng/g wet | ng/g wet | ng/g wet | | ng/g wet | ng/g wet | ng/g wet | ng/g wet | ng/g wet | | ng/g wet | | ng/g wet | | ng/g wet | |
| | <=W | <=W | | <=W | <=W | <=W | | <=W | <=W | <=W | <=W | <=W | | <=W | | <=W | | <=W | |
| | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| **American Sites** | | | | | | | | | | | | | | | | | | | |
| Two Mile Creek (mouth) | 5 | 88 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Two Mile Creek (mouth) | 5 | 100 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Two Mile Creek (mouth) | 5 | 110 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Pettit Flume (U/S) | 5 | 27 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Pettit Flume (U/S) | 5 | 29 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Pettit Flume (U/S) | 5 | 28 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Pettit Flume Cove | 5 | 43 | PS1 | 4 | 5 | 2 | <T | 5 | 50 | 2 | 2 | 1 | | 5 | <T | 12 | | 9 | MPC |
| Pettit Flume Cove | 5 | 45 | P40 | 4 | 5 | 2 | <T | 5 | 50 | 2 | 2 | 1 | | 5 | <T | 10 | | 6 | MPC |
| Pettit Flume Cove | 5 | 37 | P40 | 4 | 5 | 2 | <T | 5 | 50 | 2 | 2 | 1 | | 6 | <T | 12 | | 7 | MPC |
| Pettit Flume (D/S) | 5 | 40 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Pettit Flume (D/S) | 5 | 26 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Pettit Flume (D/S) | 5 | 24 | PS1 | 4 | 5 | 2 | <T | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| 102 nd St (@outfall U/S of landfill) | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| 102 nd St (@outfall U/S of landfill) | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| 102 nd St (@outfall U/S of landfill) | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| U/S Occidental Chem. | 5 | 23 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| U/S Occidental Chem. | 5 | 20 | | 4 | 5 | 3 | <T | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| U/S Occidental Chem. | 5 | 27 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Storm Sewer A (D/S) | 5 | 26 | PS1 | 4 | 5 | 4 | <T | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Storm Sewer A (D/S) | 5 | 26 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Storm Sewer A (D/S) | 5 | 27 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Storm Sewer B (D/S) | 5 | 31 | PS1 | 4 | 5 | 3 | <T | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Storm Sewer B (D/S) | 5 | 35 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Storm Sewer B (D/S) | 5 | 36 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Storm Sewer C (D/S) | 5 | 37 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Storm Sewer C (D/S) | 5 | 26 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Storm Sewer C (D/S) | 5 | 33 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| OCC 003 | 5 | 52 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 10 | | 2 | | 4 | <T | 1 | |
| OCC 003 | 5 | 40 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 8 | <T | 2 | | 6 | <T | 1 | |
| OCC 003 | 5 | 51 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 8 | <T | 2 | | 5 | <T | 1 | |
| Gill Creek (U/S mouth) | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Gill Creek (U/S mouth) | 5 | 20 | | 4 | 5 | 3 | <T | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Gill Creek (U/S mouth) | 5 | 20 | | 4 | 5 | 3 | <T | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Gill Creek (mouth) | 5 | 36 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 10 | | 2 | | 1 | | 1 | |
| Gill Creek (mouth) | 5 | 37 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 9 | <T | 2 | | 1 | | 1 | |
| Gill Creek (mouth) | 5 | 29 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 7 | <T | 2 | | 1 | | 1 | |
| BRC (U/S) | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| BRC (U/S) | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| BRC (U/S) | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| BRC (4th_5th pole) U/S stn 131 | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| BRC (4th_5th pole) U/S stn 131 | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| BRC (4th_5th pole) U/S stn 131 | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| BRC (7TH + 8TH POBT FROM S) | 5 | 23 | PS1 | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| BRC (7TH + 8TH POBT FROM S) | 5 | 30 | PS1 | 4 | 5 | 2 | <T | 5 | 50 | 2 | 2 | 2 | <T | 2 | | 2 | <T | 1 | |
| BRC (7TH + 8TH POBT FROM S) | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Bloody Run Creek | 5 | 20 | | 4 | 5 | 4 | <T | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Bloody Run Creek | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Bloody Run Creek | 5 | 27 | PS1 | 4 | 5 | 4 | <T | 5 | 50 | 2 | 2 | 2 | <T | 2 | | 1 | | 1 | |
| Bloody Run Creek (BRC) D/S | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Bloody Run Creek (BRC) D/S | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Bloody Run Creek (BRC) D/S | 5 | 20 | | 4 | 5 | 3 | <T | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| **Canadian Sites** | | | | | | | | | | | | | | | | | | | |
| Fort Erie | 5 | 20 | | 4 | 5 | 4 | <T | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Fort Erie | 5 | 20 | | 4 | 5 | 16 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Fort Erie | 5 | 20 | | 4 | 5 | 3 | <T | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| NOTL | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| NOTL | 5 | 20 | | 4 | 5 | 3 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| NOTL | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Balsam Lake | 5 | 20 | | 4 | 5 | 4 | <T | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Balsam Lake | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Balsam Lake | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Balsam Lake | 5 | 20 | | 4 | 5 | 1 | | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |
| Balsam Lake | 5 | 20 | | 4 | 5 | 2 | <T | 5 | 50 | 2 | 2 | 1 | | 2 | | 1 | | 1 | |

Appendix D1: Tissue concentrations (ng/g wet wt.) of organic compounds in caged mussels, Niagara River, 2015. <W= no measurable response; <T= measurable trace amount;
PS1=PCB resembled mixture of Aroclor 1248,1254,1260; PS40= resemble Aroclor 1254 AND 1260; MCP= max poss. Conc'n due to chromatographic overlap

| Station Description | 1,2,4-trichlorobenzene | | 1,2,4,5-tetrachlorobenzene | | 1,3,5-trichlorobenzene | Hexachlorobenzene | | Hexachloroethane | Octachlorostyrene | | Pentachlorobenzene | | 2,3,6-trichlorotoluene | | 2,4,5-trichlorotoluene | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ng/g wet | | ng/g wet | | ng/g wet | ng/g wet | | ng/g wet | ng/g wet | | ng/g wet | | ng/g wet | | ng/g wet | |
| | <=W | | <=W | | <=W | <=W | | <=W | <=W | | <=W | | <=W | | <=W | |
| | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| **American Sites** | | | | | | | | | | | | | | | | |
| Two Mile Creek (mouth) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Two Mile Creek (mouth) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Two Mile Creek (mouth) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Pettit Flume (U/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Pettit Flume (U/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Pettit Flume (U/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Pettit Flume Cove | 5 | <T | 9 | MPC | 2 | 26 | | 1 | 1 | | 17 | | 1 | | 1 | |
| Pettit Flume Cove | 5 | <T | 6 | MPC | 2 | 14 | | 1 | 1 | | 11 | | 1 | | 1 | |
| Pettit Flume Cove | 4 | <T | 7 | MPC | 2 | 21 | | 1 | 1 | | 15 | | 1 | | 1 | |
| Pettit Flume (D/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Pettit Flume (D/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Pettit Flume (D/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| 102 nd St (@outfall U/S of landfill) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| 102 nd St (@outfall U/S of landfill) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| 102 nd St (@outfall U/S of landfill) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| U/S Occidental Chem. | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| U/S Occidental Chem. | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| U/S Occidental Chem. | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Storm Sewer A (D/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Storm Sewer A (D/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Storm Sewer A (D/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Storm Sewer B (D/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Storm Sewer B (D/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Storm Sewer B (D/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Storm Sewer C (D/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Storm Sewer C (D/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Storm Sewer C (D/S) | 2 | | 1 | | 2 | 2 | <T | 1 | 1 | | 1 | | 1 | | 1 | |
| OCC 003 | 3 | <T | 1 | | 2 | 3 | <T | 1 | 1 | | 3 | <T | 5 | <T | 3 | <T |
| OCC 003 | 4 | <T | 1 | | 2 | 3 | <T | 1 | 1 | | 4 | <T | 5 | <T | 3 | <T |
| OCC 003 | 4 | <T | 1 | | 2 | 3 | <T | 1 | 1 | | 3 | <T | 4 | <T | 3 | <T |
| Gill Creek (U/S mouth) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Gill Creek (U/S mouth) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Gill Creek (U/S mouth) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Gill Creek (mouth) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Gill Creek (mouth) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Gill Creek (mouth) | 2 | | 1 | | 2 | 2 | <T | 1 | 1 | | 1 | | 1 | | 1 | |
| BRC (U/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| BRC (U/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| BRC (U/S) | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| BRC (4th_5th pole) U/S stn 131 | 2 | | 1 | | 2 | 8 | <T | 1 | 1 | | 5 | | 1 | | 2 | <T |
| BRC (4th_5th pole) U/S stn 131 | 2 | | 1 | | 2 | 5 | <T | 1 | 1 | | 3 | | 1 | | 1 | |
| BRC (4th_5th pole) U/S stn 131 | 2 | | 1 | | 2 | 7 | <T | 1 | 1 | | 3 | | 1 | | 2 | <T |
| BRC (7TH + 8TH POBT FROM S) | 2 | | 1 | | 2 | 11 | | 1 | 1 | | 7 | <T | 1 | | 1 | |
| BRC (7TH + 8TH POBT FROM S) | 2 | | 1 | | 2 | 36 | | 1 | 2 | <T | 28 | | 8 | MPC | 8 | MPC |
| BRC (7TH + 8TH POBT FROM S) | 2 | | 1 | | 2 | 12 | | 1 | 1 | | 11 | | 4 | MPC | 3 | <T |
| Bloody Run Creek | 2 | | 1 | | 2 | 7 | <T | 1 | 1 | | 3 | <T | 1 | | 1 | |
| Bloody Run Creek | 2 | | 1 | | 2 | 2 | <T | 1 | 1 | | 2 | <T | 2 | MPC | 2 | MPC |
| Bloody Run Creek | 2 | | 1 | | 2 | 22 | | 1 | 2 | <T | 16 | | 3 | MPC | 3 | MPC |
| Bloody Run Creek (BRC) D/S | 2 | | 1 | | 2 | 5 | <T | 1 | 1 | | 3 | <T | 2 | MPC | 1 | |
| Bloody Run Creek (BRC) D/S | 2 | | 1 | | 2 | 3 | <T | 1 | 1 | | 1 | | 1 | | 1 | |
| Bloody Run Creek (BRC) D/S | 2 | | 1 | | 2 | 5 | <T | 1 | 1 | | 2 | <T | 2 | MPC | 1 | |
| **Canadian Sites** | | | | | | | | | | | | | | | | |
| Fort Erie | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Fort Erie | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Fort Erie | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| NOTL | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| NOTL | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| NOTL | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Balsam Lake | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Balsam Lake | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Balsam Lake | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Balsam Lake | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |
| Balsam Lake | 2 | | 1 | | 2 | 1 | | 1 | 1 | | 1 | | 1 | | 1 | |

Appendix D2: Congener specific PCB tissue concentrations (ng/g **dry** wt.) in caged mussels, Niagara River, 2015. <MDL= method detection limit

| Station Description | BOW | Stn type | Station Number | Retrieval Date | Samp No | LIPID | P1PCBT | PCB018 | PCB019 | | PCB022 | | PCB033 | PCB044 | PCB049 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % | ng/g | ng/g | ng/g | | ng/g | | ng/g | ng/g | ng/g | |
| Two Mile Creek (mouth) | 5 | 2 | 197 | 28-JUL-2015 | GL151106 | 4.6 | 390 | 5 | 1 | | 2 | | 6 | 17 | 21 | |
| Two Mile Creek (mouth) | 5 | 2 | 197 | 28-JUL-2015 | GL151107 | 4.4 | 320 | 5 | 1 | | 2 | | 6 | 15 | 19 | |
| Two Mile Creek (mouth) | 5 | 2 | 197 | 28-JUL-2015 | GL151108 | 4.9 | 390 | 6 | 1 | <MDL | 3 | | 8 | 18 | 22 | |
| Rattlesnake Creek | 5 | 15 | 38 | 28-JUL-2015 | GL151109 | 4.8 | 570 | 23 | 7 | | 5 | | 23 | 48 | 53 | |
| Rattlesnake Creek | 5 | 15 | 38 | 28-JUL-2015 | GL151110 | 4.3 | 480 | 19 | 6 | | 4 | | 19 | 41 | 53 | |
| Rattlesnake Creek | 5 | 15 | 38 | 28-JUL-2015 | GL151111 | 4.2 | 450 | 18 | 6 | | 4 | | 17 | 36 | 40 | |
| Two Mile Creek (N of Hwy 290) | 5 | 15 | 42 | 28-JUL-2015 | GL151112 | 4.9 | 200 | 4 | 1 | <MDL | 1 | | 3 | 6 | 6 | |
| Two Mile Creek (N of Hwy 290) | 5 | 15 | 42 | 29-JUL-2015 | GL151113 | 5 | 190 | 4 | 1 | <MDL | 1 | | 3 | 6 | 7 | |
| Two Mile Creek (N of Hwy 290) | 5 | 15 | 42 | 29-JUL-2015 | GL151114 | 4.8 | 200 | 4 | 1 | <MDL | 1 | | 4 | 6 | 7 | |
| Two Mile Creek (Sheridan Rd) | 5 | 15 | 36 | 29-JUL-2015 | GL151115 | 4.5 | 80 | 4 | 1 | <MDL | 1 | | 3 | 3 | 2 | |
| Two Mile Creek (Sheridan Rd) | 5 | 15 | 36 | 29-JUL-2015 | GL151116 | 5.3 | 83 | 4 | 1 | <MDL | 1 | | 3 | 3 | 2 | |
| Two Mile Creek (Sheridan Rd) | 5 | 15 | 36 | 29-JUL-2015 | GL151117 | 4 | 30 | 2 | 1 | <MDL | 1 | | 1 | 2 | 1 | |
| Gratwick Riverside Park (GRP) (U/S) | 5 | 2 | 31 | 29-JUL-2015 | GL151118 | 4.5 | 220 | 9 | 2 | | 3 | | 6 | 12 | 20 | |
| Gratwick Riverside Park (GRP) (U/S) | 5 | 2 | 31 | 29-JUL-2015 | GL151119 | 3.9 | 230 | 8 | 2 | | 2 | | 6 | 11 | 20 | |
| Gratwick Riverside Park (GRP) (U/S) | 5 | 2 | 31 | 29-JUL-2015 | GL151120 | 4.2 | 210 | 9 | 1 | <MDL | 3 | | 8 | 12 | 17 | |
| GRP (U/S Marina) | 5 | 2 | 213 | 29-JUL-2015 | GL151121 | 3.8 | 980 | 34 | 6 | | 12 | | 27 | 58 | 87 | |
| GRP (U/S Marina) | 5 | 2 | 213 | 29-JUL-2015 | GL151122 | 3.2 | 600 | 19 | 3 | | 7 | | 16 | 36 | 55 | |
| GRP (U/S Marina) | 5 | 2 | 213 | 29-JUL-2015 | GL151123 | 4 | 780 | 23 | 3 | | 8 | | 19 | 44 | 70 | |
| GRP (Marina) | 5 | 2 | 122 | 29-JUL-2015 | GL151124 | 4.3 | 720 | 32 | 5 | | 9 | | 22 | 40 | 65 | |
| GRP (Marina) | 5 | 2 | 122 | 29-JUL-2015 | GL151125 | 5.3 | 1000 | 42 | 6 | | 14 | | 29 | 55 | 89 | |
| GRP (Marina) | 5 | 2 | 122 | 29-JUL-2015 | GL151126 | 5.1 | 1000 | 38 | 5 | | 14 | | 29 | 57 | 92 | |
| GRP (Mid Park) | 5 | 2 | 214 | 29-JUL-2015 | GL151127 | 4.6 | 190 | 8 | 2 | | 3 | | 8 | 11 | 15 | |
| GRP (Mid Park) | 5 | 2 | 214 | 29-JUL-2015 | GL151128 | 4.4 | 180 | 7 | 2 | | 2 | | 5 | 8 | 16 | |
| GRP (Mid Park) | 5 | 2 | 214 | 29-JUL-2015 | GL151129 | 4.7 | 200 | 9 | 2 | | 3 | | 6 | 9 | 17 | |
| GRP (D/S) | 5 | 2 | 199 | 29-JUL-2015 | GL151130 | 4.4 | 160 | 7 | 2 | | 2 | | 4 | 7 | 14 | |
| GRP (D/S) | 5 | 2 | 199 | 29-JUL-2015 | GL151131 | 4.3 | 110 | 5 | 1 | <MDL | 2 | | 4 | 6 | 8 | |
| GRP (D/S) | 5 | 2 | 199 | 29-JUL-2015 | GL151132 | 3.6 | 100 | 5 | 1 | | 1 | | 3 | 5 | 7 | |
| 102nd St. (U/S) | 5 | 2 | 93 | 29-JUL-2015 | GL151133 | 4.4 | 130 | 6 | 1 | | 2 | | 4 | 6 | 10 | |
| 102nd St. (U/S) | 5 | 2 | 93 | 29-JUL-2015 | GL151134 | 4.4 | 110 | 4 | 1 | | 1 | | 3 | 5 | 8 | |
| 102nd St. (U/S) | 5 | 2 | 93 | 29-JUL-2015 | GL151135 | 4.5 | 84 | 3 | 1 | <MDL | 1 | <MDL | 3 | 4 | 7 | |
| Little Niagara River (LNR) (D/S 102nd St.) | 5 | 2 | 95 | 29-JUL-2015 | GL151139 | 4.8 | 120 | 3 | 1 | <MDL | 1 | | 3 | 5 | 8 | |
| Little Niagara River (LNR) (D/S 102nd St.) | 5 | 2 | 95 | 29-JUL-2015 | GL151140 | 4.8 | 130 | 4 | 1 | <MDL | 2 | | 3 | 6 | 8 | |
| Little Niagara River (LNR) (D/S 102nd St.) | 5 | 2 | 95 | 29-JUL-2015 | GL151141 | 3.9 | 120 | 4 | 1 | <MDL | 2 | | 4 | 5 | 7 | |
| LNR D/S Cayuga Creek | 5 | 2 | 96 | 29-JUL-2015 | GL151142 | 4.2 | 94 | 3 | 1 | <MDL | 1 | | 3 | 5 | 7 | |
| LNR D/S Cayuga Creek | 5 | 2 | 96 | 30-JUL-2015 | GL151143 | 3.7 | 84 | 3 | 1 | <MDL | 1 | | 3 | 4 | 6 | |
| LNR D/S Cayuga Creek | 5 | 2 | 96 | 30-JUL-2015 | GL151144 | 4.9 | 97 | 3 | 1 | <MDL | 1 | <MDL | 2 | 5 | 7 | |
| Cayuga Creek | 5 | 15 | 31 | 30-JUL-2015 | GL151145 | 4.8 | 120 | 6 | 1 | <MDL | 1 | <MDL | 4 | 6 | 5 | |
| Cayuga Creek | 5 | 15 | 31 | 30-JUL-2015 | GL151146 | 4.7 | 99 | 2 | 1 | <MDL | 1 | <MDL | 2 | 4 | 5 | |
| Cayuga Creek | 5 | 15 | 31 | 30-JUL-2015 | GL151147 | 4.3 | 78 | 2 | 1 | <MDL | 1 | <MDL | 2 | 3 | 4 | |
| U/S Occidental Chem. | 5 | 2 | 97 | 30-JUL-2015 | GL151148 | 4.3 | 97 | 3 | 1 | <MDL | 1 | <MDL | 3 | 5 | 8 | |
| U/S Occidental Chem. | 5 | 2 | 97 | 30-JUL-2015 | GL151149 | 4.6 | 84 | 3 | 1 | <MDL | 1 | | 2 | 4 | 6 | |
| U/S Occidental Chem. | 5 | 2 | 97 | 30-JUL-2015 | GL151150 | 4.1 | 72 | 3 | 1 | <MDL | 1 | <MDL | 2 | 4 | 1 | <MDL |
| OCC 003 | 5 | 2 | 42 | 30-JUL-2015 | GL151163 | 4.1 | 190 | 14 | 2 | | 5 | | 11 | 18 | 21 | |
| OCC 003 | 5 | 2 | 42 | 30-JUL-2015 | GL151164 | 4.8 | 200 | 13 | 1 | <MDL | 4 | | 9 | 21 | 21 | |
| OCC 003 | 5 | 2 | 42 | 30-JUL-2015 | GL151165 | 3.7 | 160 | 10 | 1 | <MDL | 4 | | 7 | 16 | 16 | |
| Gill Creek (mouth) | 5 | 2 | 37 | 30-JUL-2015 | GL151172 | 4 | 70 | 3 | 1 | <MDL | 1 | <MDL | 2 | 5 | 6 | |
| Gill Creek (mouth) | 5 | 2 | 37 | 31-JUL-2015 | GL151173 | 4.1 | 76 | 3 | 1 | <MDL | 1 | <MDL | 2 | 5 | 7 | |
| Gill Creek (mouth) | 5 | 2 | 37 | 31-JUL-2015 | GL151174 | 4.4 | 110 | 5 | 1 | <MDL | 1 | | 4 | 7 | 9 | |

Appendix D2: Congener specific PCB tissue concentrations (ng/g **dry** wt.) in caged mussels, Niagara River, 2015. <MDL= method detection limit

| | PCB052 | PCB054 | | PCB070 | | PCB074 | | PCB087 | | PCB095 | PCB099 | PCB104 | | PCB105 | | PCB110 | PCB114 | | PCB118 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ng/g | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | ng/g | ng/g | | ng/g | | ng/g | ng/g | | ng/g |
| Two Mile Creek (mouth) | 34 | 1 | <MDL | 10 | | 9 | | 17 | | 30 | 22 | 1 | <MDL | 8 | | 29 | 1 | <MDL | 16 |
| Two Mile Creek (mouth) | 30 | 1 | <MDL | 7 | | 7 | | 14 | | 27 | 18 | 1 | <MDL | 5 | | 24 | 1 | <MDL | 11 |
| Two Mile Creek (mouth) | 35 | 1 | <MDL | 11 | | 10 | | 16 | | 29 | 22 | 1 | <MDL | 9 | | 28 | 1 | <MDL | 17 |
| Rattlesnake Creek | 94 | 1 | <MDL | 18 | | 9 | | 21 | | 59 | 26 | 1 | <MDL | 5 | | 33 | 1 | <MDL | 11 |
| Rattlesnake Creek | 80 | 1 | <MDL | 14 | | 7 | | 17 | | 49 | 21 | 1 | <MDL | 4 | | 27 | 1 | <MDL | 8 |
| Rattlesnake Creek | 69 | 1 | <MDL | 13 | | 7 | | 17 | | 45 | 22 | 1 | <MDL | 4 | | 27 | 1 | <MDL | 8 |
| Two Mile Creek (N of Hwy 290) | 14 | 1 | <MDL | 5 | | 2 | | 9 | | 15 | 10 | 1 | <MDL | 4 | | 15 | 1 | <MDL | 10 |
| Two Mile Creek (N of Hwy 290) | 14 | 1 | <MDL | 5 | | 2 | | 8 | | 15 | 10 | 1 | <MDL | 4 | | 14 | 1 | <MDL | 10 |
| Two Mile Creek (N of Hwy 290) | 14 | 1 | <MDL | 5 | | 2 | | 9 | | 16 | 10 | 1 | <MDL | 1 | <MDL | 15 | 1 | <MDL | 10 |
| Two Mile Creek (Sheridan Rd) | 5 | 1 | <MDL | 1 | | 1 | | 2 | | 4 | 2 | 1 | <MDL | 1 | | 4 | 1 | <MDL | 2 |
| Two Mile Creek (Sheridan Rd) | 5 | 1 | <MDL | 2 | | 1 | | 2 | | 4 | 3 | 1 | <MDL | 1 | | 4 | 1 | <MDL | 3 |
| Two Mile Creek (Sheridan Rd) | 3 | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | 1 | 1 | <MDL | 1 | <MDL | 2 | 1 | <MDL | 1 |
| Gratwick Riverside Park (GRP) (U/S) | 24 | 1 | <MDL | 13 | | 10 | | 7 | | 12 | 11 | 1 | <MDL | 4 | | 13 | 1 | <MDL | 8 |
| Gratwick Riverside Park (GRP) (U/S) | 22 | 1 | <MDL | 13 | | 9 | | 7 | | 12 | 12 | 1 | <MDL | 4 | | 13 | 1 | <MDL | 9 |
| Gratwick Riverside Park (GRP) (U/S) | 22 | 1 | <MDL | 12 | | 9 | | 6 | | 12 | 10 | 1 | <MDL | 4 | | 12 | 1 | <MDL | 8 |
| GRP (U/S Marina) | 110 | 2 | | 79 | | 54 | | 34 | | 49 | 46 | 1 | <MDL | 23 | | 55 | 2 | | 40 |
| GRP (U/S Marina) | 68 | 1 | | 47 | | 32 | | 22 | | 31 | 29 | 1 | <MDL | 14 | | 36 | 1 | <MDL | 26 |
| GRP (U/S Marina) | 86 | 1 | | 62 | | 41 | | 29 | | 40 | 40 | 1 | <MDL | 18 | | 48 | 2 | | 35 |
| GRP (Marina) | 85 | 3 | | 45 | | 26 | | 16 | | 37 | 31 | 1 | <MDL | 7 | | 35 | 1 | <MDL | 22 |
| GRP (Marina) | 120 | 3 | | 68 | | 39 | | 24 | | 48 | 46 | 1 | <MDL | 11 | | 51 | 1 | | 34 |
| GRP (Marina) | 120 | 3 | | 70 | | 40 | | 25 | | 52 | 48 | 1 | <MDL | 12 | | 54 | 1 | | 36 |
| GRP (Mid Park) | 20 | 1 | <MDL | 9 | | 7 | | 5 | | 10 | 8 | 1 | <MDL | 3 | | 10 | 1 | <MDL | 6 |
| GRP (Mid Park) | 18 | 1 | <MDL | 10 | | 7 | | 5 | | 8 | 8 | 1 | <MDL | 3 | | 9 | 1 | <MDL | 7 |
| GRP (Mid Park) | 19 | 1 | <MDL | 10 | | 7 | | 6 | | 9 | 9 | 1 | <MDL | 4 | | 11 | 1 | <MDL | 7 |
| GRP (D/S) | 15 | 1 | <MDL | 8 | | 6 | | 4 | | 8 | 8 | 1 | <MDL | 3 | | 8 | 1 | <MDL | 6 |
| GRP (D/S) | 11 | 1 | <MDL | 4 | | 4 | | 3 | | 5 | 5 | 1 | <MDL | 2 | | 6 | 1 | <MDL | 4 |
| GRP (D/S) | 9 | 1 | <MDL | 5 | | 3 | | 3 | | 5 | 5 | 1 | <MDL | 2 | | 5 | 1 | <MDL | 4 |
| 102nd St. (U/S) | 11 | 1 | <MDL | 5 | | 4 | | 4 | | 6 | 6 | 1 | <MDL | 3 | | 7 | 1 | <MDL | 5 |
| 102nd St. (U/S) | 9 | 1 | <MDL | 4 | | 3 | | 3 | | 6 | 5 | 1 | <MDL | 2 | | 7 | 1 | <MDL | 5 |
| 102nd St. (U/S) | 9 | 1 | <MDL | 3 | | 3 | | 2 | | 6 | 2 | 1 | <MDL | 1 | <MDL | 3 | 1 | <MDL | 4 |
| Little Niagara River (LNR) (D/S 102nd St.) | 12 | 1 | <MDL | 4 | | 4 | | 3 | | 7 | 3 | 1 | <MDL | 3 | | 8 | 1 | <MDL | 8 |
| Little Niagara River (LNR) (D/S 102nd St.) | 12 | 1 | <MDL | 5 | | 5 | | 3 | | 7 | 3 | 1 | <MDL | 3 | | 8 | 1 | <MDL | 8 |
| Little Niagara River (LNR) (D/S 102nd St.) | 11 | 1 | <MDL | 4 | | 4 | | 3 | | 7 | 3 | 1 | <MDL | 3 | | 8 | 1 | <MDL | 7 |
| LNR D/S Cayuga Creek | 9 | 1 | <MDL | 4 | | 3 | | 2 | | 6 | 2 | 1 | <MDL | 2 | | 6 | 1 | <MDL | 5 |
| LNR D/S Cayuga Creek | 8 | 1 | <MDL | 3 | | 3 | | 2 | | 5 | 2 | 1 | <MDL | 2 | | 6 | 1 | <MDL | 4 |
| LNR D/S Cayuga Creek | 9 | 1 | <MDL | 4 | | 3 | | 3 | | 6 | 3 | 1 | <MDL | 2 | | 6 | 1 | <MDL | 6 |
| Cayuga Creek | 9 | 1 | <MDL | 3 | | 2 | | 4 | | 8 | 6 | 1 | <MDL | 2 | | 8 | 1 | <MDL | 6 |
| Cayuga Creek | 7 | 1 | <MDL | 3 | | 2 | | 4 | | 8 | 3 | 1 | <MDL | 3 | | 8 | 1 | <MDL | 7 |
| Cayuga Creek | 5 | 1 | <MDL | 2 | | 1 | | 3 | | 6 | 2 | 1 | <MDL | 2 | | 6 | 1 | <MDL | 5 |
| U/S Occidental Chem. | 9 | 1 | <MDL | 4 | | 3 | | 3 | | 6 | 3 | 1 | <MDL | 2 | | 6 | 1 | <MDL | 5 |
| U/S Occidental Chem. | 7 | 1 | <MDL | 3 | | 3 | | 2 | | 5 | 2 | 1 | <MDL | 2 | | 6 | 1 | <MDL | 5 |
| U/S Occidental Chem. | 8 | 1 | <MDL | 3 | | 3 | | 2 | | 4 | 2 | 1 | <MDL | 2 | | 5 | 1 | <MDL | 4 |
| OCC 003 | 28 | 1 | <MDL | 15 | | 9 | | 5 | | 8 | 7 | 1 | <MDL | 3 | | 7 | 1 | <MDL | 4 |
| OCC 003 | 30 | 1 | <MDL | 13 | | 11 | | 5 | | 7 | 4 | 1 | <MDL | 4 | | 8 | 1 | <MDL | 6 |
| OCC 003 | 23 | 1 | <MDL | 10 | | 8 | | 4 | | 5 | 3 | 1 | <MDL | 3 | | 6 | 1 | <MDL | 5 |
| Gill Creek (mouth) | 9 | 1 | <MDL | 4 | | 3 | | 2 | | 5 | 2 | 1 | <MDL | 2 | | 4 | 1 | <MDL | 4 |
| Gill Creek (mouth) | 9 | 1 | <MDL | 4 | | 3 | | 3 | | 5 | 2 | 1 | <MDL | 2 | | 5 | 1 | <MDL | 4 |
| Gill Creek (mouth) | 12 | 1 | <MDL | 5 | | 4 | | 4 | | 6 | 5 | 1 | <MDL | 2 | | 6 | 1 | <MDL | 4 |

