APPENDIX B

Baseline Concentrations

APPENDIX B-1

Selected Baseline Concentrations

1.0 BASELINE SOIL AND BIOTA

1.1 Introduction

Jacques Whitford Limited was retained by the Regions of Durham and York to complete a sampling program to establish baseline concentrations of selected chemicals in soil and biota. The physical sampling locations were in the vicinity of the preferred development area for a Municipal Energy-from-Waste facility in the Municipality of Clarington, Ontario (Jacques Whitford, 2009a).

The USEPA (2005) has provided guidance on evaluating human health environmental effects caused by air emissions from proposed facilities at the design stage. The guidance identifies a number of media that are to be included in the assessment. These same media were targeted as media of interest for the baseline sampling program. The following lists the media of interest and the rationale for inclusion in the baseline sampling program:

- **Soil**: Soil is one of the most important of the media considered. Both human (persons that reside in or visit the area surrounding the proposed facility, including members of the general public) and ecological receptors (living organisms other than humans, the habitat which supports such organisms, or natural resources which could be adversely affected by environmental contaminations resulting by a release at or migration from a site) are exposed directly to soil. Also the models used during the risk assessment (chemical fate and transport models, human and ecological risk evaluation models) rely heavily on the soil concentrations to predict concentrations in various other media. In addition, existing soil concentrations represent the current conditions associated with any historical deposition.

- **Forage**: Forage is considered to be green herbaceous vegetation from non-woody plants such as grasses and wildflowers. Forage ingestion is a direct pathway for many ecological receptors. 11 samples were collected (including a duplicate) from ten locations. All samples were analyzed for metals. Some of the COPCs such as SVOCs, PCBs, PCDD/PCDF, PAHs, and VOCs do not commonly accumulate in vegetation. Nevertheless, five (5) forage samples were selected for analysis of the above listed chemicals.

- **Browse**: Browse is considered to be woody growth from shrubs and trees, such as willows, alders, birches, poplars, and conifers. Browse ingestion is a direct pathway for many ecological receptors. 11 samples were collected (including a duplicate) from 10 locations. All samples were analyzed for metals. As in the case of forage, some of the COPCs such as SVOCs, PCBs, PCDD/PCDF, PAHs, and VOCs do not commonly accumulate in vegetation. Furthermore, in the case of browse these chemicals are expected to accumulate even less than in the forage vegetation, as chemical transport of these chemicals to the woody parts of shrubs and trees is less likely to occur. Nevertheless three (3) browse samples were selected for analysis of the above listed chemicals (with the exception of VOCs).

- **Small Mammals**: Small mammals such as mice, voles, and shrews, are exposed directly to soil and forage/browse media as well as forming an exposure pathway for other ecological receptors.

- **Water**: Water quality is considered one of the primary indicators of the quality of aquatic habitats. In addition, water ingestion is a direct exposure pathway for all ecological receptors.
- **Sediment**: Sediment ingestion is an exposure pathway for ecological receptors.
- **Fish**: Fish ingestion is an exposure pathway for both human and ecological receptors.
- **Produce**: Produce ingestion is an exposure pathway for human receptors, and is broadly classified as above ground exposed, above ground protected, below ground, fruit and agricultural product (meat, dairy).

Several environmental media – soil, terrestrial vegetation (forage, browse, and crops), small mammals, surface water, sediment and fish – were sampled within a 1 km radius of the proposed site. However, in the case of agricultural products and local produce samples were collected from farms and markets located outside a 1 km radius of the proposed site due to limited availability. Every effort was made to ensure that the farms were as close as possible to the proposed facility site. Sampling garden produce from the backyards of residents within the area surrounding the proposed facility site was limited to one location; however, garden produce was obtained from local farmers" fields and markets. General inquiries were made to confirm that the produce acquired had been grown locally. The produce collected is considered to be sufficient to represent baseline conditions of the area surrounding the proposed facility site.

The sampling locations are shown on Figure 5-1 and the coordinates and media sampled at each location provided in Table 2.1 in the Environmental Baseline Report (Jacques Whitford, 2009a). The locations of produce and other agricultural products samples from outside the 1 km site radius are shown in Figure 2.2 (Jacques Whitford, 2009a) with the coordinates and media sampled at each location provided in Table 2.2 (Jacques Whitford, 2009a).

A summary of the sampling program, including number of samples collected and the chemical analysis required is provided in the Environmental Baseline Report (Jacques Whitford, 2009a). As indicated in the table, not all media were analyzed for all possible COPC. In some instances, this was due to limitations of the methods of analysis.

In addition, Jacques Whitford conducted ambient air quality monitoring in the vicinity of the Site from September 2007 to December 2008 (Jacques Whitford, 2009e). The monitoring station was located on the west side of Courtice Road, approximately 1.5 km south of Highway 401, and within the fenced area of the project office for the water pollution control plant. The location was approximately 2 km southwest from the Site.

Continuous monitoring of Criteria Air Contaminants (CACs) was conducted at the Courtice Road station for Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_x), Carbon Monoxide (CO), Ozone (O_3), and Particulate Matter smaller than 2.5 microns ($PM_{2.5}$). Hi-volume air samplers were installed to collect 24-hour average samples of Total Suspended Particulate (TSP) and metals, Polycyclic Aromatic Hydrocarbons (PAHs), and Dioxins and Furans. Ambient monitoring data from the Courtice Road station were compared with monitoring data collected at available monitoring stations operated by the Ontario Ministry of the Environment (MOE) to compare the levels in the vicinity of the Facility to other locations in Ontario.

In addition to the ambient monitoring data collected at the Courtice Road station, data from monitoring stations operated under the National Air Pollution Surveillance (NAPS) Network by Environment Canada were used to characterize regional air quality and to develop background concentration levels for volatile organic compounds (VOCs), chlorinated monocyclic aromatics (CMAs), and Polychlorinated Biphenyls (PCB).

1.2 Baseline Concentrations

The baseline exposure point concentrations (EPCs) established in the Environmental Baseline Report (Jacques Whitford 2009a) represent the maximum concentration, the 95th percentile, or the 95th upper confidence limit of the arithmetic or geometric mean of the concentrations of each chemical within each media type. These are generally considered as conservative approaches for estimating potential exposures for the purposes of completing human health or ecological risk assessments (Health Canada 2004a).

A review of the results of the data quality (*i.e.,* method blanks, surrogate recoveries, matrix spikes, laboratory duplicates, and field duplicates) was completed. The results indicate that the data are acceptable for the purposes of establishing the baseline EPC.

Laboratory data results were used to determine the baseline EPC of the chemical parameters analyzed in the various media. Data not included in the establishment of the baseline EPC consisted of quality control (QC) samples, such as field duplicates and laboratory duplicates. Non-detectable values were carried forward in the statistical analysis at the laboratory estimate of quantification (EQL) value, sometimes referred to as the method detection limit (MDL), according to standard practice.

1.2.1 Statistical Analysis

Laboratory results were used to determine the baseline concentrations of the chemical parameters analyzed in the various media. Data not included in the reporting of the baseline concentrations consisted of quality control samples such as laboratory duplicates. Non-detectable values were carried forward in the statistical analysis at the method detection limit (MDL) value. The use of these values will lead to an overestimation of potential risk to receptors.

Baseline concentrations were established using statistical evaluation, provided that the chemical was detected in at least one of the samples from that medium. The statistical tests were based on the assumptions of a normal or log-normal distribution (i.e., the log-normal distribution is skewed to the right but has a normal distribution once log-transformed). However, because of the uncertainty associated with estimating the true average concentration for the study area, the following procedure was used to report baseline values used in the HHERA:

- If a chemical was not detected in any of the samples, the baseline concentration was presented as the method detection limit (MDL). Where multiple detection limits were encountered, the maximum detection limit was carried forward;
- With certain exceptions the maximum detected concentration was assessed in the HHERA regardless of sample size;

- For soil samples and inorganics in small mammals the sample sizes were sufficient to conduct statistical analysis. Where appropriate the 95th UCLM was used for these media-chemical combinations.

For the calculation of the 95th UCLM values, the distribution of chemical data sets as assessed for each medium was evaluated to identify if data conforms to either a normal or a log-normal distribution using the SAS™ statistical software package program. If the p-value of the Shapiro-Wilk normality test was greater than 0.05, then the measure was deemed to be from a normal distribution. If the measures were identified as not normal, then the data were log transformed using the natural log. If the Shapiro-Wilk test still indicated the data to be not normal, then histograms of the un-transformed data were created and visual observation was conducted for identifying the outliers. Where applicable, outliers were removed and the same procedure described above was applied on the new set of data. If the data set continued not to conform to a normal or log-normal distribution, no statistical tests were further applied.

If the means were calculated using the log-transformed data, the resulting UCLM or 95th percentile was back-transformed using the EXP function in Excel for communication purposes.

As indicated above, the baseline values used in this assessment represent the maximum detected concentration, maximum method detection limit concentration, or the 95th UCLM of the concentrations of each detected chemical within each media type. These are generally considered as conservative approaches for estimating potential exposures for the purposes of completing human health or ecological risk assessments (Health Canada, 2004).

2.0 SUMMARY OF RESULTS USED IN THE HHERA

A summary of the results of the baseline sampling programs is provided in Tables B.1 and B.2. This data represents the baseline concentrations values used in the Human Health and Ecological Risk Assessment. Baseline concentrations represent either the maximum concentration, UCLM or method detection limit of each detected chemical within each media type,

3.0 ADDITIONAL INFORMATION

A full review of selected baseline concentrations was completed upon receipt of comments from the Ontario Ministry of the Environment (MOE). Appendix B-2 summarizes the change in selected baseline concentrations before and after receipt of these comments. MOE comments and comment responses are summarized in Appendix P.

Additionally, the Environmental Baseline Study Report has been provided (Appendix B-3) to give further context to the concentrations selected for assessment in this report.

Table B.1 - Baseline Air Concentrations

COPC	1-hour ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
Combustion Gases			
Ammonia (Slip at stack)	-	-	-
Carbon Monoxide (CO)	1035	1029	632
Hydrogen Chloride (HCl)	-	-	-
Hydrogen Fluoride (HF)	-	-	-
Nitrogen Oxides (NOx)	65	58	37
Organic Matter (as CH4)	-	-	-
Particulate Matter PM10	-	-	-
Particulate Matter PM2.5	23	20	9.8
Particulat Matter - Total	86	35	21
Sulfur Dioxide (SO2)	20	19	5.9
Chlorinated Polycyclic Aromatics			
Dioxins and Furans (as TEQ Toxic Equivalents)	5.78E-08	2.37E-08	1.66E-08
Polychlorinated Biphenyls (PCB)	1.02E-04	4.20E-05	1.85E-05
Metals			
Antimony	0.0073	0.0030	0.0029
Arsenic	0.0044	0.0018	0.0018
Barium	0.020	0.0082	0.0049
Beryllium	7.35E-04	3.02E-04	2.98E-04
Boron	0.19	0.076	0.015
Cadmium (Cd)	0.0015	6.04E-04	6.01E-04
Chromium (hexavalent)	-	-	-
Total Chromium (and compounds)	0.0067	0.0028	0.0017
Cobalt	0.0015	6.04E-04	5.96E-04
Lead	0.012	0.0050	0.0033
Mercury - Inorganic	-	-	-
Nickel	0.011	0.0045	0.0022
Phosphorus	0.18	0.072	0.047
Silver	8.33E-04	3.42E-04	3.43E-04
Selenium	0.0073	0.0030	0.0029
Thallium	-	-	-
Tin	0.0073	0.0030	0.0029
Vanadium	0.0038	0.0015	7.70E-04
Zinc	0.10	0.042	0.025
Chlorinated Monocyclic Aromatics			
1,2-Dichlorobenzene	0.026	0.011	0.0047
1,2,4,5-Tetrachlorobenzene	-	-	-
1,2,4 – Trichlorobenzene	0.11	0.046	0.017
2,3,4,6-Tetrachlorophenol	-	-	-
2,4,6-Trichlorophenol	-	-	-
2,4-Dichlorophenol	-	-	-
Pentachlorophenol	0.0021	8.76E-04	4.10E-04
Hexachlorobenzene	1.52E-04	6.25E-05	5.27E-05
Pentachlorobenzene	-	-	-

Table B.1 - Baseline Air Concentrations

COPC	1-hour ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
Polycyclic Organic Matter			
Acenaphthylene	7.53E-04	3.09E-04	1.58E-04
Acenaphthene	0.0030	0.0012	5.48E-04
Anthracene	3.97E-04	1.63E-04	8.00E-05
Benzo(a)anthracene	1.65E-04	6.77E-05	5.63E-05
Benzo(b)fluoranthene	3.45E-04	1.42E-04	7.56E-05
Benzo(k)fluoranthene	1.65E-04	6.77E-05	5.63E-05
Benzo(a)fluorene	3.30E-04	1.35E-04	1.13E-04
Benzo(b)fluorene	3.30E-04	1.35E-04	1.13E-04
Benzo(ghi)perylene	1.72E-04	7.07E-05	5.85E-05
Benzo(a)pyrene	1.65E-04	6.77E-05	5.63E-05
Benzo(e)pyrene	3.30E-04	1.35E-04	1.13E-04
Biphenyl	0.0033	0.0014	5.21E-04
Chrysene	2.35E-04	9.64E-05	6.47E-05
Dibenzo(a,c)anthracene	-	-	-
Dibenzo(a,h)anthracene	1.65E-04	6.77E-05	5.63E-05
Fluoranthene	0.0015	6.01E-04	3.93E-04
Fluorene	-	-	-
Indeno(1,2,3 – cd)pyrene	1.65E-04	6.77E-05	5.63E-05
1 – methylnaphthalene	0.0032	0.0013	4.43E-04
2 – methylnaphthalene	0.0053	0.0022	7.56E-04
Naphthalene	0.0059	0.0024	8.59E-04
Perylene	3.30E-04	1.35E-04	1.13E-04
Phenanthrene	0.0063	0.0026	0.0017
Pyrene	6.88E-04	2.83E-04	1.83E-04
Volatile Organic Chemicals (VOC)			
Acetaldehyde	4.3	1.8	1.0
Benzene	29	12	3.9
Bromodichloromethane	0.042	0.017	0.011
Bromoform	0.072	0.029	0.023
Bromomethane	0.22	0.088	0.098
Carbon tetrachloride	1.8	0.74	0.61
Chloroform	0.55	0.23	0.16
Dichlorodifluoromethane	7.9	3.2	2.8
Dichloroethene, 1,1 -	0.0061	0.0025	5.76E-04
Dichloromethane	3.1	1.3	0.76
Ethylbenzene	3.0	1.2	0.69
Ethylene Dibromide	0.013	0.0052	0.0018
Formaldehyde	8.2	3.4	1.7
O-terphenyl	3.30E-04	1.35E-04	1.13E-04
Tetrachloroethene	1.2	0.49	0.26
Tetralin	3.30E-04	1.35E-04	1.13E-04
Toluene	23	9.5	4.4
Trichloroethane, 1,1,1 -	0.28	0.11	0.098
Trichloroethylene, 1,1,2 -	1.3	0.54	0.27
Trichlorofluoromethane	5.2	2.1	1.9
Vinyl chloride	0.014	0.0059	0.0036
Xylenes, m-, p- and o-	12	4.8	2.8

Table B.2 - Baseline Multi-Pathway Concentrations

COPC	Surface Water mg/L	Sediment mg/kg	Soil mg/kg	Fish mg/kg	Small Mammal mg/kg	Forage mg/kg	Browse mg/kg	Crops mg/kg	Aboveground Protected Produce mg/kg
Metals									
Antimony	0.005	1	1	0.01	0.01	1	0.053	0.01	0.01
Arsenic	0.002	2	8	0.166	0.072	0.029	0.032	0.01	0.01
Barium	0.09	94	89.07	2.43	5.2	16	39.1	0.034	0.318
Beryllium	0.001	0.5	0.7	0.1	0.1	0.2	0.2	0.1	0.1
Boron	0.06	14	13.22	6	6	16	27.9	6	3.1
Cadmium	0.0001	0.5	0.5	0.0215	0.225	0.295	0.377	0.005	0.0063
Chromium (Total)	0.006	32	22.17	0.33	0.172	0.91	0.84	0.1	0.1
Chromium VI	0.01	2	-	-	-	-	-	-	-
Cobalt	0.0005	6	7	0.028	0.05	0.095	0.146	0.02	0.02
Lead	0.001	13	16.91	0.07	0.044	0.298	0.41	0.02	0.02
Mercury - Inorganic	0.0001	0.05	0.07	0.0935	0.002	0.0109	0.0223	0.001	0.001
Nickel	0.006	10	12.25	0.48	0.311	0.6	0.39	0.11	0.1
Phosphorus	0.16	680	753	6090	8756.43	1830	1030	1920	974
Selenium	0.005	1	1	1.28	0.34	0.13	0.1	0.061	0.054
Silver	0.0001	0.2	0.2	0.01	0.01	0.02	0.02	0.01	0.011
Thallium	0.0003	1	1	0.01	0.01	0.02	0.02	0.01	0.01
Tin	0.001	5	10	0.05	0.096	0.18	0.1	0.1	0.062
Vanadium	0.008	29	27.89	0.21	0.11	0.29	0.2	0.1	0.1
Zinc	0.045	81	79	38.3	29.78	30.3	67.2	16.3	6.8
Chlorinated Polycyclic Aromatics									
Aroclor 1254 (Total PCBs)	0.00002	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.01
Dioxins and Furans (as TEQ Toxic Equivalents)	3.24E-09	1.96E-06	1.76E-06	8.16E-07	5.90E-07	3.41E-07	3.67E-07	1.19E-07	2.66E-07
Chlorinated Monocyclic Aromatics									
Hexachlorobenzene	0.00005	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Pentachlorobenzene	0.00005	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1,2,4,5-Tetrachlorobenzene	0.00005	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1,2,4-Trichlorobenzene	0.0005	0.1	0.1	-	-	1	-	-	-
1,2-Dichlorobenzene	0.0005	0.02	0.02	-	-	0.2	-	-	-
Pentachlorophenol	0.00001	0.0007	0.0012	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons[a]									
Acenaphthene	0.00001	0.05	0.05	0.00111	0.0004	0.00587	0.00087	0.0003	0.0002
Anthracene	0.00001	0.05	0.05	0.0003	0.0004	0.00274	0.00075	0.0003	0.0002
Benzo(a)pyrene TEQ	3.44E-05	1.42E-01	1.42E-01	1.04E-03	1.38E-03	4.60E-03	2.06E-02	1.03E-03	6.89E-04
Fluorene	0.00002	0.05	0.05	0.00129	0.0004	0.0167	0.0017	0.0003	0.0002
VOCs[b]									
1,1,1-Trichloroethane	0.0005	0.003	0.008	-	-	0.03	-	-	-
Bromoform	0.0005	0.02	0.02	-	-	0.2	-	-	-
Carbon tetrachloride	0.0005	0.01	0.01	-	-	0.1	-	-	-
Chloroform	0.0005	0.01	0.01	-	-	0.1	-	-	-
Dichloromethane	0.0015	0.1	0.2	-	-	1	-	-	-
Trichlorofluoromethane (FREON 11)	0.001	0.02	0.02	-	-	0.2	-	-	-

[a] Benzo(a)fluorene and benzo(b)fluorene were not assessed in the Environmental Baseline program.

[b] O-Terphenyl was not assessed in the Environmental Baseline program.

Table B.2 - Baseline Multi-Pathway Concentrations

COPC	Aboveground Exposed Produce mg/kg	Belowground Produce mg/kg	Fruit mg/kg	Chicken mg/kg	Beef mg/kg	Pork mg/kg	Dairy mg/kg	Eggs mg/kg
Metals								
Antimony	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Arsenic	0.01	0.011	0.01	0.011	0.01	0.01	0.01	0.01
Barium	0.417	4.3	0.881	0.402	0.065	0.061	0.05	0.398
Beryllium	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Boron	6	3.7	6	2	6	6	2	4
Cadmium	0.0105	0.0575	0.005	0.005	0.005	0.005	0.005	0.005
Chromium (Total)	0.1	0.1	0.1	2.54	0.1	0.1	0.1	0.1
Chromium VI	-	-	-	-	-	-	-	-
Cobalt	0.02	0.02	0.02	0.02	0.02	0.051	0.02	0.02
Lead	0.02	0.026	0.02	0.02	0.02	0.02	0.02	0.02
Mercury - Inorganic	0.0016	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Nickel	0.1	0.1	0.17	0.12	0.1	0.1	0.1	0.1
Phosphorus	676	523	521	4170	1160	1310	814	1740
Selenium	0.04	0.05	0.04	0.28	0.2	0.2	0.04	0.21
Silver	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Thallium	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Tin	0.122	0.258	0.38	0.05	0.05	0.05	0.05	0.05
Vanadium	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Zinc	5.39	3.83	4.1	15.3	20.3	13.4	3.49	12.6
Chlorinated Polycyclic Aromatics								
Aroclor 1254 (Total PCBs)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Dioxins and Furans (as TEQ Toxic Equivalents)	4.50E-07	4.47E-07	5.20E-07	2.69E-07	1.24E-07	1.21E-07	1.39E-07	2.84E-07
Chlorinated Monocyclic Aromatics								
Hexachlorobenzene	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Pentachlorobenzene	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1,2,4,5-Tetrachlorobenzene	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1,2,4-Trichlorobenzene	0.5	-	-	20	0.5	10	5	5
1,2-Dichlorobenzene	0.1	-	0.1	4	0.1	2	1	1
Pentachlorophenol	-	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons[a]								
Acenaphthene	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Anthracene	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002
Benzo(a)pyrene TEQ	3.73E-03	6.89E-04	5.05E-03	6.90E-04	6.89E-04	1.03E-03	6.89E-04	6.89E-04
Fluorene	0.0002	0.0002	0.00026	0.0002	0.0002	0.0005	0.0002	0.0002
VOCs[b]								
1,1,1-Trichloroethane	0.02	-	0.02	0.6	0.02	0.3	0.2	0.2
Bromoform	0.1	-	0.1	4	0.1	2	1	1
Carbon tetrachloride	0.05	-	0.05	2	0.05	1	0.5	0.5
Chloroform	0.05	-	0.06	2	0.05	1	0.5	0.5
Dichloromethane	0.5	-	0.5	20	0.5	10	5	5
Trichlorofluoromethane (FREON 11)	0.1	-	0.1	4	0.1	2	1	1

[a] Benzo(a)fluorene and benzo(b)fluorene were not assessed in the Environmental Baseline program.

[b] O-Terphenyl was not assessed in the Environmental Baseline program.

APPENDIX B-2

Baseline Concentration Before and After Receipt of MOE Comments

COPC	Fruit (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.0002	DL	0.0002	DL	0%
Acenaphthylene	0.0002	DL	0.0002	DL	0%
Anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.0002	DL	0.00118	DL	490%
Benzo(b)fluoranthene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(g,h,i)perylene	0.0002	DL	0.0002	DL	0%
Benzo(k)fluoranthene	0.0002	DL	0.0002	DL	0%
Chrysene	0.0002	DL	0.0002	DL	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0002	DL	0.00189	DL	845%
Fluoranthene	0.0002	DL	0.00057	DL	185%
Fluorene	0.0002	DL	0.00026	DL	30%
Indeno(1,2,3-cd)pyrene	0.0002	DL	0.0002	DL	0%
Perylene	0.0002	DL	0.00106	DL	430%
Phenanthrene	0.00123	Max	0.00123	Max	0%
Pyrene	0.0002	DL	0.00037	DL	85%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	8.40E-08	Max	8.40E-08	Max	0%
1,2,3,4,6,7,8-HpCDF	6.60E-08	Max	6.60E-08	Max	0%
1,2,3,4,7,8,9-HpCDF	3.90E-08	DL	9.40E-08	DL	141%
1,2,3,4,7,8-HxCDD	2.90E-08	DL	8.40E-08	DL	190%
1,2,3,4,7,8-HxCDF	2.41E-08	Max	2.41E-08	Max	0%
1,2,3,6,7,8-HxCDD	6.20E-08	DL	8.40E-08	DL	35%
1,2,3,6,7,8-HxCDF	2.30E-08	DL	5.00E-08	DL	117%
1,2,3,7,8,9-HxCDD	6.20E-08	DL	8.30E-08	DL	34%
1,2,3,7,8,9-HxCDF	2.08E-08	Max	2.08E-08	Max	0%
1,2,3,7,8-PeCDD	4.90E-08	DL	1.40E-07	DL	186%
1,2,3,7,8-PeCDF	2.10E-08	DL	7.50E-08	DL	257%
2,3,4,6,7,8-HxCDF	1.10E-08	DL	1.00E-07	DL	809%
2,3,4,7,8-PeCDF	1.90E-08	DL	1.10E-07	DL	479%
2,3,7,8-TCDD	1.80E-08	DL	2.90E-07	DL	1511%
2,3,7,8-TCDF	1.50E-08	DL	1.20E-07	DL	700%
OCDD	7.50E-07	Max	7.50E-07	Max	0%
OCDF	4.22E-07	Max	4.22E-07	Max	0%

COPC	Fruit (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	0.02	DL	0.02	DL	0%
Bromoform	0.1	DL	0.1	DL	0%
Carbon Tetrachloride	0.05	DL	0.05	DL	0%
Chloroform	0.06	Max	0.06	Max	0%
Dichloromethane	0.5	DL	0.5	DL	0%
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	0.1	DL	0.1	DL	0%
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	-	-	-	-	-
1,2-Dichlorobenzene	0.1	DL	0.1	DL	0%
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.01	DL	0.01	DL	0%
Arsenic	0.01	DL	0.01	DL	0%
Barium	0.74	95% UCLM	0.881	Max	19%
Beryllium	0.1	DL	0.1	DL	0%
Boron	5.85	95% UCLM	6	Max	3%
Cadmium	0.005	DL	0.005	DL	0%
Chromium (Total)	0.1	DL	0.1	DL	0%
Chromium VI	-	-	-	-	-
Cobalt	0.02	DL	0.02	DL	0%
Lead	0.02	DL	0.02	DL	0%
Mercury - Inorganic	0.001	DL	0.001	DL	0%
Methyl Mercury	-	-	-	-	-
Nickel	0.17	Max	0.17	Max	0%
Phosphorus	478.35	95% UCLM	521	Max	9%
Selenium	0.04	DL	0.04	DL	0%
Silver	0.01	DL	0.01	DL	0%
Thallium	0.01	DL	0.01	DL	0%
Tin	0.07	95% UCLM	0.38	Max	443%
Vanadium	0.1	DL	0.1	DL	0%
Zinc	0.07	95% UCLM	4.1	Max	5757%

COPC	Aboveground Exposed Produce (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.0002	DL	0.0002	DL	0%
Acenaphthylene	0.0002	DL	0.0002	DL	0%
Anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluoranthene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(g,h,i)perylene	0.0002	DL	0.0002	DL	0%
Benzo(k)fluoranthene	0.0002	DL	0.0002	DL	0%
Chrysene	0.0002	DL	0.0002	DL	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0002	DL	0.00172	DL	760%
Fluoranthene	0.0002	DL	0.0002	DL	0%
Fluorene	0.0002	DL	0.0002	DL	0%
Indeno(1,2,3-cd)pyrene	0.0002	DL	0.0002	DL	0%
Perylene	0.0002	DL	0.0002	DL	0%
Phenanthrene	0.00042	Max	0.00042	Max	0%
Pyrene	0.0002	DL	0.0002	DL	0%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	1.39E-07	Max	1.39E-07	Max	0%
1,2,3,4,6,7,8-HpCDF	2.00E-08	DL	6.30E-08	DL	215%
1,2,3,4,7,8,9-HpCDF	2.80E-08	DL	9.50E-08	DL	239%
1,2,3,4,7,8-HxCDD	3.30E-08	DL	8.80E-08	DL	167%
1,2,3,4,7,8-HxCDF	1.10E-08	DL	4.90E-08	DL	345%
1,2,3,6,7,8-HxCDD	3.10E-08	DL	9.10E-08	DL	194%
1,2,3,6,7,8-HxCDF	1.00E-08	DL	4.60E-08	DL	360%
1,2,3,7,8,9-HxCDD	3.20E-08	DL	8.90E-08	DL	178%
1,2,3,7,8,9-HxCDF	1.30E-08	DL	6.80E-08	DL	423%
1,2,3,7,8-PeCDD	2.70E-08	DL	1.10E-07	DL	307%
1,2,3,7,8-PeCDF	1.60E-08	DL	6.30E-08	DL	294%
2,3,4,6,7,8-HxCDF	1.10E-08	DL	7.50E-08	DL	582%
2,3,4,7,8-PeCDF	3.40E-08	DL	8.40E-08	DL	147%
2,3,7,8-TCDD	5.00E-08	DL	2.50E-07	DL	400%
2,3,7,8-TCDF	2.70E-08	DL	1.30E-07	DL	381%
OCDD	2.14E-07	Max	2.14E-07	Max	0%
OCDF	1.00E-07	Max	1.00E-07	Max	0%

COPC	Aboveground Exposed Produce (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	0.02	DL	0.02	DL	0%
Bromoform	0.1	DL	0.1	DL	0%
Carbon Tetrachloride	0.05	DL	0.05	DL	0%
Chloroform	0.05	DL	0.05	DL	0%
Dichloromethane	0.5	DL	0.5	DL	0%
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	0.1	DL	0.1	DL	0%
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	0.5	DL	0.5	DL	0%
1,2-Dichlorobenzene	0.1	DL	0.1	DL	0%
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.01	DL	0.01	DL	0%
Arsenic	0.01	Max	0.01	Max	0%
Barium	0.388	95% UCLM	0.417	Max	7%
Beryllium	0.1	DL	0.1	DL	0%
Boron	4.7	95% UCLM	6	Max	28%
Cadmium	0.0105	Max	0.0105	Max	0%
Chromium (Total)	0.1	DL	0.1	DL	0%
Chromium VI	-	-	-	-	-
Cobalt	0.02	DL	0.02	DL	0%
Lead	0.02	DL	0.02	DL	0%
Mercury - Inorganic	0.0016	Max	0.0016	Max	0%
Methyl Mercury	-	-	-	-	-
Nickel	0.1	DL	0.1	DL	0%
Phosphorus	565.99	95% UCLM	676	Max	19%
Selenium	0.04	DL	0.04	DL	0%
Silver	0.01	DL	0.01	DL	0%
Thallium	0.01	DL	0.01	DL	0%
Tin	0.122	Max	0.122	Max	0%
Vanadium	0.1	DL	0.1	DL	0%
Zinc	3.95	95% UCLM	5.39	Max	36%

COPC	Aboveground Protected Produce (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.0002	DL	0.0002	DL	0%
Acenaphthylene	0.0002	DL	0.0002	DL	0%
Anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluoranthene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(g,h,i)perylene	0.0002	DL	0.0002	DL	0%
Benzo(k)fluoranthene	0.0002	DL	0.0002	DL	0%
Chrysene	0.0002	DL	0.0002	DL	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0002	DL	0.0002	DL	0%
Fluoranthene	0.0002	DL	0.0002	DL	0%
Fluorene	0.0002	DL	0.0002	DL	0%
Indeno(1,2,3-cd)pyrene	0.0002	DL	0.0002	DL	0%
Perylene	0.0002	DL	0.0002	DL	0%
Phenanthrene	0.0002	DL	0.0002	DL	0%
Pyrene	0.0002	DL	0.0002	DL	0%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	5.28E-08	Max	5.28E-08	Max	0%
1,2,3,4,6,7,8-HpCDF	2.10E-08	DL	4.10E-08	DL	95%
1,2,3,4,7,8,9-HpCDF	2.90E-08	DL	5.70E-08	DL	97%
1,2,3,4,7,8-HxCDD	2.70E-08	DL	4.10E-08	DL	52%
1,2,3,4,7,8-HxCDF	1.77E-08	Max	1.77E-08	Max	0%
1,2,3,6,7,8-HxCDD	2.70E-08	DL	4.20E-08	DL	56%
1,2,3,6,7,8-HxCDF	1.40E-08	DL	2.60E-08	DL	86%
1,2,3,7,8,9-HxCDD	2.70E-08	DL	4.10E-08	DL	52%
1,2,3,7,8,9-HxCDF	1.70E-08	DL	3.60E-08	DL	112%
1,2,3,7,8-PeCDD	2.80E-08	DL	8.30E-08	DL	196%
1,2,3,7,8-PeCDF	1.70E-08	DL	5.80E-08	DL	241%
2,3,4,6,7,8-HxCDF	1.60E-08	DL	5.00E-08	DL	213%
2,3,4,7,8-PeCDF	1.70E-08	DL	8.70E-08	DL	412%
2,3,7,8-TCDD	4.30E-08	DL	1.20E-07	DL	179%
2,3,7,8-TCDF	3.60E-08	DL	1.10E-07	DL	206%
OCDD	4.90E-08	DL	8.90E-08	DL	82%
OCDF	4.83E-08	Max	4.83E-08	Max	0%

COPC	Aboveground Protected Produce (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	-	-	-	-	-
Bromoform	-	-	-	-	-
Carbon Tetrachloride	-	-	-	-	-
Chloroform	-	-	-	-	-
Dichloromethane	-	-	-	-	-
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	-	-	-	-	-
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	-	-	-	-	-
1,2-Dichlorobenzene	-	-	-	-	-
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.01	DL	0.01	DL	0%
Arsenic	0.01	DL	0.01	DL	0%
Barium	0.134	95% UCLM	0.318	Max	137%
Beryllium	0.1	DL	0.1	DL	0%
Boron	3.1	Max	3.1	Max	0%
Cadmium	0.0063	Max	0.0063	Max	0%
Chromium (Total)	0.1	DL	0.1	DL	0%
Chromium VI	-	-	-	-	-
Cobalt	0.02	DL	0.02	DL	0%
Lead	0.02	DL	0.02	DL	0%
Mercury - Inorganic	0.001	DL	0.001	DL	0%
Methyl Mercury	-	-	-	-	-
Nickel	0.1	DL	0.1	DL	0%
Phosphorus	1018	95% UCLM	974	Max	-4%
Selenium	0.054	Max	0.054	Max	0%
Silver	0.011	Max	0.011	Max	0%
Thallium	0.01	DL	0.01	DL	0%
Tin	0.062	Max	0.062	Max	0%
Vanadium	0.1	DL	0.1	DL	0%
Zinc	6.8	Max	6.8	Max	0%

COPC	Belowground Produce (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.0002	DL	0.0002	DL	0%
Acenaphthylene	0.0002	DL	0.0002	DL	0%
Anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluoranthene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(g,h,i)perylene	0.0002	DL	0.0002	DL	0%
Benzo(k)fluoranthene	0.0002	DL	0.0002	DL	0%
Chrysene	0.0002	DL	0.0002	DL	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0002	DL	0.0002	DL	0%
Fluoranthene	0.0002	DL	0.0002	DL	0%
Fluorene	0.0002	DL	0.0002	DL	0%
Indeno(1,2,3-cd)pyrene	0.0002	DL	0.0002	DL	0%
Perylene	0.0002	DL	0.0002	DL	0%
Phenanthrene	0.00034	Max	0.00034	Max	0%
Pyrene	0.0002	DL	0.0002	DL	0%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	3.50E-08	DL	7.40E-08	DL	111%
1,2,3,4,6,7,8-HpCDF	1.60E-08	DL	5.30E-08	DL	231%
1,2,3,4,7,8,9-HpCDF	2.20E-08	DL	7.50E-08	DL	241%
1,2,3,4,7,8-HxCDD	2.20E-08	DL	9.00E-08	DL	309%
1,2,3,4,7,8-HxCDF	1.50E-08	DL	4.60E-08	DL	207%
1,2,3,6,7,8-HxCDD	2.10E-08	DL	8.70E-08	DL	314%
1,2,3,6,7,8-HxCDF	1.40E-08	DL	4.30E-08	DL	207%
1,2,3,7,8,9-HxCDD	2.10E-08	DL	8.80E-08	DL	319%
1,2,3,7,8,9-HxCDF	1.80E-08	DL	5.80E-08	DL	222%
1,2,3,7,8-PeCDD	3.70E-08	DL	7.60E-08	DL	105%
1,2,3,7,8-PeCDF	1.50E-08	DL	5.40E-08	DL	260%
2,3,4,6,7,8-HxCDF	1.50E-08	DL	6.90E-08	DL	360%
2,3,4,7,8-PeCDF	7.00E-08	Max	7.00E-08	Max	0%
2,3,7,8-TCDD	5.50E-08	DL	2.90E-07	DL	427%
2,3,7,8-TCDF	3.20E-08	DL	1.20E-07	DL	275%
OCDD	3.42E-07	Max	3.42E-07	Max	0%
OCDF	5.33E-08	Max	5.33E-08	Max	0%

COPC	Belowground Produce (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	-	-	-	-	-
Bromoform	-	-	-	-	-
Carbon Tetrachloride	-	-	-	-	-
Chloroform	-	-	-	-	-
Dichloromethane	-	-	-	-	-
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	-	-	-	-	-
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	-	-	-	-	-
1,2-Dichlorobenzene	-	-	-	-	-
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.01	DL	0.01	DL	0%
Arsenic	0.011	Max	0.011	Max	0%
Barium	0.35	95% UCLM	4.3	Max	1129%
Beryllium	0.1	DL	0.1	DL	0%
Boron	3.7	Max	3.7	Max	0%
Cadmium	0.037	95% UCLM	0.0575	Max	55%
Chromium (Total)	0.1	DL	0.1	DL	0%
Chromium VI	-	-	-	-	-
Cobalt	0.02	DL	0.02	DL	0%
Lead	0.026	Max	0.026	Max	0%
Mercury - Inorganic	0.001	Max	0.001	Max	0%
Methyl Mercury	-	-	-	-	-
Nickel	0.1	DL	0.1	DL	0%
Phosphorus	498.87	95% UCLM	523	Max	5%
Selenium	0.05	Max	0.05	Max	0%
Silver	0.01	DL	0.01	DL	0%
Thallium	0.01	DL	0.01	DL	0%
Tin	0.258	Max	0.258	Max	0%
Vanadium	0.1	DL	0.1	DL	0%
Zinc	3.33	95% UCLM	3.83	Max	15%