Appendix D2: Congener specific PCB tissue concentrations (ng/g **dry** wt.) in caged mussels, Niagara River, 2015. <MDL= method detection limit

| | PCB119 | | PCB123 | | PCB128 | | PCB138 | PCB149 | | PCB151 | | PCB153 | | PCB155 | | PCB156 | | PCB157 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ng/g | | ng/g | | ng/g | | ng/g | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | |
| Two Mile Creek (mouth) | 1 | | 1 | <MDL | 5 | | 28 | 20 | | 8 | | 23 | | 1 | <MDL | 2 | | 1 | <MDL |
| Two Mile Creek (mouth) | 1 | | 1 | <MDL | 4 | | 23 | 18 | | 6 | | 19 | | 1 | <MDL | 1 | | 1 | <MDL |
| Two Mile Creek (mouth) | 1 | | 1 | <MDL | 5 | | 26 | 19 | | 7 | | 22 | | 1 | <MDL | 2 | | 1 | <MDL |
| Rattlesnake Creek | 2 | | 1 | <MDL | 4 | | 18 | 17 | | 6 | | 16 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Rattlesnake Creek | 2 | | 1 | <MDL | 3 | | 14 | 15 | | 5 | | 13 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Rattlesnake Creek | 2 | | 1 | <MDL | 3 | | 17 | 15 | | 5 | | 14 | | 1 | <MDL | 1 | | 1 | <MDL |
| Two Mile Creek (N of Hwy 290) | 1 | <MDL | 1 | <MDL | 3 | | 16 | 12 | | 4 | | 14 | | 1 | <MDL | 1 | | 1 | <MDL |
| Two Mile Creek (N of Hwy 290) | 1 | <MDL | 1 | <MDL | 3 | | 16 | 11 | | 4 | | 14 | | 1 | <MDL | 1 | | 1 | <MDL |
| Two Mile Creek (N of Hwy 290) | 1 | <MDL | 1 | <MDL | 3 | | 17 | 12 | | 4 | | 13 | | 1 | <MDL | 1 | | 1 | <MDL |
| Two Mile Creek (Sheridan Rd) | 1 | <MDL | 1 | <MDL | 1 | | 7 | 6 | | 2 | | 7 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Two Mile Creek (Sheridan Rd) | 1 | <MDL | 1 | <MDL | 1 | | 8 | 6 | | 3 | | 7 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Two Mile Creek (Sheridan Rd) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | 3 | | 1 | | 3 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Gratwick Riverside Park (GRP) (U/S) | 1 | | 1 | <MDL | 1 | | 7 | 7 | | 3 | | 7 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Gratwick Riverside Park (GRP) (U/S) | 1 | | 1 | <MDL | 1 | | 9 | 7 | | 3 | | 8 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Gratwick Riverside Park (GRP) (U/S) | 1 | | 1 | <MDL | 1 | <MDL | 7 | 7 | | 3 | | 7 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| GRP (U/S Marina) | 3 | | 1 | <MDL | 3 | | 19 | 16 | | 7 | | 18 | | 1 | <MDL | 2 | | 1 | <MDL |
| GRP (U/S Marina) | 2 | | 1 | <MDL | 2 | | 12 | 10 | | 5 | | 12 | | 1 | <MDL | 1 | | 1 | <MDL |
| GRP (U/S Marina) | 2 | | 1 | <MDL | 3 | | 17 | 14 | | 6 | | 16 | | 1 | <MDL | 1 | | 1 | <MDL |
| GRP (Marina) | 2 | | 1 | <MDL | 3 | | 20 | 18 | | 8 | | 22 | | 1 | <MDL | 2 | | 1 | <MDL |
| GRP (Marina) | 3 | | 1 | <MDL | 5 | | 29 | 26 | | 11 | | 31 | | 1 | <MDL | 2 | | 1 | |
| GRP (Marina) | 4 | | 1 | <MDL | 5 | | 31 | 26 | | 11 | | 33 | | 1 | <MDL | 2 | | 1 | |
| GRP (Mid Park) | 1 | | 1 | <MDL | 1 | <MDL | 7 | 7 | | 1 | <MDL | 7 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| GRP (Mid Park) | 1 | | 1 | <MDL | 1 | | 7 | 6 | | 3 | | 8 | | 1 | <MDL | 1 | | 1 | <MDL |
| GRP (Mid Park) | 1 | <MDL | 1 | <MDL | 1 | | 9 | 7 | | 3 | | 9 | | 1 | <MDL | 1 | | 1 | <MDL |
| GRP (D/S) | 1 | <MDL | 1 | <MDL | 1 | | 6 | 5 | | 2 | | 7 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| GRP (D/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 5 | 4 | | 2 | | 5 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| GRP (D/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 5 | 4 | | 2 | | 5 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| 102nd St. (U/S) | 1 | <MDL | 1 | <MDL | 1 | | 8 | 6 | | 2 | | 7 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| 102nd St. (U/S) | 1 | <MDL | 1 | <MDL | 1 | | 7 | 5 | | 2 | | 7 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| 102nd St. (U/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 5 | 3 | | 1 | | 4 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Little Niagara River (LNR) (D/S 102nd S | 1 | <MDL | 1 | <MDL | 2 | | 7 | 3 | | 2 | | 6 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Little Niagara River (LNR) (D/S 102nd S | 1 | <MDL | 1 | <MDL | 2 | | 8 | 3 | | 2 | | 6 | | 1 | <MDL | 1 | | 1 | <MDL |
| Little Niagara River (LNR) (D/S 102nd S | 1 | <MDL | 1 | <MDL | 2 | | 7 | 3 | | 2 | | 6 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| LNR D/S Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 6 | 3 | | 2 | | 5 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| LNR D/S Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 5 | 2 | | 2 | | 5 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| LNR D/S Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 7 | 3 | | 2 | | 5 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 10 | 8 | | 1 | <MDL | 9 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | | 9 | 4 | | 2 | | 6 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | | 7 | 3 | | 2 | | 5 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| U/S Occidental Chem. | 1 | <MDL | 1 | <MDL | 1 | <MDL | 6 | 3 | | 2 | | 5 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| U/S Occidental Chem. | 1 | <MDL | 1 | <MDL | 1 | <MDL | 5 | 3 | | 1 | | 4 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| U/S Occidental Chem. | 1 | <MDL | 1 | <MDL | 1 | <MDL | 5 | 2 | | 1 | | 4 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| OCC 003 | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| OCC 003 | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| OCC 003 | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Gill Creek (mouth) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | 1 | | 1 | <MDL | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Gill Creek (mouth) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | 2 | | 1 | <MDL | 3 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Gill Creek (mouth) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 5 | 4 | | 1 | <MDL | 5 | | 1 | <MDL | 1 | <MDL | 1 | <MDL |

Appendix D2: Congener specific PCB tissue concentrations (ng/g **dry** wt.) in caged mussels, Niagara River, 2015. <MDL= method detection limit

| | PCB158 | | PCB167 | | PCB168 | | PCB170 | | PCB171 | | PCB177 | | PCB178 | | PCB180 | | PCB183 | | PCB187 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | |
| Two Mile Creek (mouth) | 2 | | 1 | | 1 | <MDL | 4 | | 1 | | 3 | | 1 | | 10 | | 2 | | 7 | |
| Two Mile Creek (mouth) | 2 | | 1 | <MDL | 1 | <MDL | 3 | | 1 | <MDL | 2 | | 1 | | 8 | | 2 | | 6 | |
| Two Mile Creek (mouth) | 2 | | 1 | <MDL | 1 | <MDL | 4 | | 1 | | 3 | | 1 | <MDL | 9 | | 2 | | 6 | |
| Rattlesnake Creek | 1 | | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 1 | | 1 | <MDL | 4 | | 1 | <MDL | 3 | |
| Rattlesnake Creek | 1 | | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 1 | | 1 | <MDL | 3 | | 1 | | 2 | |
| Rattlesnake Creek | 1 | | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 1 | | 1 | | 4 | | 1 | | 3 | |
| Two Mile Creek (N of Hwy 290) | 2 | | 1 | | 1 | <MDL | 3 | | 1 | | 1 | | 1 | <MDL | 6 | | 1 | | 4 | |
| Two Mile Creek (N of Hwy 290) | 3 | | 1 | <MDL | 1 | <MDL | 3 | | 1 | | 2 | | 1 | <MDL | 6 | | 1 | | 4 | |
| Two Mile Creek (N of Hwy 290) | 2 | | 1 | | 1 | <MDL | 2 | | 1 | | 2 | | 1 | <MDL | 6 | | 2 | | 4 | |
| Two Mile Creek (Sheridan Rd) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 1 | | 1 | <MDL | 4 | | 1 | <MDL | 3 | |
| Two Mile Creek (Sheridan Rd) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 1 | | 1 | <MDL | 4 | | 1 | | 3 | |
| Two Mile Creek (Sheridan Rd) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | |
| Gratwick Riverside Park (GRP) (U/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | | 1 | | 4 | | 1 | | 3 | |
| Gratwick Riverside Park (GRP) (U/S) | 1 | | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 1 | | 1 | | 4 | | 1 | | 4 | |
| Gratwick Riverside Park (GRP) (U/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 4 | | 1 | <MDL | 3 | |
| GRP (U/S Marina) | 2 | | 1 | | 1 | <MDL | 3 | | 1 | | 3 | | 2 | | 10 | | 3 | | 10 | |
| GRP (U/S Marina) | 1 | | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 2 | | 1 | <MDL | 6 | | 1 | | 5 | |
| GRP (U/S Marina) | 2 | | 1 | <MDL | 1 | <MDL | 3 | | 1 | | 2 | | 2 | | 10 | | 2 | | 8 | |
| GRP (Marina) | 2 | | 1 | <MDL | 1 | <MDL | 4 | | 1 | | 3 | | 2 | | 12 | | 3 | | 8 | |
| GRP (Marina) | 3 | | 1 | | 1 | <MDL | 6 | | 2 | | 4 | | 3 | | 17 | | 4 | | 11 | |
| GRP (Marina) | 3 | | 1 | | 1 | <MDL | 6 | | 2 | | 4 | | 3 | | 18 | | 5 | | 12 | |
| GRP (Mid Park) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 4 | | 1 | <MDL | 3 | |
| GRP (Mid Park) | 1 | | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | | 1 | | 4 | | 1 | | 3 | |
| GRP (Mid Park) | 1 | | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 1 | | 1 | <MDL | 5 | | 1 | | 4 | |
| GRP (D/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | | 1 | | 3 | | 1 | | 3 | |
| GRP (D/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | | 1 | <MDL | 2 | |
| GRP (D/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | | 1 | <MDL | 2 | |
| 102nd St. (U/S) | 1 | | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | | 1 | <MDL | 4 | | 1 | | 3 | |
| 102nd St. (U/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | | 1 | <MDL | 4 | | 1 | | 3 | |
| 102nd St. (U/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 2 | |
| Little Niagara River (LNR) (D/S 102nd St.) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | | 1 | <MDL | 2 | |
| Little Niagara River (LNR) (D/S 102nd St.) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | | 1 | <MDL | 3 | |
| Little Niagara River (LNR) (D/S 102nd St.) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | | 1 | <MDL | 2 | |
| LNR D/S Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 2 | |
| LNR D/S Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | | 1 | <MDL | 2 | |
| LNR D/S Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | | 1 | <MDL | 2 | |
| Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | | 1 | <MDL | 2 | |
| Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | | 1 | <MDL | 2 | |
| Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 2 | |
| U/S Occidental Chem. | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | | 1 | <MDL | 3 | |
| U/S Occidental Chem. | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 3 | | 1 | <MDL | 2 | |
| U/S Occidental Chem. | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 2 | |
| OCC 003 | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| OCC 003 | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| OCC 003 | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Gill Creek (mouth) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL |
| Gill Creek (mouth) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL |
| Gill Creek (mouth) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 1 | <MDL |

| Appendix D2: Congener specific PCB tissue concentrations (ng/g **dry** wt.) in caged mussels, Niagara River, 2015. <MDL= method detection limit | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PCB188 | | PCB189 | | PCB191 | | PCB194 | | PCB199 | | PCB201 | | PCB202 | | PCB205 | | PCB206 | | PCB208 | |
| | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | |
| Two Mile Creek (mouth) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 3 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL |
| Two Mile Creek (mouth) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL |
| Two Mile Creek (mouth) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 3 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| Rattlesnake Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Rattlesnake Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| Rattlesnake Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| Two Mile Creek (N of Hwy 290) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| Two Mile Creek (N of Hwy 290) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| Two Mile Creek (N of Hwy 290) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL |
| Two Mile Creek (Sheridan Rd) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL |
| Two Mile Creek (Sheridan Rd) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| Two Mile Creek (Sheridan Rd) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Gratwick Riverside Park (GRP) (U/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| Gratwick Riverside Park (GRP) (U/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| Gratwick Riverside Park (GRP) (U/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| GRP (U/S Marina) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 5 | | 1 | <MDL | 1 | | 1 | <MDL | 2 | | 1 | |
| GRP (U/S Marina) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 3 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| GRP (U/S Marina) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 4 | | 1 | | 1 | | 1 | <MDL | 2 | | 1 | <MDL |
| GRP (Marina) | 1 | <MDL | 1 | <MDL | 1 | | 2 | | 4 | | 3 | | 1 | | 1 | <MDL | 2 | | 1 | |
| GRP (Marina) | 1 | <MDL | 1 | <MDL | 2 | | 3 | | 5 | | 4 | | 2 | | 1 | <MDL | 3 | | 2 | |
| GRP (Marina) | 1 | <MDL | 1 | | 2 | | 3 | | 5 | | 5 | | 2 | | 1 | | 3 | | 1 | <MDL |
| GRP (Mid Park) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| GRP (Mid Park) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| GRP (Mid Park) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL |
| GRP (D/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL |
| GRP (D/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| GRP (D/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| 102nd St. (U/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| 102nd St. (U/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL |
| 102nd St. (U/S) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Little Niagara River (LNR) (D/S 102nd St | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Little Niagara River (LNR) (D/S 102nd St | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 2 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Little Niagara River (LNR) (D/S 102nd St | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| LNR D/S Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| LNR D/S Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| LNR D/S Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Cayuga Creek | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| U/S Occidental Chem. | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| U/S Occidental Chem. | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| U/S Occidental Chem. | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| OCC 003 | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| OCC 003 | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| OCC 003 | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Gill Creek (mouth) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Gill Creek (mouth) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |
| Gill Creek (mouth) | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL | 1 | <MDL |

Appendix D2: Congener specific PCB tissue concentrations (ng/g **dry** wt.) in caged mussels, Niagara River, 2015. <MDL= method detection limit

| Station Description | BOW | Stn type | Station Number | Retrieval Date | Samp No | LIPID | PCBTOT | | PCB018 | | PCB019 | | PCB022 | | PCB028 | | PCB033 | | PCB037 | | PCB044 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | |
| Fort Erie | 11 | 2 | 203 | 31-JUL-2015 | GL151244 | 3 | 5 | <=W | 2 | <=W | 2 | <=W | 0.5 | <=W | 0.5 | <=W | 0.5 | <=W | 1 | <=W | 0.3 | <T |
| Fort Erie | 11 | 2 | 203 | 31-JUL-2015 | GL151245 | 3.5 | 5 | <=W | 2 | <=W | 2 | <=W | 0.5 | <=W | 0.5 | <=W | 0.5 | <=W | 1 | <=W | 0.1 | <=W |
| Fort Erie | 11 | 2 | 203 | 31-JUL-2015 | GL151246 | 3.7 | 5 | <=W | 2 | <=W | 2 | <=W | 0.5 | <=W | 0.5 | <=W | 0.5 | <=W | 1 | <=W | 0.1 | <=W |
| NOTL | 11 | 2 | 9 | 31-JUL-2015 | GL151250 | 3.9 | 10 | <T | 2 | <=W | 2 | <=W | 0.5 | <=W | 0.5 | <=W | 0.5 | <=W | 1 | <=W | 0.4 | <T |
| NOTL | 11 | 2 | 9 | 31-JUL-2015 | GL151251 | 3 | 15 | <T | 2 | <=W | 2 | <=W | 0.5 | <=W | 1 | <T | 0.5 | <=W | 1 | <=W | 1.3 | |
| NOTL | 11 | 2 | 9 | 31-JUL-2015 | GL151252 | 3.4 | 15 | <T | 2 | <=W | 2 | <=W | 0.5 | <=W | 1 | <T | 0.5 | <=W | 1 | <=W | 1.1 | |
| Balsam Lake | 18 | 1 | 1 | 06-JUL-2015 | GL151256 | 3.8 | 5 | <=W | 2 | <=W | 2 | <=W | 0.5 | <=W | 0.5 | <=W | 0.5 | <=W | 1 | <=W | 0.1 | <=W |
| Balsam Lake | 18 | 1 | 1 | 06-JUL-2015 | GL151257 | 2.2 | 5 | <=W | 2 | <=W | 2 | <=W | 0.5 | <=W | 0.5 | <=W | 0.5 | <=W | 1 | <=W | 0.1 | <=W |
| Balsam Lake | 18 | 1 | 1 | 06-JUL-2015 | GL151258 | 3.2 | 5 | <=W | 2 | <=W | 2 | <=W | 0.5 | <=W | 0.5 | <=W | 0.5 | <=W | 1 | <=W | 0.1 | <=W |

| Station Description | PCB049 | | PCB052 | | PCB054 | | PCB070 | | PCB074 | | PCB077 | | PCB081 | | PCB087 | | PCB095 | | PCB099 | | PCB101 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | |
| Fort Erie | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.5 | <=W | 0.1 | <=W | 0.3 | <T | 0.1 | <=W | 0.5 | <T |
| Fort Erie | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.5 | <=W | 0.1 | <=W | 0.2 | <T | 0.1 | <=W | 0.4 | <T |
| Fort Erie | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.5 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W |
| NOTL | 0.2 | <T | 0.1 | <=W | 0.2 | <=W | 0.3 | <T | 0.1 | <=W | 0.4 | <T | 0.5 | <=W | 0.1 | <=W | 1 | | 0.1 | <=W | 0.4 | <T |
| NOTL | 0.8 | <T | 0.5 | <T | 0.2 | <=W | 0.8 | <T | 0.4 | <T | 0.4 | <T | 0.5 | <=W | 0.1 | <=W | 1.4 | | 0.5 | <T | 1 | |
| NOTL | 0.8 | <T | 0.5 | <T | 0.2 | <=W | 0.9 | <T | 0.5 | <T | 0.4 | <T | 0.5 | <=W | 0.1 | <=W | 1.7 | | 0.6 | <T | 1.1 | |
| Balsam Lake | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.5 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W |
| Balsam Lake | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.5 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W |
| Balsam Lake | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.5 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W |

| Station Description | PCB104 | | PCB105 | | PCB110 | | PCB114 | | PCB118 | | PCB119 | | PCB123 | | PCB126 | | PCB128 | | PCB138 | | PCB149 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | |
| Fort Erie | 0.1 | <=W | 0.4 | <T | 0.6 | <T | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 1 | <T | 0.2 | <=W |
| Fort Erie | 0.1 | <=W | 0.4 | <T | 0.5 | <T | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 1 | <T | 0.2 | <=W |
| Fort Erie | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.6 | <T | 0.2 | <=W |
| NOTL | 0.1 | <=W | 0.8 | <T | 1.1 | | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 1.2 | <T | 0.2 | <=W |
| NOTL | 0.1 | <=W | 0.6 | <T | 1 | | 0.1 | <=W | 0.4 | <T | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 1.2 | <T | 1 | <T |
| NOTL | 0.1 | <=W | 0.6 | <T | 1.1 | | 0.1 | <=W | 0.6 | <T | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 1.4 | <T | 1.2 | <T |
| Balsam Lake | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| Balsam Lake | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| Balsam Lake | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |

| Station Description | PCB151 | | PCB153 | | PCB155 | | PCB156 | | PCB157 | | PCB158 | | PCB167 | | PCB168 | | PCB169 | | PCB170 | | PCB171 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | |
| Fort Erie | 0.1 | <=W | 0.7 | <T | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.4 | MPC | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W |
| Fort Erie | 0.1 | <=W | 0.5 | <T | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | MPC | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W |
| Fort Erie | 0.1 | <=W | 0.2 | <T | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W |
| NOTL | 0.1 | <=W | 0.7 | <T | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | MPC | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W |
| NOTL | 0.2 | <T | 0.8 | <T | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.4 | MPC | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W |
| NOTL | 0.1 | <=W | 1.2 | | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.6 | MPC | 0.1 | <=W | 0.4 | <T | 0.2 | <=W |
| Balsam Lake | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W |
| Balsam Lake | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W |
| Balsam Lake | 0.1 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W |

| Station Description | PCB177 | | PCB178 | | PCB180 | | PCB183 | | PCB187 | | PCB188 | | PCB189 | | PCB191 | | PCB194 | | PCB199 | | PCB201 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | | ng/g | |
| Fort Erie | 0.1 | <=W | 0.2 | <=W | 0.4 | <T | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| Fort Erie | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| Fort Erie | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| NOTL | 0.1 | <=W | 0.2 | <=W | 0.4 | <T | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| NOTL | 0.1 | <=W | 0.2 | <=W | 0.4 | <T | 0.2 | <=W | 0.2 | <T | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| NOTL | 0.1 | <=W | 0.2 | <=W | 0.6 | <T | 0.2 | <=W | 0.3 | <T | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| Balsam Lake | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| Balsam Lake | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| Balsam Lake | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.1 | <=W | 0.1 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |

| Station Description | PCB202 | | PCB205 | | PCB206 | | PCB208 | |
|---|---|---|---|---|---|---|---|---|
| | ng/g | | ng/g | | ng/g | | ng/g | |
| Fort Erie | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| Fort Erie | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| Fort Erie | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| NOTL | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| NOTL | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| NOTL | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| Balsam Lake | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| Balsam Lake | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |
| Balsam Lake | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W | 0.2 | <=W |

## Appendix D3: Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans in caged mussels (pg/g wet wt.) deployed in the Niagara River, and sediment (ng/g dry wt), 2015. For mussels n=1 composite of four mussels. For sediment n=1 composite of 3 surface samples.

**Table D3. Dioxin and Furan concentrations, and percent lipid in caged mussels deployed in the Niagara River, 2015**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Submission: C224871 | | | | | | | | | | | | | | | | |
| Mussels | | | FISHERMANS PARK | | | FISHERMANS PARK | | | PETTIT FLUME | | PETTIT FLUME | | | PETTIT FLUME | | |
| | | | U/S Inlet | | | D/S Inlet | | | Upstream | | Downstream | | | Outer Site | | |
| | Field ID | | GL151089 | | | GL151090 | | | GL151094 | | GL151098 | | | GL151102 | | |
| | Sample Number | | C224871-0001 | | | C224871-0002 | | | C224871-0006 | | C224871-0010 | | | C224871-0014 | | |
| | Station Number | | 500020001 | | | 500020002 | | | 500020185 | | 500020187 | | | 500020186 | | |
| | Collection Date | | 28-JUL-2015 | | | 28-JUL-2015 | | | 28-JUL-2015 | | 28-JUL-2015 | | | 28-JUL-2015 | | |
| Parameter Name | Test Code | Units | | | | | | | | | | | | | | |
| Percent Lipid | LIPID | % | 0.85 | | | 1.2 | | | 0.99 | | 1.2 | | | 1.2 | | |
| 2378-tetrachlorofuran | P4F378 | pg/g dry | 1.2 | | DB5 | 0.88 | | DB5 | 0.17 | < | 0.7 | | DB5 | 18 | | DB5 |
| 12378-pentachlorofuran | P5F378 | pg/g dry | 0.25 | < | | 0.3 | < | | 0.11 | < | 0.12 | < | | 2.7 | | |
| 23478-pentachlorofuran | P5F478 | pg/g dry | 0.57 | | | 0.41 | < | | 0.11 | < | 0.41 | | | 7.8 | | |
| 123478-hexachlorofuran | P6F478 | pg/g dry | 1.7 | | DB5 | 1.1 | | DB5 | 0.058 | < | 1.3 | | DB5 | 30 | | DB5 |
| 123678-hexachlorofuran | P6F678 | pg/g dry | 0.35 | | | 0.27 | < | | 0.057 | < | 0.23 | < | | 5 | | |
| 123789-hexachlorofuran | P6F789 | pg/g dry | 0.091 | < | | 0.079 | < | | 0.058 | < | 0.068 | < | | 0.11 | < | |
| 234678-hexachlorofuran | P6F234 | pg/g dry | 0.11 | < | | 0.13 | < | | 0.062 | < | 0.079 | < | | 1.6 | | |
| 1234678-heptachlorofuran | P7F678 | pg/g dry | 2.5 | | | 1.5 | | | 0.07 | < | 1.6 | | | 48 | | |
| 1234789-heptachlorofuran | P7F789 | pg/g dry | 0.13 | < | | 0.08 | < | | 0.076 | < | 0.07 | < | | 1.5 | | |
| Octachlorofuran | P98CDF | pg/g dry | 2.1 | | | 1 | | | 0.14 | < | 1.5 | | | 35 | | |
| 2378-tetrachlorodioxin | P4D378 | pg/g dry | 0.13 | < | | 0.15 | < | | 0.15 | < | 0.14 | < | | 0.88 | | |
| 12378-pentachlorodioxin | P5D378 | pg/g dry | 0.13 | < | | 0.11 | < | | 0.16 | < | 0.14 | < | | 0.88 | | |
| 123478-hexachlorodioxin | P6D478 | pg/g dry | 0.11 | < | | 0.1 | < | | 0.13 | < | 0.081 | < | | 0.23 | | |
| 123678-hexachlorodioxin | P6D678 | pg/g dry | 0.12 | < | | 0.11 | < | | 0.14 | < | 0.083 | < | | 0.65 | | |
| 123789-hexachlorodioxin | P6D789 | pg/g dry | 0.12 | < | | 0.11 | < | DB5 | 0.14 | < | 0.085 | < | | 0.51 | | DB5 |
| 1234678-heptachlorodioxin | P7D678 | pg/g dry | 0.39 | < | | 0.23 | < | | 0.12 | < | 0.22 | < | | 1.9 | | |
| Octachlorodioxin | P98CDD | pg/g dry | 1.5 | | | 0.77 | | | 0.37 | < | 0.66 | < | | 5.5 | | |
| Sum Furans | | pg/g dry | 8 | | | 4 | | | | | 6 | | | 150 | | |
| Sum dioxins | | pg/g dry | 2 | | | 1 | | | | | 0 | | | 11 | | |
| **Sum Dioxins + Furans** | | pg/g dry | 10 | | | 5 | | | | | 6 | | | 160 | | |
| **TEQ (WHO 2005) Mammals** | | pg TEQ/g dry | 0.4 | | | 0.2 | | | | | 0.3 | | | 10 | | |
| **TEQ (WHO) Fish** | | pg TEQ/g dry | **0.3** | | | **0.2** | | | | | **0.4** | | | **11** | | |
| **TEQ (WHO) Birds** | | pg TEQ/g dry | 1.4 | | | 1.0 | | | | | 1.3 | | | 32 | | |
| **TEQ (WHO) Fish (corrected for % Lipid)** | | | 68 | | | 14 | | | | | 32 | | | 916 | | |

DB5: SAMPLES ANALYSED ON DB-5 COLUMN ONLY
SRL: RECOVERY LOWER THAN LOWER CONTROL LIMIT
< : ACTUAL RESULT IS LESS THAN THE REPORTED VALUE - a value of 0 was applied to calculate TEQs

**Table D3. Dioxin and Furan concentrations, and percent lipid in caged mussels deployed in the Niagara River, 2015**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Submission: C224871 | | | | | | | | | | | | |
| Mussels | | | BLOODY RUN CREEK (US) | | BLOODY RUN CREEK | | BLOODY RUN CREEK | | BLOODY RUN CREEK | | | BLOODY RUN CREEK | |
| | | | BRC (U/S) | | | | BRC (7th_ 8th pole) | | BRC (4th_5th pole) U/S stn 131 | | | BRC D/S | |
| | Field ID | | GL151236 | | GL151185 | | GL151189 | | GL151240 | | | GL151181 | |
| | Sample Number | | C224870-0004 | | C224871-0097 | | C224871-0101 | | C224870-0008 | | | C224871-0093 | |
| | Station Number | | 1100020018 | | 110020017 | | 110020131 | | 1100020132 | | | 110020025 | |
| | Collection Date | | 31-JUL-2015 | | 31-JUL-2015 | | 31-JUL-2015 | | 31-JUL-2015 | | | 31-JUL-2015 | |
| Parameter Name | Test Code | Units | | | | | | | | | | | |
| Percent Lipid | LIPID | % | 0.77 | | 0.95 | | 0.88 | | 1.1 | | | 0.82 | |
| 2378-tetrachlorofuran | P4F378 | pg/g dry | 0.23 | < | 0.13 | < | 0.39 | < | 0.42 | < | | 0.18 | < |
| 12378-pentachlorofuran | P5F378 | pg/g dry | 0.079 | < | 0.1 | < | 0.1 | < | 0.14 | < | | 0.13 | < |
| 23478-pentachlorofuran | P5F478 | pg/g dry | 0.08 | < | 0.1 | < | 0.17 | < | 0.15 | < | | 0.13 | < |
| 123478-hexachlorofuran | P6F478 | pg/g dry | 0.051 | < | 0.1 | < | 0.39 | < | 0.53 | | DB5 | 0.2 | |
| 123678-hexachlorofuran | P6F678 | pg/g dry | 0.051 | < | 0.076 | < | 0.06 | < | 0.15 | < | | 0.065 | < |
| 123789-hexachlorofuran | P6F789 | pg/g dry | 0.05 | < | 0.078 | < | 0.04 | < | 0.11 | < | | 0.071 | < |
| 234678-hexachlorofuran | P6F234 | pg/g dry | 0.053 | < | 0.083 | < | 0.044 | < | 0.13 | < | | 0.07 | < |
| 1234678-heptachlorofuran | P7F678 | pg/g dry | 0.1 | < | 0.11 | < | 0.24 | < | 0.44 | | | 0.15 | < |
| 1234789-heptachlorofuran | P7F789 | pg/g dry | 0.058 | < | 0.067 | < | 0.091 | < | 0.16 | < | | 0.082 | < |
| Octachlorofuran | P98CDF | pg/g dry | 0.1 | < | 0.22 | < | 0.64 | | 1.5 | | | 0.34 | < |
| 2378-tetrachlorodioxin | P4D378 | pg/g dry | 0.14 | < | 2.2 | | 6.5 | | 3.5 | | | 1 | |
| 12378-pentachlorodioxin | P5D378 | pg/g dry | 0.079 | < | 0.11 | < | 0.12 | < | 0.17 | < | | 0.13 | < |
| 123478-hexachlorodioxin | P6D478 | pg/g dry | 0.076 | < | 0.17 | < | 0.19 | < | 0.085 | < | | 0.12 | < |
| 123678-hexachlorodioxin | P6D678 | pg/g dry | 0.08 | < | 0.18 | < | 0.63 | | 0.85 | | | 0.19 | < |
| 123789-hexachlorodioxin | P6D789 | pg/g dry | 0.081 | < | 0.18 | < | 0.53 | | 0.66 | | DB5 | 0.13 | < |
| 1234678-heptachlorodioxin | P7D678 | pg/g dry | 0.12 | < | 0.42 | < | 2.9 | | 4.2 | | | 0.42 | < |
| Octachlorodioxin | P98CDD | pg/g dry | 0.3 | < | 0.46 | < | 2.3 | | 3.8 | | | 0.63 | < |
| Sum Furans | | pg/g dry | | | 0 | | 1 | | 2 | | | 0 | |
| Sum dioxins | | pg/g dry | | | 2 | | 13 | | 13 | | | 1 | |
| **Sum Dioxins + Furans** | | pg/g dry | | | 2 | | 14 | | 15 | | | 1 | |
| **TEQ (WHO 2005) Mammals** | | pg TEQ/g dry | | | 2 | | 7 | | 4 | | | 1 | |
| **TEQ (WHO) Fish** | | pg TEQ/g dry | | | **2** | | **7** | | **4** | | | **1** | |
| **TEQ (WHO) Birds** | | pg TEQ/g dry | | | 2 | | 7 | | 4 | | | 1 | |
| **TEQ (WHO) Fish (corrected for % Lipid)** | | | | | 232 | | 740 | | 325 | | | 124 | |

DB5: SAMPLES ANALYSED ON DB-5 COLUMN ONLY
SRL: RECOVERY LOWER THAN LOWER CONTROL LIMIT
< : ACTUAL RESULT IS LESS THAN THE REPORTED VALUE - a value of 0 was applied to calculate TEQs

**Table D3. Dioxin and Furan concentrations, particle size and total organic carbon concentrations in sediment collected from the Niagara River, 2015**