COPC	Crops (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.0002	DL	0.0003	DL	50%
Acenaphthylene	0.0002	DL	0.0003	DL	50%
Anthracene	0.0002	DL	0.0003	DL	50%
Benzo(a)anthracene	0.0002	DL	0.0003	DL	50%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.0002	DL	0.0003	DL	50%
Benzo(b)fluoranthene	0.0002	DL	0.0003	DL	50%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.0002	DL	0.0003	DL	50%
Benzo(g,h,i)perylene	0.0002	DL	0.0003	DL	50%
Benzo(k)fluoranthene	0.0002	DL	0.0003	DL	50%
Chrysene	0.0002	DL	0.0003	DL	50%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0002	DL	0.0003	DL	50%
Fluoranthene	0.0002	DL	0.0003	DL	50%
Fluorene	0.0002	DL	0.0003	DL	50%
Indeno(1,2,3-cd)pyrene	0.0002	DL	0.0003	DL	50%
Perylene	0.0002	DL	0.0003	DL	50%
Phenanthrene	0.0002	DL	0.0003	DL	50%
Pyrene	0.0002	DL	0.0003	DL	50%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	2.00E-08	DL	3.10E-08	DL	55%
1,2,3,4,6,7,8-HpCDF	1.40E-08	DL	2.60E-08	DL	86%
1,2,3,4,7,8,9-HpCDF	2.30E-08	DL	3.70E-08	DL	61%
1,2,3,4,7,8-HxCDD	2.10E-08	DL	4.40E-08	DL	110%
1,2,3,4,7,8-HxCDF	1.50E-08	DL	2.70E-08	DL	80%
1,2,3,6,7,8-HxCDD	1.90E-08	DL	4.30E-08	DL	126%
1,2,3,6,7,8-HxCDF	1.30E-08	DL	2.50E-08	DL	92%
1,2,3,7,8,9-HxCDD	2.00E-08	DL	4.30E-08	DL	115%
1,2,3,7,8,9-HxCDF	2.00E-08	DL	3.50E-08	DL	75%
1,2,3,7,8-PeCDD	1.80E-08	DL	3.60E-08	DL	100%
1,2,3,7,8-PeCDF	1.30E-08	DL	3.30E-08	DL	154%
2,3,4,6,7,8-HxCDF	1.40E-08	DL	2.90E-08	DL	107%
2,3,4,7,8-PeCDF	1.20E-08	DL	3.20E-08	DL	167%
2,3,7,8-TCDD	3.10E-08	DL	4.50E-08	DL	45%
2,3,7,8-TCDF	2.00E-08	DL	4.20E-08	DL	110%
OCDD	1.30E-08	DL	4.40E-08	DL	238%
OCDF	2.10E-08	DL	3.00E-08	DL	43%

COPC	Crops (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	-	-	-	-	-
Bromoform	-	-	-	-	-
Carbon Tetrachloride	-	-	-	-	-
Chloroform	-	-	-	-	-
Dichloromethane	-	-	-	-	-
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	-	-	-	-	-
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	-	-	-	-	-
1,2-Dichlorobenzene	-	-	-	-	-
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.01	DL	0.01	DL	0%
Arsenic	0.01	DL	0.01	DL	0%
Barium	0.034	95% UCLM	0.034	Max	0%
Beryllium	0.1	DL	0.1	DL	0%
Boron	2	DL	6	DL	200%
Cadmium	0.005	DL	0.005	DL	0%
Chromium (Total)	0.1	DL	0.1	DL	0%
Chromium VI	-	-	-	-	-
Cobalt	0.02	DL	0.02	DL	0%
Lead	0.02	DL	0.02	DL	0%
Mercury - Inorganic	0.001	DL	0.001	DL	0%
Methyl Mercury	-	-	-	-	-
Nickel	0.11	Max	0.11	Max	0%
Phosphorus	1050	95% UCLM	1920	Max	83%
Selenium	0.075	95% UCLM	0.061	Max	-19%
Silver	0.01	DL	0.01	DL	0%
Thallium	0.01	DL	0.01	DL	0%
Tin	0.1	Max	0.1	Max	0%
Vanadium	0.1	DL	0.1	DL	0%
Zinc	14.5	95% UCLM	16.3	Max	12%

COPC	Forage (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.0002	DL	0.00587	DL	2835%
Acenaphthylene	0.0002	DL	0.0002	DL	0%
Anthracene	0.00274	Max	0.00274	Max	0%
Benzo(a)anthracene	0.655	95% UCLM	0.00073	Max	-100%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.00044	DL	0.00372	DL	745%
Benzo(b)fluoranthene	0.00083	Max	0.00083	Max	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.932	95% UCLM	0.00105	Max	-100%
Benzo(g,h,i)perylene	0.0002	DL	0.00104	DL	420%
Benzo(k)fluoranthene	0.00021	DL	0.00104	DL	395%
Chrysene	0.00319	Max	0.00319	Max	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0002	DL	0.0002	DL	0%
Fluoranthene	3.76	95% UCLM	0.0251	Max	-99%
Fluorene	0.0002	DL	0.0167	Max	8250%
Indeno(1,2,3-cd)pyrene	0.704	95% UCLM	0.00063	Max	-100%
Perylene	0.0002	DL	0.0002	DL	0%
Phenanthrene	8.74	95% UCLM	0.0581	Max	-99%
Pyrene	2.14	95% UCLM	0.0119	Max	-99%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	1.06E-06	95% UCLM	7.60E-07	Max	-28%
1,2,3,4,6,7,8-HpCDF	1.04E-07	Max	1.04E-07	Max	0%
1,2,3,4,7,8,9-HpCDF	3.30E-08	DL	5.40E-08	DL	64%
1,2,3,4,7,8-HxCDD	2.20E-08	DL	6.70E-08	DL	205%
1,2,3,4,7,8-HxCDF	8.19E-08	95% UCLM	1.21E-07	Max	48%
1,2,3,6,7,8-HxCDD	2.10E-08	DL	6.60E-08	DL	214%
1,2,3,6,7,8-HxCDF	1.86E-08	Max	1.86E-08	Max	0%
1,2,3,7,8,9-HxCDD	8.60E-08	Max	8.60E-08	Max	0%
1,2,3,7,8,9-HxCDF	2.30E-08	DL	3.50E-08	DL	52%
1,2,3,7,8-PeCDD	7.01E-08	Max	7.01E-08	Max	0%
1,2,3,7,8-PeCDF	5.71E-08	Max	5.71E-08	Max	0%
2,3,4,6,7,8-HxCDF	2.38E-07	Max	2.38E-07	Max	0%
2,3,4,7,8-PeCDF	3.80E-08	DL	6.70E-08	DL	76%
2,3,7,8-TCDD	4.70E-08	DL	1.70E-07	DL	262%
2,3,7,8-TCDF	2.10E-08	DL	7.70E-08	DL	267%
OCDD	4.11E-06	95% UCLM	1.38E-06	Max	-66%
OCDF	4.07E-07	95% UCLM	1.53E-07	Max	-62%

COPC	Forage (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	0.02	DL	0.03	DL	50%
Bromoform	0.1	DL	0.2	DL	100%
Carbon Tetrachloride	0.05	DL	0.1	DL	100%
Chloroform	0.05	DL	0.1	DL	100%
Dichloromethane	0.5	DL	1	DL	100%
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	0.1	DL	0.2	DL	100%
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	0.5	DL	1	DL	100%
1,2-Dichlorobenzene	0.1	DL	0.2	DL	100%
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.025	95% UCLM	1	Max	3900%
Arsenic	0.024	95% UCLM	0.029	Max	21%
Barium	11.51	95% UCLM	16	Max	39%
Beryllium	0.1	DL	0.2	DL	100%
Boron	11.39	95% UCLM	16	Max	40%
Cadmium	0.039	95% UCLM	0.295	Max	656%
Chromium (Total)	0.53	95% UCLM	0.91	Max	72%
Chromium VI	-	-	-	-	-
Cobalt	0.095	Max	0.095	Max	0%
Lead	0.209	95% UCLM	0.298	Max	43%
Mercury - Inorganic	0.0087	95% UCLM	0.0109	Max	25%
Methyl Mercury	-	-	-	-	-
Nickel	0.6	Max	0.6	Max	0%
Phosphorus	1215.96	95% UCLM	1830	Max	50%
Selenium	0.0854	95% UCLM	0.13	Max	52%
Silver	0.01	DL	0.02	DL	100%
Thallium	0.01	DL	0.02	DL	100%
Tin	0.18	Max	0.18	Max	0%
Vanadium	0.29	Max	0.29	Max	0%
Zinc	19.96	95% UCLM	30.3	Max	52%

COPC	Browse (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.00087	Max	0.00087	Max	0%
Acenaphthylene	0.00024	Max	0.00024	Max	0%
Anthracene	0.00075	Max	0.00075	Max	0%
Benzo(a)anthracene	0.00078	Max	0.00078	Max	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.00147	DL	0.0197	DL	1240%
Benzo(b)fluoranthene	0.00118	DL	0.00153	DL	30%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.00067	DL	0.00141	DL	110%
Benzo(g,h,i)perylene	0.00136	Max	0.00136	Max	0%
Benzo(k)fluoranthene	0.00043	DL	0.0009	DL	109%
Chrysene	0.00172	DL	0.00351	DL	104%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0002	DL	0.0002	DL	0%
Fluoranthene	0.00874	Max	0.00874	Max	0%
Fluorene	0.0017	Max	0.0017	Max	0%
Indeno(1,2,3-cd)pyrene	0.00081	Max	0.00081	Max	0%
Perylene	0.0002	DL	0.0002	DL	0%
Phenanthrene	0.0104	Max	0.0104	Max	0%
Pyrene	0.00466	Max	0.00466	Max	0%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	7.67E-07	Max	7.67E-07	Max	0%
1,2,3,4,6,7,8-HpCDF	1.96E-07	Max	1.96E-07	Max	0%
1,2,3,4,7,8,9-HpCDF	6.40E-08	DL	1.70E-07	DL	166%
1,2,3,4,7,8-HxCDD	2.30E-08	DL	7.50E-08	DL	226%
1,2,3,4,7,8-HxCDF	3.90E-08	DL	8.20E-08	DL	110%
1,2,3,6,7,8-HxCDD	1.05E-07	Max	1.05E-07	Max	0%
1,2,3,6,7,8-HxCDF	1.80E-08	DL	5.30E-08	DL	194%
1,2,3,7,8,9-HxCDD	3.80E-08	DL	7.50E-08	DL	97%
1,2,3,7,8,9-HxCDF	2.30E-08	DL	5.60E-08	DL	143%
1,2,3,7,8-PeCDD	3.50E-08	DL	6.80E-08	DL	94%
1,2,3,7,8-PeCDF	1.20E-07	Max	1.20E-07	Max	0%
2,3,4,6,7,8-HxCDF	4.60E-08	DL	3.60E-07	DL	683%
2,3,4,7,8-PeCDF	3.90E-08	DL	1.00E-07	DL	156%
2,3,7,8-TCDD	8.70E-08	DL	1.70E-07	DL	95%
2,3,7,8-TCDF	2.70E-08	DL	8.10E-08	DL	200%
OCDD	1.69E-06	Max	1.69E-06	Max	0%
OCDF	2.05E-07	Max	2.05E-07	Max	0%

COPC	Browse (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	-	-	-	-	-
Bromoform	-	-	-	-	-
Carbon Tetrachloride	-	-	-	-	-
Chloroform	-	-	-	-	-
Dichloromethane	-	-	-	-	-
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	-	-	-	-	-
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	-	-	-	-	-
1,2-Dichlorobenzene	-	-	-	-	-
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.0222	95% UCLM	0.053	Max	139%
Arsenic	0.0247	95% UCLM	0.032	Max	30%
Barium	10.39	95% UCLM	39.1	Max	276%
Beryllium	0.1	DL	0.2	DL	100%
Boron	14.18	95% UCLM	27.9	Max	97%
Cadmium	0.11	95% UCLM	0.377	Max	243%
Chromium (Total)	0.389	95% UCLM	0.84	Max	116%
Chromium VI	-	-	-	-	-
Cobalt	0.044	95% UCLM	0.146	Max	232%
Lead	0.268	95% UCLM	0.41	Max	53%
Mercury - Inorganic	0.0155	95% UCLM	0.0223	Max	44%
Methyl Mercury	-	-	-	-	-
Nickel	0.291	95% UCLM	0.39	Max	34%
Phosphorus	834	95% UCLM	1030	Max	24%
Selenium	0.1	Max	0.1	Max	0%
Silver	0.01	DL	0.02	DL	100%
Thallium	0.01	DL	0.02	DL	100%
Tin	0.05	DL	0.1	DL	100%
Vanadium	0.2	Max	0.2	Max	0%
Zinc	24.25	95% UCLM	67.2	Max	177%

COPC	Small Mammal (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.0004	DL	0.0004	DL	0%
Acenaphthylene	0.0004	DL	0.0004	DL	0%
Anthracene	0.0004	DL	0.0004	DL	0%
Benzo(a)anthracene	0.0004	DL	0.0004	DL	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.0004	DL	0.0004	DL	0%
Benzo(b)fluoranthene	0.0004	DL	0.0004	DL	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.0004	DL	0.0004	DL	0%
Benzo(g,h,i)perylene	0.0004	DL	0.0004	DL	0%
Benzo(k)fluoranthene	0.0004	DL	0.0004	DL	0%
Chrysene	0.0004	DL	0.0004	DL	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0004	DL	0.0004	DL	0%
Fluoranthene	0.0004	DL	0.0004	DL	0%
Fluorene	0.0004	DL	0.0004	DL	0%
Indeno(1,2,3-cd)pyrene	0.0004	DL	0.0004	DL	0%
Perylene	0.0004	DL	0.0004	DL	0%
Phenanthrene	0.0004	DL	0.0004	DL	0%
Pyrene	0.0004	DL	0.0004	DL	0%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	7.90E-08	DL	1.90E-07	DL	141%
1,2,3,4,6,7,8-HpCDF	5.60E-08	DL	8.90E-08	DL	59%
1,2,3,4,7,8,9-HpCDF	7.50E-08	DL	1.20E-07	DL	60%
1,2,3,4,7,8-HxCDD	8.30E-08	DL	1.10E-07	DL	33%
1,2,3,4,7,8-HxCDF	1.40E-07	DL	2.70E-07	DL	93%
1,2,3,6,7,8-HxCDD	8.30E-08	DL	1.20E-07	DL	45%
1,2,3,6,7,8-HxCDF	1.30E-07	DL	2.40E-07	DL	85%
1,2,3,7,8,9-HxCDD	8.30E-08	DL	1.20E-07	DL	45%
1,2,3,7,8,9-HxCDF	1.50E-07	DL	2.80E-07	DL	87%
1,2,3,7,8-PeCDD	1.20E-07	DL	1.80E-07	DL	50%
1,2,3,7,8-PeCDF	1.00E-07	DL	1.60E-07	DL	60%
2,3,4,6,7,8-HxCDF	1.30E-07	DL	2.40E-07	DL	85%
2,3,4,7,8-PeCDF	9.40E-08	DL	1.50E-07	DL	60%
2,3,7,8-TCDD	1.20E-07	DL	2.30E-07	DL	92%
2,3,7,8-TCDF	6.70E-08	DL	9.10E-08	DL	36%
OCDD	2.80E-07	DL	5.60E-07	DL	100%
OCDF	1.60E-07	DL	1.90E-07	DL	19%

COPC	Small Mammal (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	-	-	-	-	-
Bromoform	-	-	-	-	-
Carbon Tetrachloride	-	-	-	-	-
Chloroform	-	-	-	-	-
Dichloromethane	-	-	-	-	-
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	-	-	-	-	-
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	-	-	-	-	-
1,2-Dichlorobenzene	-	-	-	-	-
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.01	DL	0.01	DL	0%
Arsenic	0.072	Max	0.072	Max	0%
Barium	5.2	Max	5.2	Max	0%
Beryllium	0.1	DL	0.1	DL	0%
Boron	6	DL	6	DL	0%
Cadmium	0.225	Max	0.225	Max	0%
Chromium (Total)	0.172	95% UCLM	0.172	95% UCLM	0%
Chromium VI	-	-	-	-	-
Cobalt	0.05	95% UCLM	0.05	95% UCLM	0%
Lead	0.044	95% UCLM	0.044	95% UCLM	0%
Mercury - Inorganic	0.002	95% UCLM	0.002	95% UCLM	0%
Methyl Mercury	-	-	-	-	-
Nickel	0.311	95% UCLM	0.311	95% UCLM	0%
Phosphorus	8756.43	95% UCLM	8756.43	95% UCLM	0%
Selenium	0.34	95% UCLM	0.34	95% UCLM	0%
Silver	0.01	DL	0.01	DL	0%
Thallium	0.01	DL	0.01	DL	0%
Tin	0.096	Max	0.096	Max	0%
Vanadium	0.11	Max	0.11	Max	0%
Zinc	29.78	95% UCLM	29.78	95% UCLM	0%

COPC	Soil (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.01	DL	0.05	DL	400%
Acenaphthylene	0.01	DL	0.05	DL	400%
Anthracene	0.01	DL	0.05	DL	400%
Benzo(a)anthracene	0.05	Max	0.05	Max	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.02	Max	0.02	Max	0%
Benzo(b)fluoranthene	0.05	Max	0.05	Max	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	-	-	-	-	-
Benzo(g,h,i)perylene	0.05	Max	0.05	Max	0%
Benzo(k)fluoranthene	0.05	Max	0.05	Max	0%
Chrysene	0.05	Max	0.05	Max	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.01	DL	0.05	DL	400%
Fluoranthene	0.05	Max	0.05	Max	0%
Fluorene	0.01	DL	0.05	DL	400%
Indeno(1,2,3-cd)pyrene	0.05	Max	0.05	Max	0%
Perylene	0.01	DL	0.01	DL	0%
Phenanthrene	0.01	Max	0.01	Max	0%
Pyrene	0.05	Max	0.05	Max	0%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.05	DL	400%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	2.22E-05	95% UCLM	2.22E-05	95% UCLM	0%
1,2,3,4,6,7,8-HpCDF	7.43E-06	95% UCLM	7.43E-06	95% UCLM	0%
1,2,3,4,7,8,9-HpCDF	5.29E-07	95% UCLM	5.29E-07	95% UCLM	0%
1,2,3,4,7,8-HxCDD	6.15E-07	95% UCLM	6.15E-07	95% UCLM	0%
1,2,3,4,7,8-HxCDF	1.22E-06	95% UCLM	1.22E-06	95% UCLM	0%
1,2,3,6,7,8-HxCDD	1.54E-06	95% UCLM	1.54E-06	95% UCLM	0%
1,2,3,6,7,8-HxCDF	7.72E-07	95% UCLM	7.72E-07	95% UCLM	0%
1,2,3,7,8,9-HxCDD	1.28E-06	95% UCLM	1.28E-06	95% UCLM	0%
1,2,3,7,8,9-HxCDF	6.22E-08	Max	6.22E-08	Max	0%
1,2,3,7,8-PeCDD	3.73E-07	95% UCLM	3.73E-07	95% UCLM	0%
1,2,3,7,8-PeCDF	7.17E-07	95% UCLM	7.17E-07	95% UCLM	0%
2,3,4,6,7,8-HxCDF	7.02E-07	95% UCLM	7.02E-07	95% UCLM	0%
2,3,4,7,8-PeCDF	5.47E-07	95% UCLM	5.47E-07	95% UCLM	0%
2,3,7,8-TCDD	2.25E-07	95% UCLM	2.25E-07	95% UCLM	0%
2,3,7,8-TCDF	9.06E-07	95% UCLM	9.06E-07	95% UCLM	0%
OCDD	1.14E-04	95% UCLM	1.14E-04	95% UCLM	0%
OCDF	1.44E-05	95% UCLM	1.44E-05	95% UCLM	0%

COPC	Soil (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	0.003	DL	0.008	DL	167%
Bromoform	0.02	DL	0.02	DL	0%
Carbon Tetrachloride	0.01	DL	0.01	DL	0%
Chloroform	0.01	DL	0.01	DL	0%
Dichloromethane	0.2	Max	0.2	Max	0%
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	0.02	DL	0.02	DL	0%
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	0.1	DL	0.1	DL	0%
1,2-Dichlorobenzene	0.02	DL	0.02	DL	0%
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	0.0005	DL	0.0012	DL	140%
Inorganics					
Antimony	1	DL	1	DL	0%
Arsenic	8	Max	8	Max	0%
Barium	89.07	95% UCLM	89.07	95% UCLM	0%
Beryllium	0.7	Max	0.7	Max	0%
Boron	13.22	95% UCLM	13.22	95% UCLM	0%
Cadmium	0.5	DL	0.5	DL	0%
Chromium (Total)	22.17	95% UCLM	22.17	95% UCLM	0%
Chromium VI	-	-	-	-	-
Cobalt	7	95% UCLM	7	95% UCLM	0%
Lead	16.91	95% UCLM	16.91	95% UCLM	0%
Mercury - Inorganic	0.07	Max	0.07	Max	0%
Methyl Mercury	-	-	-	-	-
Nickel	12.25	95% UCLM	12.25	95% UCLM	0%
Phosphorus	753	95% UCLM	753	95% UCLM	0%
Selenium	1	DL	1	DL	0%
Silver	0.2	DL	0.2	DL	0%
Thallium	1	DL	1	DL	0%
Tin	10	Max	10	Max	0%
Vanadium	27.89	95% UCLM	27.89	95% UCLM	0%
Zinc	79	95% UCLM	79	95% UCLM	0%

COPC	Sediment (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.05	DL	0.05	DL	0%
Acenaphthylene	0.05	DL	0.05	DL	0%
Anthracene	0.05	DL	0.05	DL	0%
Benzo(a)anthracene	0.05	DL	0.05	DL	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.02	DL	0.02	DL	0%
Benzo(b)fluoranthene	0.05	DL	0.05	DL	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	-	-	-	-	-
Benzo(g,h,i)perylene	0.05	DL	0.05	DL	0%
Benzo(k)fluoranthene	0.05	DL	0.05	DL	0%
Chrysene	0.05	DL	0.05	DL	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.05	DL	0.05	DL	0%
Fluoranthene	0.05	DL	0.05	DL	0%
Fluorene	0.05	DL	0.05	DL	0%
Indeno(1,2,3-cd)pyrene	0.05	DL	0.05	DL	0%
Perylene	0.02	Max	0.02	Max	0%
Phenanthrene	0.05	DL	0.05	DL	0%
Pyrene	0.05	DL	0.05	DL	0%
PCBs					
Aroclor 1254 (Total PCBs)	0.05	DL	0.05	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	1.82E-05	Max	1.82E-05	Max	0%
1,2,3,4,6,7,8-HpCDF	4.09E-06	Max	4.09E-06	Max	0%
1,2,3,4,7,8,9-HpCDF	3.10E-07	Max	3.10E-07	Max	0%
1,2,3,4,7,8-HxCDD	3.39E-07	Max	3.39E-07	Max	0%
1,2,3,4,7,8-HxCDF	3.27E-07	Max	3.27E-07	Max	0%
1,2,3,6,7,8-HxCDD	7.25E-07	Max	7.25E-07	Max	0%
1,2,3,6,7,8-HxCDF	3.69E-07	Max	3.69E-07	Max	0%
1,2,3,7,8,9-HxCDD	8.42E-07	Max	8.42E-07	Max	0%
1,2,3,7,8,9-HxCDF	8.67E-08	Max	8.67E-08	Max	0%
1,2,3,7,8-PeCDD	1.96E-07	Max	1.96E-07	Max	0%
1,2,3,7,8-PeCDF	4.11E-07	Max	4.11E-07	Max	0%
2,3,4,6,7,8-HxCDF	3.20E-07	Max	3.20E-07	Max	0%
2,3,4,7,8-PeCDF	2.20E-07	Max	2.20E-07	Max	0%
2,3,7,8-TCDD	9.00E-08	DL	1.10E-06	DL	1122%
2,3,7,8-TCDF	6.48E-07	Max	6.48E-07	Max	0%
OCDD	9.31E-05	Max	9.31E-05	Max	0%
OCDF	1.10E-05	Max	1.10E-05	Max	0%

COPC	Sediment (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	0.003	DL	0.003	DL	0%
Bromoform	0.02	DL	0.02	DL	0%
Carbon Tetrachloride	0.01	DL	0.01	DL	0%
Chloroform	0.01	DL	0.01	DL	0%
Dichloromethane	0.1	DL	0.1	DL	0%
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	0.02	DL	0.02	DL	0%
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	0.1	DL	0.1	DL	0%
1,2-Dichlorobenzene	0.02	DL	0.02	DL	0%
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	0.0006	DL	0.0007	DL	17%
Inorganics					
Antimony	1	DL	1	DL	0%
Arsenic	2	Max	2	Max	0%
Barium	78.59	95% UCLM	94	Max	20%
Beryllium	0.5	DL	0.5	DL	0%
Boron	14.31	95% UCLM	14	Max	-2%
Cadmium	0.5	DL	0.5	DL	0%
Chromium (Total)	14	95% UCLM	32	Max	129%
Chromium VI	2	DL	2	DL	0%
Cobalt	5.15	95% UCLM	6	Max	17%
Lead	6	95% UCLM	13	Max	117%
Mercury - Inorganic	0.05	DL	0.05	DL	0%
Methyl Mercury	-	-	-	-	-
Nickel	8.77	95% UCLM	10	Max	14%
Phosphorus	680	Max	680	Max	0%
Selenium	1	DL	1	DL	0%
Silver	0.2	DL	0.2	DL	0%
Thallium	1	DL	1	DL	0%
Tin	5	Max	5	Max	0%
Vanadium	23.33	95% UCLM	29	Max	24%
Zinc	62.99	95% UCLM	81	Max	29%

COPC	Surface Water (mg/L)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.00001	DL	0.00001	DL	0%
Acenaphthylene	0.00001	DL	0.00001	DL	0%
Anthracene	0.00001	Max	0.00001	Max	0%
Benzo(a)anthracene	0.00001	DL	0.00001	DL	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.00001	DL	0.00001	DL	0%
Benzo(b)fluoranthene	0.00001	DL	0.00001	DL	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	-	-	-	-	-
Benzo(g,h,i)perylene	0.00001	DL	0.00001	DL	0%
Benzo(k)fluoranthene	0.00001	DL	0.00001	DL	0%
Chrysene	0.00001	DL	0.00001	DL	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.00001	DL	0.00001	DL	0%
Fluoranthene	0.00001	DL	0.00001	DL	0%
Fluorene	0.00001	DL	0.00002	DL	100%
Indeno(1,2,3-cd)pyrene	0.00001	DL	0.00001	DL	0%
Perylene	0.00001	DL	0.00001	DL	0%
Phenanthrene	0.00001	DL	0.00001	DL	0%
Pyrene	0.00001	DL	0.00001	DL	0%
PCBs					
Aroclor 1254 (Total PCBs)	0.00002	DL	0.00002	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	1.38E-09	Max	1.38E-09	Max	0%
1,2,3,4,6,7,8-HpCDF	3.60E-10	DL	8.00E-10	DL	122%
1,2,3,4,7,8,9-HpCDF	2.70E-10	DL	1.30E-09	DL	381%
1,2,3,4,7,8-HxCDD	3.50E-10	DL	5.70E-10	DL	63%
1,2,3,4,7,8-HxCDF	3.10E-10	DL	5.40E-10	DL	74%
1,2,3,6,7,8-HxCDD	3.30E-10	DL	6.20E-10	DL	88%
1,2,3,6,7,8-HxCDF	3.10E-10	DL	3.00E-09	DL	868%
1,2,3,7,8,9-HxCDD	3.60E-10	DL	6.30E-10	DL	75%
1,2,3,7,8,9-HxCDF	3.90E-10	DL	7.30E-10	DL	87%
1,2,3,7,8-PeCDD	3.00E-10	DL	1.00E-09	DL	233%
1,2,3,7,8-PeCDF	2.90E-10	DL	8.30E-10	DL	186%
2,3,4,6,7,8-HxCDF	3.00E-10	DL	5.00E-10	DL	67%
2,3,4,7,8-PeCDF	5.52E-10	Max	5.52E-10	Max	0%
2,3,7,8-TCDD	4.20E-10	DL	1.50E-09	DL	257%
2,3,7,8-TCDF	2.30E-10	DL	1.20E-09	DL	422%
OCDD	2.10E-08	Max	2.10E-08	Max	0%
OCDF	5.00E-10	DL	1.20E-09	DL	140%

COPC	Surface Water (mg/L)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	0.0005	DL	0.0005	DL	0%
Bromoform	0.0005	DL	0.0005	DL	0%
Carbon Tetrachloride	0.0005	DL	0.0005	DL	0%
Chloroform	0.0005	DL	0.0005	DL	0%
Dichloromethane	1.54	95% UCLM	0.0015	Max	-100%
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	0.001	DL	0.001	DL	0%
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.00005	DL	0.00005	DL	0%
1,2,4-Trichlorobenzene	0.0005	DL	0.0005	DL	0%
1,2-Dichlorobenzene	0.0005	DL	0.0005	DL	0%
Hexachlorobenzene	0.00005	DL	0.00005	DL	0%
Pentachlorobenzene	0.00005	DL	0.00005	DL	0%
Pentachlorophenol	0.00001	DL	0.00001	DL	0%
Inorganics					
Antimony	0.005	DL	0.005	DL	0%
Arsenic	0.002	Max	0.002	Max	0%
Barium	0.0893	95% UCLM	0.09	Max	1%
Beryllium	0.001	DL	0.001	DL	0%
Boron	0.06	Max	0.06	Max	0%
Cadmium	0.0001	DL	0.0001	DL	0%
Chromium (Total)	0.006	Max	0.006	Max	0%
Chromium VI	0.01	DL	0.01	DL	0%
Cobalt	0.0005	Max	0.0005	Max	0%
Lead	0.001	DL	0.001	DL	0%
Mercury - Inorganic	0.0001	DL	0.0001	DL	0%
Methyl Mercury	-	-	-	-	-
Nickel	0.006	Max	0.006	Max	0%
Phosphorus	0.16	Max	0.16	Max	0%
Selenium	0.005	DL	0.005	DL	0%
Silver	0.0001	DL	0.0001	DL	0%
Thallium	0.0003	DL	0.0003	DL	0%
Tin	0.001	DL	0.001	DL	0%
Vanadium	0.008	Max	0.008	Max	0%
Zinc	0.0329	95% UCLM	0.045	Max	37%

COPC	Fish (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.00114	95% UCLM	0.00111	Max	-3%
Acenaphthylene	0.0003	DL	0.0003	DL	0%
Anthracene	0.0003	Max	0.0003	Max	0%
Benzo(a)anthracene	0.0003	DL	0.0003	DL	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.0003	DL	0.0003	DL	0%
Benzo(b)fluoranthene	0.0003	DL	0.0003	DL	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.0003	DL	0.0003	DL	0%
Benzo(g,h,i)perylene	0.0003	DL	0.00065	DL	117%
Benzo(k)fluoranthene	0.0003	DL	0.0003	DL	0%
Chrysene	0.0003	DL	0.00053	DL	77%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0003	DL	0.0003	DL	0%
Fluoranthene	0.00079	Max	0.00079	Max	0%
Fluorene	0.00115	95% UCLM	0.00129	Max	12%
Indeno(1,2,3-cd)pyrene	0.0003	DL	0.0003	DL	0%
Perylene	0.0003	DL	0.0003	DL	0%
Phenanthrene	0.00224	95% UCLM	0.00272	Max	21%
Pyrene	0.0003	DL	0.00044	DL	47%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	Max	0.01	Max	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	3.51E-07	Max	3.51E-07	Max	0%
1,2,3,4,6,7,8-HpCDF	1.43E-07	Max	1.43E-07	Max	0%
1,2,3,4,7,8,9-HpCDF	4.50E-08	DL	1.30E-07	DL	189%
1,2,3,4,7,8-HxCDD	4.80E-08	DL	1.50E-07	DL	213%
1,2,3,4,7,8-HxCDF	7.90E-08	DL	2.30E-07	DL	191%
1,2,3,6,7,8-HxCDD	8.80E-08	DL	1.50E-07	DL	70%
1,2,3,6,7,8-HxCDF	7.30E-08	DL	2.20E-07	DL	201%
1,2,3,7,8,9-HxCDD	4.90E-08	DL	1.50E-07	DL	206%
1,2,3,7,8,9-HxCDF	9.10E-08	DL	2.60E-07	DL	186%
1,2,3,7,8-PeCDD	2.33E-07	Max	2.33E-07	Max	0%
1,2,3,7,8-PeCDF	2.16E-07	95% UCLM	2.39E-07	Max	11%
2,3,4,6,7,8-HxCDF	7.70E-08	DL	2.20E-07	DL	186%
2,3,4,7,8-PeCDF	5.68E-07	Max	5.68E-07	Max	0%
2,3,7,8-TCDD	1.70E-07	DL	2.10E-07	DL	24%
2,3,7,8-TCDF	6.30E-07	95% UCLM	7.10E-07	Max	13%
OCDD	9.04E-07	95% UCLM	9.45E-07	Max	5%
OCDF	1.93E-07	Max	1.93E-07	Max	0%

COPC	Fish (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	-	-	-	-	-
Bromoform	-	-	-	-	-
Carbon Tetrachloride	-	-	-	-	-
Chloroform	-	-	-	-	-
Dichloromethane	-	-	-	-	-
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	-	-	-	-	-
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	-	-	-	-	-
1,2-Dichlorobenzene	-	-	-	-	-
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.01	DL	0.01	DL	0%
Arsenic	0.131	95% UCLM	0.166	Max	27%
Barium	2.31	95% UCLM	2.43	Max	5%
Beryllium	0.1	DL	0.1	DL	0%
Boron	6	DL	6	DL	0%
Cadmium	0.022	95% UCLM	0.0215	Max	-2%
Chromium (Total)	0.28	95% UCLM	0.33	Max	18%
Chromium VI	-	-	-	-	-
Cobalt	0.028	Max	0.028	Max	0%
Lead	0.06	95% UCLM	0.07	Max	17%
Mercury - Inorganic	0.0944	95% UCLM	0.0935	Max	-1%
Methyl Mercury	-	-	-	-	-
Nickel	0.19	95% UCLM	0.48	Max	153%
Phosphorus	5999	95% UCLM	6090	Max	2%
Selenium	1.26	95% UCLM	1.28	Max	2%
Silver	0.01	DL	0.01	DL	0%
Thallium	0.01	DL	0.01	DL	0%
Tin	0.05	DL	0.05	DL	0%
Vanadium	0.21	Max	0.21	Max	0%
Zinc	34.6	95% UCLM	38.3	Max	11%

COPC	Chicken (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.0002	DL	0.0002	DL	0%
Acenaphthylene	0.0002	DL	0.0002	DL	0%
Anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluoranthene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(g,h,i)perylene	0.0002	DL	0.00025	DL	25%
Benzo(k)fluoranthene	0.0002	DL	0.0002	DL	0%
Chrysene	0.0002	DL	0.0002	DL	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0002	DL	0.0002	DL	0%
Fluoranthene	0.0002	DL	0.0002	DL	0%
Fluorene	0.0002	DL	0.0002	DL	0%
Indeno(1,2,3-cd)pyrene	0.0002	DL	0.0002	DL	0%
Perylene	0.0002	DL	0.0002	DL	0%
Phenanthrene	0.0002	DL	0.0002	DL	0%
Pyrene	0.00062	DL	0.00081	DL	31%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	5.10E-08	DL	1.10E-07	DL	116%
1,2,3,4,6,7,8-HpCDF	5.10E-08	DL	7.40E-08	DL	45%
1,2,3,4,7,8,9-HpCDF	4.10E-08	DL	7.60E-08	DL	85%
1,2,3,4,7,8-HxCDD	2.30E-08	DL	5.70E-08	DL	148%
1,2,3,4,7,8-HxCDF	1.60E-08	DL	3.80E-08	DL	138%
1,2,3,6,7,8-HxCDD	2.40E-08	DL	5.20E-08	DL	117%
1,2,3,6,7,8-HxCDF	1.80E-08	DL	3.90E-08	DL	117%
1,2,3,7,8,9-HxCDD	3.50E-08	DL	5.40E-08	DL	54%
1,2,3,7,8,9-HxCDF	2.20E-08	DL	5.40E-08	DL	145%
1,2,3,7,8-PeCDD	4.10E-08	DL	1.00E-07	DL	144%
1,2,3,7,8-PeCDF	2.60E-08	DL	4.20E-08	DL	62%
2,3,4,6,7,8-HxCDF	2.00E-08	DL	4.90E-08	DL	145%
2,3,4,7,8-PeCDF	3.40E-08	DL	9.10E-08	DL	168%
2,3,7,8-TCDD	7.50E-08	DL	1.00E-07	DL	33%
2,3,7,8-TCDF	4.40E-08	DL	7.10E-08	DL	61%
OCDD	9.20E-08	DL	1.30E-07	DL	41%
OCDF	1.90E-08	DL	5.80E-08	DL	205%

COPC	Chicken (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	0.3	DL	0.6	DL	100%
Bromoform	2	DL	4	DL	100%
Carbon Tetrachloride	1	DL	2	DL	100%
Chloroform	1	DL	2	DL	100%
Dichloromethane	10	DL	20	DL	100%
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	2	DL	4	DL	100%
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	10	DL	20	DL	100%
1,2-Dichlorobenzene	2	DL	4	DL	100%
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.01	DL	0.01	DL	0%
Arsenic	0.011	Max	0.011	Max	0%
Barium	0.402	Max	0.402	Max	0%
Beryllium	0.1	DL	0.1	DL	0%
Boron	2	DL	2	DL	0%
Cadmium	0.005	DL	0.005	DL	0%
Chromium (Total)	2.54	Max	2.54	Max	0%
Chromium VI	-	-	-	-	-
Cobalt	0.02	DL	0.02	DL	0%
Lead	0.02	DL	0.02	DL	0%
Mercury - Inorganic	0.001	DL	0.001	DL	0%
Methyl Mercury	-	-	-	-	-
Nickel	0.12	Max	0.12	Max	0%
Phosphorus	4170	Max	4170	Max	0%
Selenium	0.28	Max	0.28	Max	0%
Silver	0.01	DL	0.01	DL	0%
Thallium	0.01	DL	0.01	DL	0%
Tin	0.05	DL	0.05	DL	0%
Vanadium	0.1	DL	0.1	DL	0%
Zinc	15.3	Max	15.3	Max	0%