Submission: C222580

| Sediment | | | FISHERMANS PARK U/S Inlet | | FISHERMANS PARK D/S Inlet | | PETTIT FLUME Upstream | | | PETTIT FLUME Downstream | | PETTIT FLUME Outer Site | | TWO MILE CK (NEAR HWY 290) | | | TWO MILE CK (NEAR SHERIDAN ROAD) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Field ID | | GL51193 | | GL51194 | | GL51195 | | | GL51196 | | GL51197 | | GL51198 | | | GL51199 | | |
| | Sample Number | | C222580-0001 | | C222580-0002 | | C222580-0003 | | | C222580-0004 | | C222580-0005 | | C222580-0006 | | | C222580-0007 | | |
| | Station Number | | 500020001 | | 500020002 | | 500020185 | | | 500020187 | | 500020186 | | 500150042 | | | 500150036 | | |
| | Collection Date | | 28-JUL-2015 | | 28-JUL-2015 | | 28-JUL-2015 | | | 28-JUL-2015 | | 28-JUL-2015 | | 28-JUL-2015 | | | 28-JUL-2015 | | |
| Parameter Name | Test Code | Units | | | | | | | | | | | | | | | | | |
| % <62 um, >2.63 um, sum | silt | % | 35 | | 35 | | 10 | | | 45 | | 50 | | 64 | <T | | 56 | | |
| % <1000 um, >62 um, sum | sand | % | 57 | | 58 | | 66 | | | 43 | | 39 | | 0 | | | 26 | | |
| % <2.63 um, >0.10 um, sum | clay | % | 8 | | 7 | | 3 | | | 13 | | 11 | | 36 | | | 18 | | |
| Carbon; total organic | TOC | mg/g dry | 83 | | 49 | | 35 | | | 22 | | 100 | | 9.8 | | | 82 | | |
| 2378-tetrachlorofuran | P4F378 | pg/g dry | 210 | DB5 | 130 | DB5 | 12 | < | | 270 | | 4000 | | 1.6 | < | | 26 | | |
| 12378-pentachlorofuran | P5F378 | pg/g dry | 130 | | 82 | | 2.9 | | | 110 | | 1200 | | 0.38 | < | | 6 | | |
| 23478-pentachlorofuran | P5F478 | pg/g dry | 260 | | 130 | | 4.3 | | | 350 | | 2900 | | 0.58 | < | | 14 | | |
| 123478-hexachlorofuran | P6F478 | pg/g dry | 3800 | DB5 | 1700 | DB5 | 29 | | DB5 | 4000 | | 43000 | | 0.84 | < | | 21 | | |
| 123678-hexachlorofuran | P6F678 | pg/g dry | 590 | | 310 | | 6.7 | | | 520 | | 6900 | | 0.72 | < | | 23 | < | |
| 123789-hexachlorofuran | P6F789 | pg/g dry | 5.1 | | 4.1 | | 0.24 | < | | 3.6 | | 49 | | 0.14 | | | 0.64 | | |
| 234678-hexachlorofuran | P6F234 | pg/g dry | 190 | | 87 | | 4.5 | | | 140 | DB5 | 1800 | DB5 | 0.77 | < | | 33 | | DB5 |
| 1234678-heptachlorofuran | P7F678 | pg/g dry | 12000 | | 5700 | | 99 | | | 11000 | | 100000 | | 4.9 | < | | 200 | | |
| 1234789-heptachlorofuran | P7F789 | pg/g dry | 430 | | 190 | | 3 | | | 370 | SRL | 4500 | | 0.34 | | | 11 | | |
| Octachlorofuran | P98CDF | pg/g dry | 23000 | | 8300 | | 88 | | | 24000 | | 260000 | | 6.1 | | | 320 | | |
| 2378-tetrachlorodioxin | P4D378 | pg/g dry | 77 | | 19 | | 0.77 | | | 13 | DB5 | 220 | DB5 | 0.16 | | DB5 | 1.6 | | DB5 |
| 12378-pentachlorodioxin | P5D378 | pg/g dry | 21 | | 16 | | 1.3 | | | 28 | | 430 | | 0.34 | < | | 4.2 | | |
| 123478-hexachlorodioxin | P6D478 | pg/g dry | 23 | | 16 | | 0.97 | | | 32 | | 410 | | 0.33 | | | 6.6 | | |
| 123678-hexachlorodioxin | P6D678 | pg/g dry | 55 | | 32 | | 3.8 | | | 60 | DB5 | 880 | DB5 | 1.5 | | DB5 | 19 | | DB5 |
| 123789-hexachlorodioxin | P6D789 | pg/g dry | 37 | DB5 | 25 | DB5 | 3.2 | | DB5 | 45 | | 590 | | 1.3 | | | 20 | | |
| 1234678-heptachlorodioxin | P7D678 | pg/g dry | 580 | | 440 | | 47 | | | 470 | | 6100 | | 21 | | | 410 | | |
| Octachlorodioxin | P98CDD | pg/g dry | 3100 | | 2900 | | 370 | | | 1400 | SRL | 18000 | | 180 | | | 3700 | | |
| Sum Furans | | pg/g dry | 40615 | | 16633 | | 244 | | | 40764 | | 424349 | | 11 | | | 644 | | |
| Sum dioxins | | pg/g dry | 3893 | | 3448 | | 427 | | | 2048 | | 26630 | | 204 | | | 4161 | | |
| **Sum Dioxins + Furans** | | pg/g dry | 44508 | | 20081 | | 671 | | | 42812 | | 450979 | | 216 | | | 4805 | | |
| **TEQ (WHO 2005) Mammals** | | pg TEQ/g dry | 810 | | 370 | | 11 | | | 780 | | 8500 | | 1 | | | 31 | | |
| **TEQ (WHO) Fish** | | pg TEQ/g dry | 840 | | 390 | | 10 | | | 840 | | 8800 | | 1 | | | 27 | | |
| **TEQ (WHO) Birds** | | pg TEQ/g dry | 1200 | | 580 | | 18 | | | 1300 | | 14000 | | 2 | | | 59 | | |
| **TEQ (WHO) Fish (corrected for % TOC)** | | | 10,000 | | 7,900 | | 300 | | | 38,000 | | 88,000 | | 90 | | | 330 | | |

DB5: SAMPLES ANALYSED ON DB-5 COLUMN ONLY
SRL: RECOVERY LOWER THAN LOWER CONTROL LIMIT
< : ACTUAL RESULT IS LESS THAN THE REPORTED VALUE - 1/2 detection limit was applied to calculate TEQs

**Table D3. Dioxin and Furan concentrations, particle size and total organic carbon concentrations in sediment collected from the Niagara River, 2015**

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | U/S BLOODY RUN CREEK | | BLOODY RUN CREEK | | BLOODY RUN CREEK | | BLOODY RUN CREEK | | BLOODY RUN CREEK | | BLOODY RUN CREEK | BLOODY RUN CREEK |
| Sediment | | | 25 m upstream of Historical U/S Station | | Upstream | | Upstream | | 65M U/S of Stn. 132 | | 25M U/S of stn. 132 | | BRC (4th_5th pole) U/S of stn 131 | BRC (4th_5th pole) U/S stn 131 |
| | | | | | Historical Stn | | Historical Stn | | 27 m D/S of station 18's big flat rock | | | | | |
| | Field ID | | GL151084 | | GL151082 | | GL151082 | | GL151203 | | GL151202 | | GL151081 | GL151081 |
| | Sample Number | | C224881-0004 | | C224881-0002 | | C224881-0002 | | C224882-0003 | | C224882-0002 | | C224881-0001 | C224881-0001 |
| | Station Number | | 1100020026 | | 1100020018 | | 1100020018 | | 1100020027 | | 1100020028 | | 1100020132 | 1100020132 |
| | Collection Date | | 10-Jul-15 | | 05-Aug-83 | | 05-Aug-83 | | 31-JUL-2015 | | 31-JUL-2015 | | 10-Jul-15 | 10-Jul-15 |
| | | | screening method | | screening method | | routine method | | routine method | | routine method | | screening method | routine method |
| | Test Code | Units | | | | | | | | | | | | |
| % <62 um, >2.63 um, sum | Silt | % | 70 | | 70 | | | | 68 | | 69 | | 65 | |
| % <1000 um, >62 um, sum | Sand | % | 7 | | 2 | | | | 9 | | 10 | | 17 | |
| % <2.63 um, >0.10 um, sum | Clay | % | 23 | | 28 | | | | 23 | | 21 | | 18 | |
| Carbon; total organic | TOC | mg/g dry | 22 | | 21 | | | | 15 | | 14 | | 24 | |
| | | | | | | | | | | | | | | |
| 2378-tetrachlorofuran | P4F378 | pg/g dry | 2.7 | | 3 | | 6.7 | < < | 2.8 | DB5 | 52 | DB5 | 170 | 360 |
| 12378-pentachlorofuran | P5F378 | pg/g dry | 0.58 | | 0.79 | | 1.1 | | 0.54 | | 13 | | 77 | 150 |
| 23478-pentachlorofuran | P5F478 | pg/g dry | 1.5 | | 2.3 | | 3.4 | | 1.5 | | 49 | | 180 | 470 |
| 123478-hexachlorofuran | P6F478 | pg/g dry | 9.2 | | 12 | | 21 | | 7.8 | DB5 | 460 | DB5 | 1100 | 3100 |
| 123678-hexachlorofuran | P6F678 | pg/g dry | 1.4 | | 2.3 | | 3.7 | | 1.2 | | 71 | | 340 | 610 |
| 123789-hexachlorofuran | P6F789 | pg/g dry | 0.41 | < < | 0.51 | < < | 0.24 | < < | 0.39 | < | 1.9 | | 8.3 | 13 |
| 234678-hexachlorofuran | P6F234 | pg/g dry | 0.77 | | 0.95 | | 0.97 | | 0.56 | | 16 | | 70 | 150 |
| 1234678-heptachlorofuran | P7F678 | pg/g dry | 14 | | 13 | | 21 | | 4.4 | | 240 | | 770 | 3200 |
| 1234789-heptachlorofuran | P7F789 | pg/g dry | 2.3 | | 2.3 | | 5.1 | | 1.2 | | 59 | | 180 | 510 |
| Octachlorofuran | P98CDF | pg/g dry | 39 | | 28 | | 92 | | 12 | | 1100 | | 5000 | 8400 |
| 2378-tetrachlorodioxin | P4D378 | pg/g dry | 14 | | 52 | | 80 | | 39 | | 1400 | | 3500 | 9700 |
| 12378-pentachlorodioxin | P5D378 | pg/g dry | 0.51 | < < | 2.1 | | 1.1 | | 1 | < | 18 | | 63 | 160 |
| 123478-hexachlorodioxin | P6D478 | pg/g dry | 0.97 | | 1.3 | | 2.3 | | 1.1 | | 47 | | 240 | 590 |
| 123678-hexachlorodioxin | P6D678 | pg/g dry | 8.9 | | 16 | | 32 | | 1.1 | | 890 | | 3200 | 8100 |
| 123789-hexachlorodioxin | P6D789 | pg/g dry | 4.6 | | 8.6 | | 16 | | 0.61 | DB5 | 430 | DB5 | 1500 | 4600 |
| 1234678-heptachlorodioxin | P7D678 | pg/g dry | 39 | | 79 | | 180 | | 60 | | 4200 | | 15000 | 33000 |
| Octachlorodioxin | P98CDD | pg/g dry | 45 | | 85 | | 140 | | 59 | | 3100 | | 12000 | 28000 |
| | | | | | | | | | | | | | | |
| **Sum Furans** | | pg/g dry | 72 | | 65 | | 155 | | 32 | | 2062 | | 7895 | 16963 |
| **Sum dioxins** | | pg/g dry | 113 | | 244 | | 451 | | 162 | | 10085 | | 35503 | 84150 |
| **Sum Dioxins + Furans** | | pg/g dry | 185 | | 309 | | 607 | | 194 | | 12147 | | 43398 | 101113 |
| | | | | | | | | | | | | | | |
| **TEQ (WHO 2005) Mammals** | | pg TEQ/g dr | 18 | | 60 | | 92 | | 42 | | 1700 | | 4400 | 12000 |
| **TEQ (WHO) Fish** | | pg TEQ/g dr | **17** | | **58** | | **88** | | **42** | | **1500** | | **4000** | **11000** |
| **TEQ (WHO) Birds** | | pg TEQ/g dr | 20 | | 62 | | 93 | | 45 | | 1600 | | 4300 | 12000 |
| | | | | | | | | | | | | | | |
| **TEQ (WHO) Fish (corrected for % TOC)** | | | 779 | | 2768 | | 4175 | | 2805 | | 107143 | | 166667 | 458333 |

< : ACTUAL RESULT IS LESS THAN THE REPORTED VALUE - 1/2 detection limit was applied to calculate TEQs

**Table D3. Dioxin and Furan concentrations, particle size and total organic carbon concentrations in sediment collected from the Niagara River, 2015**

| Sediment | | | BLOODY RUN CREEK Btwn stn 132 and stn 17 | BLOODY RUN CREEK (on shore 10m E of Stn 0017) | BLOODY RUN CREEK 18 m U/S of station 25 | | | BLOODY RUN CREEK (Downstream) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Field ID | | GL151083 | GL151085 | GL151204 | | | GL151201 | | |
| | Sample Number | | C224881-0003 | C224881-0005 | C224882-0004 | | | C224882-0001 | | |
| | Station Number | | 1100020030 | 1100020029 | 1100020031 | | | 1100020025 | | |
| | Collection Date | | 10-Jul-15 | 10-Jul-15 | 31-JUL-2015 | | | 31-JUL-2015 | | |
| | | | screening method | screening method | routine method | | | routine method | | |
| | Test Code | Units | | | | | | | | |
| % <62 um, >2.63 um, sum | Silt | % | 70 | 65 | 63 | | | 62 | | |
| % <1000 um, >62 um, sum | Sand | % | 5 | 13 | 0 | | | 18 | | |
| % <2.63 um, >0.10 um, sum | Clay | % | 25 | 22 | 37 | | | 20 | | |
| Carbon; total organic | TOC | mg/g dry | 21 | 20 | 7.8 | | | 12 | | |
| | | | | | | | | | | |
| 2378-tetrachlorofuran | P4F378 | pg/g dry | 320 | 46 | 14 | | DB5 | 6.4 | | DB5 |
| 12378-pentachlorofuran | P5F378 | pg/g dry | 65 | 19 | 1.3 | | | 1.6 | | |
| 23478-pentachlorofuran | P5F478 | pg/g dry | 300 | 60 | 6.3 | | | 4.4 | | |
| 123478-hexachlorofuran | P6F478 | pg/g dry | 2200 | 560 | 31 | | DB5 | 38 | | DB5 |
| 123678-hexachlorofuran | P6F678 | pg/g dry | 510 | 75 | 4.5 | | | 5.5 | | |
| 123789-hexachlorofuran | P6F789 | pg/g dry | 12 | 2 | 0.42 | < | | 0.23 | < | |
| 234678-hexachlorofuran | P6F234 | pg/g dry | 160 | 12 | 1.9 | | | 1.6 | | |
| 1234678-heptachlorofuran | P7F678 | pg/g dry | 2700 | 270 | 27 | | | 23 | | |
| 1234789-heptachlorofuran | P7F789 | pg/g dry | 400 | 64 | 4.1 | | | 5 | | |
| Octachlorofuran | P98CDF | pg/g dry | 15000 | 490 | 65 | | | 52 | | |
| 2378-tetrachlorodioxin | P4D378 | pg/g dry | 2900 | 1600 | 150 | | | 130 | | |
| 12378-pentachlorodioxin | P5D378 | pg/g dry | 110 | 15 | 2.7 | | | 2.3 | | |
| 123478-hexachlorodioxin | P6D478 | pg/g dry | 380 | 53 | 3.2 | | | 3.7 | | |
| 123678-hexachlorodioxin | P6D678 | pg/g dry | 4900 | 1100 | 42 | | | 70 | | |
| 123789-hexachlorodioxin | P6D789 | pg/g dry | 2400 | 550 | 18 | | DB5 | 33 | | DB5 |
| 1234678-heptachlorodioxin | P7D678 | pg/g dry | 23000 | 5500 | 160 | | | 400 | | |
| Octachlorodioxin | P98CDD | pg/g dry | 19000 | 4000 | 100 | | | 280 | | |
| | | | | | | | | | | |
| **Sum Furans** | | pg/g dry | 21667 | 1598 | 156 | | | 138 | | |
| **Sum dioxins** | | pg/g dry | 52690 | 12818 | 476 | | | 919 | | |
| **Sum Dioxins + Furans** | | pg/g dry | 74357 | 14416 | 631 | | | 1057 | | |
| | | | | | | | | | | |
| **TEQ (WHO 2005) Mammals** | | pg TEQ/g dry | 4500 | 1900 | 170 | | | 150 | | |
| **TEQ (WHO) Fish** | | pg TEQ/g dry | **3800** | **1800** | **160** | | | **140** | | |
| **TEQ (WHO) Birds** | | pg TEQ/g dry | 4300 | 1900 | 180 | | | 150 | | |
| | | | | | | | | | | |
| **TEQ (WHO) Fish (corrected for % TOC)** | | | 180952 | 90000 | 20000 | | | 11667 | | |

< : ACTUAL RESULT IS LESS THAN THE REPORTED VALUE - 1/2 detection limit was applied to calculate TEQs

***Appendix E. Total TEQ pg/g* and TEQ for Dioxin-Like (DL) PCBs(pg/g)** in caged mussels (wet wt.) and sediment (dry wt.) collected from the Niagara River (1987-2015).***

***NR-Niagara River; ND-below the detection limit***

| | | Mussels | | Sediment | | |
|---|---|---|---|---|---|---|
| **STATION** | **YEAR** | **Total TEQ** | **DL-PCB TEQ** | **Total TEQ** | **DL-PCB TEQ** | **TOC (mg/g)** |
| **Canadian Sites** | | | | | | |
| NR - Fort Erie | 1995 | ND | | 0.9 | | |
| | 1997 | | | 10 | | 20 |
| | 2000 | 0.01 | 0.01 | 2 | 0.01 | 9 |
| NR - Chippawa Channel | 2000 | ND | ND | 0.01 | 0.01 | 5 |
| Niagara-on-the-Lake | 1993 | ND | | 13 | | |
| | 1995 | ND | | 14 | | |
| | 1997 | ND | | | | |
| | 2000 | 0.01 | 0.01 | | | |
| | 2003 | | | 8 | 0.05 | 7 |
| **American Sites** | | | | | | |
| Tonawanda Channel (U/S Two Mile Ck.) | 2009 | 0.01 | | | | |
| Scajaquada Creek | 2009 | 0.03 | | 13 | | 45 |
| Rattlesnake Creek | 2009 | 0.11 | | 13 | | 30 |
| Two Mile Creek | 2000 | | | 30 | 3.3 | 39 |
| | 2003 | | | 52 | 1.4 | 65 |
| **Two Mile Creek (near HWY 290)** | **2015** | | | **1** | | **10** |
| **Two Mile Creek (near Sheridan Rd.)** | **2015** | | | **27** | | **82** |
| Exalon (upstream) in Erie Canal | 2003 | 0.04 | 0.04 | 77 | 0.2 | 33 |
| NR - Gratwick /Riverside Park | 1991 | 15 | | | | |
| NR - Wheatfield | 1987 | ND | | | | |
| Little Niagara River (downstream 102nd St.) | 2006 | 16 | | 300 | 2.1 | 43 |
| Cayuga Creek | 1995 | 18 | | 18 | | |
| | 2003 | 0.16 | 0.05 | 59 | 0.3 | 82 |
| Little Niagara River (downstream Cayuga Ck.) | 2006 | 8 | | 140 | 0.6 | 110 |
| Occidental Sewer 003 | 1991 | ND | | | | |
| Gill Creek (upstream in Creek) | 2000 | | | 71 | 0.8 | 14 |
| | 2003 | 0.44 | 0.08 | 88 | 1.0 | 17 |
| | 2006 | 1 | | 28 | 0.3 | 8 |
| NR - 102nd Street | 1991 | 70 | | | | |
| | 1993 | 96 | | 230 | | |
| | 1995 | 130 | | 500 | | |
| | 1997 | 1 | | ND | | ND |
| Pettit Flume (upstream) | 1991 | 5 | | | | |
| | 1993 | ND | | 26 | | |
| | 2000 | ND | 0.05 | 13 | 0.3 | 23 |
| | 2003 | ND | ND | 37 | 0.3 | 34 |
| | 2006 | 0.03 | | 15 | | |
| | 2009 | 0.010 | | 21 | | 44 |
| | 2012 | 0.10 | | | | |
| | **2015** | **ND** | | **10** | | **35** |
| Pettit Flume Cove (site A) | 1991 | 960 | | | | |
| | 1993 | 200 | | 48000 | | |
| Pettit Flume Cove (site B) | 1997 | 46 | | 20000 | | 110 |
| | 2000 | 74 | ND | 30000 | 2.6 | 120 |
| | 2003 | 60 | 0.05 | 11000 | 1.4 | 120 |
| | 2006 | 190 | | 15000 | | |
| | 2009 | 46 | | 3800 | | 71 |
| | 2012 | 4 | | 25500 | | 83 |
| | **2015** | **11** | | **8800** | | **100** |
| Pettit Flume (downstream) | 2000 | 3 | 0.03 | 490 | 0.2 | 33 |
| | 2003 | 0.36 | 0.01 | 2000 | 0.3 | 20 |
| | 2006 | 5 | | 680 | | |
| | 2009 | 1 | | 7200 | | 47 |
| | 2012 | 8 | | 380 | | 26 |
| | **2015** | **0.4** | | **840** | | **22** |
| Fisherman's Park (upstream inlet) | 2012 | 3 | | 330 | | 37 |
| | **2015** | **0.3** | | **840** | | **83** |
| Fisherman's Park (downstream inlet) | 2012 | 0.4 | | 210 | | 41 |
| | **2015** | **0.2** | | **390** | | **49** |
| NR - upstream of Bloody Run Creek | 2000 | ND | ND | 43 | 0.3 | 5 |
| | 2003 | | | 180 | 0.4 | 5 |
| | 2004 | 0.01 | 0.01 | | | |
| | 2006 | 2 | | 36 | | 12 |
| | 2009 | ND | | 44 | | 9 |
| | 2012 | | | 346 | | 10 |
| | **2015** | **ND** | | **88** | | **21** |
| NR- Bloody Run Creek (BRC) | 1993 | 270 | | 120000 | | |
| | 1994 | 56 | | | | |
| | 1995 | 120 | | 61000 | | |
| | 1997 | 84 | | 52000 | | 29 |
| | 2000 | 23 | 0.04 | 3300 | | 7 |
| | 2003 | | | 110000 | 6.2 | 22 |
| | 2004 | 46 | 0.06 | | | |
| | 2006 | 45 | | 4200 | | 14 |
| | 2009 | 18 | | 48000 | | 16 |
| | 2012 | 9 | | 4000 | | 5 |
| | **2015** | **7** | | **11000** | | **24** |
| Bloody Run Creek (downstream) | 2004 | 9 | 0.02 | | | |
| | 2006 | 6 | | 220 | | 7 |
| | 2009 | 6 | | 2200 | | 22 |
| | 2012 | 1 | | | | |
| | **2015** | **1** | | **150** | | **12** |

*Dioxin, furan and dioxin-like PCB concentrations were multiplied by the WHO Toxicity *Equivalency Factors (TEF) for protection of fish to express their respective toxicity* on a common basis and then summed to yield a total toxic equivalent (TEQ).

** Analysis for dioxin-like PCBs was not available prior to 2000

# Appendix F1-F4: SPMD Data

AXYS Data Qualifiers

U or ND = not detected above the reporting limit

K or NDR = peak detected, but did not meet quantification criteria, result reported represents the estimated maximum possible concentration.

This flag indicates that for one of several reasons (low level interferences, poor peak shape, etc) the peak for this compound was detected but did not meet all the criteria required by the method, please treat the value as an estimated maximum.

D = Dilution data. Either due to matrix interferences of analyte levels out of linear range of the instrument. Extract was diluted and instrumentally re-analyzed.

J = Concentration was found to be below the linear range of the instrument, the value should be considered to be estimated

V = Surrogate recovery is not within method/contract control limits

NQ = Data not quantifiable

E = Exceeds calibrated linear range, see dilution data

X = results reported separately (original report and separate reports)

H = concentration is estimated (information only value)

T = Data recalculated using an alternate surrogate

C = compound co-elutes with at least one other compound, the result is only reported once for each coelution

MAX = Concentration should be considered to be an estimated maximum

Q = Maximum concentration, single GC column result, not confirmed by second column

**Appendix F1:** SPMD data for Lab Blank and Spiked Matrix - concentrations represent ng/SPMD unless noted otherwise

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLIENT_ID | | Lab Blank (101) | | | Lab Blank (101) | | | Lab Blank (101) | | | Lab Blank (101) | | | Lab Blank (101) | | | Lab Blank (101) | |
| Axys ID | | WG53086-101 i | | | WG52369-101 i | | | WG52371-101 i | | | WG52400-101 | | | WG52449-101 | | | WG52450-101 i | |
| WORKGROUP | | WG53086 | | | WG52369 | | | WG52371 | | | WG52400 | | | WG52449 | | | WG52450 | |
| Sample Size | | 1sample | | | 1sample | | | 1sample | | | 1sample | | | 1sample | | | 1sample | |
| UNITS | flag | ng/sample | ng/sample (RL) | flag | ng/sample | ng/sample (RL) | flag | ng/sample | ng/sample (RL) | flag | ng/sample | ng/sample (RL) | flag | ng/sample | ng/sample (RL) | flag | ng/sample | ng/sample (RL) |
| 1,3-Dichlorobenzene | ND H | | 3.93 | J | 2.71 | 0.86 | | 3.26 | 0.74 | NQ | | | J | 2.22 | 1.06 | NDR J | 1.29 | 1.01 |
| 1,4-Dichlorobenzene | H | 8.08 | 4.01 | | 16.2 | 0.925 | | 13.4 | 0.755 | NQ | | | | 10.9 | 1.05 | | 9.52 | 1.03 |
| 1,2-Dichlorobenzene | ND H | | 3.77 | J | 2.84 | 0.905 | NDR J | 2.04 | 0.748 | NQ | | | NDR J | 1.16 | 0.887 | J | 1.82 | 1.02 |
| 1,3,5-Trichlorobenzene | ND | | 1.79 | ND | | 0.614 | ND | | 0.67 | ND | | 0.827 | ND | | 0.483 | ND | | 0.708 |
| 1,2,4-Trichlorobenzene | ND | | 1.86 | ND | | 0.628 | ND | | 0.712 | ND | | 0.842 | ND | | 0.491 | ND | | 0.753 |
| 1,2,3-Trichlorobenzene | ND | | 1.92 | NDR J | 2.11 | 0.638 | NDR J | 0.872 | 0.731 | ND | | 0.846 | ND | | 0.494 | ND | | 0.773 |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | ND | | 0.599 | ND | | 0.177 | ND | | 0.153 | ND | | 0.267 | ND | | 0.177 | ND | | 0.182 |
| 1,2,3,4-Tetrachlorobenzene | ND | | 0.611 | ND | | 0.18 | ND | | 0.155 | ND | | 0.272 | ND | | 0.18 | ND | | 0.185 |
| Hexachlorobutadiene | ND | | 0.611 | ND | | 0.18 | NDR J | 0.596 | 0.155 | NDR J | 0.324 | 0.272 | ND | | 0.18 | ND | | 0.185 |
| Pentachlorobenzene | ND | | 0.858 | ND | | 0.231 | ND | | 0.327 | ND | | 0.506 | ND | | 0.208 | ND | | 0.643 |
| Hexachlorobenzene | NDR J | 0.5 | 0.435 | J | 0.425 | 0.2 | J | 0.426 | 0.359 | J | 0.472 | 0.141 | J | 0.484 | 0.143 | J | 0.514 | 0.338 |
| HCH, alpha | ND | | 1.02 | ND | | 0.612 | ND | | 0.678 | ND | | 0.822 | ND | | 0.807 | ND | | 0.967 |
| HCH, beta | ND | | 1.71 | ND | | 0.617 | ND | | 1.31 | ND | | 1.26 | ND | | 0.867 | ND | | 1.19 |
| HCH, gamma | ND | | 1.29 | ND | | 0.807 | ND | | 0.904 | ND | | 0.928 | ND | | 0.728 | ND | | 1.14 |
| Heptachlor | ND | | 0.672 | ND | | 0.796 | ND | | 1.18 | ND | | 0.757 | ND | | 0.42 | ND | | 1.41 |
| Aldrin | ND | | 0.624 | ND | | 0.414 | ND | | 0.672 | ND | | 0.587 | ND | | 0.477 | ND | | 0.793 |
| Chlordane, gamma (trans) | ND | | 0.284 | ND | | 0.159 | ND | | 0.345 | ND | | 0.174 | ND | | 0.153 | ND | | 0.337 |
| Chlordane, alpha (cis) | ND | | 0.332 | ND | | 0.189 | ND | | 0.411 | ND | | 0.209 | ND | | 0.183 | ND | | 0.401 |
| Octachlorostyrene | ND | | 0.348 | ND | | 0.147 | ND | | 0.264 | ND | | 0.251 | ND | | 0.215 | ND | | 0.446 |
| Chlordane, oxy- | ND | | 1.28 | ND | | 1.4 | ND | | 1.1 | ND | | 1.72 | ND | | 1.21 | ND | | 1.24 |
| Nonachlor, trans- | ND | | 0.125 | ND | | 0.154 | ND | | 0.142 | ND | | 0.108 | ND | | 0.107 | ND | | 0.117 |
| Nonachlor, cis- | ND | | 0.146 | ND | | 0.175 | ND | | 0.165 | ND | | 0.128 | ND | | 0.126 | ND | | 0.136 |
| Mirex | ND | | 0.369 | ND | | 0.302 | ND | | 0.15 | ND | | 0.164 | ND | | 0.204 | ND | | 0.211 |
| 2,4'-DDE | ND | | 0.106 | ND | | 0.103 | ND | | 0.11 | ND | | 0.0848 | ND | | 0.0853 | ND | | 0.129 |
| 4,4'-DDE | ND | | 0.148 | NDR J | 0.19 | 0.144 | NDR J | 0.224 | 0.153 | NDR J | 0.202 | 0.119 | NDR J | 0.171 | 0.119 | ND | | 0.18 |
| 2,4'-DDD | ND | | 0.145 | ND | | 0.17 | ND | | 0.144 | ND | | 0.13 | ND | | 0.135 | ND | | 0.122 |
| 4,4'-DDD | ND | | 0.195 | ND | | 0.178 | ND | | 0.184 | ND | | 0.146 | ND | | 0.145 | ND | | 0.181 |
| 2,4'-DDT | ND | | 0.19 | ND | | 0.183 | ND | | 0.176 | ND | | 0.129 | ND | | 0.128 | ND | | 0.172 |
| 4,4'-DDT | ND | | 0.221 | ND | | 0.213 | ND | | 0.214 | ND | | 0.157 | ND | | 0.156 | ND | | 0.21 |
| 13C-1,4-Dichlorobenzene (% Recovery) | H | 4.08 | | | 19.3 | | | 10.2 | | NQ | | | | 10.2 | | | 10.3 | |
| 13C-1,2,3-Trichlorobenzene (% Recovery) | | 6.15 | | | 44.8 | | | 24.7 | | | 11 | | | 20.3 | | | 22.1 | |
| 13C-1,2,3,4-Tetrachlorobenzene (% Recovery) | | 11.8 | | | 51.1 | | | 33.4 | | | 19 | | | 28.8 | | | 29.2 | |
| 13C-Pentachlorobenzene (% Recovery) | V | 20.3 | | | 52.5 | | | 38.8 | | V | 27.8 | | | 37.3 | | | 31.6 | |
| 13C-Hexachlorobenzene (% Recovery) | | 38.4 | | | 58.6 | | | 52.8 | | | 47.8 | | | 52 | | | 39 | |
| 13C-beta-HCH (% Recovery) | | 52.5 | | | 63.1 | | | 50.9 | | | 51.4 | | | 51.9 | | | 42.8 | |
| 13C-gamma-HCH (% Recovery) | | 57.7 | | | 67.9 | | | 59.8 | | | 60.6 | | | 66.1 | | | 43 | |
| 13C-Heptachlor (% Recovery) | | 63.6 | | | 57.4 | | | 73.9 | | | 64.4 | | | 62.6 | | | 42.1 | |
| 13C-Aldrin (% Recovery) | | 65.4 | | | 67.1 | | | 67.7 | | | 68.4 | | | 69.7 | | | 45.7 | |
| 13C-Chlordane, gamma (trans) (% Recovery) | | 84.9 | | | 76.7 | | | 82.4 | | | 86.9 | | | 86.3 | | | 70.3 | |
| 13C-Nonachlor, trans- (% Recovery) | | 85.1 | | | 74 | | | 85 | | | 85.3 | | | 85 | | | 68.5 | |
| 13C-4,4'-DDE (% Recovery) | | 95.3 | | | 80.5 | | | 83.1 | | | 93.5 | | | 94.7 | | | 81.1 | |
| 13C-4,4'-DDT (% Recovery) | | 88.3 | | | 78.9 | | | 83 | | | 93.5 | | | 92.7 | | | 75.3 | |
| 13C-4,4'-DDD (ng/sample) | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLIENT_ID | | Lab Blank DB17 | | | Spiked Matrix DB17 | | | Lab Blank DB5 | | | Spiked Matrix DB5 | | | Spiked Matrix DB5 | | | Lab Blank DB5 | |
| Axys ID | | WG53086-101 i | | | WG53086-102 i | | | WG52369-101 | | | WG52369-102 | | | WG52371-102 | | | WG52400-101 | |
| WORKGROUP | | WG53086 | | | WG53086 | | | WG52369 | | | WG52369 | | | WG52371 | | | WG52400 | |
| Sample Size | | 1sample | | | | | | 1sample | | | | | | | | 1sample | | |
| UNITS | flag | ng/sample | ng/sample (RL) | flag | % Recovery | - | | flag | ng/sample | flag | % Recovery | - | flag | % Recovery | - | flag | ng/sample | ng/sample (RL) |
| HCH, delta | ND | | 0.15 | | 69.5 | | | ND | | | 102 | | | 106 | | ND | | 0.076 |
| Heptachlor Epoxide | ND | | 0.0893 | | 79.2 | | | ND | | | 90.8 | | | 94.5 | | ND | | 0.0751 |
| Dieldrin | ND | | 0.127 | | 128 | | | ND | | | 113 | | | 112 | | ND | | 0.157 |
| Endrin | ND | | 0.131 | | 126 | | | ND | | | 115 | | | 114 | | ND | | 0.161 |
| Endrin Aldehyde | ND | | 0.171 | | 77 | | | ND | | | 89.7 | | | 84 | | ND | | 0.254 |
| Endrin Ketone | ND | | 0.0629 | | 89 | | | ND | | | 98.9 | | | 119 | | ND | | 0.108 |
| Methoxychlor | ND | | 0.137 | | 89.4 | | | ND | | | 88.4 | | | 115 | | ND | | 0.236 |
| alpha-Endosulphan | J | 0.12 | 0.105 | | 110 | | | ND | | | 93.7 | | | 92.3 | | ND | | 0.146 |
| beta-Endosulphan | ND | | 0.124 | | 110 | | | ND | | | 102 | | | 90.4 | | ND | | 0.154 |
| Endosulphan Sulphate | ND | | 0.151 | | 86.3 | | | ND | | | 94.1 | | | 111 | | ND | | 0.199 |
| D4-alpha-Endosulphan (% Recovery) DB5 | | | | | | | | | 99.1 | | 101 | | | 87.1 | | | 82.8 | |
| D4-beta-Endosulphan (% Recovery) DB5 | | | | | | | | | 79.6 | | 87.6 | | | 80.6 | | | 76.8 | |
| D4-alpha-Endosulphan (% Recovery) DB17 | | 89.6 | | | 106 | | | | | | | | | | | | | |
| D4-beta-Endosulphan (% Recovery) DB17 | | 88.4 | | | 67.7 | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLIENT_ID | | Spiked Matrix DB5 | | | Lab Blank DB17 | | | Lab Blank DB17 | | | Lab Blank DB5 | | | Lab Blank DB17 | | | Lab Blank DB5 | |
| Axys ID | | WG52400-102 | | | WG52369-101 | | | WG52371-101 | | | WG52371-101 | | | WG52449-101 | | | WG52449-101 | |
| WORKGROUP | | WG52400 | | | WG52369 | | | WG52371 | | | WG52371 | | | WG52449 | | | WG52449 | |
| Sample Size | | | | | 1sample | | | 1sample | | | 1sample | | | 1sample | | | 1sample | |
| UNITS | flag | % Recovery | - | flag | ng/sample | ng/sample (RL) | flag | ng/sample | ng/sample (RL) | flag | ng/sample | ng/sample (RL) | flag | ng/sample | ng/sample (RL) | flag | ng/sample | ng/sample (RL) |
| HCH, delta | | 105 | | ND | | 0.0659 | ND | | 0.097 | ND | | 0.172 | ND | | 0.098 | ND | | 0.132 |
| Heptachlor Epoxide | | 93.4 | | ND | | 0.0555 | ND | | 0.135 | ND | | 0.0203 | ND | | 0.149 | ND | | 0.0762 |
| Dieldrin | | 109 | | ND | | 0.0656 | ND | | 0.0385 | ND | | 0.132 | ND | | 0.213 | ND | | 0.254 |
| Endrin | | 109 | | ND | | 0.0854 | ND | | 0.0397 | ND | | 0.134 | ND | | 0.219 | ND | | 0.259 |
| Endrin Aldehyde | | 72.6 | | ND | | 0.0289 | ND | | 0.0517 | ND | | 0.212 | ND | | 0.286 | ND | | 0.41 |
| Endrin Ketone | | 88.4 | | ND | | 0.0134 | ND | | 0.0451 | ND | | 0.0358 | ND | | 0.0247 | ND | | 0.0295 |
| Methoxychlor | | 84.3 | | ND | | 0.0291 | ND | | 0.098 | ND | | 0.078 | ND | | 0.0537 | ND | | 0.0644 |
| alpha-Endosulphan | | 90.7 | | ND | | 0.102 | ND | | 0.0263 | ND | | 0.0955 | ND | | 0.193 | ND | | 0.231 |
| beta-Endosulphan | | 91.2 | | ND | | 0.0546 | ND | | 0.0376 | ND | | 0.129 | ND | | 0.208 | ND | | 0.249 |
| Endosulphan Sulphate | | 85.6 | | ND | | 0.0629 | ND | | 0.0456 | ND | | 0.166 | ND | | 0.252 | ND | | 0.321 |
| D4-alpha-Endosulphan (% Recovery) DB5 | | 97.5 | | | | | | | | | 83.3 | | | | | | 88.1 | |
| D4-beta-Endosulphan (% Recovery) DB5 | | 89 | | | | | | | | | 69 | | | | | | 90 | |

**Appendix F1:** SPMD data for Lab Blank and Spiked Matrix - concentrations represent ng/SPMD unless noted otherwise

| CLIENT_ID | | Spiked Matrix (102) | | Spiked Matrix (102) | | Spiked Matrix (102) | | Spiked Matrix (102) | | Spiked Matrix (102) | | Spiked Matrix (102) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | | WG53086-102 i | | WG52369-102 i2 | | WG52371-102 i | | WG52400-102 i | | WG52449-102 | | WG52450-102 i |
| WORKGROUP | | WG53086 | | WG52369 | | WG52371 | | WG52400 | | WG52449 | | WG52450 |
| Sample Size | | | | | | | | | | | | |
| UNITS | flag | % Recovery - | flag | % Recovery - | flag | % Recovery - | flag | % Recovery - | flag | % Recovery - | flag | % Recovery - |
| 1,3-Dichlorobenzene | | 97.3 | | 113 | | 73.3 | | 97.1 | | 111 | | 130 |
| 1,4-Dichlorobenzene | | 113 | | 114 | | 81 | | 109 | | 108 | | 105 |
| 1,2-Dichlorobenzene | | 83.1 | | 91.7 | | 60.9 | | 90.4 | | 110 | | 121 |
| 1,3,5-Trichlorobenzene | | 99.3 | | 86.9 | | 67.5 | | 87.8 | | 78.7 | | 97.9 |
| 1,2,4-Trichlorobenzene | | 98.3 | | 92.9 | | 79.6 | | 95 | | 89 | | 104 |
| 1,2,3-Trichlorobenzene | | 114 | | 96.6 | | 90.7 | | 99.9 | | 93.7 | | 110 |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | | 93 | | 99 | | 99.3 | | 95.5 | | 91.5 | | 96.1 |
| 1,2,3,4-Tetrachlorobenzene | | 101 | | 101 | | 105 | | 96.8 | | 98.9 | | 99.6 |
| Hexachlorobutadiene | | | | | | | | | | | | |
| Pentachlorobenzene | | 99.9 | | 100 | | 103 | | 99 | | 99.5 | | 99.8 |
| Hexachlorobenzene | | 94.2 | | 95.1 | | 94.2 | | 91.8 | | 92.6 | | 92.4 |
| HCH, alpha | | 79.5 | | 86.4 | | 82.4 | | 82.7 | | 81.7 | | 85.1 |
| HCH, beta | | 99.2 | | 101 | | 101 | | 99.4 | | 97 | | 99.8 |
| HCH, gamma | | 93.7 | | 98.8 | | 93.3 | | 97.5 | | 91.7 | | 101 |
| Heptachlor | | 97.9 | | 89.7 | | 90.2 | | 95.4 | | 94 | | 87.6 |
| Aldrin | | 98.1 | | 94.9 | | 103 | | 98.2 | | 97.7 | | 98.6 |
| Chlordane, gamma (trans) | | 99.7 | | 98.5 | | 104 | | 98 | | 96.9 | | 99.3 |
| Chlordane, alpha (cis) | | 99.5 | | 99.7 | | 108 | | 100 | | 102 | | 103 |
| Octachlorostyrene | | 94 | | 92.3 | | 98 | | 91.2 | | 89 | | 92 |
| Chlordane, oxy- | | 95.5 | | 104 | | 90.3 | | 91.8 | | 91.7 | | 85.4 |
| Nonachlor, trans- | | 97.4 | | 98.6 | | 103 | | 98.6 | | 97.3 | | 99.6 |
| Nonachlor, cis- | | 107 | | 103 | | 113 | | 115 | | 108 | | 116 |
| Mirex | | 114 | | 95.3 | | 106 | | 103 | | 100 | | 99.8 |
| 2,4'-DDE | | 93.9 | | 99.6 | | 96.6 | | 90.9 | | 94.3 | | 94.2 |
| 4,4'-DDE | | 93.7 | | 96.9 | | 94.3 | | 93.8 | | 93.9 | | 93 |
| 2,4'-DDD | | 91.1 | | 98.9 | | 98.9 | | 95 | | 94.8 | | 95.3 |
| 4,4'-DDD | | 96.7 | | 103 | | 106 | | 102 | | 99.9 | | 96.8 |
| 2,4'-DDT | | 94.2 | | 102 | | 103 | | 90.8 | | 93.3 | | 97.8 |
| 4,4'-DDT | | 96.6 | | 97.5 | | 104 | | 98.4 | | 97.4 | | 97.2 |
| 13C-1,4-Dichlorobenzene (% Recovery) | | 5.33 | | 11.8 | | 2.87 | | 9.1 | | 5.61 | | 7.54 |
| 13C-1,2,3-Trichlorobenzene (% Recovery) | | 10.5 | | 33.2 | | 9.47 | | 16.9 | | 13.7 | | 15.1 |
| 13C-1,2,3,4-Tetrachlorobenzene (% Recovery) | | 16.5 | | 39.4 | | 16.2 | | 22.6 | | 23.1 | | 20 |
| 13C-Pentachlorobenzene (% Recovery) | V | 25.7 | | 46.1 | | 31.9 | V | 26.6 | | 33 | V | 25.9 |
| 13C-Hexachlorobenzene (% Recovery) | | 42.2 | | 59.3 | | 56.8 | | 39.8 | | 46.4 | | 41 |
| 13C-beta-HCH (% Recovery) | | 47.3 | | 69.6 | | 53.4 | | 45.5 | | 58.3 | | 50.2 |
| 13C-gamma-HCH (% Recovery) | | 55.8 | | 72.4 | | 62.6 | | 51.7 | | 64.2 | | 48.5 |
| 13C-Heptachlor (% Recovery) | | 60.6 | | 63.6 | | 74.1 | | 53.7 | | 54.6 | | 48.6 |
| 13C-Aldrin (% Recovery) | | 63.1 | | 77 | | 71.5 | | 59.1 | | 62.3 | | 54.2 |
| 13C-Chlordane, gamma (trans) (% Recovery) | | 82.4 | | 83.5 | | 84.2 | | 80 | | 80.3 | | 75.5 |
| 13C-Nonachlor, trans- (% Recovery) | | 83.9 | | 83.3 | | 88.8 | | 81.7 | | 81.6 | | 77.2 |
| 13C-4,4'-DDE (% Recovery) | | 91.2 | | 90.1 | | 85.8 | | 91.5 | | 89.6 | | 84.2 |
| 13C-4,4'-DDT (% Recovery) | | 86.3 | | 93.1 | | 85.7 | | 98.9 | | 88.8 | | 81.2 |
| 13C-4,4'-DDD (ng/sample) | | | | | | | | | | | | |

| CLIENT_ID | | Lab Blank DB5 | | | Spiked Matrix DB5 | | | Spiked Matrix DB17 | | Spiked Matrix DB17 | | Lab Blank DB17 | | | Spiked Matrix DB17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | | WG53086-101 i | | | WG53086-102 i | | | WG52369-102 | | WG52371-102 | | WG52400-101 | | | WG52400-102 |
| WORKGROUP | | WG53086 | | | WG53086 | | | WG52369 | | WG52371 | | WG52400 | | | WG52400 |
| Sample Size | | 1sample | | | | | | | | | | 1sample | | | |
| UNITS | flag | ng/sample | ng/sample (RL) | flag | % Recovery - | ng/sample (RL) | flag | % Recovery - | flag | % Recovery - | flag | ng/sample | ng/sample (RL) | flag | % Recovery - |
| HCH, delta | J | 0.92 | 0.2 | | 88.9 | 0.0786 | | 99.7 | | 105 | ND | | 0.219 | | 100 |
| Heptachlor Epoxide | ND | | 0.0596 | | 93.1 | 0.0226 | | 92.8 | | 97.3 | ND | | 0.128 | | 96.9 |
| Dieldrin | ND | | 0.141 | | 103 | 0.0998 | | 121 | | 122 | ND | | 0.0998 | | 120 |
| Endrin | ND | | 0.144 | | 105 | 0.0465 | | 117 | | 119 | ND | | 0.103 | | 117 |
| Endrin Aldehyde | ND | | 0.228 | | 66.5 | 0.0634 | | 88.7 | | 99.8 | ND | | 0.134 | | 75.6 |
| Endrin Ketone | ND | | 0.059 | | 89.6 | 0.0304 | | 99.7 | | 121 | ND | | 0.0581 | | 88.3 |
| Methoxychlor | ND | | 0.129 | | 92.2 | 0.0662 | | 88.2 | | 116 | ND | | 0.126 | | 85.2 |
| alpha-Endosulphan | ND | | 0.123 | | 93.6 | 0.0859 | | 97.7 | | 96 | ND | | 0.0847 | | 111 |
| beta-Endosulphan | ND | | 0.138 | | 94.5 | 0.107 | | 111 | | 98 | ND | | 0.0975 | | 97.8 |
| Endosulphan Sulphate | ND | | 0.178 | | 81.6 | 0.0496 | | 105 | | 120 | ND | | 0.141 | | 93.5 |
| D4-alpha-Endosulphan (% Recovery) DB5 | | 94 | | | 98.2 | | | | | | | | | | |
| D4-beta-Endosulphan (% Recovery) DB5 | | 92.4 | | | 86.9 | | | | | | | | | | |
| D4-alpha-Endosulphan (% Recovery) DB17 | | | | | | | | 101 | | 85.5 | | 83.1 | | | 98.5 |
| D4-beta-Endosulphan (% Recovery) DB17 | | | | | | | | 85.4 | | 75.3 | | 80.7 | | | 83.5 |

| CLIENT_ID | | Spiked Matrix DB17 | | Spiked Matrix DB5 | | Lab Blank DB17 | | | Lab Blank DB5 | | | Spiked Matrix DB17 | | Spiked Matrix DB5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | | WG52449-102 | | WG52449-102 | | WG52450-101 | | | WG52450-101 | | | WG52450-102 | | WG52450-102 |
| WORKGROUP | | WG52449 | | WG52449 | | WG52450 | | | WG52450 | | | WG52450 | | WG52450 |
| Sample Size | | | | | | 1sample | | | 1sample | | | | | |
| UNITS | flag | % Recovery - | flag | % Recovery - | flag | ng/sample | ng/sample (RL | g | 'sam | ng/sample (RL | g | Recov - | flag | Recov - |
| HCH, delta | | 87.9 | | 104 | ND | | 0.152 | D | | 0.319 | | 92 | | 104 |
| Heptachlor Epoxide | | 87.5 | | 89.7 | ND | | 0.21 | D | | 0.0788 | | 90 | | 89 |
| Dieldrin | | 110 | | 102 | ND | | 0.137 | D | | 0.157 | | 100 | | 94 |
| Endrin | | 107 | | 105 | ND | | 0.141 | D | | 0.16 | | 95 | | 91 |
| Endrin Aldehyde | | 79.6 | | 72.8 | ND | | 0.184 | D | | 0.254 | | 71 | | 61 |
| Endrin Ketone | | 110 | | 104 | ND | | 0.0236 | D | | 0.0339 | | 104 | | 103 |
| Methoxychlor | | 119 | | 105 | ND | | 0.0513 | D | | 0.0739 | | 96 | | 97 |
| alpha-Endosulphan | | 96.1 | | 91 | ND | | 0.203 | D | | 0.223 | | 98 | | 94 |
| beta-Endosulphan | | 99.8 | | 92.9 | ND | | 0.134 | D | | 0.154 | | 99 | | 91 |
| Endosulphan Sulphate | | 106 | | 95.7 | ND | | 0.162 | D | | 0.199 | | 103 | | 92 |
| D4-alpha-Endosulphan (% Recovery) DB5 | | | | 75 | | | | | 71 | | | | | 87 |
| D4-beta-Endosulphan (% Recovery) DB5 | | | | 75 | | | | | 94 | | | | | 98 |
| D4-alpha-Endosulphan (% Recovery) DB17 | | 74.5 | | | | 67.3 | | | | | | 82 | | |
| D4-beta-Endosulphan (% Recovery) DB17 | | 71.1 | | | | 90.3 | | | | | | 90 | | |

**Appendix F2:** SPMD data for American deployments - concentrations represent ng/SPMD

Gratwick Riverside Park (GRP)

Little Niagara River (LNR)

Niagara-on-the-Lake (NOTL)

| CLIENT_ID | GRP (Middle of Park) Field Blank | | Bloody Run Ck Field Blank | | Ushers Ck Field Blank | | Two Mile Ck (Mouth)-1 | | Two Mile Ck (Mouth)-2 | | Two Mile Ck (Mouth)-3 | | Pettit Flume (D/S)-1 | | Pettit Flume (D/S)-2 | | Pettit Flume (D/S)-3 | | Pettit Flume (Outer Site B)-1 | | Pettit Flume (Outer Site B)-2 | | Pettit Flume (Outer Site B)-3 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | L23776-1 i | | L23776-2 i | | L23776-4 i | | L23776-5 L | | L23776-6 L | | L23776-7 L | | L23776-8 i | | L23776-9 L | | L23776-10 L | | L23776-11 L | | L23776-12 L | | L23776-13 L | |
| WORKGROUP | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | |
| Sample Size | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | |
| UNITS | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| 1,3-Dichlorobenzene | J | 2.62 | J | 2.38 | J | 1.8 | J | 2.84 | J | 1.79 | J | 1.94 | | 6.71 | | 4.79 | | 4.71 | | 311 | | 373 | NQ | |
| 1,4-Dichlorobenzene | | 14.4 | | 12.2 | | 11 | | 21.6 | | 18 | | 17.6 | | 24 | | 32.3 | | 32.1 | | 608 | | 848 | NQ | |
| 1,2-Dichlorobenzene | | 3.22 | J | 2.84 | J | 1.71 | J | 2.47 | J | 2.48 | J | 2.66 | J | 2.87 | | 4.46 | | 4.67 | | 150 | | 199 | NQ | |
| 1,3,5-Trichlorobenzene | ND | | ND | | ND | | J | 2.57 | J | 1.73 | J | 1.96 | | 6.61 | | 6.51 | | 6.76 | | 336 | | 326 | | 378 |
| 1,2,4-Trichlorobenzene | ND | | ND | | NDR J | 0.651 | | 10.4 | | 7.55 | | 8.06 | | 15.6 | | 14.4 | | 17 | | 1400 | | 1250 | | 1560 |
| 1,2,3-Trichlorobenzene | ND | | NDR J | 2.11 | ND | | | 3.61 | J | 2.34 | J | 2.82 | | 6.43 | | 6.56 | | 7.57 | | 880 | | 762 | | 968 |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | ND | | ND | | ND | | J | 3.45 | J | 3.1 | J | 3.03 | | 16.1 | | 16.4 | | 17.1 | | 897 | | 980 | | 965 |
| 1,2,3,4-Tetrachlorobenzene | J | 0.24 | ND | | ND | | | 3.33 | | 3.02 | | 3.3 | | 19.9 | | 20 | | 21.4 | D | 1440 | D | 1530 | D | 1630 |
| Hexachlorobutadiene | ND | | ND | | ND | | J | 1.61 | NDR J | 1.09 | J | 0.992 | J | 0.391 | NDR J | 0.404 | J | 0.352 | | 10.5 | | 13.7 | | 10.4 |
| Pentachlorobenzene | ND | | J | 0.554 | ND | | | 12 | | 11.3 | | 11.6 | | 28.2 | | 27.6 | | 29.7 | D | 1160 | D | 1230 | D | 1150 |
| Hexachlorobenzene | J | 0.606 | J | 0.866 | J | 0.556 | | 25.5 | | 24.1 | | 26.2 | | 29.1 | | 27.2 | | 29.2 | D | 542 | D | 558 | D | 527 |
| HCH, alpha | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, beta | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, gamma | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Heptachlor | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Aldrin | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Chlordane, gamma (trans) | ND | | ND | | ND | | | 14.8 | | 14.8 | | 15.9 | J | 2.6 | J | 2.69 | J | 2.74 | | 13.5 | | 14.5 | | 14.2 |
| Chlordane, alpha (cis) | ND | | ND | | ND | | | 23.9 | | 24 | | 26.2 | J | 3.4 | J | 3.84 | J | 3.99 | | 23 | | 22.9 | | 23 |
| Octachlorostyrene | ND | | ND | | ND | | ND | | J | 0.416 | ND | | ND | | ND | | ND | | J | 1.57 | J | 1.6 | J | 1.39 |
| Chlordane, oxy- | NDR | 24.8 | NDR | 20.6 | NDR | 21.6 | NDR | 23.1 | NDR | 22 | NDR | 22.6 | NDR | 19.3 | NDR | 15.3 | NDR | 20.9 | NDR | 28.8 | NDR | 26.3 | NDR | 29.7 |
| Nonachlor, trans- | ND | | ND | | ND | | | 9.64 | | 9.76 | | 10.2 | J | 1.88 | J | 1.84 | J | 2.31 | | 8.42 | | 8.39 | | 8.14 |
| Nonachlor, cis- | ND | | ND | | ND | | J | 2.57 | J | 2.56 | J | 2.82 | J | 0.624 | J | 0.58 | J | 0.669 | J | 2.3 | J | 2.11 | J | 2.21 |
| Mirex | ND | | ND | | ND | | NDR | 18.1 | NDR | 8.26 | | 10.7 | ND | | ND | | ND | | ND | | ND | | NDR | 10.5 |
| 2,4'-DDE (o,p' DDE) | ND | | ND | | ND | | ND | | J | 2.01 | NDR J | 2.4 | NDR J | 1.44 | NDR J | 0.846 | ND | | NDR J | 2.22 | NDR J | 2.41 | NDR J | 2.63 |
| 4,4'-DDE (p,p' DDE) | ND | | ND | | ND | | | 14.9 | | 15.5 | | 14.7 | | 5.75 | | 4.79 | | 5.48 | | 14.3 | | 14.8 | | 15.2 |
| 2,4'-DDD (o,p' DDD) | ND | | ND | | ND | | | 11.3 | | 10.3 | | 10.6 | J | 1.26 | J | 1.67 | J | 1.43 | | 12 | | 11.3 | | 11.5 |
| 4,4'-DDD (p,p' DDD) | ND | | ND | | ND | | | 39.9 | | 38.5 | | 39.8 | | 6.16 | | 5.93 | | 6.19 | | 53.7 | | 50.2 | | 48.7 |
| 2,4'-DDT (o,p' DDT) | ND | | ND | | ND | | NDR | 5.74 | NDR | 5.63 | NDR | 6.15 | NDR J | 3.25 | NDR J | 2.31 | NDR J | 2.68 | NDR | 3.9 | NDR | 6.36 | ND | |
| 4,4'-DDT (p,p' DDT) | ND | | ND | | ND | | | 7.03 | | 5.89 | | 7.97 | ND | | ND | | ND | | ND | | | 4.15 | | 5.2 |
| HCH, delta | J Q | 0.182 | J Q | 0.158 | J Q | 0.207 | J Q | 0.4 | ND | | J Q | 0.659 | ND | | J Q | 0.294 | J Q | 0.305 | ND | | ND | | J | 0.615 |
| Heptachlor Epoxide | ND | | ND | | ND | | | 9.17 | Q | 9.35 | Q | 9.68 | Q | 3.47 | | 3.25 | Q | 3.47 | Q | 3.89 | Q | 4.84 | Q | 4.05 |
| Dieldrin | ND | | J Q | 0.053 | J Q | 0.036 | | 29.6 | | 27.6 | | 30.6 | Q | 6.18 | | 5.51 | | 5.48 | | 10.5 | | 9.88 | | 10.7 |
| Endrin | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Aldehyde | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Ketone | ND | | ND | | J Q | 0.066 | ND | | ND | | ND | | J | 2 | ND | | ND | | ND | | ND | | ND | |
| Methoxychlor | ND | | ND | | ND | | ND | | | 7.4 | Q | 3.76 | ND | | ND | | ND | | ND | | ND | | ND | |
| alpha-Endosulphan | ND | | ND | | ND | | ND | | J Q | 1.02 | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| beta-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endosulphan Sulphate | ND | | ND | | ND | | ND | | ND | | J Q | 1.17 | ND | | ND | | ND | | J Q | 1.73 | J Q | 1.56 | ND | |
| 13C-1,4-Dichlorobenzene (% Recovery) | | 8.3 | | 9.08 | | 26.5 | | 10.3 | | 10.9 | | 5.06 | | 8.8 | | 5.78 | | 5.01 | | 5.84 | | 9.57 | NQ | |
| 13C-1,2,3-Trichlorobenzene (% Recovery) | | 20.4 | | 22.1 | | 58.4 | | 31.9 | | 32.4 | | 21.7 | | 23.1 | | 20.9 | | 18.5 | | 20.5 | | 32.7 | | 18.4 |
| 13C-1,2,3,4-Tetrachlorobenzene (% Recovery) | | 29.1 | | 30.1 | | 64.9 | | 38.3 | | 43.6 | | 36.7 | | 33.6 | | 26.4 | | 28 | NDR | 35 | NDR | 35.4 | NDR | 33.4 |
| 13C-Pentachlorobenzene (% Recovery) | | 41.4 | | 38.2 | | 69.5 | | 55.2 | | 64.7 | | 59.6 | | 49.3 | | 39.8 | | 42.8 | NDR | 101 | NDR | 89 | NDR | 92.9 |
| 13C-Hexachlorobenzene (% Recovery) | | 61.3 | | 59.1 | | 77.3 | | 80 | | 84.1 | | 83.4 | | 69.9 | | 66.7 | | 68.1 | | 96 | | 87 | | 90 |
| 13C-beta-HCH (% Recovery) | | 63.9 | | 71 | | 70.2 | | 72 | | 74.6 | | 65.7 | | 69.1 | | 68.1 | | 72.1 | | 86.2 | | 81.1 | | 72.4 |
| 13C-gamma-HCH (% Recovery) | | 67.9 | | 67.4 | | 79.1 | | 83.1 | | 82.8 | | 86 | | 82.5 | | 73.5 | | 75.9 | NDR | 69.2 | NDR | 97.8 | NDR | 92.6 |
| 13C-Heptachlor (% Recovery) | | 61.3 | | 63.5 | | 74.4 | | 71.3 | | 79.1 | | 82 | | 69.5 | | 71.7 | | 71.8 | | 73.4 | | 74.4 | | 76 |
| 13C-Aldrin (% Recovery) | | 70.9 | | 68.5 | | 77.6 | | 74.1 | | 82.1 | | 84.6 | | 68.6 | | 71.8 | | 75.6 | | 81 | | 77.9 | | 79.8 |
| 13C-Chlordane, gamma (trans) (% Recovery) | | 80.3 | | 78.3 | | 86.2 | | 86.9 | | 92.5 | | 93.7 | | 82.7 | | 92.5 | | 89.2 | | 92.6 | | 88.7 | | 90.9 |
| 13C-Nonachlor, trans- (% Recovery) | | 77.4 | | 76.5 | | 83.6 | | 83.9 | | 90.9 | | 95.2 | | 76.8 | | 91.1 | | 87.1 | | 90.7 | | 87.5 | | 90.3 |
| 13C-4,4'-DDE (% Recovery) | | 87.6 | | 84.1 | | 90.5 | | 90.7 | | 97.2 | | 103 | | 81.9 | | 97.6 | | 90.7 | | 94 | | 92.2 | | 94.5 |
| 13C-4,4'-DDT (% Recovery) | | 87.4 | | 84.2 | | 91.1 | | 88.2 | | 96.7 | | 101 | | 85.5 | | 87.4 | | 82.6 | | 86.5 | | 86.7 | | 90.5 |
| 13C-4,4'-DDD (ng/sample) | | 98.9 | | 99.1 | | 103.2 | | 91.3 | | 97.7 | | 90.5 | | 87.5 | | 90.3 | | 93.8 | | 86.6 | | 88.1 | | 89.5 |
| D4-alpha-Endosulphan (% Recovery) DB5 | | 102 | | 98.3 | | 104 | | 144 | V | 145 | V | 146 | | 119 | | 101 | | 102 | | 111 | | 108 | | 106 |
| D4-beta-Endosulphan (% Recovery) DB5 | | 97.8 | | 92.3 | | 101 | | 98.2 | | 102 | | 99 | | 97.6 | | 89.6 | | 88.4 | | 105 | | 99.2 | | 93.9 |
| D4-alpha-Endosulphan (% Recovery) DB17 | | 98.4 | | 94.1 | | 101 | | 90.3 | | 91.8 | | 94.3 | | 105 | | 95.4 | | 93.1 | | 92.9 | | 91.8 | | 87.7 |
| D4-beta-Endosulphan (% Recovery) DB17 | | 97.3 | | 90.2 | | 103 | | 86.7 | | 90 | | 89.3 | | 101 | | 90.7 | | 90.3 | | 83.8 | | 82.6 | | 74 |