COPC	Beef (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.0002	DL	0.0002	DL	0%
Acenaphthylene	0.0002	DL	0.0002	DL	0%
Anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluoranthene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(g,h,i)perylene	0.0002	DL	0.0002	DL	0%
Benzo(k)fluoranthene	0.0002	DL	0.0002	DL	0%
Chrysene	0.0002	Max	0.0002	Max	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0002	DL	0.0002	DL	0%
Fluoranthene	0.0002	DL	0.0002	DL	0%
Fluorene	0.0002	DL	0.0002	DL	0%
Indeno(1,2,3-cd)pyrene	0.0002	DL	0.0002	DL	0%
Perylene	0.0002	DL	0.0002	DL	0%
Phenanthrene	0.00025	Max	0.00025	Max	0%
Pyrene	0.0002	DL	0.0002	DL	0%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	2.40E-08	DL	4.90E-08	DL	104%
1,2,3,4,6,7,8-HpCDF	1.90E-08	DL	3.20E-08	DL	68%
1,2,3,4,7,8,9-HpCDF	3.20E-08	DL	5.10E-08	DL	59%
1,2,3,4,7,8-HxCDD	3.10E-08	DL	3.20E-08	DL	3%
1,2,3,4,7,8-HxCDF	2.40E-08	DL	3.10E-08	DL	29%
1,2,3,6,7,8-HxCDD	2.90E-08	DL	2.90E-08	DL	0%
1,2,3,6,7,8-HxCDF	1.90E-08	DL	2.30E-08	DL	21%
1,2,3,7,8,9-HxCDD	2.90E-08	DL	3.00E-08	DL	3%
1,2,3,7,8,9-HxCDF	3.10E-08	DL	4.00E-08	DL	29%
1,2,3,7,8-PeCDD	2.00E-08	DL	3.70E-08	DL	85%
1,2,3,7,8-PeCDF	2.10E-08	DL	2.70E-08	DL	29%
2,3,4,6,7,8-HxCDF	2.20E-08	DL	2.60E-08	DL	18%
2,3,4,7,8-PeCDF	2.00E-08	DL	2.70E-08	DL	35%
2,3,7,8-TCDD	4.20E-08	DL	5.30E-08	DL	26%
2,3,7,8-TCDF	3.30E-08	DL	4.30E-08	DL	30%
OCDD	4.24E-08	Max	4.24E-08	Max	0%
OCDF	2.40E-08	DL	5.00E-08	DL	108%

COPC	Beef (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	0.02	DL	0.02	DL	0%
Bromoform	0.1	DL	0.1	DL	0%
Carbon Tetrachloride	0.05	DL	0.05	DL	0%
Chloroform	0.05	DL	0.05	DL	0%
Dichloromethane	0.5	DL	0.5	DL	0%
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	0.1	DL	0.1	DL	0%
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	0.5	DL	0.5	DL	0%
1,2-Dichlorobenzene	0.1	DL	0.1	DL	0%
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.01	DL	0.01	DL	0%
Arsenic	0.01	DL	0.01	DL	0%
Barium	0.065	Max	0.065	Max	0%
Beryllium	0.1	DL	0.1	DL	0%
Boron	4	DL	6	DL	50%
Cadmium	0.005	DL	0.005	DL	0%
Chromium (Total)	0.1	DL	0.1	DL	0%
Chromium VI	-	-	-	-	-
Cobalt	0.02	DL	0.02	DL	0%
Lead	0.02	DL	0.02	DL	0%
Mercury - Inorganic	0.001	DL	0.001	DL	0%
Methyl Mercury	-	-	-	-	-
Nickel	0.1	DL	0.1	DL	0%
Phosphorus	1160	Max	1160	Max	0%
Selenium	0.2	DL	0.2	DL	0%
Silver	0.01	DL	0.01	DL	0%
Thallium	0.01	DL	0.01	DL	0%
Tin	0.05	DL	0.05	DL	0%
Vanadium	0.1	DL	0.1	DL	0%
Zinc	20.3	Max	20.3	Max	0%

COPC	Pork (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.0003	Max	0.0003	Max	0%
Acenaphthylene	0.0002	DL	0.0003	DL	50%
Anthracene	0.0002	DL	0.0003	DL	50%
Benzo(a)anthracene	0.0002	DL	0.0003	DL	50%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.0002	DL	0.0003	DL	50%
Benzo(b)fluoranthene	0.0002	DL	0.0003	DL	50%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.0002	DL	0.0003	DL	50%
Benzo(g,h,i)perylene	0.0002	DL	0.0003	DL	50%
Benzo(k)fluoranthene	0.0002	DL	0.0003	DL	50%
Chrysene	0.0003	Max	0.0003	Max	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0002	DL	0.0003	DL	50%
Fluoranthene	0.0002	DL	0.0003	DL	50%
Fluorene	0.0005	Max	0.0005	Max	0%
Indeno(1,2,3-cd)pyrene	0.0002	DL	0.0003	DL	50%
Perylene	0.0002	DL	0.0003	DL	50%
Phenanthrene	0.00044	Max	0.00044	Max	0%
Pyrene	0.0002	DL	0.0003	DL	50%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	2.70E-08	DL	6.10E-08	DL	126%
1,2,3,4,6,7,8-HpCDF	2.50E-08	DL	2.80E-08	DL	12%
1,2,3,4,7,8,9-HpCDF	3.90E-08	DL	4.30E-08	DL	10%
1,2,3,4,7,8-HxCDD	2.20E-08	DL	2.50E-08	DL	14%
1,2,3,4,7,8-HxCDF	2.60E-08	Max	2.60E-08	Max	0%
1,2,3,6,7,8-HxCDD	2.10E-08	DL	2.40E-08	DL	14%
1,2,3,6,7,8-HxCDF	3.10E-08	DL	4.20E-08	DL	35%
1,2,3,7,8,9-HxCDD	2.20E-08	DL	2.40E-08	DL	9%
1,2,3,7,8,9-HxCDF	1.60E-08	DL	3.10E-08	DL	94%
1,2,3,7,8-PeCDD	1.90E-08	DL	3.10E-08	DL	63%
1,2,3,7,8-PeCDF	1.30E-08	DL	2.20E-08	DL	69%
2,3,4,6,7,8-HxCDF	1.20E-08	DL	2.40E-08	DL	100%
2,3,4,7,8-PeCDF	1.30E-08	DL	2.10E-08	DL	62%
2,3,7,8-TCDD	4.60E-08	DL	6.10E-08	DL	33%
2,3,7,8-TCDF	4.20E-08	DL	4.80E-08	DL	14%
OCDD	2.52E-07	Max	2.52E-07	Max	0%
OCDF	3.70E-08	DL	3.80E-08	DL	3%

COPC	Pork (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	0.3	DL	0.3	DL	0%
Bromoform	2	DL	2	DL	0%
Carbon Tetrachloride	1	DL	1	DL	0%
Chloroform	1	DL	1	DL	0%
Dichloromethane	10	DL	10	DL	0%
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	2	DL	2	DL	0%
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	10	DL	10	DL	0%
1,2-Dichlorobenzene	2	DL	2	DL	0%
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.01	DL	0.01	DL	0%
Arsenic	0.01	DL	0.01	DL	0%
Barium	0.061	Max	0.061	Max	0%
Beryllium	0.1	DL	0.1	DL	0%
Boron	4	DL	6	DL	50%
Cadmium	0.005	DL	0.005	DL	0%
Chromium (Total)	0.1	DL	0.1	DL	0%
Chromium VI	-	-	-	-	-
Cobalt	0.051	Max	0.051	Max	0%
Lead	0.02	DL	0.02	DL	0%
Mercury - Inorganic	0.001	DL	0.001	DL	0%
Methyl Mercury	-	-	-	-	-
Nickel	0.1	DL	0.1	DL	0%
Phosphorus	1310	Max	1310	Max	0%
Selenium	0.2	DL	0.2	DL	0%
Silver	0.01	DL	0.01	DL	0%
Thallium	0.01	DL	0.01	DL	0%
Tin	0.05	DL	0.05	DL	0%
Vanadium	0.1	DL	0.1	DL	0%
Zinc	13.4	Max	13.4	Max	0%

COPC	Dairy (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.0002	DL	0.0002	DL	0%
Acenaphthylene	0.0002	DL	0.0002	DL	0%
Anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluoranthene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(g,h,i)perylene	0.0002	DL	0.0002	DL	0%
Benzo(k)fluoranthene	0.0002	DL	0.0002	DL	0%
Chrysene	0.0002	DL	0.0002	DL	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0002	DL	0.0002	DL	0%
Fluoranthene	0.0002	DL	0.0002	DL	0%
Fluorene	0.0002	DL	0.0002	DL	0%
Indeno(1,2,3-cd)pyrene	0.0002	DL	0.0002	DL	0%
Perylene	0.0002	DL	0.0002	DL	0%
Phenanthrene	0.0002	DL	0.0002	DL	0%
Pyrene	0.0002	DL	0.0002	DL	0%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	8.18E-08	Max	8.18E-08	Max	0%
1,2,3,4,6,7,8-HpCDF	2.90E-08	DL	3.40E-08	DL	17%
1,2,3,4,7,8,9-HpCDF	3.10E-08	DL	3.80E-08	DL	23%
1,2,3,4,7,8-HxCDD	4.54E-08	Max	4.54E-08	Max	0%
1,2,3,4,7,8-HxCDF	4.88E-08	Max	4.88E-08	Max	0%
1,2,3,6,7,8-HxCDD	3.00E-08	DL	3.60E-08	DL	20%
1,2,3,6,7,8-HxCDF	3.00E-08	Max	3.00E-08	Max	0%
1,2,3,7,8,9-HxCDD	2.40E-08	DL	2.80E-08	DL	17%
1,2,3,7,8,9-HxCDF	2.40E-08	DL	2.70E-08	DL	13%
1,2,3,7,8-PeCDD	3.40E-08	DL	3.50E-08	DL	3%
1,2,3,7,8-PeCDF	3.20E-08	DL	3.20E-08	DL	0%
2,3,4,6,7,8-HxCDF	1.90E-08	DL	2.30E-08	DL	21%
2,3,4,7,8-PeCDF	5.88E-08	Max	5.88E-08	Max	0%
2,3,7,8-TCDD	4.60E-08	DL	5.80E-08	DL	26%
2,3,7,8-TCDF	2.80E-08	DL	4.80E-08	DL	71%
OCDD	1.20E-07	DL	2.10E-07	DL	75%
OCDF	7.50E-08	Max	7.50E-08	Max	0%

COPC	Dairy (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	0.2	DL	0.2	DL	0%
Bromoform	1	DL	1	DL	0%
Carbon Tetrachloride	0.5	DL	0.5	DL	0%
Chloroform	0.5	DL	0.5	DL	0%
Dichloromethane	5	DL	5	DL	0%
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	1	DL	1	DL	0%
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	5	DL	5	DL	0%
1,2-Dichlorobenzene	1	DL	1	DL	0%
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.01	DL	0.01	DL	0%
Arsenic	0.01	DL	0.01	DL	0%
Barium	0.05	Max	0.05	Max	0%
Beryllium	0.1	DL	0.1	DL	0%
Boron	2	DL	2	DL	0%
Cadmium	0.005	DL	0.005	DL	0%
Chromium (Total)	0.1	DL	0.1	DL	0%
Chromium VI	-	-	-	-	-
Cobalt	0.02	DL	0.02	DL	0%
Lead	0.02	DL	0.02	DL	0%
Mercury - Inorganic	0.001	DL	0.001	DL	0%
Methyl Mercury	-	-	-	-	-
Nickel	0.1	DL	0.1	DL	0%
Phosphorus	814	Max	814	Max	0%
Selenium	0.04	DL	0.04	DL	0%
Silver	0.01	DL	0.01	DL	0%
Thallium	0.01	DL	0.01	DL	0%
Tin	0.05	DL	0.05	DL	0%
Vanadium	0.1	DL	0.1	DL	0%
Zinc	3.49	Max	3.49	Max	0%

COPC	Eggs (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
PAHs					
Acenaphthene	0.0002	DL	0.0002	DL	0%
Acenaphthylene	0.0002	DL	0.0002	DL	0%
Anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)anthracene	0.0002	DL	0.0002	DL	0%
Benzo(a)fluorene	-	-	-	-	-
Benzo(a)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluoranthene	0.0002	DL	0.0002	DL	0%
Benzo(b)fluorene	-	-	-	-	-
Benzo(e)pyrene	0.0002	DL	0.0002	DL	0%
Benzo(g,h,i)perylene	0.0002	DL	0.0002	DL	0%
Benzo(k)fluoranthene	0.0002	DL	0.0002	DL	0%
Chrysene	0.0002	DL	0.0002	DL	0%
Dibenzo(a,c)anthracene	-	-	-	-	-
Dibenzo(a,h)anthracene	0.0002	DL	0.0002	DL	0%
Fluoranthene	0.0002	DL	0.0002	DL	0%
Fluorene	0.0002	DL	0.0002	DL	0%
Indeno(1,2,3-cd)pyrene	0.0002	DL	0.0002	DL	0%
Perylene	0.0002	DL	0.0002	DL	0%
Phenanthrene	0.0002	DL	0.0002	DL	0%
Pyrene	0.0002	DL	0.0002	DL	0%
PCBs					
Aroclor 1254 (Total PCBs)	0.01	DL	0.01	DL	0%
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	1.67E-07	Max	1.67E-07	Max	0%
1,2,3,4,6,7,8-HpCDF	7.75E-07	Max	7.75E-07	Max	0%
1,2,3,4,7,8,9-HpCDF	3.30E-08	DL	5.60E-08	DL	70%
1,2,3,4,7,8-HxCDD	1.60E-08	DL	4.40E-08	DL	175%
1,2,3,4,7,8-HxCDF	6.20E-08	DL	1.30E-07	DL	110%
1,2,3,6,7,8-HxCDD	6.36E-08	Max	6.36E-08	Max	0%
1,2,3,6,7,8-HxCDF	5.70E-08	DL	1.20E-07	DL	111%
1,2,3,7,8,9-HxCDD	1.60E-08	DL	4.40E-08	DL	175%
1,2,3,7,8,9-HxCDF	7.30E-08	DL	1.60E-07	DL	119%
1,2,3,7,8-PeCDD	3.00E-08	DL	6.30E-08	DL	110%
1,2,3,7,8-PeCDF	1.90E-08	DL	3.40E-08	DL	79%
2,3,4,6,7,8-HxCDF	6.30E-08	DL	1.30E-07	DL	106%
2,3,4,7,8-PeCDF	8.80E-08	Max	8.80E-08	Max	0%
2,3,7,8-TCDD	3.00E-08	DL	1.20E-07	DL	300%
2,3,7,8-TCDF	2.00E-08	DL	5.00E-08	DL	150%
OCDD	1.28E-06	Max	1.28E-06	Max	0%
OCDF	7.20E-08	Max	7.20E-08	Max	0%

COPC	Eggs (mg/kg)				
	Pre-MOE		Post-MOE		Difference, %
	Concentration	Basis	Concentration	Basis	
VOCs					
1,1,1-Trichloroethane	0.2	DL	0.2	DL	0%
Bromoform	1	DL	1	DL	0%
Carbon Tetrachloride	0.5	DL	0.5	DL	0%
Chloroform	0.5	DL	0.5	DL	0%
Dichloromethane	5	DL	5	DL	0%
O-Terphenyl	-	-	-	-	-
Trichlorofluoromethane (FREON 11)	1	DL	1	DL	0%
Chlorinated Monocyclic Aromatics					
1,2,4,5-Tetrachlorobenzene	0.01	DL	0.01	DL	0%
1,2,4-Trichlorobenzene	5	DL	5	DL	0%
1,2-Dichlorobenzene	1	DL	1	DL	0%
Hexachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorobenzene	0.01	DL	0.01	DL	0%
Pentachlorophenol	-	-	-	-	-
Inorganics					
Antimony	0.01	DL	0.01	DL	0%
Arsenic	0.01	DL	0.01	DL	0%
Barium	0.398	Max	0.398	Max	0%
Beryllium	0.1	DL	0.1	DL	0%
Boron	2	DL	4	DL	100%
Cadmium	0.005	DL	0.005	DL	0%
Chromium (Total)	0.1	DL	0.1	DL	0%
Chromium VI	-	-	-	-	-
Cobalt	0.02	DL	0.02	DL	0%
Lead	0.02	DL	0.02	DL	0%
Mercury - Inorganic	0.001	DL	0.001	DL	0%
Methyl Mercury	-	-	-	-	-
Nickel	0.1	DL	0.1	DL	0%
Phosphorus	1740	Max	1740	Max	0%
Selenium	0.21	Max	0.21	Max	0%
Silver	0.01	DL	0.01	DL	0%
Thallium	0.01	DL	0.01	DL	0%
Tin	0.05	DL	0.05	DL	0%
Vanadium	0.1	DL	0.1	DL	0%
Zinc	12.6	Max	12.6	Max	0%

APPENDIX B-3

Environmental Baseline Study Report (Jacques Whitford, 2009)

ENVIRONMENTAL BASELINE STUDY

Project Durham/York: Proposed Energy from Waste Facility in Clarington, Ontario

Durham and York Regions, Ontario, Canada

REPORT NO. 1009497.06

REPORT NO. 1009497.06

REPORT TO **Durham and York Regions**

ON **Environmental Baseline Study**

FOR **Proposed Energy from Waste Facility in the Durham Region, Ontario**

April 30, 2009

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EXECUTIVE SUMMARY

The Baseline Environmental Study was prepared as background information for the site-specific risk assessment (RA) for the Durham/York Municipal Energy-From-Waste Facility (“the Project”), the proposed municipal incinerator in Durham Region, Ontario.

The Project involves the proposed development of a thermal treatment energy-from-waste (EFW) facility as a means of handling residual municipal waste. At this point no vendor or specific technology has been selected for implementation.

In this Baseline Environmental Study, sampling procedures and chemical analysis conducted by Jacques Whitford to establish baseline concentrations of selected chemicals in various environmental media (Table 1) in the area surrounding the proposed EFW facility site in Durham Region are described. The objective of this study was to establish pre-construction baseline concentrations of chemicals in the environment that can be used to assist in the potential assessment of environmental effects of the Project and so that cumulative environmental effects can be assessed during the site-specific risk assessment.

The general approach taken to meet the objective of the study was to:

- Identify and sample various environmental media of interest based on USEPA (2005) guidance on evaluating potential human health effects caused by air emissions from proposed facilities at the design stage.
- Determine concentrations of chemicals of potential concern (COPCs) identified in the Generic Human Health and Ecological Risk Assessment Study (Jacques Whitford 2007a) in the sampled environmental media of interest in the area surrounding the proposed facility site.
- Complete a statistical analysis of the analytical results and present descriptive statistics that characterize the baseline COPC concentrations in sampled environmental media.

A summary of the media selected for analysis and the chemicals analyzed in each media type in order to establish baseline concentrations is provided in Table 1.

The baseline values identified in this assessment represent the maximum, the upper concentration limit of the mean (UCLM at the 95th percentile) and the 95th percentile of the sample distribution. Baseline identified COPC concentrations were compared to the Province of Ontario Soil, Ground Water and Sediment Standards, Ontario Regulation (O. Reg.) 153/04 Table 1 Standards or Provincial Water Quality Guidelines (considered the provincial soil, water and sediment background, or ‘natural’ concentrations). When provincial values for comparison were not available, comparison was made to relevant federal guidelines from the Canadian Council of Ministers (CCME).

In summary, results indicated that generally there were no exceedances of the relevant guidelines. Of note, some COPCs had the detection limit greater than the standards.

A review of the results of the data quality (i.e., method blanks, matrix spikes, laboratory duplicates, and field duplicates) was completed. The results indicate that the data are acceptable for the purposes of establishing the baseline concentrations.