**Appendix F2:** SPMD data for US deployments - concentrations represent ng/SPMD

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gratwick Riverside Park (GRP) | | | | | | | | | | | | | | | | | | | | | | | | |
| Little Niagara River (LNR) | | | | | | | | | | | | | | | | | | | | | | | | |
| Niagara-on-the-Lake (NOTL) | | | | | | | | | | | | | | | | | | | | | | | | |
| CLIENT_ID | Pettit Flume | | Pettit Flume | | Pettit Flume | | Fisherman's Park | | Fisherman's Park | | Fisherman's Park | | Fisherman's Park | | Fisherman's Park | | Fisherman's Park | | GRP | | GRP | | GRP | |
| Axys ID | (U/S)-1 | | (U/S)-2 | | (U/S)-3 | | (D/S)-1 | | (D/S)-2 | | (D/S)-3 | | (U/S)-1 | | (U/S)-2 | | (U/S)-3 | | (U/S of Marina)-1 | | (U/S of Marina)-2 | | (U/S of Marina)-3 | |
| WORKGROUP | | | | | | | | | | | | | | | | | | | | | | | | |
| Sample Size | L23776-14 Li2 | | L23776-15 L | | L23776-16 L | | L23776-17 L | | L23776-18 L | | L23776-19 i | | L23776-20 i | | L23776-21 i | | L23776-22 i | | L23776-23 i | | L23776-24 i | | L23776-25 i | |
| UNITS | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | |
| | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | |
| | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| 1,3-Dichlorobenzene | NQ | | J | 2.13 | NQ | | NQ | | | 6.65 | | 8.22 | | 4.69 | | 4.35 | | 4.47 | | 3.32 | | 6.81 | | 4.07 |
| 1,4-Dichlorobenzene | NQ | | | 17.7 | NQ | | NQ | | | 51 | | 37.3 | | 20 | | 19.4 | | 18 | | 14.3 | | 21.1 | | 14.6 |
| 1,2-Dichlorobenzene | NQ | | | 3.15 | NQ | | NQ | | | 6.11 | | 3.69 | J | 2.6 | | 3.19 | J | 2.63 | J | 2.03 | ND | | J | 2.02 |
| 1,3,5-Trichlorobenzene | J | 0.68 | ND | | ND | | | 7.57 | | 6.9 | | 6.54 | | 4.22 | | 4.22 | | 4.28 | J | 2.48 | J | 2.3 | J | 2.48 |
| 1,2,4-Trichlorobenzene | | 5.11 | | 3.79 | | 4.39 | | 39.6 | | 40.3 | | 39.9 | | 7.76 | | 7.52 | | 6.89 | | 4.23 | | 4.66 | | 4.52 |
| 1,2,3-Trichlorobenzene | NDR J | 1.85 | NDR J | 2 | NDR J | 1.48 | | 15.2 | | 12.2 | | 13.6 | J | 1.23 | J | 1.19 | J | 1.3 | ND | | NDR J | 2.54 | ND | |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | J | 2.79 | J | 2.57 | J | 2.37 | | 16.9 | | 18.1 | | 18.9 | | 7.42 | | 7.58 | | 8.05 | J | 4.12 | J | 4.02 | J | 4.71 |
| 1,2,3,4-Tetrachlorobenzene | J | 1.28 | J | 1.02 | J | 0.88 | | 21.8 | | 21.5 | | 22.1 | | 3.14 | J | 2.94 | J | 2.92 | J | 2.29 | J | 2.26 | J | 2.49 |
| Hexachlorobutadiene | NDR J | 0.358 | ND | | ND | | ND | | J | 0.4 | NDR J | 0.493 | ND | | J | 0.263 | J | 0.278 | NDR J | 0.355 | NDR J | 0.798 | J | 0.273 |
| Pentachlorobenzene | | 5.46 | | 5.2 | | 5.27 | | 40.9 | | 39.1 | | 42.1 | | 13.4 | | 14.3 | | 14.2 | | 10.2 | | 10.4 | | 11.7 |
| Hexachlorobenzene | | 4.45 | | 4.66 | | 4.58 | | 44.3 | | 42.1 | | 47.6 | | 24.7 | | 25.1 | | 24.8 | | 20.8 | | 15.6 | | 17.7 |
| HCH, alpha | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, beta | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, gamma | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Heptachlor | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Aldrin | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Chlordane, gamma (trans) | J | 2.07 | J | 1.87 | J | 1.99 | J | 1.97 | J | 1.96 | J | 2.49 | J | 2.41 | J | 2.36 | J | 2.39 | J | 2.14 | J | 2.3 | J | 2.35 |
| Chlordane, alpha (cis) | J | 3.09 | J | 2.93 | J | 2.66 | J | 3.07 | J | 3 | J | 3.5 | J | 3.5 | J | 3.41 | J | 3.6 | J | 2.75 | J | 3.06 | J | 3.07 |
| Octachlorostyrene | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Chlordane, oxy- | NDR | 20.3 | NDR | 21.6 | NDR | 26.4 | NDR | 28.1 | NDR | 22.8 | NDR | 17.2 | ND | | NDR | 16.9 | NDR | 12.1 | ND | | ND | | NDR | 20.4 |
| Nonachlor, trans- | J | 1.61 | J | 1.69 | J | 1.62 | J | 1.8 | J | 1.84 | J | 1.97 | J | 1.92 | J | 1.9 | J | 1.81 | J | 1.54 | J | 1.63 | J | 1.8 |
| Nonachlor, cis- | J | 0.596 | J | 0.53 | J | 0.501 | J | 0.482 | J | 0.502 | J | 0.548 | J | 0.623 | J | 0.618 | J | 0.603 | J | 0.468 | J | 0.438 | J | 0.532 |
| Mirex | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| 2,4'-DDE (o,p' DDE) | NDR J | 1.29 | J | 0.773 | NDR J | 1.35 | ND | | ND | | NDR J | 1.08 | NDR J | 1.47 | ND | | ND | | ND | | NDR J | 2.04 | NDR J | 1.46 |
| 4,4'-DDE (p,p' DDE) | | 5.35 | | 4.74 | | 4.72 | | 6.14 | | 6.68 | | 7.39 | | 6.39 | | 6.93 | | 6.4 | | 5.29 | | 5.54 | | 6.37 |
| 2,4'-DDD (o,p' DDD) | ND | | J | 1.54 | NDR J | 1.31 | ND | | J | 1.66 | NDR J | 1.9 | ND | | ND | | ND | | ND | | ND | | ND | |
| 4,4'-DDD (p,p' DDD) | | 5.27 | | 4.72 | | 4.18 | | 5.84 | | 5.39 | | 6.59 | | 5.52 | | 6.97 | | 5.63 | | 5.61 | | 5.99 | | 5.34 |
| 2,4'-DDT (o,p' DDT) | NDR | 4.62 | NDR J | 2.95 | NDR J | 3.11 | NDR J | 3.09 | NDR J | 2.03 | NDR | 3.77 | ND | | NDR | 5.28 | NDR | 3.62 | NDR | 5.76 | NDR | 6.43 | ND | |
| 4,4'-DDT (p,p' DDT) | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, delta | J | 0.339 | J | 0.565 | J | 0.767 | J Q | 0.222 | J Q | 0.186 | flag | ng/sample | J | 0.5 | ND | | ND | | ND | | ND | | ND | |
| Heptachlor Epoxide | Q | 3.35 | Q | 3.21 | Q | 3.57 | J | 2.26 | J Q | 1.03 | ND | | Q | 3.04 | Q | 3.38 | Q | 3.05 | | 4.65 | | 4.63 | | 4.46 |
| Dieldrin | | 6.22 | | 6.88 | | 7.52 | | 6.61 | | 6.23 | | 2.53 | | 6.59 | | 6.64 | | 7.05 | | 8.02 | | 8.24 | | 7.28 |
| Endrin | ND | | J Q | 0.122 | ND | | ND | | ND | | | 6.32 | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Aldehyde | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Ketone | J Q | 0.913 | J Q | 1.25 | J | 1.53 | J Q | 0.098 | ND | | ND | | ND | | ND | | J Q | 0.232 | J Q | 0.239 | ND | | J Q | 0.299 |
| Methoxychlor | ND | | ND | | ND | | | 2.88 | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| alpha-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| beta-Endosulphan | ND | | J Q | 0.058 | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endosulphan Sulphate | ND | | J Q | 0.133 | ND | | J Q | 0.352 | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| 13C-1,4-Dichlorobenzene (% Recovery) | NQ | | | 6.55 | NQ | | NQ | | | 9.46 | | 11.9 | | 6.44 | | 6.08 | | 15.3 | | 9.57 | | 3.03 | | 12.3 |
| 13C-1,2,3-Trichlorobenzene (% Recovery) | | 13.3 | | 18.9 | | 15.2 | | 9.83 | | 31.9 | | 28.6 | | 17.9 | | 19.3 | | 40.4 | | 23.7 | | 11.6 | | 32.7 |
| 13C-1,2,3,4-Tetrachlorobenzene (% Recovery) | | 25.8 | | 26.4 | | 25.7 | | 17.5 | | 38.4 | | 46.2 | | 28 | | 32.2 | | 55.1 | | 35.3 | | 24.7 | | 43.7 |
| 13C-Pentachlorobenzene (% Recovery) | | 39.5 | | 41.2 | | 41 | | 36.3 | | 51.8 | | 64.8 | | 43 | | 46.1 | | 65 | | 50.3 | | 42.1 | | 55.7 |
| 13C-Hexachlorobenzene (% Recovery) | | 65.8 | | 69.8 | | 70.2 | | 68 | | 75.9 | | 85.5 | | 64 | | 62.8 | | 83.3 | | 74.8 | | 66.2 | | 76 |
| 13C-beta-HCH (% Recovery) | | 74.7 | | 75.2 | | 78.2 | | 76.1 | | 84.3 | | 62.8 | | 50.6 | | 48.4 | | 64.9 | | 71.7 | | 59.7 | | 69.9 |
| 13C-gamma-HCH (% Recovery) | | 72.6 | | 75.5 | | 77.3 | | 79.8 | | 82.8 | | 83.6 | | 61.4 | | 60.6 | | 80.9 | | 80.3 | | 65 | | 82.3 |
| 13C-Heptachlor (% Recovery) | | 66.1 | | 76.4 | | 75.1 | | 65.3 | | 83.3 | | 92.8 | | 68.5 | | 66.6 | | 96 | | 74.6 | | 68.3 | | 79.2 |
| 13C-Aldrin (% Recovery) | | 68.9 | | 71.4 | | 75.9 | | 70.6 | | 73.4 | | 61.8 | | 64 | | 56.6 | | 84.1 | | 66 | | 61.3 | | 67.1 |
| 13C-Chlordane, gamma (trans) (% Recovery) | | 89.5 | | 90 | | 90.3 | | 91.3 | | 96.1 | | 97.1 | | 80.6 | | 74.7 | | 99.1 | | 88.8 | | 83.4 | | 90 |
| 13C-Nonachlor, trans- (% Recovery) | | 86.8 | | 87.5 | | 86 | | 87.9 | | 91.8 | | 98.8 | | 83 | | 75.8 | | 102 | | 90.7 | | 85.9 | | 88.8 |
| 13C-4,4'-DDE (% Recovery) | | 89.6 | | 90.6 | | 90.5 | | 94.2 | | 97.2 | | 95.6 | | 79 | | 71.8 | | 94.1 | | 86 | | 84.1 | | 86.7 |
| 13C-4,4'-DDT (% Recovery) | | 94.6 | | 84.1 | | 87.3 | | 79.9 | | 90.8 | | 78.6 | | 71.9 | | 66.5 | | 102 | | 82.9 | | 70 | | 77.5 |
| 13C-4,4'-DDD (ng/sample) | | 91.7 | | 96.1 | | 98.5 | | 104.1 | | 98.7 | | 96.0 | | 90.1 | | 84.1 | | 76.3 | | 95.4 | | 100.1 | | 103.2 |
| D4-alpha-Endosulphan (% Recovery) DB5 | | 106 | | 113 | | 102 | | 108 | | 97.4 | ND | | | 82.2 | | 86.1 | | 113 | | 116 | | 105 | | 119 |
| D4-beta-Endosulphan (% Recovery) DB5 | | 86.7 | | 85.6 | | 83.1 | | 95.1 | | 81 | | 95.8 | | 72.6 | | 76.2 | | 91.3 | | 96.6 | | 85.6 | | 98.9 |
| D4-alpha-Endosulphan (% Recovery) DB17 | | 97.5 | | 99.8 | | 92.6 | | 96.2 | | 91.9 | | 86.6 | | 75.8 | | 79.2 | | 100 | | 103 | | 95.8 | | 106 |
| D4-beta-Endosulphan (% Recovery) DB17 | | 89.1 | | 96.1 | | 86.6 | | 92.3 | | 81.7 | | 86.8 | | 71.5 | | 76.7 | | 90.4 | | 91.4 | | 81.9 | | 94.2 |

**Appendix F2:** SPMD data for US deployments - concentrations represent ng/SPMD

Gratwick Riverside Park (GRP)

Little Niagara River (LNR)

Niagara-on-the-Lake (NOTL)

| CLIENT_ID | GRP | | GRP | | GRP | | GRP | | GRP | | GRP | | GRP | | GRP | | GRP | | GRP | | GRP | | GRP | | 102nd St | | 102nd St | | 102nd St | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | (in Marina)-1 | | (in Marina)-2 | | (in Marina)-3 | | (U/S of Dump)-1 | | (U/S of Dump)-2 | | (U/S of Dump)-3 | | (Middle of Park)-1 | | (Middle of Park)-2 | | (Middle of Park)-3 | | (D/S)-1 | | (D/S)-2 | | (D/S)-3 | | (U/S)-1 | | (U/S)-2 | | (U/S)-3 | |
| WORKGROUP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sample Size | L23776-26 L | | L23776-27 L | | L23776-28 L | | L23776-29 i | | L23776-30 i | | L23776-31 i | | L23776-32 i | | L23776-33 i | | L23776-34 i | | L23776-35 i | | L23776-36 i | | L23776-37 | | L23776-38 | | L23776-39 | | L23776-40 | |
| UNITS | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | |
| | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | |
| | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| 1,3-Dichlorobenzene | | 34.1 | | 32.5 | | 23 | | 7.83 | | 4.55 | | 6.69 | | 4.84 | | 4.8 | | 8.05 | | 4.53 | | 5.28 | NQ | | | 5.91 | | 4.99 | | 4.18 |
| 1,4-Dichlorobenzene | | 93.8 | | 115 | | 77.4 | | 25 | | 22.4 | | 31.4 | | 22.8 | | 27.5 | | 28.2 | | 28.2 | | 23.4 | NQ | | | 20 | | 20.2 | | 18 |
| 1,2-Dichlorobenzene | | 10.2 | | 15.4 | | 10.1 | J | 2.58 | | 3.2 | | 4.92 | | 3.05 | | 4.27 | | 5.41 | | 3.97 | | 3.94 | NQ | | J | 2.16 | J | 2.29 | J | 2.66 |
| 1,3,5-Trichlorobenzene | | 13.6 | | 11.6 | | 12 | J | 2.66 | J | 2.61 | J | 2.81 | J | 2.45 | J | 2.37 | J | 2.05 | J | 2.26 | J | 1.97 | J | 2.2 | J | 2.29 | J | 2.52 | J | 2.29 |
| 1,2,4-Trichlorobenzene | | 31.9 | | 29.2 | | 27.4 | | 7.18 | | 5.38 | | 5.77 | | 14.7 | | 13.1 | | 13.8 | | 5.21 | | 4.6 | | 4.64 | | 7.03 | | 6.12 | | 6.14 |
| 1,2,3-Trichlorobenzene | | 4.76 | NDR | 8.67 | | 5.21 | J | 2.85 | J | 1 | J | 1.37 | J | 2.86 | | 3.26 | J | 3.01 | ND | | J | 1.2 | J | 1.09 | NDR J | 0.975 | J | 0.961 | NDR J | 0.659 |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | | 17.3 | | 17 | | 17.4 | J | 6.05 | J | 4.98 | J | 4.98 | J | 4.71 | J | 4.99 | J | 4.78 | J | 4.01 | J | 3.83 | J | 3.43 | | 18.7 | | 13.9 | | 14.4 |
| 1,2,3,4-Tetrachlorobenzene | | 13.2 | | 13.4 | | 13.2 | | 6.14 | J | 2.45 | J | 2.49 | | 3.06 | | 3.27 | | 3.18 | J | 2.15 | J | 2.15 | J | 2.14 | | 3.15 | | 3.08 | | 3.23 |
| Hexachlorobutadiene | NDR J | 0.566 | ND | | NDR J | 0.518 | ND | | ND | | ND | | NDR J | 0.71 | J | 0.383 | J | 0.325 | ND | | ND | | NDR J | 0.249 | NDR J | 0.295 | J | 0.295 | NDR J | 0.288 |
| Pentachlorobenzene | | 16.9 | | 17.6 | | 18.4 | | 13.8 | | 11.3 | | 11.6 | | 9.83 | | 9.76 | | 10.3 | | 10.3 | | 10.8 | | 10.2 | | 10.8 | | 10.7 | | 10.3 |
| Hexachlorobenzene | | 17.1 | | 17.7 | | 19.2 | | 20.1 | | 17.1 | | 17.5 | | 16.8 | | 16.2 | | 14.9 | | 14.5 | | 16.5 | | 15.4 | | 18.8 | | 18.2 | | 18 |
| HCH, alpha | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | NDR J | 1.95 | ND | | ND | |
| HCH, beta | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, gamma | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | NDR J | 5.1 | ND | |
| Heptachlor | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | NDR J | 0.57 | NDR J | 1.01 | ND | | ND | |
| Aldrin | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | NDR J | 0.483 | ND | | ND | | ND | |
| Chlordane, gamma (trans) | J | 4.76 | J | 4.6 | J | 4.77 | J | 2.18 | J | 2.06 | J | 2 | J | 2.26 | J | 2.33 | J | 2.52 | J | 2.48 | J | 2.43 | J | 2.26 | J | 2.43 | J | 2.25 | J | 2.4 |
| Chlordane, alpha (cis) | J | 5.76 | J | 5.88 | | 6.34 | J | 3.21 | J | 2.99 | J | 3.17 | J | 3.51 | J | 3.3 | J | 3.19 | J | 3.4 | J | 3.85 | J | 3.35 | J | 3.57 | J | 3.42 | J | 3.39 |
| Octachlorostyrene | NDR J | 0.568 | J | 0.558 | J | 0.496 | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Chlordane, oxy- | NDR | 29.7 | NDR | 23.9 | ND | | ND | | NDR | 14 | NDR | 24.5 | ND | | ND | | NDR | 21.9 | ND | | NDR | 17.8 | NDR | 16.3 | NDR | 19.8 | NDR | 15.2 | NDR | 21.8 |
| Nonachlor, trans- | J | 1.8 | J | 1.8 | J | 2.14 | J | 1.67 | J | 1.54 | J | 1.55 | J | 1.88 | J | 1.74 | J | 1.79 | J | 2.1 | J | 2.08 | J | 2.05 | J | 2.06 | J | 1.99 | J | 1.9 |
| Nonachlor, cis- | J | 1.16 | J | 1.2 | J | 1.29 | J | 0.49 | J | 0.56 | J | 0.519 | J | 0.568 | J | 0.501 | J | 0.517 | J | 0.652 | J | 0.887 | NDR J | 0.715 | J | 0.679 | J | 0.615 | NDR J | 0.683 |
| Mirex | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | NDR J | 0.924 | ND | | ND | | NDR J | 1.39 |
| 2,4'-DDE (o,p' DDE) | NDR | 11.3 | NDR | 8.5 | ND | | ND | | NDR J | 1.51 | ND | | ND | | NDR J | 1.94 | ND | | NDR J | 1.16 | NDR J | 1.7 | NDR J | 1.56 | NDR J | 1.13 | NDR J | 1.02 | NDR J | 1.03 |
| 4,4'-DDE (p,p' DDE) | | 18.2 | | 19.1 | | 19 | | 5.82 | | 5.5 | | 5.75 | | 6.39 | | 5.97 | | 5.96 | | 6.02 | | 7.63 | | 6.95 | | 5.75 | | 6.05 | | 5.66 |
| 2,4'-DDD (o,p' DDD) | ND | | ND | | ND | | ND | | J | 1.99 | J | 2.23 | ND | | | 3.27 | ND | | ND | | J | 1.98 | J | 1.42 | J | 1.82 | J | 1.99 | J | 1.61 |
| 4,4'-DDD (p,p' DDD) | | 19.6 | NDR | 19.8 | | 19.8 | | 7.09 | | 7.59 | | 7.17 | | 4.81 | | 5.34 | | 5.8 | | 6.87 | | 8.01 | | 6.42 | | 6.46 | | 5.99 | | 5.56 |
| 2,4'-DDT (o,p' DDT) | NDR | 26.6 | NDR | 17 | NDR | 14.5 | NDR | 5.38 | ND | | NDR | 5.57 | NDR | 3.82 | ND | | ND | | NDR | 4.49 | NDR | 4.36 | NDR | 3.3 | NDR J | 2.64 | NDR J | 2.07 | NDR J | 2.42 |
| 4,4'-DDT (p,p' DDT) | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | J | 1.12 | J | 1.07 | ND | | NDR J | 1.01 |
| HCH, delta | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | J | 0.859 |
| Heptachlor Epoxide | J | 2.11 | ND | | J Q | 1.22 | | 4.16 | | 4.26 | | 4.13 | Q | 4.72 | Q | 4.41 | Q | 4.27 | Q | 4.17 | Q | 4.45 | | 4.58 | Q | 3.42 | Q | 3.78 | Q | 3 |
| Dieldrin | | 4.62 | | 4.94 | | 5.14 | | 7.11 | | 7.21 | | 6.83 | | 6.93 | | 7.21 | | 6.86 | | 8.16 | | 9.54 | | 8.25 | | 7.66 | | 7.07 | | 7.41 |
| Endrin | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Aldehyde | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Ketone | ND | | ND | | ND | | J Q | 0.39 | ND | | ND | | ND | | J Q | 1.65 | J Q | 1.01 | ND | | ND | | ND | | ND | | J Q | 0.226 | J Q | 0.332 |
| Methoxychlor | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| alpha-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| beta-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endosulphan Sulphate | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| 13C-1,4-Dichlorobenzene (% Recovery) | | 3.98 | | 2.01 | | 4.51 | | 3.67 | | 7.32 | | 3.82 | | 9.57 | | 12.1 | | 3.88 | | 6.24 | | 4.65 | NQ | | | 6.29 | | 13.1 | | 10.8 |
| 13C-1,2,3-Trichlorobenzene (% Recovery) | | 13.2 | | 8.43 | | 15.7 | | 14 | | 19 | | 12.4 | | 25.3 | | 30.4 | | 17 | | 15.2 | | 14.7 | | 13.8 | | 14 | | 24.8 | | 20.2 |
| 13C-1,2,3,4-Tetrachlorobenzene (% Recovery) | | 26 | | 25.4 | | 28.2 | | 29.8 | | 35.6 | | 25.3 | | 35.5 | | 42.2 | | 30.9 | | 23.5 | | 32.2 | | 27.2 | | 26.1 | | 35.7 | | 30.6 |
| 13C-Pentachlorobenzene (% Recovery) | | 48.2 | | 52 | | 48.3 | | 49 | | 56.3 | | 46.2 | | 47.8 | | 52.2 | | 45.6 | | 33.9 | | 53.1 | | 41.3 | | 37.1 | | 44.9 | | 44.2 |
| 13C-Hexachlorobenzene (% Recovery) | | 79.4 | | 80.7 | | 78.4 | | 75 | | 80.6 | | 75 | | 71.3 | | 63.6 | | 68.6 | | 50.5 | | 81.2 | | 61.1 | | 57 | | 65 | | 65.1 |
| 13C-beta-HCH (% Recovery) | | 88.4 | | 61.5 | | 81.6 | | 74.6 | | 73.1 | | 73.6 | | 71.8 | | 41.8 | | 63.3 | | 34.9 | | 81.6 | | 68.2 | | 67.8 | | 77.3 | | 64.6 |
| 13C-gamma-HCH (% Recovery) | | 90.5 | | 76.7 | | 85.3 | | 77 | | 90.5 | | 79.5 | | 77.6 | | 58.2 | | 73.3 | | 44.5 | | 86.8 | | 77.9 | | 77.8 | | 88.7 | | 82.1 |
| 13C-Heptachlor (% Recovery) | | 58.1 | | 61.8 | | 79.3 | | 92.5 | | 94.5 | | 82.3 | | 82.5 | | 70.5 | | 74.8 | | 56.4 | | 87.9 | | 75 | | 74.4 | | 80.4 | | 70.3 |
| 13C-Aldrin (% Recovery) | | 59.6 | | 56.7 | | 67.4 | | 58 | | 65.2 | | 61.7 | | 71.6 | | 70.8 | | 71.5 | | 57 | | 75.1 | | 69.6 | | 46.1 | | 67.4 | | 69.8 |
| 13C-Chlordane, gamma (trans) (% Recovery) | | 96.9 | | 91.2 | | 98.1 | | 96.9 | | 102 | | 96.5 | | 88.8 | | 72.3 | | 82.6 | | 62.7 | | 100 | | 92.3 | | 87.6 | | 97.5 | | 94.1 |
| 13C-Nonachlor, trans- (% Recovery) | | 95.3 | | 90.5 | | 99.6 | | 97 | | 103 | | 97.6 | | 89 | | 74.6 | | 84.1 | | 66.7 | | 100 | | 91.2 | | 84.8 | | 93.8 | | 90.8 |
| 13C-4,4'-DDE (% Recovery) | | 97.9 | | 92.3 | | 98.2 | | 93.6 | | 99.1 | | 93.6 | | 84.9 | | 68.3 | | 80.6 | | 63.3 | | 95.7 | | 94.4 | | 86.4 | | 94.9 | | 94 |
| 13C-4,4'-DDT (% Recovery) | | 89.2 | | 78.7 | | 100 | | 89.2 | | 85.5 | | 82 | | 84.2 | | 66.1 | | 77.8 | | 58.4 | | 95.9 | | 110 | | 101 | | 116 | | 102 |
| 13C-4,4'-DDD (ng/sample) | | 78.7 | | 77.9 | | 81.2 | | 97.7 | | 100.1 | | 102.4 | | 91.7 | | 89.1 | | 92.4 | | 84.0 | | 91.3 | | 79.3 | | 86.1 | | 80.4 | | 80.9 |
| D4-alpha-Endosulphan (% Recovery) DB5 | | 117 | | 89.2 | | 76 | | 110 | | 107 | | 108 | | 92.3 | | 80.5 | | 87.6 | | 80.7 | | 105 | | 112 | | 63.9 | | 105 | | 103 |
| D4-beta-Endosulphan (% Recovery) DB5 | | 103 | | 84.2 | | 68.1 | | 94.9 | | 91.2 | | 94.6 | | 81.3 | | 64.2 | | 78 | | 64.8 | | 86.7 | | 103 | | 58.5 | | 103 | | 90.3 |
| D4-alpha-Endosulphan (% Recovery) DB17 | | 110 | | 89.2 | | 74.4 | | 100 | | 95.8 | | 98.7 | | 81.3 | | 78.4 | | 80.6 | | 78.1 | | 96 | | 99.3 | | 53.2 | | 93.4 | | 87.8 |
| D4-beta-Endosulphan (% Recovery) DB17 | | 97.5 | | 83.1 | | 66.8 | | 91.9 | | 86.8 | | 90.1 | | 78.1 | | 69.5 | | 78.8 | | 69.5 | | 89.2 | | 98.2 | | 55.3 | | 104 | | 89.3 |

**Appendix F2:** SPMD data for US deployments - concentrations represent ng/SPMD

Gratwick Riverside Park (GRP)

Little Niagara River (LNR)

Niagara-on-the-Lake (NOTL)

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLIENT_ID | LNR | | LNR | | LNR | | Cayuga Creek | | Cayuga Creek | | Cayuga Creek | | LNR | | LNR | | LNR | | U/S Occidental | | U/S Occidental | | U/S Occidental | |
| Axys ID | (Near 102nd St)-1 | | (Near 102nd St)-2 | | (Near 102nd St)-3 | | (Within the creek)-1 | | (Within the creek)-2 | | (Within the creek)-3 | | (D/S Cayuga Creek)-1 | | (D/S Cayuga Creek)-2 | | (D/S Cayuga Creek)-3 | | Facility-1 | | Facility-2 | | Facility-3 | |
| WORKGROUP | | | | | | | | | | | | | | | | | | | | | | | | |
| Sample Size | L23776-41 | | L23776-42 | | L23776-43 | | L23776-44 L | | L23776-45 L | | L23776-46 L | | L23776-47 | | L23776-48 | | L23776-49 | | L23776-50 | | L23776-51 | | L23776-52 | |
| UNITS | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | |
| | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | |
| | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| 1,3-Dichlorobenzene | NQ | | | 21.9 | | 15 | NQ | | | 9.01 | | 5.82 | NQ | | NQ | | | 6.41 | | 5.78 | NDR | 4.49 | | 5.23 |
| 1,4-Dichlorobenzene | NQ | | | 41.4 | | 38.9 | NQ | | | 30.7 | | 27.6 | NQ | | NQ | | | 24.1 | | 17.7 | | 18.9 | | 19.2 |
| 1,2-Dichlorobenzene | NQ | | | 3.39 | J | 2.63 | NQ | | | 6.58 | | 4.71 | NQ | | NQ | | J | 1.7 | J | 1.68 | ND | | J | 2.44 |
| 1,3,5-Trichlorobenzene | | 14.6 | | 14.7 | | 14.6 | | 14.1 | | 16.2 | | 15.7 | | 5.93 | | 4.21 | | 5.13 | J | 3 | J | 2.92 | | 3.12 |
| 1,2,4-Trichlorobenzene | | 47 | | 47.2 | | 46.9 | | 33.2 | | 35.8 | | 35.3 | | 6.77 | | 6.76 | | 8.71 | | 4.04 | | 3.61 | | 3.86 |
| 1,2,3-Trichlorobenzene | | 12.6 | | 11.4 | | 11.7 | | 4.91 | | 3.6 | | 3.62 | J | 2.23 | J | 1.84 | J | 2.38 | ND | | J | 0.802 | NDR J | 0.926 |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | | 70.8 | | 71.2 | | 72.4 | | 51 | | 52.7 | | 55.8 | | 17.5 | | 17.2 | | 18.7 | | 7.68 | | 7.29 | | 7.71 |
| 1,2,3,4-Tetrachlorobenzene | | 247 | | 230 | | 225 | | 80.5 | | 76.9 | | 80.9 | | 29.5 | | 27.7 | | 27.6 | | 8.02 | | 8.38 | | 8.51 |
| Hexachlorobutadiene | NDR J | 0.333 | NDR J | 0.381 | J | 0.432 | J | 1.33 | NDR J | 2.02 | J | 1.9 | NDR J | 0.694 | NDR J | 0.281 | J | 0.34 | J | 0.545 | NDR J | 0.479 | J | 0.416 |
| Pentachlorobenzene | | 260 | | 222 | | 213 | | 69 | | 67.9 | | 70.9 | | 38.1 | | 37.1 | | 36.8 | | 20.5 | | 20.1 | | 20.8 |
| Hexachlorobenzene | | 61.4 | | 56 | | 54.7 | | 23.7 | | 22.8 | | 22.1 | | 19.9 | | 19.8 | | 20.1 | | 19.4 | | 18.5 | | 20.1 |
| HCH, alpha | NDR J | 2.24 | NDR J | 2.05 | J | 2.64 | | 335 | | 333 | | 344 | | 13 | | 11.5 | | 14.7 | | 9.77 | | 9.23 | | 8.41 |
| HCH, beta | ND | | ND | | ND | | | 82.5 | | 85 | NDR | 87.1 | NDR J | 4.9 | NDR J | 3.61 | NDR | 6.12 | ND | | NDR J | 2.14 | ND | |
| HCH, gamma | ND | | NDR J | 2.23 | NDR J | 2.68 | | 18.2 | | 18.8 | NDR | 16.3 | ND | | NDR J | 2.5 | ND | | ND | | ND | | NDR J | 1.98 |
| Heptachlor | ND | | ND | | ND | | ND | | ND | | ND | | ND | | NDR J | 0.911 | ND | | ND | | ND | | NDR J | 0.698 |
| Aldrin | NDR J | 0.57 | NDR J | 0.604 | ND | | ND | | ND | | ND | | ND | | NDR J | 0.83 | ND | | ND | | NDR J | 0.73 | ND | |
| Chlordane, gamma (trans) | J | 2.31 | J | 2.22 | J | 2.1 | J | 5.57 | | 5.97 | | 6.01 | J | 3.7 | J | 4.36 | J | 4.78 | J | 3.17 | J | 3.17 | J | 3.13 |
| Chlordane, alpha (cis) | J | 3.65 | J | 3.59 | J | 3.2 | | 10.1 | | 10.2 | | 9.97 | | 5.96 | | 6.81 | | 7.1 | J | 4.96 | J | 4.8 | J | 4.92 |
| Octachlorostyrene | ND | | ND | | ND | | J | 0.378 | J | 0.311 | NDR J | 0.219 | ND | | NDR J | 0.231 | J | 0.248 | J | 0.366 | J | 0.446 | J | 0.482 |
| Chlordane, oxy- | NDR | 16.5 | NDR | 16.8 | NDR | 17.7 | NDR | 20.2 | NDR | 23.9 | ND | | NDR | 18.5 | NDR | 12.3 | NDR | 15 | NDR | 18.3 | NDR | 16.6 | NDR | 13.9 |
| Nonachlor, trans- | J | 1.97 | J | 1.81 | J | 1.74 | J | 4.03 | J | 4.1 | J | 3.84 | J | 3.72 | J | 4.04 | J | 4.22 | J | 2.45 | J | 2.48 | J | 2.32 |
| Nonachlor, cis- | NDR J | 0.583 | J | 0.651 | J | 0.539 | J | 1.21 | J | 1.26 | J | 1.19 | J | 1.25 | J | 1.45 | J | 1.27 | J | 0.837 | J | 0.8 | J | 0.835 |
| Mirex | ND | | ND | | NDR J | 0.676 | NDR | 7.87 | NDR | 6.29 | NDR | 5.65 | | 3.71 | | 4.01 | | 4.19 | NDR J | 1.81 | J | 1.68 | J | 1.77 |
| 2,4'-DDE (o,p' DDE) | NDR J | 1.22 | NDR J | 1.36 | NDR J | 1 | NDR J | 2.34 | NDR J | 2.48 | NDR J | 2.37 | NDR J | 1.97 | NDR J | 2.41 | NDR J | 2.36 | NDR J | 2.29 | NDR J | 2.21 | NDR J | 2.25 |
| 4,4'-DDE (p,p' DDE) | | 5.95 | | 6.34 | | 6.43 | | 18.8 | | 18.7 | | 17.1 | | 10.6 | | 10.7 | | 11.6 | | 8.31 | | 8.3 | | 8.71 |
| 2,4'-DDD (o,p' DDD) | | 7.16 | | 6.32 | | 5.75 | | 5.98 | | 5.9 | | 5.39 | | 4.4 | | 4.64 | | 4.48 | | 3.22 | | 3.5 | J | 2.93 |
| 4,4'-DDD (p,p' DDD) | | 27.1 | | 24.6 | | 22.5 | | 26.9 | | 29.1 | | 26.7 | | 17.3 | | 17.2 | | 16.7 | | 10.4 | | 10.7 | | 9.43 |
| 2,4'-DDT (o,p' DDT) | NDR J | 2.62 | NDR J | 2.61 | NDR J | 2.05 | NDR | 4.51 | NDR | 5.06 | NDR | 5.45 | NDR | 5.81 | NDR | 6.58 | NDR | 5.8 | NDR | 4.89 | NDR | 5.48 | NDR | 4.74 |
| 4,4'-DDT (p,p' DDT) | J | 1.33 | J | 1.4 | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, delta | J | 1.12 | J | 1.01 | J | 0.954 | | 33.7 | | 39.3 | | 47.7 | J | 2.01 | J | 2.3 | J | 2.61 | J | 0.879 | J | 1.03 | J | 0.849 |
| Heptachlor Epoxide | Q | 3.6 | Q | 3.02 | Q | 2.94 | Q | 2.97 | | 3.84 | | 4.08 | | 3.57 | | 3.12 | Q | 2.99 | | 4.57 | | 4.22 | | 4.51 |
| Dieldrin | | 7 | | 6.42 | Q | 6.12 | | 6.99 | | 7.74 | | 6.39 | | 6.47 | | 6.04 | | 5.99 | | 7.53 | | 7.85 | | 7.56 |
| Endrin | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Aldehyde | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Ketone | ND | | ND | | ND | | J Q | 0.431 | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Methoxychlor | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| alpha-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| beta-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endosulphan Sulphate | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| 13C-1,4-Dichlorobenzene (% Rec | NQ | | | 8.14 | | 7.26 | NQ | | | 6.05 | | 10.6 | NQ | | NQ | | | 9.86 | NDR | 15.2 | | 6.98 | | 6.71 |
| 13C-1,2,3-Trichlorobenzene (% Recovery | | 9.34 | | 16.7 | | 13.2 | | 11.6 | | 14.9 | | 24.7 | | 6.54 | | 13.3 | | 24.7 | | 36.3 | | 18.1 | | 13.4 |
| 13C-1,2,3,4-Tetrachlorobenzene (% Reco | | 23.9 | | 27.3 | | 19.3 | | 26.1 | | 22.3 | | 32.7 | | 13.5 | | 32.4 | | 37.3 | | 49.5 | | 33.9 | | 23.2 |
| 13C-Pentachlorobenzene (% Recovery) | | 47 | | 46.8 | | 31.5 | | 50.5 | | 39.1 | | 48.3 | | 33.9 | | 51.6 | | 47.1 | | 56.1 | | 48.8 | | 38.2 |
| 13C-Hexachlorobenzene (% Recovery) | | 65.2 | | 65.1 | | 54.4 | | 78.1 | | 67.6 | | 71 | | 63.6 | | 69.1 | | 63.8 | | 69.3 | | 68.8 | | 58.1 |
| 13C-beta-HCH (% Recovery) | | 67.2 | | 81.9 | | 68.6 | | 76.8 | | 65.7 | | 75.5 | | 66.5 | | 64.2 | | 65.8 | | 65.1 | | 72 | | 56.8 |
| 13C-gamma-HCH (% Recovery) | | 84.4 | | 90.9 | | 72.8 | | 84.1 | | 69.2 | | 75.9 | | 69.6 | | 82.7 | | 76.3 | | 83.5 | | 84.5 | | 72.3 |
| 13C-Heptachlor (% Recovery) | | 63.8 | | 70.2 | | 63.7 | | 76.6 | | 59.6 | | 57.1 | | 47.2 | | 53.5 | | 54.3 | | 57.4 | | 55.8 | | 65.3 |
| 13C-Aldrin (% Recovery) | | 73.9 | | 77.3 | | 64.3 | | 59.6 | | 53.5 | | 36.5 | | 66.8 | | 69.6 | | 71.1 | | 75.1 | | 73.2 | | 64.5 |
| 13C-Chlordane, gamma (trans) (% Recov | | 95.2 | | 98.8 | | 93.7 | | 98.9 | | 90.8 | | 85.7 | | 87.8 | | 88.2 | | 87.2 | | 91.8 | | 87.2 | | 86.2 |
| 13C-Nonachlor, trans- (% Recovery) | | 91.2 | | 95 | | 92.4 | | 95 | | 86.4 | | 80.7 | | 83.1 | | 85.5 | | 83.7 | | 88.1 | | 82.4 | | 83.9 |
| 13C-4,4'-DDE (% Recovery) | | 96.9 | | 101 | | 96.4 | | 99.7 | | 95 | | 90.1 | | 91.7 | | 91.3 | | 88.5 | | 92.5 | | 87.4 | | 86.6 |
| 13C-4,4'-DDT (% Recovery) | | 98.4 | | 106 | | 110 | | 99.6 | | 90.7 | | 92.2 | | 77.4 | | 82.7 | | 86.3 | | 96.1 | | 87.7 | | 102 |
| 13C-4,4'-DDD (ng/sample) | | 93.7 | | 89.8 | | 79.0 | | 93.3 | | 95.1 | | 95.5 | | 102.6 | | 86.6 | | 91.6 | | 84.5 | | 87.9 | | 82.5 |
| D4-alpha-Endosulphan (% Recovery) DB5 | | 96.7 | | 90.4 | | 96 | | 106 | | 117 | | 104 | | 89.8 | | 92.7 | | 111 | | 106 | | 111 | | 102 |
| D4-beta-Endosulphan (% Recovery) DB5 | | 98.6 | | 88.6 | | 101 | | 102 | | 96.3 | | 91.9 | | 87.8 | | 95.5 | | 103 | | 102 | | 104 | | 99.8 |
| D4-alpha-Endosulphan (% Recovery) DB1 | | 80.7 | | 77.5 | | 80.9 | | 87.1 | | 99 | | 86.7 | | 76 | | 75 | | 95.4 | | 87.4 | | 84.3 | | 75.3 |
| D4-beta-Endosulphan (% Recovery) DB1 | | 94.7 | | 85.2 | | 98 | | 95.3 | | 92.5 | | 90.6 | | 83.4 | | 85.5 | | 98.8 | | 98.8 | | 85 | | 113 |

**Appendix F2:** SPMD data for US deployments - concentrations represent ng/SPMD

Gratwick Riverside Park (GRP)

Little Niagara River (LNR)

Niagara-on-the-Lake (NOTL)

| CLIENT_ID | D/S Storm Sewer | | D/S Storm Sewer | | D/S Storm Sewer | | D/S Storm Sewer | | D/S Storm Sewer | | D/S Storm Sewer | | At Storm Sewer | | At Storm Sewer | | At Storm Sewer | | Occidental Sewer | | Occidental Sewer | | Occidental Sewer | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | A-1 | | A-2 | | A-3 | | B-1 | | B-2 | | B-3 | | C-1 | | C-2 | | C-3 | | 003-1 | | 003-2 | | 003-3 | |
| WORKGROUP | | | | | | | | | | | | | | | | | | | | | | | | |
| Sample Size | L23776-53 | | L23776-54 | | L23776-55 | | L23776-56 | | L23776-57 | | L23776-58 | | L23776-59 | | L23776-60 | | L23776-61 | | L23776-62 | | L23776-63 | | L23776-64 | |
| UNITS | WG52400 | | WG52400 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | |
| | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | |
| | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| 1,3-Dichlorobenzene | | 4.65 | | 7.6 | NQ | | ND | | | 3.1 | | 5.62 | | 6.69 | ND | | | 4.65 | | 197 | | 178 | | 166 |
| 1,4-Dichlorobenzene | | 19.5 | | 15.6 | NQ | | | 16.4 | | 16.2 | | 20.5 | | 18.2 | | 14.2 | | 16.6 | | 113 | | 119 | | 107 |
| 1,2-Dichlorobenzene | J | 2.35 | J | 2.16 | NQ | | ND | | J | 2.76 | ND | | J | 2.54 | ND | | J | 2.24 | | 13.3 | | 13.3 | | 12.4 |
| 1,3,5-Trichlorobenzene | J | 2.86 | J | 2.53 | ND | | | 3.81 | | 3.97 | | 3.65 | | 6.25 | | 5.05 | | 5.6 | T | 68.2 | T | 68.7 | T | 58.5 |
| 1,2,4-Trichlorobenzene | | 4.86 | | 4.76 | | 3.54 | | 5.17 | | 4.52 | | 4.95 | | 8.21 | | 6.67 | | 6.85 | T | 836 | T | 838 | T | 727 |
| 1,2,3-Trichlorobenzene | J | 1.36 | J | 1.22 | NDR J | 1.88 | J | 1.79 | NDR J | 1.85 | J | 1.32 | NDR J | 1.99 | ND | | J | 1.62 | T | 139 | T | 142 | T | 125 |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | | 10.8 | | 9.88 | | 9.14 | | 13 | | 12.5 | | 12.2 | | 25 | | 22.2 | | 26.4 | | 326 | | 312 | | 292 |
| 1,2,3,4-Tetrachlorobenzene | | 26.9 | | 24.6 | | 23.1 | | 26.8 | | 26.9 | | 25.7 | | 34.2 | | 32.4 | | 34.9 | | | | | | 1080 |
| Hexachlorobutadiene | J | 2.44 | J | 1.56 | NDR J | 2.19 | NDR J | 2.84 | J | 2.25 | J | 1.86 | | 5.13 | | 3.26 | | 3.8 | D | 1900 | D | 1730 | | 1190 |
| Pentachlorobenzene | | 44 | | 48 | | 34.9 | | 55 | | 56.1 | | 49.2 | | 73 | | 75.8 | | 79.3 | D T | 1010 | D T | 926 | T | 748 |
| Hexachlorobenzene | | 19.7 | | 19.5 | | 18.4 | | 21.8 | | 23.2 | | 20.2 | | 97.7 | | 98.3 | | 111 | | 442 | | 459 | | 402 |
| HCH, alpha | | 7.96 | NDR | 5.89 | J | 5.2 | J | 4.61 | J | 5.71 | J | 4.62 | J | 4.55 | J | 4.62 | J | 4.37 | | 8.66 | | 7.85 | | 6.93 |
| HCH, beta | ND | | NDR J | 1.9 | NDR J | 2.4 | ND | | ND | | ND | | J | 3.52 | J | 3.29 | J | 4.57 | | 7.73 | NDR | 6.65 | J | 4.98 |
| HCH, gamma | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | NDR J | 2.35 | J | 2.99 | J | 2.03 | ND | |
| Heptachlor | ND | | NDR J | 0.809 | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | NDR J | 1.36 | ND | |
| Aldrin | ND | | NDR J | 0.53 | ND | | ND | | ND | | ND | | ND | | ND | | NDR J | 0.443 | ND | | NDR J | 0.716 | ND | |
| Chlordane, gamma (trans) | J | 2.71 | J | 2.46 | J | 2.52 | J | 2.28 | J | 2.46 | J | 2.25 | J | 1.77 | J | 1.64 | J | 1.75 | J | 2.3 | J | 2.27 | J | 2.52 |
| Chlordane, alpha (cis) | J | 4.2 | J | 3.69 | J | 3.7 | J | 3.18 | J | 3.74 | J | 3.44 | J | 2.66 | J | 2.14 | J | 2.5 | J | 3.71 | J | 3.73 | J | 3.86 |
| Octachlorostyrene | J | 0.841 | J | 0.664 | NDR J | 0.503 | J | 0.709 | J | 0.722 | J | 0.347 | | 5.86 | | 5.58 | | 6.47 | | 21.6 | | 21.9 | | 18 |
| Chlordane, oxy- | NDR | 19.5 | NDR | 14.9 | NDR | 9.87 | ND | | ND | | ND | | NDR | 14.2 | NDR | 12.1 | NDR | 9.66 | ND | | ND | | NDR | 7.99 |
| Nonachlor, trans- | J | 2.25 | J | 2.02 | J | 1.97 | J | 1.8 | J | 2.23 | J | 1.74 | J | 1.59 | J | 1.46 | J | 1.46 | J | 2.12 | J | 2.17 | J | 2.19 |
| Nonachlor, cis- | J | 0.715 | J | 0.778 | J | 0.627 | J | 0.706 | J | 0.854 | J | 0.648 | J | 0.534 | J | 0.483 | J | 0.635 | J | 0.736 | J | 0.632 | J | 0.626 |
| Mirex | NDR J | 2.18 | NDR J | 1.66 | ND | | ND | | ND | | ND | | | 8.87 | | 9.51 | | 9.83 | | 70.9 | | 76.4 | | 147 |
| 2,4'-DDE (o,p' DDE) | NDR J | 2.08 | NDR J | 1.86 | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | NDR J | 1.49 | ND | |
| 4,4'-DDE (p,p' DDE) | | 6.93 | | 6.73 | | 6.85 | | 6.09 | | 6.71 | | 5.69 | | 4.81 | | 4.39 | | 4.97 | | 7.03 | | 6.55 | | 6.21 |
| 2,4'-DDD (o,p' DDD) | J | 2.26 | J | 2.22 | ND | | J | 1.95 | ND | | ND | | ND | | ND | | J | 1.31 | ND | | J | 1.65 | J | 2.3 |
| 4,4'-DDD (p,p' DDD) | | 6.64 | | 7.82 | | 6.69 | | 6.06 | | 6.52 | | 5.51 | | 5.37 | | 4.76 | | 4.94 | | 5.92 | | 6.55 | | 6.32 |
| 2,4'-DDT (o,p' DDT) | NDR | 3.8 | NDR | 3.92 | ND | | NDR | 3.49 | ND | | ND | | ND | | ND | | ND | | ND | | NDR | 3.44 | NDR J | 3.18 |
| 4,4'-DDT (p,p' DDT) | J | 1.44 | J | 1.65 | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, delta | J | 1.19 | J | 0.846 | J Q | 0.647 | J Q | 0.511 | J | 0.694 | J | 0.799 | J | 0.751 | J Q | 0.491 | J Q | 0.514 | J | 1.54 | J | 1.49 | J | 1.3 |
| Heptachlor Epoxide | Q | 4.42 | | 4.53 | | 4.6 | | 4.03 | | 4.24 | | 4.3 | | 3.12 | | 2.69 | | 2.81 | | 4.61 | | 4.86 | | 4.99 |
| Dieldrin | | 8.73 | | 7.81 | | 9 | | 7.76 | | 7.86 | | 7.98 | | 6.33 | | 5.8 | | 5.92 | | 7.27 | | 7.12 | | 7.42 |
| Endrin | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Aldehyde | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Ketone | J Q | 0.277 | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | J Q | 0.478 |
| Methoxychlor | ND | | ND | | ND | | ND | | J | 2.3 | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| alpha-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| beta-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endosulphan Sulphate | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| 13C-1,4-Dichlorobenzene (% Recovery) | | 12.3 | | 5.82 | NQ | | | 10.7 | | 8.65 | | 5.74 | | 11.1 | | 5.95 | | 8.1 | | 9.3 | | 11.8 | | 5.72 |
| 13C-1,2,3-Trichlorobenzene (% Recovery) | | 32.8 | | 15.6 | | 12.8 | | 21.7 | | 19.8 | | 19.4 | | 28.8 | | 15.1 | | 18.8 | NQ | | NQ | | NQ | |
| 13C-1,2,3,4-Tetrachlorobenzene (% Recovery) | | 42.3 | | 27.7 | | 21.7 | | 26.6 | | 29.4 | | 30.8 | | 37.8 | | 23.8 | | 26.8 | | 29.5 | | 45 | | 26.3 |
| 13C-Pentachlorobenzene (% Recovery) | | 50.6 | | 45.3 | | 35.1 | V | 29.3 | | 44.9 | | 43.1 | | 50.2 | | 36.6 | | 31.8 | NDR D T | 41.6 | NDR D T | 55.4 | NDR | 46 |
| 13C-Hexachlorobenzene (% Recovery) | | 68 | | 67.8 | | 54.8 | | 33.9 | | 64.1 | | 62.2 | | 66.6 | | 55.1 | | 38.1 | | 44.7 | | 66.9 | | 65.7 |
| 13C-beta-HCH (% Recovery) | | 71 | | 71.9 | | 55.5 | | 34.8 | | 72.4 | | 68.1 | | 70.2 | | 58.9 | | 40.8 | | 43.9 | | 77.5 | | 70.3 |
| 13C-gamma-HCH (% Recovery) | | 81.6 | | 81.1 | | 70.6 | | 45 | | 87.3 | | 81.6 | | 81.6 | | 68.9 | | 49.7 | | 62.8 | | 105 | | 111 |
| 13C-Heptachlor (% Recovery) | | 75.5 | | 74.2 | | 59.2 | | 35.4 | | 73.6 | | 67.7 | | 73 | | 64.5 | | 44.1 | | 50.3 | | 77.6 | | 75.1 |
| 13C-Aldrin (% Recovery) | | 77.7 | | 75.3 | | 63.4 | | 38.5 | | 74.8 | | 75.9 | | 77.2 | | 66.4 | | 45.1 | | 47.2 | | 69.6 | | 76.1 |
| 13C-Chlordane, gamma (trans) (% Recovery) | | 93.2 | | 95.3 | | 79.6 | | 43.8 | | 92.9 | | 91.5 | | 90.8 | | 84.6 | | 55.3 | | 55.9 | | 84.2 | | 90.2 |
| 13C-Nonachlor, trans- (% Recovery) | | 89.9 | | 90.4 | | 76.6 | | 41.6 | | 90 | | 89.4 | | 87.3 | | 83.7 | | 52.3 | | 55.3 | | 82.1 | | 89.5 |
| 13C-4,4'-DDE (% Recovery) | | 94.2 | | 94.3 | | 80.4 | | 45.2 | | 96.5 | | 96.1 | | 92.7 | | 89 | | 56.6 | | 57.2 | | 88.8 | | 95.7 |
| 13C-4,4'-DDT (% Recovery) | | 114 | | 113 | | 96.3 | | 50.3 | | 116 | | 116 | | 112 | | 105 | | 65 | | 67.2 | | 112 | | 117 |
| 13C-4,4'-DDD (ng/sample) | | 75.8 | | 82.8 | | 82.8 | | 82.7 | | 82.1 | | 84.6 | | 89.8 | | 88.6 | | 82.1 | | 81.7 | | 85.8 | | 87.6 |
| D4-alpha-Endosulphan (% Recovery) DB5 | | 120 | | 108 | | 85.7 | | 97.9 | | 109 | | 95.8 | | 95.3 | | 44.8 | | 94.3 | | 98.5 | | 86.8 | | 92.3 |
| D4-beta-Endosulphan (% Recovery) DB5 | | 110 | | 102 | | 81.6 | | 93 | | 104 | | 93.5 | | 94.4 | | 43.1 | | 94.9 | | 99.8 | | 90 | | 90.8 |
| D4-alpha-Endosulphan (% Recovery) DB17 | | 66.9 | | 97.1 | | 70.5 | | 81.3 | | 82.5 | | 87.3 | | 75.7 | | 41.5 | | 70.1 | | 84.2 | | 73.1 | | 73.9 |
| D4-beta-Endosulphan (% Recovery) DB17 | | 83.3 | | 99.5 | | 72.1 | | 88.7 | | 86.1 | | 93.2 | | 88.6 | | 42.3 | | 87.8 | | 89.6 | | 78.5 | | 79 |

**Appendix F2:** SPMD data for US deployments - concentrations represent ng/SPMD

Gratwick Riverside Park (GRP)

Little Niagara River (LNR)

Niagara-on-the-Lake (NOTL)

| CLIENT_ID | U/S Gill Creek Mouth | | U/S Gill Creek Mouth | | U/S Gill Creek Mouth | | Gill Ck | | Gill Ck | | Gill Ck | | Bloody Run Ck | | Bloody Run Ck | | Bloody Run Ck-1 | | Bloody Run Ck-2 | | Bloody Run Ck | | Bloody Run Ck | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | (in Niagara River)-1 | | (in Niagara River)-2 | | (in Niagara River)-3 | | (Mouth)-1 | | (Mouth)-2 | | (Mouth)-3 | | (U/S)-1 | | (U/S)-2 | | | | | | (D/S)-1 | | (D/S)-2 | |
| WORKGROUP | | | | | | | | | | | | | | | | | | | | | | | | |
| Sample Size | L23776-65 i | | L23776-66 | | L23776-67 | | L23776-68 | | L23776-69 | | L23776-70 | | L23776-71 | | L23776-72 | | L23776-74 | | L23776-75 i | | L23776-77 i | | L23776-78 i | |
| UNITS | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52450 | | WG52450 | | WG52450 | |
| | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | |
| | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| 1,3-Dichlorobenzene | | 3.47 | J | 2.45 | NQ | | | 41.3 | | 37.7 | | 34 | | 3.24 | | 3.37 | J | 2.72 | NDR | 3.26 | | 4.96 | | 4.01 |
| 1,4-Dichlorobenzene | | 10.6 | | 9.9 | NQ | | | 89.3 | | 85.1 | | 77.1 | | 12.2 | | 11.6 | | 15.2 | | 11.8 | | 10.3 | | 10.3 |
| 1,2-Dichlorobenzene | J | 1.9 | J | 1.58 | NQ | | | 41.1 | | 36.1 | | 34.3 | J | 2.67 | ND | | | 3.18 | ND | | J | 2.7 | J | 2.75 |
| 1,3,5-Trichlorobenzene | J | 0.912 | J | 0.763 | NQ | | T | 7.19 | T | 7.12 | T | 5.87 | ND | | ND | | J | 2.35 | T | 8.56 | T | 3.96 | T | 4.13 |
| 1,2,4-Trichlorobenzene | J | 2.1 | J | 1.57 | NQ | | T | 158 | T | 155 | T | 137 | | 4.55 | | 4.64 | | 3.59 | T | 11.3 | T | 14.1 | T | 14.5 |
| 1,2,3-Trichlorobenzene | J | 0.484 | J | 0.499 | NQ | | T | 45.5 | T | 45.1 | T | 40.5 | NDR J | 3.08 | NDR J | 2.77 | J | 1.32 | NDR T | 5.51 | T | 4.61 | T | 5.37 |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | | 7.58 | | 6.7 | NDR J | 4.71 | | 44.1 | | 44.7 | | 44.1 | | 10.3 | | 9.59 | | 50.9 | | 59.1 | | 36.9 | | 37.6 |
| 1,2,3,4-Tetrachlorobenzene | J | 3.09 | J | 2.48 | J | 2.61 | | 24.8 | | 24.8 | | 24.1 | | 17.5 | | 17.2 | | 62.2 | | 67.1 | | 48.6 | | 48.3 |
| Hexachlorobutadiene | J | 0.646 | J | 0.633 | NDR J | 1.9 | D | 1080 | | 907 | | 790 | NDR | 5.07 | | 4.88 | | 39.8 | | 53.5 | | 24.2 | | 23.5 |
| Pentachlorobenzene | | 5.38 | | 4.84 | | 4.74 | | 36.9 | | 36.2 | | 38.7 | | 36.8 | | 37.5 | | 434 | | 609 | | 277 | | 273 |
| Hexachlorobenzene | | 7.8 | | 7.27 | | 7.33 | | 35 | | 35.5 | | 35 | | 93 | | 104 | D | 378 | | 395 | | 271 | | 263 |
| HCH, alpha | ND | | ND | | ND | | | 153 | | 150 | | 151 | ND | | ND | | NDR J | 1.77 | J | 1.95 | ND | | ND | |
| HCH, beta | ND | | ND | | ND | | NDR | 20 | NDR | 21.3 | NDR | 23.1 | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, gamma | ND | | ND | | ND | | | 27.7 | | 27 | NDR | 29.5 | ND | | J | 3.66 | NDR | 11.5 | NDR J | 5.66 | ND | | | 9.97 |
| Heptachlor | ND | | ND | | ND | | ND | | ND | | ND | | ND | | NDR J | 0.777 | ND | | ND | | ND | | ND | |
| Aldrin | ND | | ND | | ND | | NDR J | 0.613 | ND | | ND | | ND | | ND | | NDR J | 1.49 | NDR J | 1.8 | ND | | ND | |
| Chlordane, gamma (trans) | J | 0.736 | J | 0.614 | J | 0.746 | J | 0.918 | J | 0.907 | J | 0.954 | J | 0.883 | J | 0.907 | J | 0.733 | J | 0.883 | J | 0.974 | J | 0.828 |
| Chlordane, alpha (cis) | J | 1.24 | J | 0.986 | J | 1.17 | J | 1.47 | J | 1.38 | J | 1.54 | J | 1.39 | J | 1.45 | J | 1.1 | J | 1.38 | J | 1.42 | J | 1.39 |
| Octachlorostyrene | J | 0.585 | J | 0.502 | NDR J | 0.384 | J | 0.896 | J | 1.03 | J | 0.805 | | 8.95 | | 10.2 | | 8.65 | | 9.9 | | 10.6 | | 10.3 |
| Chlordane, oxy- | NDR | 14.6 | NDR | 14.4 | NDR | 14 | NDR | 12 | NDR | 16.2 | NDR | 18.6 | NDR | 15.7 | NDR | 10.6 | NDR | 10.6 | NDR | 18.5 | NDR | 26.6 | NDR | 17.2 |
| Nonachlor, trans- | J | 0.781 | J | 0.72 | J | 0.747 | J | 0.874 | J | 0.984 | J | 0.888 | J | 0.986 | J | 1.03 | J | 1.08 | J | 1.28 | J | 0.95 | J | 0.858 |
| Nonachlor, cis- | NDR J | 0.247 | J | 0.263 | J | 0.252 | J | 0.347 | J | 0.34 | J | 0.349 | J | 0.286 | J | 0.326 | J | 0.415 | J | 0.506 | J | 0.358 | J | 0.387 |
| Mirex | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | J | 2.7 | J | 2.91 | J | 1.83 | J | 1.57 |
| 2,4'-DDE (o,p' DDE) | NDR J | 0.443 | ND | | ND | | ND | | ND | | ND | | ND | | ND | | NDR J | 0.299 | ND | | ND | | ND | |
| 4,4'-DDE (p,p' DDE) | J | 2.34 | NDR J | 2.55 | J | 2.28 | | 3.28 | | 3.35 | | 3.36 | J | 3.08 | | 3.33 | | 6.88 | | 9.3 | | 3.84 | | 3.42 |
| 2,4'-DDD (o,p' DDD) | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | J | 0.638 | J | 0.482 | ND | | J | 0.598 |
| 4,4'-DDD (p,p' DDD) | J | 1.98 | J | 1.7 | J | 1.8 | J | 2.92 | J | 2.81 | | 3.44 | J | 2.33 | J | 2.42 | J | 2.67 | J | 2.86 | J | 2.21 | J | 2.89 |
| 2,4'-DDT (o,p' DDT) | ND | | NDR J | 1.16 | J | 1.12 | ND | | J | 1.32 | NDR J | 1.61 | ND | | J | 1.2 | ND | | ND | | J | 1.12 | ND | |
| 4,4'-DDT (p,p' DDT) | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | J | 1.43 | J | 1.5 | J | 1.46 | ND | |
| HCH, delta | J | 0.784 | J Q | 0.388 | J | 0.776 | | 12.6 | | 11.2 | | 12.3 | J | 0.721 | ND | | J Q | 0.911 | ND | | ND | | J Q | 0.645 |
| Heptachlor Epoxide | | 4.09 | | 3.48 | Q | 3.57 | | 3.36 | | 3.45 | | 3.92 | | 3.55 | | 3.52 | | 3.08 | J Q | 1.57 | Q | 3.14 | Q | 2.87 |
| Dieldrin | | 6.81 | | 6.21 | | 7.06 | | 6.73 | | 6.88 | | 7.32 | | 8.54 | | 8.85 | | 6.73 | | 6.7 | | 8.64 | | 7.55 |
| Endrin | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Aldehyde | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Ketone | ND | | ND | | ND | | J Q | 0.206 | ND | | ND | | ND | | ND | | ND | | ND | | J Q | 0.343 | J | 0.254 |
| Methoxychlor | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| alpha-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | J | 1.52 | J | 1.27 | ND | | ND | |
| beta-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | J | 0.579 | ND | | ND | |
| Endosulphan Sulphate | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| 13C-1,4-Dichlorobenzene (% Recovery) | | 10.9 | | 17 | NQ | | | 9.34 | | 10.2 | | 5.96 | | 5.69 | | 6.49 | | 5.14 | | 5.02 | | 13.7 | | 11.7 |
| 13C-1,2,3-Trichlorobenzene (% Recovery) | | 25 | | 35.4 | NQ | | NQ | | NQ | | NQ | | | 17.8 | | 17.1 | NDR | 38.9 | NQ | | NQ | | NQ | |
| 13C-1,2,3,4-Tetrachlorobenzene (% Recovery) | | 36.4 | | 47.3 | | 6.94 | | 35.8 | | 35.1 | | 25.6 | | 26 | | 25.2 | | 24.5 | | 20.7 | | 37.9 | | 35.1 |
| 13C-Pentachlorobenzene (% Recovery) | | 49 | | 55.1 | V | 25.8 | | 47.5 | | 45.2 | | 38.6 | | 39 | | 38.7 | NDR | 45.5 | V | 28.7 | | 50.1 | | 45.3 |
| 13C-Hexachlorobenzene (% Recovery) | | 69.7 | | 69.6 | | 49.6 | | 65.5 | | 61.2 | | 59.3 | | 58 | | 61 | | 59.7 | | 52.9 | | 57.7 | | 56.1 |
| 13C-beta-HCH (% Recovery) | | 71.5 | | 72.3 | | 59.1 | | 68.7 | | 61.7 | | 72.6 | | 74.9 | | 71.6 | | 73.4 | | 60.3 | | 65.2 | | 65.8 |
| 13C-gamma-HCH (% Recovery) | | 81 | | 81.7 | | 62.2 | | 82.3 | | 75.7 | | 72 | | 79.6 | | 77.8 | | 77.6 | | 59.8 | | 65.1 | | 66.6 |
| 13C-Heptachlor (% Recovery) | | 87.3 | | 83.4 | | 59.7 | | 77.7 | | 70.5 | | 67.7 | | 76.3 | | 71.9 | | 71.7 | | 64 | | 67.7 | | 65.7 |
| 13C-Aldrin (% Recovery) | | 80.1 | | 78.7 | | 71.3 | | 80.1 | | 76.3 | | 71.5 | | 67.9 | | 55.3 | | 53.9 | | 42.9 | | 58.9 | | 42.5 |
| 13C-Chlordane, gamma (trans) (% Recovery) | | 97.6 | | 95.4 | | 85.6 | | 93.8 | | 89.4 | | 92.2 | | 98.3 | | 93.6 | | 94.5 | | 86.8 | | 90.1 | | 90.2 |
| 13C-Nonachlor, trans- (% Recovery) | | 93.7 | | 90 | | 82.7 | | 91 | | 86.7 | | 88 | | 93.8 | | 92.2 | | 91.9 | | 84.3 | | 87.4 | | 87.5 |
| 13C-4,4'-DDE (% Recovery) | | 96 | | 92.2 | | 88.8 | | 95.4 | | 92.5 | | 95.5 | | 96.9 | | 95.3 | | 95.6 | | 89.2 | | 89.1 | | 90.3 |
| 13C-4,4'-DDT (% Recovery) | | 110 | | 98.4 | | 90.9 | | 101 | | 90.1 | | 95.7 | | 97.3 | | 90.8 | | 90.5 | | 91.4 | | 96.7 | | 93 |
| 13C-4,4'-DDD (ng/sample) | | 90.8 | | 82.7 | | 89.9 | | 88.8 | | 84.0 | | 89.6 | | 90.5 | | 93.3 | | 91.6 | | 88.4 | | 90.3 | | 96.6 |
| D4-alpha-Endosulphan (% Recovery) DB5 | | 75.3 | | 81 | | 97.4 | | 83.2 | | 83.8 | | 92.6 | | 91.7 | | 94.4 | | 85.9 | | 88.7 | | 48.5 | | 92.8 |
| D4-beta-Endosulphan (% Recovery) DB5 | | 79.4 | | 82.5 | | 91.2 | | 90 | | 88.5 | | 93.8 | | 90 | | 93.6 | | 87.6 | | 96.5 | | 45.7 | | 95.1 |
| D4-alpha-Endosulphan (% Recovery) DB17 | | 68.3 | | 75.3 | | 87.7 | | 77.8 | | 79.3 | | 86 | | 85.5 | | 90.4 | | 80.7 | | 80.4 | | 44.6 | | 83.7 |
| D4-beta-Endosulphan (% Recovery) DB17 | | 76.6 | | 79.9 | | 89.8 | | 90.4 | | 88.7 | | 89.4 | | 87.1 | | 90.9 | | 85.1 | | 90.4 | | 46.1 | | 92.6 |