Table 1 Summary of Chemicals for which Baseline Concentrations were Established by Media Type

	Media	Metals	Chlorinated Monocyclic Aromatics		Chlorinated Polycyclic Aromatics		PAHs	VOCs	General Chemistry	Acetaldehydes	Arsenic	% Lipids
			SVOCs	Chlorophenols	PCBs	Dioxins and Furans						
Terrestrial	Soil	✓	✓	✓	✓	✓	✓	✓		✓		
	Forage	✓	✓		✓	✓	✓	✓				
	Browse	✓	✓		✓	✓	✓					
	Small Mammals	✓	✓		✓	✓	✓					✓
Freshwater Stream	Surface Water	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	Sediment	✓	✓	✓	✓	✓	✓	✓		✓		
	Fish	✓	✓		✓	✓	✓				✓	✓
Produce	AGE	✓	✓		✓	✓	✓	✓				
	AGP	✓	✓		✓	✓	✓					
	BG	✓	✓		✓	✓	✓					
	Crops	✓	✓		✓	✓	✓					
	Fruit	✓	✓		✓	✓	✓	✓				
	Ag. Products	✓	✓		✓	✓	✓	✓				✓

PAH = Polycyclic Aromatic Hydrocarbons; PCBs = Polychlorinated Biphenyls; SVOCs = semi-volatile organic compounds; VOCs = volatile organic compounds; AGE = above ground exposed; AGP = above ground protected; BG = below ground; Ag. Products = agricultural products

Table of Contents

List of Tables

List of Figures

List of Appendices

List of Acronyms and Units

AGE	Above Ground Exposed
AGP	Above Ground Protected
ALS	ALS Laboratory Group
BG	Below Ground
CAEAL	Canadian Association of Environmental Analytical Laboratories
COPC	Chemicals of potential concern
DMA	Dimethyl arsenic
EA	Environmental assessment
EAA	*Environmental Assessment Act*
EFW	Energy-from-waste
EQL	Estimate of quantification
HHERA	Human health and ecological risk assessment
JWMG	Durham/York Joint Waste Management Group
Max	Maximum
Min	Minimum
MMA	Monomethyl arsenic
MOE	Ontario Ministry of the Environment
MPOI	Maximum point of impingement
OPG	Ontario Power Generation
OTR	Ontario typical range
PAH	Polycyclic aromatic hydrocarbons

PCB	Polychlorinated biphenyl
PCDD/PCDF	Polychlorinated dibenzo-p-dioxins and dibenzofurans
QA/QC	Quality assurance/quality control
RA	Risk assessment
RDL	Reportable detection limit
RPD	Relative percent difference
SOP	Standard operating procedure
SVOC	Semi-volatile organic compounds
TEF	Toxic equivalency factor
TEQ	Toxic equivalent quotient
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compounds
WHO	World Health Organization

Units

ppm (part per million)	=	mg/kg, ug/g, ng/mg, pg/ug, mg/L, ug/mL, ng/uL
ppb (part per billion)	=	ug/kg, ng/g, pg/mg, ug/L, ng/mL, pg/uL
ppt (part per trillion)	=	ng/kg, pg/g, fg/mg, ng/L, pg/mL, fg/uL
1 ppm = 1000ppb		1 ppb = 0.001 ppm

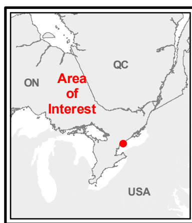
1.0 INTRODUCTION

Durham and York Regions (the Regions) have partnered to undertake a joint Residual Waste Planning Study. Both municipalities are in need of a solution to manage the residual solid waste that remains after diversion. The Regions are working together to address the social, economic, and environmental concerns through an Environmental Assessment (EA) process to examine potential long-term residual waste management alternatives.

In June of 2006, both Regional Councils endorsed the Durham/York Joint Waste Management Group (JWMG) and consultant's recommendation to manage residual waste through a thermal treatment energy-from-waste (EFW) facility. This is the preferred alternative being examined further in the EA. At this point in time no vendor or specific technology has been selected for implementation.

Through the EA public consultation process, concerns have been raised about the potential for emissions from an EFW facility to adversely impact human and environmental health. In 1999, the Ontario Ministry of the Environment (MOE) published a report "Environmental Risks of Municipal Non-Hazardous Waste Landfilling and Incineration" (MOE 1999). This report concluded that no significant human or ecological effects would be likely in a typical suburban community located near an incinerator. In addition, Cantox Environmental Inc. (now Intrinsik Environmental Inc.) conducted a human health risk assessment (HHRA) on the proposed expansion of the KMS Peel, Inc. Brampton, EFW facility. This facility is a 150,000 t/y thermal treatment EFW facility currently operating in the Region of Peel. Overall, the report concluded it is unlikely that there would be any significant health effects on residents in the local area. Although previous human health and ecological risk assessments (HHERAs) of thermal treatment conducted in Ontario have concluded that there would be no significant impact on the environment, recent regulatory changes have prompted a re-examination of these findings.

A regional generic risk assessment (RA) was conducted by Jacques Whitford (2007a) based on emissions data from an existing facility and Ontario emissions guidelines in order to study the potential health and environmental impacts and feasibility of siting an EFW facility in Durham or York Regions. The findings of the generic RA report were incorporated into the siting criteria used to select the preferred site and to identify chemicals or issues of particular concern that should be further scrutinized in any site-specific RA to be completed under the EA. The site chosen for the proposed facility is located in the Municipality of Clarington, near the town of Courtice between highway 401 and Lake Ontario. The location of the proposed EFW facility is outlined in Figure 1.1.



Site Location Plan

Acknowledgements: Base data was supplied by The Government of Canada.
Image provided by Durham and York Regions
Projection: UTM Zone 17, NAD 83

PREPARED FOR
Jacques Whitford

PREPARED FOR
York Region

FIGURE NO.
1.0

Last Modified: October 28, 2008 by ARocha

1.1 Organization of this Study

Documented within this report are the scope, methodology, and results of the baseline soil, surface water, sediment, biota and agricultural produce sampling program that was completed to establish the baseline concentrations of selected chemicals in various media within the close proximity of the proposed facility, and is presented in nine major sections, as follows:

- Section 1.0 provides a general introduction and background information about the Project and the Baseline Study.
- Section 2.0 summarizes the methodology used to collect, prepare, analyze, and calculate the samples and data collected.
- Section 3.0 summarizes the terrestrial results from samples collected.
- Section 4.0 summarizes the freshwater stream results from samples collected.
- Section 5.0 summarizes the produce results from samples collected.
- Section 6.0 summarizes the laboratory Quality Assurance/ Quality Control (QA/QC).
- Section 7.0 provides an overall summary of the Study.
- Section 8.0 provides closing remarks and a statement of limitations concerning the work conducted.
- Section 9.0 provides the list of references cited as part of the work.
- Additional supporting documentation is provided in the appendices.

1.2 The Environmental Assessment Process

The purpose of the undertaking (i.e. what the outcome of this EA Study is intended to do) as described in the approved EA Terms of Reference (ToR) is:

> *"To process - physically, biologically and/or thermally - the waste that remains after the application of both Regions' at-source waste diversion programs in order to recover resources - both material and energy - and to minimize the amount of material requiring landfill disposal. In proceeding with this undertaking only those approaches that will meet or exceed all regulatory requirements will be considered."*

The EA Study follows a planning approach where environmental constraints or opportunities are considered in the context of the broadly defined environment under the *Environmental Assessment Act* (EAA) (i.e. the natural environment as well as the social, economic and heritage and other "environments" relevant to the undertaking) and potential effects are understood and addressed before development occurs. In accordance with the ToR and EAA, the EA process evaluates: alternatives considering potential effects on the environment; the availability of mitigative measures that address, in whole or in part, the potential effects; and, the comparison of the advantages and disadvantages of the remaining or "net" effects. The result of this process provides the planning rationale and support for a preferred approach and method to implement the undertaking.

The EA document has been prepared and conducted in accordance with the *Ontario Environmental Assessment Act* (OEAA), including in accordance with the ToR approved by Ontario's Minister of the

Environment on March 31, 2006. There are currently no federal environmental assessment process triggers identified and, therefore, this project does not require approval under the *Canadian Environmental Assessment Act* (CEAA).

This EA process essentially consists of three parts taking place in stages including:

- The Development and Approval of an EA Terms of Reference.
- The evaluation of “Alternatives To” the undertaking.
- The evaluation of “Alternative Methods” of implementing the undertaking.

Refer to the EA for a detailed description of the EA process undertaken as part of the Durham/York Residual Waste EA.

1.3 Purpose of the Baseline Study

In this Baseline Study, sampling procedures and chemical analysis conducted by Jacques Whitford to identify the baseline concentrations of selected chemicals in various environmental media in the area surrounding the proposed facility site in Durham Region are described. The objective of this study was to establish pre-construction baseline concentrations of chemicals in the environment that can be used to assist in the potential assessment of environmental effects of the Project and so that cumulative environmental effects can be assessed during the site-specific risk assessment.

1.4 Assessment Area

The site for the proposed EFW facility is located in the Municipality of Clarington, on the south side of Hwy 401 and South Service Road, between Courtice Road and Osbourne Road (Figure 1.1). The area surrounding the site is characterized by a variety of land uses including agricultural, rural residential, commercial/industrial and natural areas. The area surrounding the site has lost most of its natural vegetative cover. Tooley Creek, an important aquatic environmental feature in the area surrounding the proposed facility, runs north to south approximately 900 m from the western property line of the proposed site.

The sampling program was designed to characterize the baseline soil, surface water, sediment and biota conditions within a 1 km radius of the proposed site fence line as well as agricultural produce conditions in the area surrounding the proposed facility site (based on availability). The location of the sampling points was based largely on air modeling (Jacques Whitford 2007b) that was conducted in support of the generic HHERA and on air monitoring at the Courtice Rd. Station (Jacques Whitford 2008a). The selection of baseline sampling points was also based, in part, on the information gathered from local open house meetings and various site visits conducted by Jacques Whitford biologists. Whenever possible consideration was given to areas identified by the community as being of particular importance. Different land uses (residential, parkland, agricultural) and their proximity to the proposed development were considered in the selection of sampling points. Where possible preference was given to sites owned by the municipality. In cases where access to public property was required, Jacques Whitford contacted property owners to obtain permission before accessing the property.

The air dispersion modeling included estimates of the 1-hour, 24-hour and annual averaging periods of the chemicals of potential concern (COPC) from the facility at the maximum point of impingement (MPOI). The modeling program indicated that the 1-hour maximum ground level concentrations of COPCs were located approximately 700 m from the EFW facility stack or over 680 m outside the fence line of the facility, while the 24-hour concentrations were typically located within 300 m of the facility. The annual average MPOI concentrations were located between approximately 280 m and 340 m from the fence line of the facility (Table 1.1).

As mentioned above, the selection of baseline sampling points was also based, in part, on the meteorological data collected by an air monitoring station installed south of Hwy 401 along the west side of Courtice Road which showed that winds over an 11-month period occurred predominantly from west to north, with winds from east to south also being important (Jacques Whitford 2008a). In the wind rose representation in Figure 1.2, the percent of the total time that the wind blows from each of 16 cardinal directions is shown graphically with the length of the rose petal representing the percentage of the total time from the indicated direction (as read from the label on each concentric circle). Each of the rose petals is made up of a number of colored sections going outwards from black to yellow to red, etc., with the length of each of the colours representing the proportion of the wind from that sector which falls in the speed range as indicated in the legend to the right of the rose.

Table 1.1 Maximum Point of Impingement Distance from Stack

Scenario	Distance of MPOI from Stack (m)					
	1-hour		24-hour		Annual Average	
	Particulate	Vapour	Particulate	Vapour	Particulate	Vapour
Scenario 1: 400,000 t/y	728	728	316	316	381	381
Scenario 2: 266,666 t/y	762	762	316	316	381	381
Scenario 3: 133,333 t/y	728	728	316	316	316	316

Note: All distances are approximate as limited by the grid spacing of the air dispersion modelling exercise.

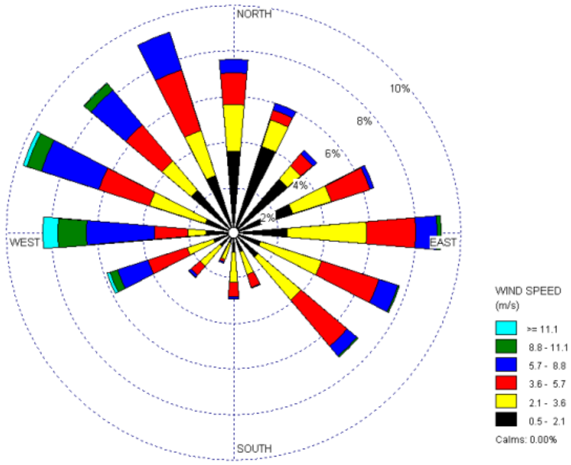


Figure 1.2 Windrose for Courtice Monitoring Station for the Period of mid September 2007 to August 2008

Several locations that Jacques Whitford recommended be included in the program could not be sampled as permission to access the property could not be obtained and/or the location was physically inaccessible. These locations included a large area directly northwest of the facility which the property owner did not allow access to, a large rectangle to the east of the site stretching from Hwy 401 to Lake Ontario which the property owner did not allow access to, as well as an area to the southeast of the site which was inaccessible due to an unregulated railway crossing on the north side, private property and high fencing on the east and west sides and steep bluffs on the south side.

1.5 Objective and Approach

The objective of this study is to establish concentrations of chemicals in the environment that can be used to establish a pre-construction baseline against which the Project and cumulative environmental effects of the proposed facility can be assessed in the site-specific RA.

The general approach taken to meet the objective of the study was to:

- Identify and sample various environmental media of interest based on USEPA (2005) guidance on evaluating potential human health effects caused by air emissions from proposed facilities at the design stage.
- Determine concentrations of chemicals of potential concern (COPCs) identified in the Generic Human Health and Ecological Risk Assessment Study (Jacques Whitford 2007a) in the sampled environmental media of interest in the area surrounding the proposed facility site.
- Complete a statistical analysis of the analytical results and present descriptive statistics that characterize the baseline COPC concentrations in sampled environmental media.

1.5.1 Identification of Chemicals of Potential Concern for Analysis

A list of possible COPCs was completed during preparation of the generic RA and was based on information from the following sources:

- MOE 1999, Environmental Risks of Municipal Non-Hazardous Waste Landfilling and Incineration.
- Cantox Environmental Inc 2000, Human Health Risk Assessment for the Proposed Expansion of the KMS Peel, Inc. Brampton, Energy-From-Waste Facility.
- MOE (Ontario Ministry of the Environment), 2004. Guideline A-7: Combustion and Air Pollution Control Requirements for New Municipal Waste Incinerators.
- United States Environmental Protection Agency (USEPA) 2005, Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities.
- Based on the information from the above-noted sources, and the previous experience of the HHERA Project Team with similar types of projects.

This list of COPCs that were characterized in sampled environmental media is provided in Table 1.2.

Table 1.2 Chemicals of Potential Concern Evaluated in the Baseline Study

Metals	Chlorinated Monocyclic Aromatics	Chlorinated Polycyclic Aromatics	Polycyclic Aromatic Hydrocarbons	Volatile Organic Compounds
Antimony Arsenic✓ Barium Beryllium Boron Cadmium✓+ Chromium ✓ Cobalt Lead✓+ Mercury✓+ Nickel Phosphorus Silver Vanadium Zinc	1,2-Dichlorobenzene 1,2,4-Trichlorobenzene 1,2,4,5-Tetrachlorobenzene Pentachlorobenzene Hexachlorobenzene 2,4-Dichlorophenol 2,4,6-Trichlorophenol 2,3,4,6-Tetrachlorophenol Pentachlorophenol	PCBs 2,3,7,8-TCDD - (dioxin/furan)TEQ✓+	*Benzo(a)pyrene group* Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k)fluoranthene Chrysene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Anthracene Napthalene Phenanthrene	Benzene✓ Chloroform Dichloromethane Formaldehyde Tetrachloroethylene Vinyl chloride✓

Notes: Chemical list derived from Cantox Report for Human Health Risk Assessment for the Proposed Expansion of the KMS Peel, Inc. Brampton, Energy-From-Waste Facility (2000)
✓ Chemicals also reviewed by MOE in Environmental Risks of Municipal Non-Hazardous Waste Landfilling and Incineration (1999)
\+ Chemical also included in GUIDELINE A-7 Combustion and Air Pollution Requirements for New Municipal Waste Incinerators (MOE 2004)

1.5.2 Sample Media of Interest

The USEPA (2005) has provided guidance on evaluating human health environmental effects caused by air emissions from proposed facilities at the design stage. The guidance identifies a number of media that are to be included in the assessment. These same media were targeted as media of interest for the baseline sampling program. The following lists the media of interest and the rationale for inclusion in the baseline sampling program.

- Soil: Soil is one of the most important of the media considered. Both human (persons that reside in or visit the area surrounding the proposed facility, including members of the general public) and ecological receptors (living organisms other than humans, the habitat which supports such organisms, or natural resources which could be adversely affected by environmental contaminations resulting by a release at or migration from a site) are exposed directly to soil. Also the models used during the risk assessment (chemical fate and transport models, human and ecological risk evaluation models) rely heavily on the soil concentrations to predict concentrations in various other media. In addition, existing soil concentrations represent the current conditions associated with any historical deposition.
- Forage: Forage is considered to be green herbaceous vegetation, this year's growth, from non-woody plants such as grasses and wildflowers. Forage ingestion is a direct pathway for many ecological receptors.
- Browse: Browse is considered to be this year's woody growth from shrubs and trees, such as willows, alders, birches, poplars, and conifers. Browse ingestion is a direct pathway for many ecological receptors.
- Terrestrial Invertebrates: Terrestrial invertebrates, such as spiders, worms, and slugs, are exposed

directly to the soil as well as forming an exposure pathway for other ecological receptors.

- Small Mammals: Small mammals such as mice, voles, and shrews, are exposed directly to soil and forage/browse media as well as forming an exposure pathway for other ecological receptors.
- Water: Water quality is considered one of the primary indicators of the quality of aquatic habitats. In addition, water ingestion is a direct exposure pathway for all ecological receptors.
- Sediment: Sediment ingestion is an exposure pathway for ecological receptors.
- Fish: Fish ingestion is an exposure pathway for both human and ecological receptors.
- Produce: Produce ingestion is an exposure pathway for human receptors, and is broadly classified as above ground exposed, above ground protected, below ground, fruit and agricultural product (meat, dairy).

Air was also considered one of the media of interest for the HHERA. Sampling of air quality to establish baseline concentrations of the possible COPC was completed as part of a separate study (Jacques Whitford 2007a).

2.0 METHODOLOGY

2.1 Sampling Program

Several environmental media – soil, terrestrial vegetation (forage, browse, and crops), terrestrial invertebrates, small mammals, surface water, sediment and fish – were sampled within a 1 km radius of the proposed site. However, in the case of agricultural products and local produce, samples were collected from farms and markets located outside a 1 km radius of the proposed site due to limited availability. Every effort was made to ensure that the farms were as close as possible to the proposed facility site. Sampling garden produce from the backyards of residents within the area surrounding the proposed facility site was limited to one location; however, garden produce was obtained from local farmers' fields and markets. General inquiries were made to confirm that the produce acquired had been grown locally. The produce collected is considered to be sufficient to represent baseline conditions of the area surrounding the proposed facility site.

The sampling locations are shown on Figure 2.1, and the coordinates and media sampled at each location provided in Table 2.1. The locations of produce and other agricultural products samples from outside the 1 km site radius are shown in Figure 2.2 with the coordinates and media sampled at each location provided in Table 2.2.

A summary of the sampling program, including number of samples collected and the chemical analysis required is provided in Table 2.1. As indicated in the table, not all media were analyzed for all possible COPCs. In some instances, this was due to limitations of the methods of analysis.