**Appendix F2:** SPMD data for Canadian deployments - concentrations represent ng/SPMD

Niagara-on-the-Lake (NOTL)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLIENT_ID | Fort Erie | | Fort Erie | | Fort Erie | | Ushers Ck-1 | | Ushers Ck-2 | | Ushers Ck-3 | | Niagara River | | Niagara River | | Niagara River | |
| Axys ID | at Robertson St-1 | | at Robertson St-2 | | at Robertson St-3 | | | | | | | | U/S of | | U/S of | | U/S of | |
| WORKGROUP | | | | | | | | | | | | | Chippawa Channel-1 | | Chippawa Channel-2 | | Chippawa Channel-3 | |
| Sample Size | L23776-80 i | | L23776-81 i | | L23776-82 i | | L23776-83 i | | L23776-84 | | L23776-85 RXi | | L23776-86 | | L23776-87 | | L23776-88 | |
| UNITS | WG52450 | | WG52450 | | WG52450 | | WG52450 | | WG52450 | | WG53086 | | WG52450 | | WG52450 | | WG52450 | |
| | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | |
| | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| 1,3-Dichlorobenzene | J | 1.5 | J | 1.83 | ND | | J | 1.92 | ND | | ND | | NQ | | ND | | J | 2.2 |
| 1,4-Dichlorobenzene | | 10.5 | | 11.3 | | 10.2 | | 9.56 | | 8.38 | NDR | 11 | NQ | | | 8.47 | | 11.1 |
| 1,2-Dichlorobenzene | J | 1.39 | J | 1.29 | ND | | J | 1.62 | ND | | J | 3.39 | NQ | | ND | | J | 1.3 |
| 1,3,5-Trichlorobenzene | ND | | ND | | ND | | NDR J | 0.607 | ND | | ND | | ND | | ND | | ND | |
| 1,2,4-Trichlorobenzene | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| 1,2,3-Trichlorobenzene | ND | | ND | | ND | | ND | | NDR J | 2.02 | ND | | NDR J | 1.37 | ND | | NDR J | 1.6 |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | ND | | J | 0.28 | ND | | J | 1.72 | J | 1.62 | ND | | ND | | J | 0.329 | ND | |
| 1,2,3,4-Tetrachlorobenzene | J | 0.28 | J | 0.258 | J | 0.305 | J | 0.473 | J | 0.458 | ND | | ND | | ND | | ND | |
| Hexachlorobutadiene | ND | | ND | | ND | | ND | | NDR J | 0.672 | ND | | NDR J | 0.753 | ND | | ND | |
| Pentachlorobenzene | J | 1.55 | J | 1.31 | J | 1.52 | | 5.64 | | 5.61 | J | 5.57 | NDR J | 0.946 | J | 1.37 | J | 1.07 |
| Hexachlorobenzene | | 3.76 | | 3.58 | | 3.34 | J | 1.6 | J | 1.72 | J | 1.76 | J | 2.44 | J | 2.52 | J | 2.53 |
| HCH, alpha | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, beta | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, gamma | ND | | NDR J | 4.74 | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Heptachlor | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Aldrin | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Chlordane, gamma (trans) | J | 0.997 | J | 1.06 | J | 0.951 | J | 1.38 | J | 1.53 | J | 1.34 | J | 0.64 | J | 0.604 | J | 0.696 |
| Chlordane, alpha (cis) | J | 1.75 | J | 1.67 | J | 1.69 | J | 2.47 | J | 2.21 | J | 1.95 | J | 0.972 | J | 1.04 | J | 1.06 |
| Octachlorostyrene | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Chlordane, oxy- | NDR | 28 | NDR | 18.5 | NDR | 15.9 | NDR | 22.2 | NDR | 28.1 | NDR | 32.1 | NDR | 14.2 | NDR | 27.9 | NDR | 19.4 |
| Nonachlor, trans- | J | 1.19 | NDR J | 1.15 | J | 1.19 | J | 3.25 | J | 3.03 | J | 2.63 | J | 0.72 | J | 0.592 | J | 0.779 |
| Nonachlor, cis- | J | 0.385 | J | 0.342 | J | 0.479 | NDR J | 1.45 | J | 1.1 | NDR J | 0.794 | J | 0.277 | ND | | J | 0.27 |
| Mirex | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| 2,4'-DDE (o,p' DDE) | J | 1.24 | J | 1.41 | J | 1.25 | ND | | ND | | ND | | ND | | ND | | ND | |
| 4,4'-DDE (p,p' DDE) | | 90.6 | | 104 | | 104 | | 13.8 | | 13.2 | | 12.1 | | 6.89 | | 6.4 | | 6.67 |
| 2,4'-DDD (o,p' DDD) | | 5.78 | | 5.75 | | 5.32 | J | 0.988 | J | 1.25 | J | 0.873 | J | 0.629 | J | 0.636 | J | 0.497 |
| 4,4'-DDD (p,p' DDD) | | 24.8 | | 28.9 | | 28.2 | | 5.1 | | 4.92 | J | 4.02 | | 3.66 | | 3.5 | J | 3.29 |
| 2,4'-DDT (o,p' DDT) | J | 1.34 | J | 1.57 | J | 1.77 | NDR J | 0.388 | ND | | ND | | ND | | ND | | ND | |
| 4,4'-DDT (p,p' DDT) | | 5.21 | | 6.03 | | 6.15 | J | 1.05 | J | 1.17 | J | 0.887 | J | 0.96 | J | 0.88 | J | 1.02 |
| HCH, delta | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Heptachlor Epoxide | Q | 2.95 | Q | 2.93 | Q | 2.82 | J Q | 1.3 | J Q | 1.5 | J | 1.47 | J Q | 2.35 | J Q | 2.34 | J Q | 2.46 |
| Dieldrin | | 8.65 | | 7.85 | | 7.54 | | 3.33 | | 3.47 | | 3.41 | | 6.3 | | 6.29 | | 5.85 |
| Endrin | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Aldehyde | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Ketone | J | 0.912 | J Q | 0.311 | J Q | 0.31 | ND | | ND | | ND | | ND | | ND | | ND | |
| Methoxychlor | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| alpha-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| beta-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Endosulphan Sulphate | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| 13C-1,4-Dichlorobenzene (% Recovery) | | 14 | | 19.7 | | 10.7 | | 10.5 | | 5.92 | | 5.06 | NQ | | | 12.5 | | 15 |
| 13C-1,2,3-Trichlorobenzene (% Recovery) | | 25.9 | | 38.3 | | 20.5 | | 29 | | 14.2 | | 10.4 | | 12.4 | | 29.2 | | 29 |
| 13C-1,2,3,4-Tetrachlorobenzene (% Recovery) | | 33.4 | | 46.6 | | 27.2 | | 39.9 | | 21.9 | | 18 | | 22.7 | | 37.7 | | 33.9 |
| 13C-Pentachlorobenzene (% Recovery) | | 39.7 | | 49.3 | | 33.9 | | 46.9 | V | 29.8 | V | 29.3 | | 32.9 | | 40.7 | | 38.6 |
| 13C-Hexachlorobenzene (% Recovery) | | 56.3 | | 59.5 | | 53.1 | | 56.4 | | 46.8 | | 51 | | 50.9 | | 55 | | 53.6 |
| 13C-beta-HCH (% Recovery) | | 60.4 | | 59.7 | | 58.4 | | 55.7 | | 48.3 | | 57 | | 62.8 | | 67.7 | | 72.3 |
| 13C-gamma-HCH (% Recovery) | | 59.8 | | 61.2 | | 56.4 | | 58.9 | | 48.5 | | 62.7 | | 64.3 | | 64.1 | | 67 |
| 13C-Heptachlor (% Recovery) | | 46.7 | | 52.9 | | 51.1 | | 51.9 | | 49.3 | | 69.1 | | 63.9 | | 63.7 | | 68.6 |
| 13C-Aldrin (% Recovery) | | 65.9 | | 68.7 | | 63.4 | | 60.7 | | 58.2 | | 71.8 | | 50.7 | NDR | 63.3 | NDR | 53.9 |
| 13C-Chlordane, gamma (trans) (% Recovery) | | 78.1 | | 85.4 | | 86.4 | | 80.9 | | 74.1 | | 85.9 | | 90.7 | | 89.2 | | 92.2 |
| 13C-Nonachlor, trans- (% Recovery) | | 74.4 | | 82.5 | | 82.6 | | 77.1 | | 71.9 | | 88.5 | | 86.2 | | 87.3 | | 92.5 |
| 13C-4,4'-DDE (% Recovery) | | 86.6 | | 90.4 | | 92.5 | | 84.7 | | 82 | | 92 | | 89.5 | | 90.8 | | 94.1 |
| 13C-4,4'-DDT (% Recovery) | | 68.8 | | 77.2 | | 78.6 | | 76.8 | | 72.4 | | 92 | | 94.5 | | 93.4 | | 100 |
| 13C-4,4'-DDD (ng/sample) | | 99.6 | | 97.9 | | 97.8 | | 96.8 | | 89.7 | | 94.9 | | 89.0 | | 83.5 | | 89.3 |
| D4-alpha-Endosulphan (% Recovery) DB5 | | 92 | | 94.1 | | 91.7 | | 85.8 | | 86.6 | | 103 | | 79.5 | | 95 | | 88.1 |
| D4-beta-Endosulphan (% Recovery) DB5 | | 90.4 | | 94.1 | | 95.6 | | 85 | | 79.1 | | 88.4 | | 92 | | 87.8 | | 91.3 |
| D4-alpha-Endosulphan (% Recovery) DB17 | | 78.3 | | 79.9 | | 72.3 | | 87 | | 77.5 | | 90.9 | | 73.8 | | 79.8 | | 72.7 |
| D4-beta-Endosulphan (% Recovery) DB17 | | 95.3 | | 91.1 | | 93.9 | | 92.6 | | 79.3 | | 79.9 | | 84 | | 102 | | 88.1 |

**Appendix F2:** SPMD data for Canadian deployments - concentrations represent ng/SPMD

Niagara-on-the-Lake (NOTL)

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLIENT_ID | NOTL-1 | | NOTL-2 | | NOTL-3 | | Balsam Lake | | Balsam Lake | | Balsam Lake | |
| Axys ID | | | | | | | Control-1 | | Control-2 | | Control-3 | |
| WORKGROUP | | | | | | | | | | | | |
| Sample Size | L23776-89 | | L23776-90 | | L23776-91 | | L23776-92 RXi | | L23776-93 | | L23776-94 | |
| UNITS | WG52450 | | WG52450 | | WG52450 | | WG53086 | | WG52450 | | WG52450 | |
| | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | | 1sample | |
| | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| 1,3-Dichlorobenzene | | 3.89 | J | 2.68 | | 3.25 | J | 2.05 | | 3.13 | J | 1.72 |
| 1,4-Dichlorobenzene | | 14.5 | | 12.5 | | 13.5 | | 10.8 | | 11.3 | | 8.11 |
| 1,2-Dichlorobenzene | ND | | J | 2.12 | ND | | J | 3.05 | ND | | J | 2.09 |
| 1,3,5-Trichlorobenzene | ND | | NDR J | 0.749 | ND | | ND | | ND | | ND | |
| 1,2,4-Trichlorobenzene | | 4.28 | | 3.98 | | 3.94 | ND | | ND | | ND | |
| 1,2,3-Trichlorobenzene | NDR J | 2.97 | ND | | ND | | ND | | ND | | ND | |
| 1,2,4,5-/1,2,3,5-Tetrachlorobenzene | J | 4.03 | J | 4.44 | J | 3.99 | ND | | ND | | ND | |
| 1,2,3,4-Tetrachlorobenzene | | 9.58 | | 10.6 | | 9.59 | ND | | ND | | ND | |
| Hexachlorobutadiene | J | 2.34 | J | 1.91 | J | 1.92 | ND | | ND | | ND | |
| Pentachlorobenzene | | 10.1 | | 10.6 | | 9.88 | ND | | J | 0.56 | NDR J | 0.532 |
| Hexachlorobenzene | | 13.5 | | 14.5 | | 13.3 | J | 1.56 | J | 1.74 | J | 1.53 |
| HCH, alpha | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, beta | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, gamma | ND | | ND | | ND | | ND | | ND | | ND | |
| Heptachlor | ND | | NDR | 3.74 | ND | | ND | | NDR | 7.38 | NDR | 7.54 |
| Aldrin | ND | | ND | | ND | | ND | | ND | | ND | |
| Chlordane, gamma (trans) | J | 0.897 | J | 0.822 | J | 0.822 | ND | | J | 0.47 | NDR J | 0.316 |
| Chlordane, alpha (cis) | J | 1.29 | J | 1.21 | J | 1.12 | ND | | J | 0.513 | J | 0.507 |
| Octachlorostyrene | J | 2.6 | J | 2.66 | J | 2.34 | ND | | ND | | ND | |
| Chlordane, oxy- | NDR | 20.8 | NDR | 20.9 | NDR | 17.3 | NDR | 17.4 | NDR | 24.7 | NDR | 26.9 |
| Nonachlor, trans- | NDR J | 0.774 | NDR J | 0.887 | J | 0.919 | J | 0.348 | J | 0.367 | J | 0.407 |
| Nonachlor, cis- | ND | | J | 0.368 | J | 0.269 | ND | | ND | | ND | |
| Mirex | ND | | ND | | ND | | ND | | ND | | ND | |
| 2,4'-DDE (o,p' DDE) | ND | | ND | | ND | | ND | | ND | | ND | |
| 4,4'-DDE (p,p' DDE) | J | 2.96 | J | 2.78 | J | 2.7 | J | 1.91 | J | 2.22 | NDR J | 2.12 |
| 2,4'-DDD (o,p' DDD) | ND | | ND | | ND | | ND | | ND | | ND | |
| 4,4'-DDD (p,p' DDD) | J | 2.56 | J | 1.6 | J | 2.14 | J | 0.746 | ND | | ND | |
| 2,4'-DDT (o,p' DDT) | ND | | NDR J | 1.34 | ND | | ND | | ND | | ND | |
| 4,4'-DDT (p,p' DDT) | ND | | ND | | ND | | ND | | ND | | ND | |
| HCH, delta | J | 0.759 | ND | | ND | | ND | | ND | | ND | |
| Heptachlor Epoxide | Q | 2.96 | Q | 2.84 | J Q | 2.32 | J | 1.28 | J Q | 1.19 | J Q | 1.21 |
| Dieldrin | | 6.25 | | 6.01 | | 5.33 | J Q | 1.44 | J | 2.23 | J | 2.34 |
| Endrin | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Aldehyde | ND | | ND | | ND | | ND | | ND | | ND | |
| Endrin Ketone | ND | | ND | | ND | | ND | | ND | | ND | |
| Methoxychlor | ND | | ND | | ND | | ND | | ND | | ND | |
| alpha-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | |
| beta-Endosulphan | ND | | ND | | ND | | ND | | ND | | ND | |
| Endosulphan Sulphate | ND | | ND | | ND | | ND | | ND | | ND | |
| 13C-1,4-Dichlorobenzene (% Recovery) | | 5.73 | | 7.72 | | 7.06 | | 11.1 | | 9.53 | | 12.9 |
| 13C-1,2,3-Trichlorobenzene (% Recovery) | | 13.5 | | 24.2 | | 20.2 | | 24.2 | | 21.1 | | 28.2 |
| 13C-1,2,3,4-Tetrachlorobenzene (% Recovery) | | 20 | | 35 | | 29.5 | | 32 | | 29.7 | | 35.2 |
| 13C-Pentachlorobenzene (% Recovery | V | 27.5 | | 42.3 | | 38.5 | | 40.3 | | 38.8 | | 41.8 |
| 13C-Hexachlorobenzene (% Recovery) | | 49.9 | | 57.3 | | 57.6 | | 58.6 | | 56.2 | | 55.4 |
| 13C-beta-HCH (% Recovery) | | 63.3 | | 58.4 | | 67.4 | | 58.4 | | 58.6 | | 52.9 |
| 13C-gamma-HCH (% Recovery) | | 59.7 | | 60.3 | | 61.3 | | 68.9 | | 61.3 | | 57.4 |
| 13C-Heptachlor (% Recovery) | | 51.6 | | 56.8 | | 54.6 | | 76.7 | | 57 | | 59.2 |
| 13C-Aldrin (% Recovery) | | 62.9 | | 67 | | 65.2 | | 76.9 | | 64.4 | | 62 |
| 13C-Chlordane, gamma (trans) (% Recovery) | | 87.2 | | 86.7 | | 85.2 | | 89.4 | | 76.8 | | 75 |
| 13C-Nonachlor, trans- (% Recovery) | | 83.4 | | 84.6 | | 84.2 | | 88.2 | | 73.6 | | 74.3 |
| 13C-4,4'-DDE (% Recovery) | | 91.7 | | 88.6 | | 89.3 | | 93.3 | | 85.2 | | 80.1 |
| 13C-4,4'-DDT (% Recovery) | | 77.3 | | 91.1 | | 80.2 | | 95.3 | | 76 | | 82.6 |
| 13C-4,4'-DDD (ng/sample) | | 91.1 | | 78.0 | | 90.7 | | 92.8 | | 88.2 | | 82.3 |
| D4-alpha-Endosulphan (% Recovery) DB5 | | 94.1 | | 94.7 | | 88.8 | | 139 | | 84.5 | | 115 |
| D4-beta-Endosulphan (% Recovery) DB5 | | 102 | | 90.9 | | 94.3 | | 120 | | 87 | | 115 |
| D4-alpha-Endosulphan (% Recovery) DB17 | | 80.5 | | 86.5 | | 81.4 | | 130 | | 79 | | 98.5 |
| D4-beta-Endosulphan (% Recovery) DB17 | | 97.1 | | 91.7 | | 92.8 | | 112 | | 83.9 | | 109 |

**F3: Dioxin and furan concentrations in SPMD**

| CLIENT_ID | | Bloody Run Ck (U/S)-3 | | | Bloody Run Ck-3 | | | Bloody Run Ck (D/S)-3 | | | Lab Blank (101) | | | Bloody Run Ck BLANK 2 OF 2 | | | Spiked Matrix (102) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | | L23776-73 | | | L23776-76 | | | L23776-79 | | | WG52451-101 | | | L23776-3 | | | WG52451-102 | |
| WORKGROUP | | WG52451 | | | WG52451 | | | WG52451 | | | WG52451 | | | WG52451 | | | WG52451 | |
| Sample Size | | 1sample | | | 1sample | | | 1sample | | | 1sample | | | 1sample | | | | |
| UNITS | flag | pg/sample | pg/sample (RL) | flag | pg/sample | pg/sample (RL) | flag | pg/sample | pg/sample (RL) | flag | pg/sample | pg/sample (RL) | flag | pg/sample | pg/sample (RL) | flag | % Recovery | - |
| 2,3,7,8-TCDD | J | 5.81 | 0.762 | | 128 | 1.46 | | 40.8 | 0.76 | U | | 0.757 | U | | 0.762 | | 97.1 | |
| 1,2,3,7,8-PECDD | U | | 0.762 | J | 1.64 | 0.801 | U | | 0.76 | U | | 0.757 | U | | 0.762 | | 103 | |
| 1,2,3,4,7,8-HXCDD | U | | 0.762 | J | 1.24 | 0.917 | K J | 0.825 | 0.76 | U | | 0.757 | U | | 0.762 | | 91.6 | |
| 1,2,3,6,7,8-HXCDD | U | | 0.762 | K J | 13.4 | 0.917 | J | 5.25 | 0.76 | U | | 0.757 | U | | 0.762 | | 94.3 | |
| 1,2,3,7,8,9-HXCDD | J | 1.34 | 0.762 | J | 7.25 | 0.917 | J | 3.52 | 0.76 | U | | 0.757 | U | | 0.762 | | 86.9 | |
| 1,2,3,4,6,7,8-HPCDD | J | 4.37 | 0.762 | J | 23.1 | 1.46 | J | 12.2 | 0.84 | U | | 1.49 | K J | 1.26 | 0.937 | | 90.5 | |
| OCDD | J | 15.3 | 0.762 | J | 15.9 | 1.98 | J | 15.5 | 1.29 | K J | 1.53 | 1.36 | J | 2.59 | 0.762 | | 90.7 | |
| 2,3,7,8-TCDF (225) | K J | 3.01 | 0.762 | J | 1.86 | 0.758 | J | 2.03 | 0.76 | | | | | | | | | |
| 2,3,7,8-TCDF | K J | 3.37 | 0.762 | J | 8.18 | 1.44 | K J | 5.01 | 0.76 | U | | 0.757 | U | | 0.762 | | 89.2 | |
| 1,2,3,7,8-PECDF | U | | 0.762 | K J | 2.3 | 1.66 | U | | 0.76 | U | | 0.757 | U | | 0.762 | | 93 | |
| 2,3,4,7,8-PECDF | J | 1.32 | 0.762 | J | 3.51 | 1.66 | J | 1.97 | 0.76 | U | | 0.757 | U | | 0.762 | | 94.4 | |
| 1,2,3,4,7,8-HXCDF | K J | 1.29 | 0.762 | K J | 6.05 | 1.47 | J | 3.2 | 0.76 | U | | 0.757 | U | | 0.762 | | 93.8 | |
| 1,2,3,6,7,8-HXCDF | K J | 0.836 | 0.762 | U | | 1.47 | J | 0.907 | 0.76 | U | | 0.757 | U | | 0.762 | | 92.8 | |
| 1,2,3,7,8,9-HXCDF | U | | 0.762 | U | | 1.47 | U | | 0.76 | U | | 0.757 | U | | 0.762 | | 98.2 | |
| 2,3,4,6,7,8-HXCDF | U | | 0.762 | U | | 1.47 | U | | 0.76 | U | | 0.757 | U | | 0.762 | | 93.7 | |
| 1,2,3,4,6,7,8-HPCDF | J | 2.07 | 0.762 | J | 3.26 | 1.14 | J | 3.48 | 0.76 | U | | 1.06 | U | | 0.762 | | 96.7 | |
| 1,2,3,4,7,8,9-HPCDF | U | | 0.762 | U | | 1.14 | U | | 0.76 | U | | 1.06 | U | | 0.762 | | 97.1 | |
| OCDF | K J | 4.97 | 0.762 | J | 5.32 | 0.758 | J | 8.01 | 0.762 | U | | 1.14 | U | | 0.762 | | 118 | |
| TOTAL TETRA-DIOXINS | | 7.64 | 0.762 | | 128 | 1.46 | | 42.8 | 0.76 | U | | 0.757 | U | | 0.762 | | | |
| TOTAL PENTA-DIOXINS | U | | 0.762 | | 9.1 | 0.801 | | 2.25 | 0.76 | U | | 0.757 | U | | 0.762 | | | |
| TOTAL HEXA-DIOXINS | | 1.34 | 0.762 | | 42.9 | 0.917 | | 21.9 | 0.76 | U | | 0.757 | U | | 0.762 | | | |
| TOTAL HEPTA-DIOXINS | | 10.1 | 0.762 | | 36.3 | 1.46 | | 18.2 | 0.84 | U | | 1.49 | | 1.47 | 0.937 | | | |
| OCDD | J | 15.3 | 0.762 | J | 15.9 | 1.98 | J | 15.5 | 1.29 | K J | 1.53 | 1.36 | J | 2.59 | 0.762 | | 90.7 | |
| TOTAL TETRA-FURANS | | 29.4 | 0.762 | | 81.4 | 1.44 | | 16.2 | 0.76 | U | | 0.757 | U | | 0.762 | | | |
| TOTAL PENTA-FURANS | | 4.34 | 0.762 | | 29.7 | 1.66 | | 12 | 0.76 | U | | 0.757 | U | | 0.762 | | | |
| TOTAL HEXA-FURANS | U | | 0.762 | | 5.51 | 1.47 | | 6.64 | 0.76 | U | | 0.757 | U | | 0.762 | | | |
| TOTAL HEPTA-FURANS | | 2.07 | 0.762 | | 3.26 | 1.14 | | 3.48 | 0.76 | U | | 1.06 | U | | 0.762 | | | |
| OCDF | K J | 4.97 | 0.762 | J | 5.32 | 0.758 | J | 8.01 | 0.762 | U | | 1.14 | U | | 0.762 | | 118 | |
| 13C-2,3,7,8-TCDD (% Recovery) | | 78.2 | | | 84.9 | | | 64.5 | | | 59.6 | | | 71.8 | | | 57 | |
| 13C-1,2,3,7,8-PECDD (% Recovery) | | 100 | | | 92.8 | | | 93 | | | 69.5 | | | 90.2 | | | 79.2 | |
| 13C-1,2,3,4,7,8-HXCDD (% Recovery) | | 82.1 | | | 83.9 | | | 82.6 | | | 61.2 | | | 75.5 | | | 68.6 | |
| 13C-1,2,3,6,7,8-HXCDD (% Recovery) | | 84.8 | | | 86.9 | | | 86.6 | | | 61.3 | | | 76.2 | | | 70.1 | |
| 13C-1,2,3,4,6,7,8-HPCDD (% Recovery) | | 75.7 | | | 92.2 | | | 72.7 | | | 56 | | | 68.7 | | | 69 | |
| 13C-OCDD (% Recovery) | | 70.1 | | | 75.2 | | | 39 | | | 50.6 | | | 65.9 | | | 47.2 | |
| 13C-2,3,7,8-TCDF (% Recovery) | | 79 | | | 89.8 | | | 89.8 | | | 60.4 | | | 73.8 | | | 65.8 | |
| 13C-1,2,3,7,8-PECDF (% Recovery) | | 76.1 | | | 81.5 | | | 76.6 | | | 59.2 | | | 69.5 | | | 62.9 | |
| 13C-2,3,4,7,8-PECDF (% Recovery) | | 67.3 | | | 76.1 | | | 76.1 | | | 51.5 | | | 61.2 | | | 57 | |
| 13C-1,2,3,4,7,8-HXCDF (% Recovery) | | 84 | | | 87.3 | | | 89.2 | | | 66.7 | | | 79 | | | 70.5 | |
| 13C-1,2,3,6,7,8-HXCDF (% Recovery) | | 88.5 | | | 88.2 | | | 86.2 | | | 68.3 | | | 81.2 | | | 73.7 | |
| 13C-1,2,3,7,8,9-HXCDF (% Recovery) | | 77.3 | | | 84.8 | | | 82 | | | 61.1 | | | 72.7 | | | 68.6 | |
| 13C-2,3,4,6,7,8-HXCDF (% Recovery) | | 78.8 | | | 88 | | | 88.2 | | | 58.3 | | | 74.3 | | | 65.9 | |
| 13C-1,2,3,4,6,7,8-HPCDF (% Recovery) | | 78.4 | | | 84.3 | | | 42.7 | | | 59.4 | | | 70.7 | | | 55 | |
| 13C-1,2,3,4,7,8,9-HPCDF (% Recovery) | | 72.1 | | | 85.8 | | | 74.3 | | | 58 | | | 70.4 | | | 66.4 | |
| 37CL-2,3,7,8-TCDD (% Recovery) | | 69.2 | | | 79.5 | | | 62.5 | | | 56.3 | | | 60.8 | | | 60.1 | |
| 13C6-1,2,3,4-TCDD (pg/sample) | | 1296 | | | 1212 | | | 1753 | | | | | | 1495 | | | | |

**Appendix F4:** Homologue data, ng/SPMD. Individual congener data can be obtained on request

Gratwick Riverside Park (GRP)

Little Niagara River (LNR)

Niagara-on-the-Lake (NOTL)

| CLIENT_ID | | | Two Mile Ck (Mouth)-1 | | Two Mile Ck (Mouth)-2 | | Two Mile Ck (Mouth)-3 | | Pettit Flume (D/S)-1 | | Pettit Flume (D/S)-2 | | Pettit Flume (D/S)-3 | | Pettit Flume (Outer Site B)-1 | | Pettit Flume (Outer Site B)-2 | | Pettit Flume (Outer Site B)-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | | | L23776-5 L | | L23776-6 L | | L23776-7 L | | L23776-8 i | | L23776-9 L | | L23776-10 L | | L23776-11 LNK | | L23776-12 LNK | | L23776-13 LNK |
| WORKGROUP | | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 |
| UNITS | | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| Total Monochloro Biphenyls | Mono | ND | | ND | | ND | | | 116 | | 93.3 | | 98 | | 14200 | | 15200 | | 14400 |
| Total Dichloro Biphenyls | Di | | 28.8 | | 21.2 | | 23 | | 79.2 | | 77.2 | | 77 | | 3048 | | 2976.1 | | 2896 |
| Total Trichloro Biphenyls | Tri | | 151.1 | | 145.4 | | 155 | | 102.3 | | 95.9 | | 108 | | 45.9 | | 44.9 | | 47 |
| Total Tetrachloro Biphenyls | Tetra | | 642.8 | | 599.2 | | 640 | | 118.9 | | 103.9 | | 116 | | 45.7 | | 43.8 | | 42 |
| Total Pentachloro Biphenyls | Penta | | 326 | | 312 | | 340 | | 36.3 | | 37.1 | | 40 | | 59.4 | | 60.5 | | 59 |
| Total Hexachloro Biphenyls | Hexa | | 112 | | 106 | | 111 | | 14.5 | | 14 | | 15 | | 64.8 | | 69.5 | | 66 |
| Total Heptachloro Biphenyls | Hepta | | 21.3 | | 20.6 | | 20 | | 3.91 | | 3.44 | | 4 | | 18.2 | | 19.9 | | 18 |
| Total Octachloro Biphenyls | Octa | | 2.19 | | 2.39 | | 3 | | 0.284 | ND | | | 1 | | 1.95 | | 1.33 | | 1 |
| Total Nonachloro Biphenyls | Nona | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Decachloro Biphenyl | Deca | ND | | ND | | ND | | ND | | ND | | ND | | ND | | | 0.142 | | 0.129 |
| **Total PCB=TOTAL PCBs** | | | **1282** | | **1202** | | **1286** | | **470** | | **424** | | **457** | | **17469** | | **18367** | | **17566** |
| CLIENT_ID | | | Pettit Flume (U/S)-1 | | Pettit Flume (U/S)-2 | | Pettit Flume (U/S)-3 | | Fisherman's Park (D/S)-1 | | Fisherman's Park (D/S)-2 | | Fisherman's Park (D/S)-3 | | Fisherman's Park (U/S)-1 | | Fisherman's Park (U/S)-2 | | Fisherman's Park (U/S)-3 |
| Axys ID | | | L23776-14 Li2 | | L23776-15 L | | L23776-16 L | | L23776-17 L | | L23776-18 L | | L23776-19 i | | L23776-20 i | | L23776-21 i | | L23776-22 i |
| WORKGROUP | | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52369 | | WG52371 | | WG52371 | | WG52371 | | WG52371 |
| UNITS | | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| Total Monochloro Biphenyls | Mono | | 9 | | 4.37 | | 3 | | 18.7 | | 10.5 | | 12 | | 13.1 | | 8.66 | | 11 |
| Total Dichloro Biphenyls | Di | | 52.9 | | 50.4 | | 52 | | 46.8 | | 35.3 | | 37 | | 52.5 | | 53.9 | | 50 |
| Total Trichloro Biphenyls | Tri | | 116.2 | | 133.2 | | 131 | | 103.2 | | 102.5 | | 133 | | 143.3 | | 151.3 | | 155 |
| Total Tetrachloro Biphenyls | Tetra | | 133.5 | | 127.9 | | 131 | | 135.7 | | 134.7 | | 155 | | 190.7 | | 190.6 | | 197 |
| Total Pentachloro Biphenyls | Penta | | 45 | | 41.9 | | 40 | | 46.5 | | 47.1 | | 56 | | 63.6 | | 63.5 | | 62 |
| Total Hexachloro Biphenyls | Hexa | | 13.5 | | 13.8 | | 14 | | 17.4 | | 17.8 | | 20 | | 20.9 | | 20.1 | | 20 |
| Total Heptachloro Biphenyls | Hepta | | 3.44 | | 3.07 | | 3 | | 4.24 | | 4.52 | | 5 | | 5.22 | | 4.64 | | 5 |
| Total Octachloro Biphenyls | Octa | | 0.236 | ND | | ND | | ND | | ND | | | 1 | | 0.364 | | 0.669 | | 1 |
| Total Nonachloro Biphenyls | Nona | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Decachloro Biphenyl | Deca | ND | | ND | | ND | | ND | | ND | | | 0.142 | | 0.197 | | 0.111 | ND | |
| **Total PCB=TOTAL PCBs** | | | **375** | | **374** | | **374** | | **373** | | **354** | | **418** | | **491** | | **493** | | **499** |
| CLIENT_ID | | | GRP (U/S of Marina)-1 | | GRP (U/S of Marina)-2 | | GRP (U/S of Marina)-3 | | GRP (in Marina)-1 | | GRP (in Marina)-2 | | GRP (in Marina)-3 | | GRP (U/S of Dump)-1 | | GRP (U/S of Dump)-2 | | GRP (U/S of Dump)-3 |
| Axys ID | | | L23776-23 i | | L23776-24 i | | L23776-25 i | | L23776-26 L | | L23776-27 L | | L23776-28 L | | L23776-29 i | | L23776-30 i | | L23776-31 i |
| WORKGROUP | | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 |
| UNITS | | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| Total Monochloro Biphenyls | Mono | | 35.8 | | 33.1 | | 32 | | 10.7 | | 11.6 | ND | | | 61.4 | | 20.8 | | 18 |
| Total Dichloro Biphenyls | Di | | 591.7 | | 523.9 | | 546 | | 296.6 | | 304.1 | | 313 | | 183.2 | | 175.5 | | 113 |
| Total Trichloro Biphenyls | Tri | | 2395.1 | | 2460.3 | | 2273 | | 1162 | | 1221 | | 1359 | | 553.8 | | 541 | | 509 |
| Total Tetrachloro Biphenyls | Tetra | | 4024.4 | | 3645 | | 3594 | | 1647.1 | | 1734.3 | | 1895 | | 751.2 | | 757.4 | | 739 |
| Total Pentachloro Biphenyls | Penta | | 960 | | 859 | | 835 | | 460 | | 471 | | 509 | | 194 | | 198 | | 197 |
| Total Hexachloro Biphenyls | Hexa | | 110 | | 99.6 | | 102 | | 107 | | 108 | | 118 | | 35.6 | | 35.1 | | 40 |
| Total Heptachloro Biphenyls | Hepta | | 28 | | 25.9 | | 28 | | 25.8 | | 25.6 | | 28 | | 8.87 | | 8.91 | | 12 |
| Total Octachloro Biphenyls | Octa | | 6.16 | | 5.73 | | 6 | | 3.63 | | 3.35 | | 4 | | 1.43 | | 1.04 | | 3 |
| Total Nonachloro Biphenyls | Nona | | 0.338 | | 0.417 | ND | | ND | | | 0.283 | | 0.294 | | 0.224 | ND | | | 0.323 |
| Decachloro Biphenyl | Deca | ND | | | 0.169 | ND | | | 0.236 | | 0.269 | | 0.258 | | 0.107 | | 0.11 | | 0.132 |
| **Total PCB=TOTAL PCBs** | | | **8161** | | **7656** | | **7417** | | **3711** | | **3877** | | **4225** | | **1790** | | **1737** | | **1627** |

**Appendix F4:** Homologue data, ng/SPMD. Individual congener data can be obtained on request

Gratwick Riverside Park (GRP)
Little Niagara River (LNR)
Niagara-on-the-Lake (NOTL)
Storm Sewer (SS)

| CLIENT_ID | GRP (Middle of Park)-1 | | GRP (Middle of Park)-2 | | GRP (Middle of Park)-3 | | GRP (D/S)-1 | | GRP (D/S)-2 | | GRP (D/S)-3 | | 102nd St (U/S)-1 | | 102nd St (U/S)-2 | | 102nd St (U/S)-3 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | L23776-32 i | | L23776-33 i | | L23776-34 i | | L23776-35 i | | L23776-36 i | | L23776-37 | | L23776-38 | | L23776-39 | | L23776-40 | |
| WORKGROUP | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52371 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | |
| UNITS | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| Total Monochloro Biphenyls | | 17.2 | | 17 | | 16 | | 20.2 | | 22.5 | | 20 | | 7.76 | | 12 | | 7 |
| Total Dichloro Biphenyls | | 122 | | 112.8 | | 114 | | 112.2 | | 123.9 | | 112 | | 75.1 | | 77.9 | | 91 |
| Total Trichloro Biphenyls | | 371.3 | | 382.5 | | 372 | | 326.1 | | 394.5 | | 335 | | 252.1 | | 254.5 | | 239 |
| Total Tetrachloro Biphenyls | | 454.5 | | 453 | | 436 | | 366.5 | | 430.6 | | 381 | | 293.9 | | 290.9 | | 283 |
| Total Pentachloro Biphenyls | | 116 | | 113 | | 110 | | 99.5 | | 116 | | 104 | | 97 | | 88.7 | | 94 |
| Total Hexachloro Biphenyls | | 27.1 | | 26.1 | | 25 | | 22.6 | | 26.9 | | 26 | | 30.1 | | 27.5 | | 29 |
| Total Heptachloro Biphenyls | | 6.99 | | 6.86 | | 7 | | 4.91 | | 6.64 | | 5 | | 5.88 | | 5 | | 6 |
| Total Octachloro Biphenyls | | 0.483 | | 0.472 | | 1 | | 0.403 | | 0.564 | | 0.461 | | 0.306 | ND | | | 0.315 |
| Total Nonachloro Biphenyls | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Decachloro Biphenyl | ND | | ND | | | 0.102 | ND | | | 0.129 | | 0.157 | | 0.086 | ND | | ND | |
| **Total PCB=TOTAL PCBs** | | **1115** | | **1112** | | **1082** | | **953** | | **1123** | | **979** | | **763** | | **756** | | **750** |

| CLIENT_ID | LNR (Near 102nd St)-1 | | LNR (Near 102nd St)-2 | | LNR (Near 102nd St)-3 | | Cayuga Creek -1 | | Cayuga Creek-2 | | Cayuga Creek-3 | | LNR (D/S Cayuga)-1 | | LNR (D/S Cayuga)-2 | | LNR (D/S Cayuga)-3 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | L23776-41 | | L23776-42 | | L23776-43 | | L23776-44 L | | L23776-45 L | | L23776-46 L | | L23776-47 | | L23776-48 | | L23776-49 | |
| WORKGROUP | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | |
| UNITS | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| Total Monochloro Biphenyls | | 17 | | 12.4 | | 12 | ND | | ND | | ND | | ND | | | 3.88 | ND | |
| Total Dichloro Biphenyls | | 149.2 | | 144.4 | | 144 | | 11.3 | | 18 | | 9 | | 82.1 | | 70.5 | | 14.6 |
| Total Trichloro Biphenyls | | 316.9 | | 303.8 | | 308 | | 62.3 | | 53.3 | | 46 | | 209.4 | | 198.4 | | 171.6 |
| Total Tetrachloro Biphenyls | | 321.8 | | 305.4 | | 286 | | 100.8 | | 94.6 | | 91 | | 256.3 | | 264.9 | | 226.4 |
| Total Pentachloro Biphenyls | | 107 | | 103 | | 98 | | 73.8 | | 72 | | 68 | | 79.8 | | 83 | | 84.7 |
| Total Hexachloro Biphenyls | | 30.4 | | 28.2 | | 29 | | 29.5 | | 28.9 | | 28 | | 24.1 | | 25.1 | | 25.8 |
| Total Heptachloro Biphenyls | | 5.23 | | 4.66 | | 4 | | 4.28 | | 4.06 | | 4 | | 4.17 | | 4.48 | | 4.55 |
| Total Octachloro Biphenyls | | 0.507 | | 0.681 | | 0.143 | | 0.265 | | 0.225 | ND | | | 0.297 | | 0.573 | | 0.633 |
| Total Nonachloro Biphenyls | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Decachloro Biphenyl | ND | | ND | | | 0.092 | ND | | ND | | ND | | | 0.14 | ND | | ND | |
| **Total PCB=TOTAL PCBs** | | **950** | | **908** | | **877** | | **283** | | **271** | | **247** | | **656** | | **651** | | **660** |

| CLIENT_ID | U/S OCC.-1 | | U/S OCC. -2 | | U/S OCC.-3 | | D/S Storm Sewer (SS) A-1 | | D/S SS A-2 | | D/S SS A-3 | | D/S SS B-1 | | D/S SS B-2 | | D/S SS B-3 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | L23776-50 | | L23776-51 | | L23776-52 | | L23776-53 | | L23776-54 | | L23776-55 | | L23776-56 | | L23776-57 | | L23776-58 | |
| WORKGROUP | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52400 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | |
| UNITS | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| Total Monochloro Biphenyls | | 1.96 | | 5.1 | | 5 | | 6.5 | | 5.44 | | 5 | | 5.5 | | 4.96 | | 9 |
| Total Dichloro Biphenyls | | 100.3 | | 95.8 | | 96 | | 94.6 | | 75.2 | | 101 | | 80.7 | | 83.2 | | 85 |
| Total Trichloro Biphenyls | | 305.9 | | 272 | | 297 | | 249.6 | | 259.4 | | 230 | | 235.3 | | 219.6 | | 220 |
| Total Tetrachloro Biphenyls | | 357 | | 353.5 | | 337 | | 312 | | 300.9 | | 296 | | 278.4 | | 288 | | 245 |
| Total Pentachloro Biphenyls | | 105 | | 99.1 | | 105 | | 91.4 | | 87.9 | | 87 | | 83.9 | | 88.7 | | 75 |
| Total Hexachloro Biphenyls | | 28.7 | | 27.9 | | 29 | | 24.9 | | 25.1 | | 23 | | 22.8 | | 25 | | 19 |
| Total Heptachloro Biphenyls | | 5.84 | | 5.91 | | 6 | | 5.67 | | 5.26 | | 6 | | 3.68 | | 5.66 | | 4 |
| Total Octachloro Biphenyls | ND | | | 0.14 | | 0.135 | | 0.638 | ND | | | 0.356 | | 0.495 | | 0.333 | | 1 |
| Total Nonachloro Biphenyls | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Decachloro Biphenyl | ND | | ND | | ND | | | 0.164 | | 0.131 | ND | | ND | | | 0.161 | | 0.111 |
| **Total PCB=TOTAL PCBs** | | **902** | | **860** | | **875** | | **786** | | **759** | | **748** | | **710** | | **717** | | **659** |

**Appendix F4:** Homologue data, ng/SPMD. Individual congener data can be obtained on request

Gratwick Riverside Park (GRP)
Little Niagara River (LNR)
Niagara-on-the-Lake (NOTL)
Bloody Run Creek (BRC)

| CLIENT_ID | | SS C-1 | | SS C-2 | | SS C-3 | | OCC 003-1 | | OCC 003-2 | | OCC 003-3 | | U/S Gill Creek (in NR)-1 | | U/S Gill Creek (NR)-2 | | U/S Gill Creek (in NR)-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | | L23776-59 | | L23776-60 | | L23776-61 | | L23776-62 | | L23776-63 | | L23776-64 | | L23776-65 i | | L23776-66 | | L23776-67 |
| WORKGROUP | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 |
| UNITS | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| Total Monochloro Biphenyls | | 4.94 | | 3.8 | | 2 | | 7 | | 6.05 | ND | | ND | | ND | | ND | |
| Total Dichloro Biphenyls | | 61.8 | | 57.1 | | 44 | | 234.2 | | 239.2 | | 174 | ND | | | 1.2 | | 1 |
| Total Trichloro Biphenyls | | 165.8 | | 152.7 | | 162 | | 3887.4 | | 4619.9 | | 2702 | | 10.6 | | 8.2 | | 8 |
| Total Tetrachloro Biphenyls | | 282.3 | | 255.7 | | 262 | | 9593.8 | | 11663.4 | | 6056 | | 14 | | 12.9 | | 12 |
| Total Pentachloro Biphenyls | | 83.5 | | 74.9 | | 80 | | 2150 | | 2890 | | 1340 | | 9.31 | | 7.83 | | 7 |
| Total Hexachloro Biphenyls | | 17.7 | | 15.8 | | 16 | | 138 | | 199 | | 95 | | 5 | | 3.74 | | 4 |
| Total Heptachloro Biphenyls | | 3.77 | | 2.68 | | 3 | | 14 | | 21.2 | | 10 | | 1.24 | | 0.845 | | 1 |
| Total Octachloro Biphenyls | | 0.651 | | 0.402 | | 0.347 | | 2.98 | | 5.2 | | 1 | ND | | ND | | ND | |
| Total Nonachloro Biphenyls | ND | | ND | | ND | | ND | | | 0.559 | ND | | ND | | ND | | ND | |
| Decachloro Biphenyl | | 0.167 | | 0.141 | | 0.177 | | 0.504 | | 0.495 | | 0.391 | ND | | ND | | ND | |
| **Total PCB=TOTAL PCBs** | | **620** | | **564** | | **570** | | **15978** | | **19671** | | **10376** | | **40** | | **34** | | **32** |

| CLIENT_ID | | Gill Ck (Mouth)-1 | | Gill Ck (Mouth)-2 | | Gill Ck (Mouth)-3 | | BRC (U/S)-1 | | BRC (U/S)-2 | | BRC-1 | | BRC-2 | | BRC (D/S)-1 | | BRC (D/S)-2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | | L23776-68 | | L23776-69 | | L23776-70 | | L23776-71 | | L23776-72 | | L23776-74 | | L23776-75 i | | L23776-77 i | | L23776-78 i |
| WORKGROUP | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52449 | | WG52450 | | WG52450 | | WG52450 |
| UNITS | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| Total Monochloro Biphenyls | ND | | | 1.88 | | 2 | ND | | ND | | ND | | ND | | ND | | ND | |
| Total Dichloro Biphenyls | | 14.5 | | 13.5 | | 13 | | 2.5 | | 1 | | 4.4 | | 2 | | 2.6 | | 1 |
| Total Trichloro Biphenyls | | 161.3 | | 179.3 | | 167 | | 15.1 | | 15 | | 76.7 | | 65 | | 40.5 | | 42 |
| Total Tetrachloro Biphenyls | | 339 | | 351.2 | | 303 | | 28.2 | | 27 | | 138.5 | | 125 | | 73.8 | | 64 |
| Total Pentachloro Biphenyls | | 93.9 | | 97.6 | | 81 | | 13.5 | | 13 | | 48.3 | | 46 | | 26.8 | | 25 |
| Total Hexachloro Biphenyls | | 16.2 | | 17.3 | | 15 | | 5.79 | | 6 | | 15.7 | | 19 | | 7.75 | | 8 |
| Total Heptachloro Biphenyls | | 2.89 | | 3.05 | | 3 | | 1.39 | | 2 | | 4.17 | | 6 | | 1.12 | | 1 |
| Total Octachloro Biphenyls | | 0.191 | | 0.298 | ND | | ND | | ND | | | 0.541 | | 1 | ND | | ND | |
| Total Nonachloro Biphenyls | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Decachloro Biphenyl | ND | | ND | | ND | | ND | | ND | | | 0.101 | ND | | | 0.129 | ND | |
| **Total PCB=TOTAL PCBs** | | **628** | | **664** | | **583** | | **67** | | **64** | | **289** | | **264** | | **153** | | **140** |

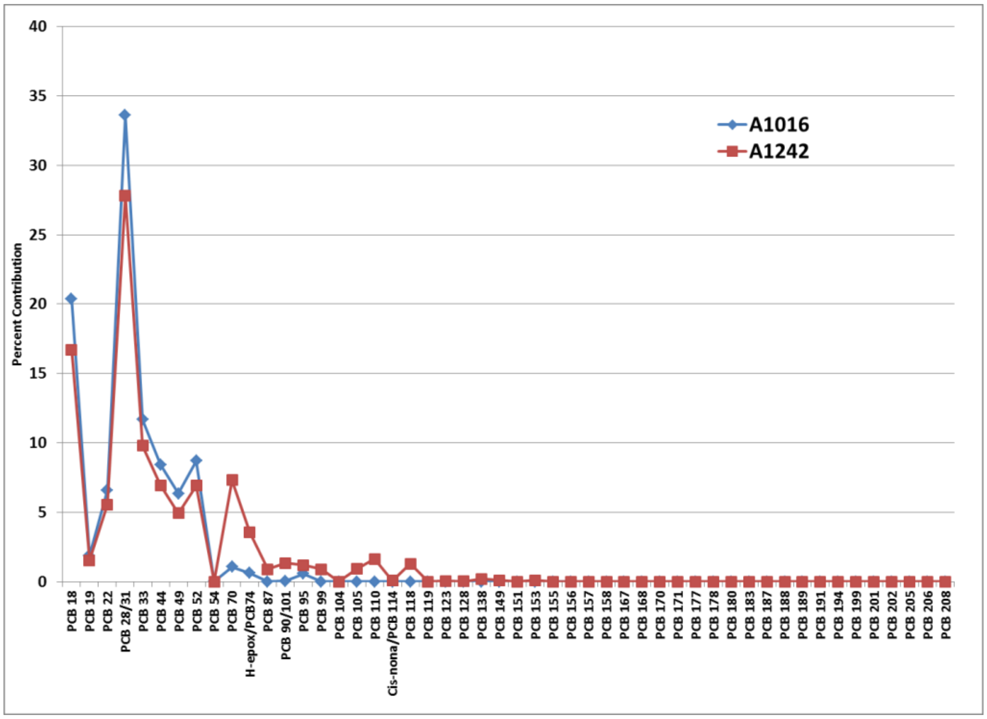
**Appendix F4:** Homologue data, ng/SPMD. Individual congener data can be obtained on request

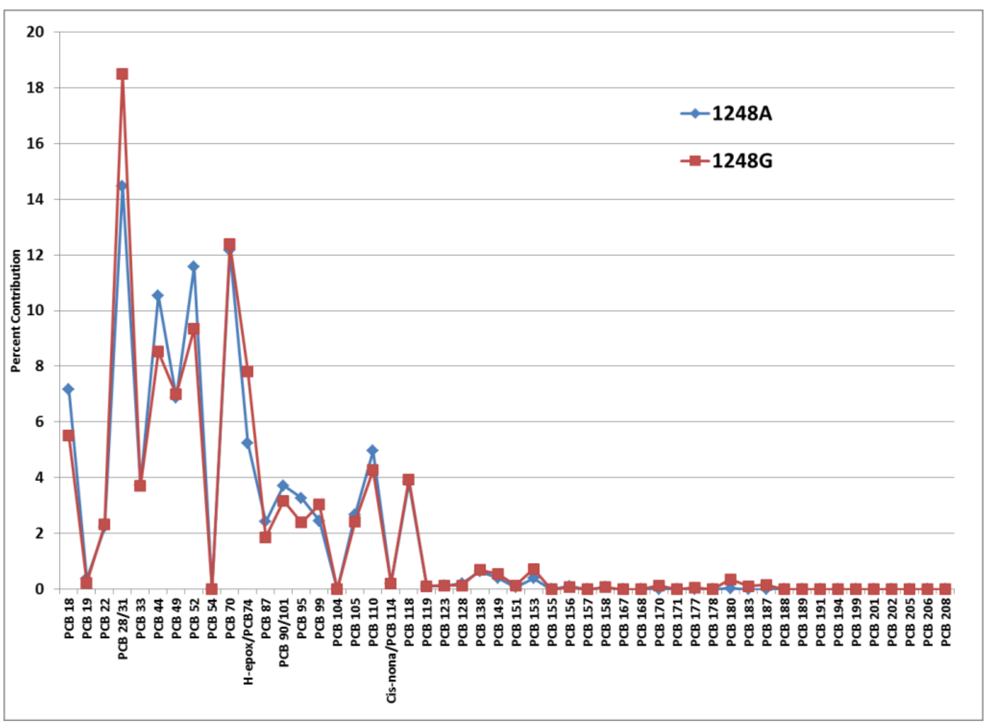
Niagara-on-the-Lake (NOTL)

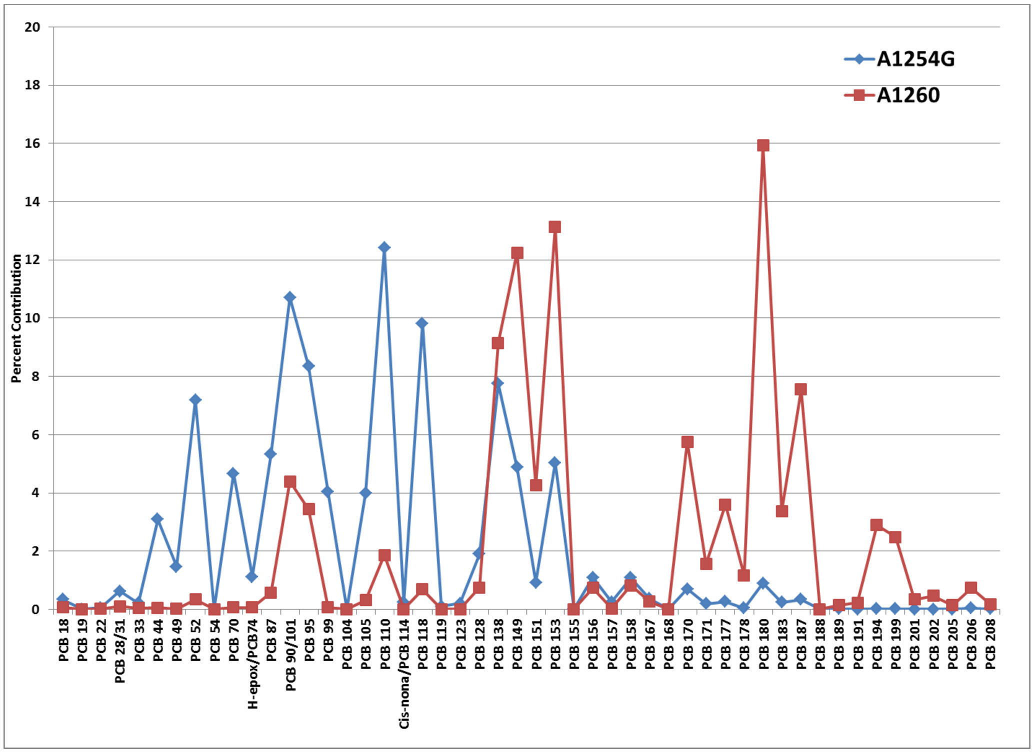
| CLIENT_ID | | Fort Erie -1 | | Fort Erie -2 | | Fort Erie -3 | | Ushers Ck-1 | | Ushers Ck-2 | | Ushers Ck-3 | | Chippawa Channel-1 | | Chippawa Channel-2 | | Chippawa Channel-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | | L23776-80 i | | L23776-81 i | | L23776-82 i | | L23776-83 i | | L23776-84 | | L23776-85 RXi | | L23776-86 | | L23776-87 | | L23776-88 |
| WORKGROUP | | WG52450 | | WG52450 | | WG52450 | | WG52450 | | WG52450 | | WG53086 | | WG52450 | | WG52450 | | WG52450 |
| UNITS | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| Total Monochloro Biphenyls | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Total Dichloro Biphenyls | | 2.3 | | 1.9 | ND | | ND | | ND | | ND | | | 1.3 | ND | | | 1 |
| Total Trichloro Biphenyls | | 6.2 | | 6.7 | | 6 | | 3.8 | | 4.5 | | 4 | | 4.5 | | 3.8 | | 5 |
| Total Tetrachloro Biphenyls | | 9.3 | | 8.6 | | 9 | | 4.8 | | 0.8 | | 3 | | 3.5 | | 0.9 | | 6 |
| Total Pentachloro Biphenyls | | 7.84 | | 7.98 | | 8 | | 1.9 | | 2 | | 2 | | 3.46 | | 3.06 | | 3 |
| Total Hexachloro Biphenyls | | 3.36 | | 4.32 | | 4 | | 2.09 | | 1.51 | | 2 | | 2.32 | | 1.66 | | 2 |
| Total Heptachloro Biphenyls | ND | | | 0.485 | | 0.255 | | 0.503 | | 0.529 | ND | | | 0.232 | | 0.214 | | 0.408 |
| Total Octachloro Biphenyls | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Total Nonachloro Biphenyls | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| Decachloro Biphenyl | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | | ND | |
| **Total PCB=TOTAL PCBs** | | **29** | | **30** | | **28** | | **13** | | **9** | | **11** | | **15** | | **9** | | **18** |

| CLIENT_ID | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Axys ID | | NOTL-1 | | NOTL-2 | | NOTL-3 | | Balsam Lake Control-1 | | Balsam Lake Control-2 | | Balsam Lake Control-3 |
| WORKGROUP | | L23776-89 | | L23776-90 | | L23776-91 | | L23776-92 RXi | | L23776-93 | | L23776-94 |
| UNITS | | WG52450 | | WG52450 | | WG52450 | | WG53086 | | WG52450 | | WG52450 |
| | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample | flag | ng/sample |
| Total Monochloro Biphenyls | | | | | | | | | | | | |
| Total Dichloro Biphenyls | ND | | ND | | ND | | ND | | ND | | ND | |
| Total Trichloro Biphenyls | | 2.3 | | 6.2 | | 3 | ND | | ND | | ND | |
| Total Tetrachloro Biphenyls | | 24.9 | | 25.8 | | 26 | | 3.2 | | 3.1 | | 3 |
| Total Pentachloro Biphenyls | | 34.7 | | 39.1 | | 33 | | 1.4 | | 1.9 | | 1 |
| Total Hexachloro Biphenyls | | 14.2 | | 13.9 | | 13 | ND | | | 0.34 | ND | |
| Total Heptachloro Biphenyls | | 5.42 | | 5.97 | | 3 | ND | | | 0.701 | | 0.457 |
| Total Octachloro Biphenyls | | 0.718 | | 0.724 | | 1 | ND | | ND | | ND | |
| Total Nonachloro Biphenyls | ND | | ND | | ND | | ND | | ND | | ND | |
| Decachloro Biphenyl | ND | | ND | | ND | | ND | | ND | | ND | |
| **Total PCB=TOTAL PCBs** | ND | | ND | | ND | | ND | | ND | | ND | |
| | | **83** | | **91** | | **80** | | **5** | | **6** | | **5** |

# Appendix G: Aroclor Profiles for PCBC3485





A1254G
A1260
Percent Contribution
0
2
4
6
8
10
12
14
16
18
20
PCB 18
PCB 19
PCB 22
PCB 28/31
PCB 33
PCB 44
PCB 49
PCB 52
PCB 54
PCB 70
H-epox/PCB74
PCB 87
PCB 90/101
PCB 95
PCB 99
PCB 104
PCB 105
PCB 110
Cis-nona/PCB 114
PCB 118
PCB 119
PCB 123
PCB 128
PCB 138
PCB 149
PCB 151
PCB 153
PCB 155
PCB 156
PCB 157
PCB 158
PCB 167
PCB 168
PCB 170
PCB 171
PCB 177
PCB 178
PCB 180
PCB 183
PCB 187
PCB 188
PCB 189
PCB 191
PCB 194
PCB 199
PCB 201
PCB 202
PCB 205
PCB 206
PCB 208