Table 2.1 Samples Collected Within 1 km Radius of Proposed Site

Identifier	Soil	Forage	Browse	Crop	Small Mammal	Terrestrial Invertebrates	Surface Water	Sediment	Fish	UTMX	UTMY
E1	X		X	X						17T 0680709	4860362
E2	X	X	X	X		X				17T 0680935	4860971
E3	X		X							17T 0681603	4860567
E4	X									17T 0681537	4860919
E5	X	X	X	X						17T 0681072	4860585
E6	X	X								17T 0681617	4860332
N1	X	X								17T 0680627	4860564
N2	X			X						17T 0680644	4860749
N3	X		X		X	X	X	X		17 T 0679829	4861051
N4	X	X	X				X	X		17T 0679502	4861001
S1	X				X	X				17 T 0680453	4860189
S3	X	X			X	X				17T 0680704	4859881
S7	X	X	X		X	X	X	X	X	17T 0679846	4859791
W1	X									17T 0680101	4859951
W2	X	X	X			X				17T 0680305	4860195
W3	X	X	X		X	X	X	X	X	17T 0679725	4859955
W4	X	X	X				X	X	X	17T 0679500	4860706

Notes: UTM -Universal Transverse Mercator used to identify sample location

Sampling Locations within 1 km of Proposed Site

Acknowledgements: Base data was supplied by The Government of Canada.
Image provided by Durham and York Regions
Projection: UTM Zone 17, NAD 83

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FIGURE NO. 2.1

Last Modified: February 02, 2009 by ARocha

Table 2.2 Produce and Other Agricultural Products Sampled Outside the 1 km Radius of the Proposed Site

Location	Category	Species	UTMX	UTMY
Racansky Home	Soil	--	17T 0678891	4865513
	Fruit	Mulberries		
Watson Farms Limited	Soil	--	17T 0683194	4864045
	Fruit	Strawberries		
	Fruit	Raspberries		
	AGE	Peas		
	AGE	Beans		
	AGP	Corn		
Fred's Fruit Orchard	AGE	Apples	17T 0690016	4867514
Fred's Fruit Market	Fruit	Strawberries	17T 0691895	4870062
Clarington Farmer's Market	BG	Potatoes (Dup)	17T 0693532	4865150
	BG	Radishes		
	BG	Beets		
	BG	Potatoes		
	BG	Carrots		
	AGE	Peppers		
	AGE	Cucumbers		
	AGP	Corn (Dup)		
	AGE	Cucumbers		
	Fruit	Apples		
Price's Country Market	AGP	Vegetable Spaghetti (Squash)	17T 0688067	4864596
	AGP	Corn		
	AGE	Beans (Dup)		
	AGP	Squash		
Bloomfield's Farm Market	AGP	Corn	17T 0695345	4865947
Metcalf Farm	Ag. Products	Eggs (Dup)	17N 0682602	4862494
	Ag. Products	Dairy (Dup)		
Foley Farm	Ag. Products	Chicken (Dup)	17N 0681837	4862331
Found Family Farm	Ag. Products	Pork (Dup)	17N 0677416	4861059
	Ag. Products	Beef (Dup)		

Notes:

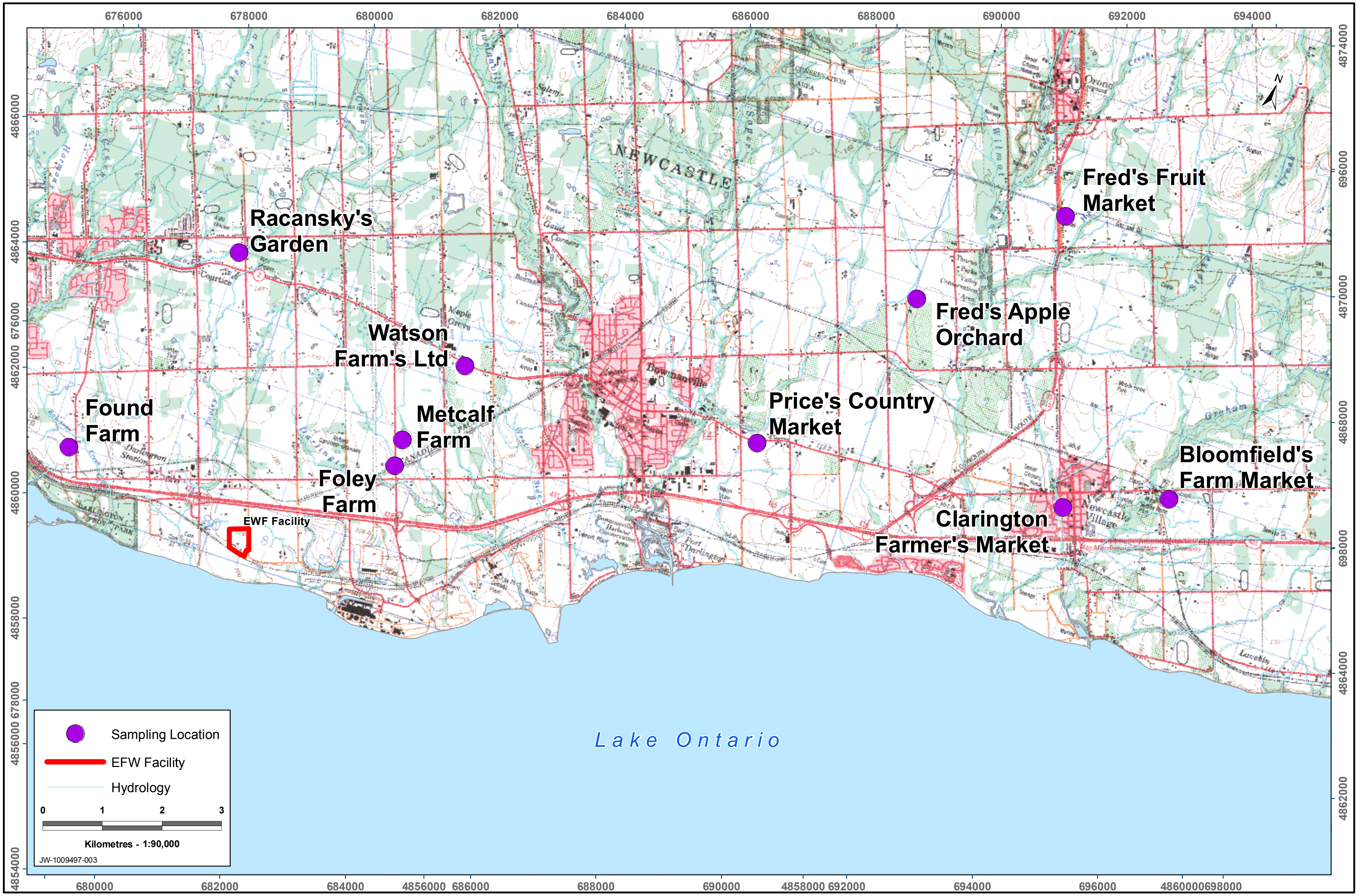
AGE – Aboveground Exposed Vegetable

AGP – Aboveground Protected Vegetable

BG – Belowground Vegetable

Ag. Products – Agricultural Products

Dup- duplicate sample collected



PREPARED FOR Jacques Whitford

PREPARED FOR Durham Region York Region

Produce and Other Agricultural Products Sampling Locations outside 1 km Radius of the Proposed Site

Acknowledgements: Base data was supplied by The Government of Canada.
Imagery provided by Natural Resources Canada
Projection: UTM Zone 17, NAD 83

FIGURE NO. 2.2

Last Modified: December 11, 2008 by ARocha

2.2 Sample Collection

Jacques Whitford professionals collected field samples from June through December 2008 at the various sampling locations. Standard operating procedures (SOPs) were followed (copies of which are on record at Jacques Whitford). Field notes were recorded along with a sample collection field sheet where observations about the local biophysical environment were collected along with the weight of sample, description of sample, equipment used, and weather at the time of sample collection, and when applicable, a plant or fish biologist's comments on the sample collected.

2.3 Sample Preparation

Soil and sediment samples were composited in the field to give a generic soil or sediment sample, respectively, from each individual site as per the SOPs (copies of which are on record at Jacques Whitford). All other sample preparation was done by ALS Laboratory Group (ALS). A description of the preparation required for produce, terrestrial and aquatic samples prior to laboratory analysis is presented in Table 2.3.

Table 2.3 Sample Preparation for Laboratory Analysis

Produce	Sample Preparation
Cucumber	ends off, skin on, seeds rinsed and patted dry, reported on a wet weight basis
Beets	no greens, ends off, peel on, rinsed and patted dry, reported on a wet weight basis
Carrots	ends off, peel on, rinsed and patted dry, reported on a wet weight basis
Peas	kept in pod, rinsed and patted dry, reported on a wet weight basis
Radish	ends off, no greens, rinsed and patted dry, reported on a wet weight basis
Corn	rinsed and patted dry, kernels only, reported on a wet weight basis
Apples	peel on, no seeds, rinsed and patted dry, reported on a wet weight basis
Beans	ends off, rinsed and patted dry, reported on a wet weight basis
Strawberries	no greens, rinsed and patted dry, reported on a wet weight basis
Raspberries	rinsed and patted dry, reported on a wet weight basis
Mulberries	rinsed and patted dry, reported on a wet weight basis
Peppers	no seeds, ends off, rinsed and patted dry, reported on a wet weight basis
Potato	scrubbed with nylon brush, peel on, reported on a wet weight basis
Squash	scrubbed with nylon brush, peel on, reported on a wet weight basis
Agricultural product	as is, homogenized at laboratory, reported on a wet weight basis
Dairy	as is
Eggs	homogenized at laboratory, reported on a wet weight basis
Terrestrial Samples	**Sample Preparation**
Soil	field composite, air dried to room temperature, reported on a dry-weight basis
Forage	field composite, rinsed and patted dry, reported on a wet weight basis
Browse	field composite, rinsed and patted dry, reported on a wet weight basis
Small mammals	as is, homogenized at laboratory, reported on a wet weight basis
Aquatic Samples	**Sample Preparation**
Water	as is
Sediment	field composite, air dried at room temperature, reported on a dry-weight basis
Fish	field composite, homogenized at laboratory, reported on a wet weight basis

Table 2.4 Sampling Program Summary

	Media	Number of Sampling Locations	Number of Samples per Site	Total No.of Samples Taken	Metals Analysis	Chlorinated Monocyclic Aromatics		Chlorinated Polycyclic Aromatics		PAHs	VOCs	General Chemistry	Acetaldehyde	Arsenic	% Lipids
						SVOCs	Chlorophenols	PCBs	Dioxins/ Furans						
Terrestrial	Soil	20	1-2	23	23	11	3	11	13	11	23	0	23	0	0
	Forage	10	1-2	11	11	5	0	5	5	5	5	0	0	0	0
	Browse	10	1-2	11	11	3	0	3	3	3	0	0	0	0	0
	Small Mammals	5	1-4	11	11	3	0	3	3	3	0	0	0	0	11
Freshwater Stream	Surface Water	5	1-2	6	6	6	6	6	4	4	6	6	6	0	0
	Sediment	5	1-2	6	6	4	6	4	4	4	6	0	6	0	0
	Fish	3	2	6	6	6	0	6	6	6	0	0	0	6	6
Produce	Produce - Above Ground Exposed (AGE)	3	1-3	7	7	3	0	3	3	3	4	0	0	0	0
	Produce - Above Ground Protected (AGP)	4	1-3	7	7	3	0	3	3	3	0	0	0	0	0
	Produce - Below Ground (BG)	1	7	7	7	3	0	3	3	3	0	0	0	0	0
	Produce - Fruit	5	1-2	7	7	3	0	3	3	3	3	0	0	0	0
	Crops	4	1-2	5	5	2	0	3	3	3	0	0	0	0	0
	Agricultural Products - Chicken	1	2	2	2	2	0	2	2	2	2	0	0	0	2
	Agricultural Products - Beef	1	2	2	2	2	0	2	2	2	1	0	0	0	2
	Agricultural Products - Pork	1	2	2	2	2	0	2	2	2	1	0	0	0	2
	Agricultural Products - Dairy	1	2	2	2	2	0	2	2	2	2	0	0	0	2
	Agricultural Products - Eggs	2	1-2	3	3	3	0	3	3	3	2	0	0	0	3
Total				**118**	**118**	**63**	**15**	**64**	**64**	**62**	**55**	**6**	**35**	**6**	**28**

2.4 Laboratory Analysis and Data Analysis

All laboratory analyses of the collected samples were conducted by ALS at various facility locations. ALS is accredited by the Canadian Association of Environmental Analytical Laboratories (CAEAL) to the standards of the Standards Council of Canada. Standard methods for the laboratory analyses were used, including those of the USEPA or other reputable organizations. A rigorous QA/QC program was used to ensure the integrity of the results, as summarized in Section 6.0 of this report.

The laboratory results were subjected to rigorous statistical data analysis techniques detailed in the sub-sections that follow.

2.4.1 Statistical Analysis

Laboratory results were used to determine the baseline concentrations of the chemical parameters analyzed in the various media. Data not included in the reporting of the baseline concentrations consisted of quality control samples such as laboratory duplicates. Non-detectable values were carried forward in the statistical analysis at the detection limit (DL) value according to standard practice.

Baseline concentrations were established using statistical evaluation, provided that the chemical was detected in at least one of the samples from that medium. The statistical tests were based on the assumptions of a normal or log-normal distribution (i.e., the log-normal distribution is skewed to the right but has a normal distribution once log-transformed). However, because of the uncertainty associated with estimating the true average concentration for the study area, the following procedure was used to report baseline values:

- If a chemical was not detected in any of the samples, the baseline concentration was presented based on the detection limit (DL).
- If the total number of samples analyzed was less than five, no statistical tests were applied to the collected data.
- If the number of samples equalled or exceeded five then the mean, standard deviation, minimum, maximum, the upper concentration limit of the mean (UCLM, at the 95th percentile) and the 95th percentile of the sample distribution was calculated and presented.

The distribution of chemical data sets as assessed for each medium was evaluated to identify if data conforms to either a normal or a log-normal distribution using the SAS^{TM}statistical software package program. If the p-value of the Shapiro-Wilk normality test was greater than 0.05, then the measure was deemed to be from a normal distribution. If the measures were identified as not normal, then the data were log transformed using the natural log. If the Shapiro-Wilk test still indicated the data to be not normal, then histograms of the un-transformed data were created and visual observation was conducted for identifying the outliers. Where applicable, outliers were removed and the same procedure described above was applied on the new set of data. If the data set continued not to conform to a normal or log-normal distribution, no statistical tests were further applied.

If the means were calculated using the log-transformed data, the resulting UCLM or 95th percentile was back-transformed using the EXP function in Excel for communication purposes.

Tabular summaries of the statistical evaluation are provided in Appendix A.

As indicated above, the baseline values reported in this assessment represent the maximum concentration, UCLM or the 95th percentile of the concentrations of each detected chemical within each media type. These are generally considered as conservative approaches for estimating potential exposures for the purposes of completing human health or ecological risk assessments (Health Canada 2004).

2.4.2 Assessment of Polychlorinated Dioxins and Furans (PCD/PCDF)

Dioxin and furan congeners are rarely encountered individually, and are generally present as mixtures of several congeners (CCME 2002). There are 210 possible congeners of dioxins and furans, each with unique physico-chemical properties. However, only 7 of the 75 PCDD congeners and 10 of the 135 PCDF congeners are thought to have "dioxin-like" toxicity (i.e., elicit their toxicity via binding to the aryl hydrocarbon (*Ah*) receptor) (CCME 2002). In order to compare the toxicity of different samples with different congener profiles, toxic equivalency factors (TEFs) have been developed that standardize "dioxin-like" substances to a toxicologically equivalent (TEQ) amount of 2,3,7,8-TCDD, the most toxic congener (CCME 2002). The TEQ is expressed as:

$$\text{Total TEQ} = \sum_{i=1}^{n} (C_i \times TEF_i)$$

Where:

TEQ = concentration of the mixture of congeners, expressed as a toxic equivalent of 2,3,7,8-TCDD

n = number of congeners with available TEF values (i.e., 17)

C_i = concentration of congener i

TEF_i = toxic equivalency factor for the congener i (unitless)

The statistical analyses and baseline concentration calculations for dioxins and furans were conducted on each of the 17 individual congeners. Toxic equivalency factors (TEFs) developed by the World Health Organization (WHO, 2005) were applied to the reported concentrations (maximum, mean, UCLM and 95th percentile of the 17 congeners to determine the TEQ. Separate TEFs were developed for mammals and fish, as shown in Table 2.5. Note that based on the two TEF schemes, the same original analytical data may be expressed as two slightly different TEQ values, depending upon which receptor class is being evaluated.

Table 2.5 TEFs for Dioxins and Furans (PCDD/PCDF)

Chemical Parameter	Humans/Mammals $TEF_{H/M}$	Fish TEF_F
Chlorinated dibenzo-p-dioxins		
2,3,7,8-TCDD	1.0	1.0
1,2,3,7,8-PeCDD	1.0	1.0
1,2,3,4,7,8-HxCDD	0.1	0.5
1,2,3,6,7,8-HxCDD	0.1	0.01
1,2,3,7,8,9-HxCDD	0.1	0.01
1,2,3,4,6,7,8-HpCDD	0.01	0.001
OCDD	0.0003	<0.0001
Chlorinated dibenzofurans		
2,3,7,8-TCDF	0.1	0.05
1,2,3,7,8-PeCDF	0.03	0.05
2,3,4,7,8-PeCDF	0.3	0.5
1,2,3,4,7,8-HxCDF	0.1	0.1
1,2,3,6,7,8-HxCDF	0.1	0.1
2,3,4,6,7,8-HxCDF	0.1	0.1
1,2,3,7,8,9-HxCDF	0.1	0.1
1,2,3,4,6,7,8-HpCDF	0.01	0.01
1,2,3,4,7,8,9-HpCDF	0.01	0.01
OCDF	0.0003	<0.0001

Notes: TEF = Toxic equivalency factor for humans/mammals ($_{H/M}$) and Fish ($_F$) based on World Health Organization (WHO) (1998 and 2005)

2.4.3 Arsenic Speciation

Trace levels of arsenic occur naturally in air, food and water. Arsenic compounds may also enter the environment through anthropogenic sources such as pesticide manufacturing, smelter and industrial operations, burning fossil fuel or cigarette smoke. However, not all forms of arsenic are associated with serious health concerns. Organic arsenic, which includes arsenobetaine, monomethyl arsenic (MMA), and dimethyl arsenic (DMA), is generally considered less-toxic relative to inorganic arsenic compounds, which include As(III) and As(V). A number of studies have confirmed that arsenic in marine foods primarily occurs as organic arsenic (i.e., arsenic in marine foods is 98 to 99% arsenobetaine) (Devesa *et al.* 2005; Amlund *et al.* 2006). Similar studies completed on freshwater aquatic foods have indicated that organic forms of arsenic represent the majority of the arsenic in these foods as well (Amlund *et al.* 2006; Koch 1999).

As part of the baseline study, fish samples were analyzed for total arsenic, As(III), and As(V) and baseline concentrations were established. It is assumed that the combined concentration of As(III) and As(V) represent the total concentration of inorganic arsenic present in these foods (samples), and that the difference between the total arsenic concentration and the inorganic arsenic concentration represents the concentration of organic arsenic.

During arsenic speciation at the laboratory the arsenic species were ultrasonically extracted from fish tissue into a methanol/water mixture. Separation and detection was achieved by anion chromatography with post-column hydride generation and inductively coupled plasma – sector field mass spectrometry. Hydride generation was used to improve the sensitivity of detection for arsenite and arsenate as these are the toxic species of most interest. Since dimethylarsinate and monomethylarsonate are also separated on the column and form volatile hydrides, these were also analyzed. The bulk of the organic arsenic compounds, i.e. arsenobetaine, arsenocholine, arsenosugars, etc. are not separated by anion chromatography and co-elute in the void volume. They do not form volatile hydrides either and so were not detected using this method.

2.5 Quality Assurance/Quality Control

Quality control for the collection, transport, and analysis of the samples was an important part of the study. As noted in Section 2.2, Project-specific standard operating procedures were established to clearly describe the methods used to collect the samples, field sheets were completed to document the collection, and sample chain of custody forms were completed to ensure the integrity of the sample handling.

To confirm the adequacy of these quality controls and the reproducibility of the results, a number of QA/QC samples were analyzed. These samples included method blanks, matrix spikes, laboratory duplicates, and field duplicates. Descriptions of these QA/QC samples and the purpose for each are provided in Table 2.6. In total, the number of laboratory QA/QC samples was greater than 15% of the total number of samples collected and analyzed.

Table 2.6 QA/QC Description

QA/QC Procedure	Description	Purpose
Method Blanks	High purity water/clean sand or process chemicals that are analyzed in the same way for each sample. It is exposed to glassware, equipment, solvents, reagents, and internal standards that are used during the analysis of other samples.	Determines bias due to the potential presence of impurities in the laboratory environment.
Matrix Spikes	A field sample to which the lab adds a known amount of contaminant. The sample is then prepared and analyzed by the same methodology as other samples. Matrix spike recoveries denote the percentage of the added contaminant that was actually recovered during analysis.	Provides an indication of the recovery expected for field samples and the bias that the contaminant matrix (i.e., soil or water) has on the analysis, and an estimate of the method accuracy.
Laboratory Duplicates	Samples that were taken from one location in the field and split into two portions in the lab. The fact that the two samples are duplicates is known to the lab. The two portions are analyzed separately using identical procedures.	Used to measure precision or reproducibility of data.
Field Duplicates	Samples which were split or divided in the field, depending on the analysis to be conducted. Each sample was then carried through the remaining steps in the measurement process. These split samples were submitted to the same laboratory for analysis.	Used to measure precision of reproducibility of data. Precision (percent difference from the mean) should be ± 50% for PAH; ± 40% for other parameters.

As indicated in Table 2.6, the assessment of laboratory and field duplicates was compared based on the relative percent difference (RPD) between the two. The formula used to determine the RPD from the mean between two samples, the original and the duplicate, is the absolute value of the following:

$$RPD = 100\% \text{ x } \frac{C_{original} - C_{dup}}{\frac{1}{2}(C_{original} + C_{dup})}$$

Where:

RPD = relative percent difference;
$C_{original}$ = concentration in the original sample; and
C_{dup} = concentration in the duplicate.

If a parameter was not detected in one of the duplicates but was detected in the other, the RPD could not be calculated. A summary of the QA/QC results is presented in Section 6.0.

3.0 SUMMARY OF TERRESTRIAL RESULTS

Twenty terrestrial sampling locations were used in this baseline study and are shown in Figure 2.1 and 2.2 (seventeen location were situated within the 1 km radius and three locations [farms] were situated outside the 1 km radius). Various terrestrial media were sampled at each of the locations (Table 2.1). Media collected included: soil, forage, browse, crops, terrestrial invertebrates and small mammals. Descriptions of the terrestrial sampling locations and the media obtained for analysis (*e.g.*, forage, small mammals, *etc*.) are provided in Section 3.1.

A permit to collect small mammals for scientific purposes was obtained from the Ontario Ministry of Natural Resources (MNR) before traps were set. There were five types of small mammals collected at the sites including, northern short-tailed shrews (*Blarina brevicauda*), common (masked) shrews (*Sorex cinereus*), white-footed mice (*Peromyscus leucopus)*, deer mice (*Peromyscus maniculata)*, and meadow voles (*Microtus pennsylvanicus)*. Small mammals were submitted to the laboratory with each small mammal considered as a separate sample.

Terrestrial invertebrates were collected, however the weight of the samples was limited and chemical analysis could not be performed.

Copies of the laboratory certificates are on record at Jacques Whitford while tabular summaries of the analytical results and the statistical calculations are provided in Appendix A. The recommended baseline concentrations of selected chemicals in each of these media are provided in the following sections.

3.1 Description of Terrestrial Sampling Locations

A brief description of each terrestrial sampling location situated within the 1 km radius is provided below.

3.1.1 Terrestrial Sampling Locations

<u>Terrestrial Site N1</u> was located within the proposed facility development area in a maintained grassy field south of a car auction centre property on the west side of Osbourne Road. Forage species collected included 5% red clover (*Trifolium rubra*), 1% black medic (*Medicago lupulina*), <1% dandelion (*Taraxacum officinale*), <1% vetch species (*Vicia* sp.), <1% field horsetail (*Equisetum arvense*), 31% Kentucky bluegrass (*Poa pratensis*) and 63% smooth brome (*Bromus inermis*).

Terrestrial Site N1

<u>Terrestrial Site N2</u> was located along Osbourne Road just north of site N1. Soil and corn were collected approximately 20 m into the corn crop on the west side of the road. The corn crop did not show any visual signs of phytotoxicity.

Terrestrial Site N2

<u>Terrestrial Site N3</u> was situated near a ravine along Baseline Road about 300 m east of the intersection of Courtice Road and Baseline Road. The soil, browse and small mammal sampling was completed at the edge of south side of the ravine approximately 20 meters from the west edge of the Clarington Region property. White-footed mice (*Peromyscus leucopus)* and a deer mouse (*Peromyscus maniculata)* were captured at N3. Three white-footed mice (*Peromyscus leucopus)* were submitted to the laboratory. Browse collected from the site included 40% sugar maple (*Acer saccharanum*), 10% European buckthorn (*Rhamnus cathartica*) and 50% choke cherry (*Prunus virginiana*).

Terrestrial Site N3

<u>Terrestrial Site N4</u> was near a ravine approximately 100 m west of the intersection of Courtice Road and Baseline Road. The soil, forage and browse sampled at this location were taken from the northern edge of the ravine. Forage species collected included 3% European gromwell (*Lithospermym officinale*), 3% bedstraw species (*Galium* sp.), 10% fescue species (*Festuca* sp.), 5% orchard grass (*Dactylis glomerata*), 65 % smooth brome (*Bromus inermis*), 1% heath aster (*Symphyotrichum ericoides*), 10% Canada thistle and 3% other grass species. Browse species collected included 6.5% cherry species (*Prunus* sp.), 6.5% European buckthorn (*Rhamnus cathartica*), 6.5% red-osier dogwood (*Carnus stolonifera*), 35% riverbank grape (*Vitis riparia*), 45% sugar maple (*Acer saccharanum*) and <1% tartarian honeysuckle (*Lonicera tartarica*).

Terrestrial Site N4

<u>Terrestrial Site E1</u> was located south of N1 at the entrance to the municipal wastewater treatment plant on Osbourne Road. Soil and crops were collected approximately 20 m west of the western edge of the corn field across the street from the entrance to the waste water treatment plant. The corn crop appeared healthy and was reaching maturity with some green leaves still present. The browse was collected on the north side of the entrance to the waste water treatment plant approximately 10 m from Osbourne Road. Species of browse collected included 10% staghorn sumac (*Rhus typhina)* 35% choke cherry (*Prunus virginiana*), 25% red osier dogwood (*C* (*Vitis* sp.) and 5% red raspberry (*Rubus idaeus*).

Terrestrial Site E1


Terrestrial Site E2

Terrestrial Site E2 was located approximately 50 m from the edge of South Service road along the eastern edge of the corn field near a large tree. Corn and soil were collected approximately 20 m east into the corn field. The corn crop appeared healthy and was reaching maturity with some green leaves still present. Forage and browse were collected from the edge of the corn crop. Small mammal and terrestrial invertebrate traps were set up at this location; however no small mammals were captured. Forage species included 65% smooth brome (*Bromus inermis*), 25% reed canary grass (*Phalaris arundinacea*), 3% riverbank grape (*Vitis riparia*), 3% panicled aster (*Symophyotrichum lanceolatum*), 4% Canada thistle (*Cirsium arvense*) and <1% dandelion (*Taraxacum officinale*). Browse species included 63% American basswood (*Tilia americana*), 31% European mountain ash (*Sorbus aucuparia*), 2% black cherry (*Prunus serotina*), 2% red raspberry (*Rubus idaeus*) and 2% goldenrod species (*Solidago* sp.).


Terrestrial Site E3

Terrestrial Site E3 was located near the western edge of the parking lot at a soccer field along Solina Road. The browse and soil sampling location was just northeast of the small pond at the south side of the parking lot. Browse species collected included: 30% European mountain ash (*Sorbus aucuparia*), 20% white ash *(Fraxinus americana)*, 20% red osier dogwood (*Carnus stolonifera*), 20% willow (*Salix* sp.) and 10% choke cherry (*Prunus virginiana*).


Terrestrial Site E4

Terrestrial Site E4 was located near the Ontario Power Generating (OPG) facility fence line at the eastern edge of the most northern soccer field along Solina Road. The soil sample was collected approximately parallel to midfield of the soccer field.


Terrestrial Site E5

Terrestrial Site E5 was located at the edge of the corn field approximately 400 m from the E2 sampling location. Corn was collected approximately 20 m from the edge of the corn field. Soil, forage and browse were collected from the edge of the field. Forage species collected included 100% smooth brome (*Bromus inermis*). Browse species collected included <1% hawthorn species (*Crataegus* sp.), <1% bittersweet nightshade (*Solanum dulcamara*), 35% red raspberry (*Rubus idaeus*) and 65% poplar species (*Populus* sp.).

Terrestrial Site E6 was located south of the soccer fields on Solina Road just inside the entrance to the OPG Waterfront Trail. Soil and forage were collected from the south side of the trail. Forage species collected included 25% tall goldenrod (*Solidago altissima*), 25% reed canary grass (*Phalaris arundinacea*), 20% purple leaved willow herb (*Epilobium coloratum*), 20% Queen Anne's lace (*Daucus carota*), 8% heath aster (*Symphyotrichum ericoides*) and 2% wormseed mustard (*Erysimum cheiranthoides* L).

Terrestrial Site E6

Terrestrial Site S1 was located on the southern property line of the proposed facility site. The site is approximately 155 m northwest of the intersection of the railway tracks and the driveway entrance to the municipal wastewater treatment plant. The site was overgrown with long grass and a small tree stand was located to the west. Soil was collected at this location and small mammals and terrestrial invertebrate traps were set. At this location a northern short-tailed shrew (*Blarina brevicauda*) and a masked shrew (*Sorex cinereus*) were captured. Only the northern short-tailed shrew (*Blarina brevicauda*) was analyzed as the masked shrew (*Sorex cinereus*) was not large enough.

Terrestrial Site S1

Terrestrial Site S3 was located within the municipal waste water treatment plant property. The site was on the east side of the plant in a grassy meadow. Soil and forage were collected at this location. Forage species collected included 20% Burdock (*Arctium* sp.), 5% white clover (*Trifolium repens*), 10% Queen Anne's lace (*Daucus carota*), 30% Prickly lettuce (*Lactuca serriola*), 15% green foxtail (*Setaria viridis*) and 20% red fescue (*Festuca rubra*). Small mammal and terrestrial invertebrate traps were set up at this location. Three meadow voles (*Microtus pennsylvanicus)* and a northern short-tailed shrew (*Blarina brevicauda*) were captured at this location and sent to the laboratory for analyses.

Terrestrial Site S3

Terrestrial Site S7 was located at the end of Courtice Road next to Lake Ontario. Soil, forage and browse were collected just across Tooley Creek in a small tree stand at the edge of a cow pasture. Forage species collected at this location included 13% tall goldenrod (*Solidago altissima*), 13% panicled aster (*Symphyotrichum lanceolatum*), 5% red raspberry (*Rubus idaeus*), 2% Canada anemone (*Anemone canadensis*), 33% brome grass (*Bromus inermis*) and 33% reed canary grass (*Phalaris arundinacea*). Browse

Terrestrial Site S7

species collected at this location included 8% red-osier dogwood (*Cornus stolonifera*), 15% willow species (*Salix* sp.), 70% red raspberry (*Rubus idaeus*) and 7% tartarian honeysuckle (*Lonicera tartarica*). Small mammal and terrestrial invertebrate traps were set at this location and one meadow vole (*Microtus pennsylvanicus)* was captured and sent to the laboratory for analyses.

Terrestrial Site W1 was located within the municipal waste water treatment plant property south of the settling ponds. Soil was sampled approximately 20 m from the edge of a 'turn around' area on the road in a grassy field near a drainage ditch.

Terrestrial Site W1

Terrestrial Site W2 was located within the municipal waste water treatment plant property north of the facility near the CN rail fence. The site was approximately 350 m northwest of the driveway entrance to the plant on the south side of the railway tracks. Soil, forage and browse were collected at this location in and around a small tree stand. Forage species collected included 10% red clover (*Trifolium pretense*), 5% Queen Anne's lace (*Daucus carota*), 5% curly dock (*Rumex crispus)*, 10% vetch species (*Vicia* sp.), 15% sweet white clover (*Melilotus alba*), 15% tall goldenrod (*Solidago altissima*), 15% heath aster (*Symphyotrichum ericoides*), 10% chicory, 7.5% fescue species (*Festuca* sp.) and 7.5% smooth brome (*Bromus inermis*). Browse species collected included 50% sugar maple (*Acer saccharum*), 30% Manitoba maple (*Acer negundo*), 15% pincherry (*Prunus pensylvanica*) and 5% common buckthorn (*Rhamnus cathartica*). Small mammal and terrestrial invertebrate traps were set at this location; however no small mammals were captured.

Terrestrial Site W2

Terrestrial Site W3 was located approximately 375 m upstream (Tooley Creek) from S7. The location of soil, forage, browse, small mammal and terrestrial invertebrate sampling was next to Tooley Creek in a small stand of willow trees. The site showed evidence of frequent visits by neighbouring cattle. Forage species collected included 10% European gromwell (*Lithospermum officinale*), 50% fescue species (*Festuca* sp.), 15% tall goldenrod (*Solidago altissima*), 10% smooth brome (*Bromus inermis*), 15% New England aster (*Symphyotrichum novae-angliae*), <1% wild carrot (*Daucus carota*), <1% vetch species (*Vicia* sp.) and <1% sowthistle species (*Sonchus* sp.). Browse species collected included 100% willow species (*Salix* sp.). Three meadow voles (*Microtus pennsylvanicus)* and a masked

Terrestrial Site W3

shrew (*Sorex cinereus*) were captured at this location, however only two meadow voles (*Microtus pennsylvanicus)* were large enough for laboratory analyses.

<u>Terrestrial Site W4</u> was located where Tooley Creek exits from under the south side of Hwy 401. The area is characterized by a canopy of large trees. Soil, forage and browse were collected from the edge of the creek approximately 15 m from Darlington Park Road. Forage species collected included 25% coltsfoot (*Tussilago farfara*), 5% horsetail (*Equisetum* sp.), 10% large-leaved avens (*Geum macrophyllum*), 10% creeping Charlie (*Glechoma headracea)*, 10% dog strangling vine (*Vincetoxicum nigrum*), 30% tall goldenrod (*Solidago altissima*) and 10% jewelweed (*Impatiens* sp.). Browse species collected included 70% Manitoba maple (*Acer negundo*), 20% ash species (*Fraxinus* sp.) and 10% willow species (*Salix* sp.).

Terrestrial Site W4

3.2 Soil Results

One soil sample (plus a duplicate at three locations) was collected from each of the 17 terrestrial locations in addition to three soil samples taken from farms where produce was sampled. All 23 soil samples (including 17 samples within the 1 km area, 3 samples from farms and 3 duplicates) were analyzed for metals, volatile organic compounds (VOCs), ammonia, formaldehyde and acetaldehyde. Eleven samples (including a duplicate) were also analyzed for semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs). Also 13 samples were analyzed for PCDD/PCDFs and three for chlorophenols.

3.2.1 Trace Metals in Soil

Table 3.1 provides a summary of the baseline trace metal COPC soil concentrations and also provides the MOE O.Reg. 153/04 Table 1 Standards (considered to be provincial soil background, or ‘natural’ concentration for comparison). Several trace metals from the list of COPCs such as antimony, cadmium, molybdenum, selenium, silver and uranium were not detected in any of the soil samples (Table 3.1). All other trace metals were detected in at least five of the 23 soil samples. The soil sample from E2 generally had higher metal concentrations than the other soil samples, with concentrations of barium, chromium, and zinc over a few times higher than concentrations in the other soil samples. Results indicate that there were no soil metal COPCs concentrations above the Table 1 Standards.

Table 3.1 Baseline Concentrations for Metals in Soil

Parameter	MOE O. Reg. 153/04 Table 1 (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Aluminum (Al)	-	23	23	1830	18600	11668	13082	18500
Antimony (Sb)	1	23	0	1	1 [a]	-	-	-
Arsenic (As)	14	23	21	1	8	- [c]	- [c]	- [c]
Barium (Ba)	190	23	23	15	171	83	89	168
Beryllium (Be)	1.2	23	7	0.5	1	- [d]	- [d]	- [d]
Bismuth (Bi)	-	23	5	1	2	- [d]	- [d]	- [d]
Boron (B)	-	23	23	9	19	12	13	16
Cadmium (Cd)	1	23	0	0.5	0.5 [a]	-	-	-
Calcium (Ca)	-	23	23	5390	109000	23624 [b]	40135 [b]	106938 [b]
Chromium (Cr)	67	23	23	4	44	20	22	44
Cobalt (Co)	19	23	23	3	10	6	7	9
Copper (Cu)	56	23	23	6	28	11 [b]	13 [b]	24 [b]
Iron (Fe)	-	23	23	5810	22800	14730	15931	22700
Lead (Pb)	55	23	23	4	33	15	17	32
Magnesium (Mg)	-	23	23	1210	6200	4277	4748	6080
Manganese (Mn)	-	23	23	138	487	340	364	452
Mercury (Hg)	0.16	23	6	0.05	0.07	- [c]	- [c]	- [c]
Molybdenum (Mo)	2.5	23	0	1	1 [a]	-	-	-
Nickel (Ni)	43	23	23	4	20	11	12	19
Phosphorus (P)	-	23	23	440	1240	693 [e]	753 [e]	910 [e]
Potassium (K)	-	23	23	370	2420	1140	1316	2100
Selenium (Se)	1.4	23	0	1	1 [a]	-	-	-
Silver (Ag)	0.35	23	0	0.2	0.2 [a]	-	-	-
Sodium (Na)	-	23	23	220	670	352 [e]	386 [e]	500 [e]
Strontium (Sr)	-	23	23	13	150	43 [b]	65 [b]	150 [b]
Thallium (Tl)	2.5	23	0	1	1 [a]	-	-	-
Tin (Sn)	-	23	23	3	10	- [c]	- [c]	- [c]
Titanium (Ti)	-	23	23	220	776	546	599	776
Uranium (U)	-	23	0	1	1 [a]	-	-	-
Vanadium (V)	91	23	23	7	39	25	28	38
Zinc (Zn)	150	23	23	28	151	63 [b]	79 [b]	119 [b]
Zirconium (Zr)	-	23	23	2	8	6	6	8

Notes:
a - Maximum value is the detection limit
b - Lognormally distributed data
c - Data distribution was not normal or lognormal
d - Statistical analysis cannot be performed due to insufficient number of unique data points
e - Outlier(s) removed

3.2.2 Chlorinated Monocyclic Aromatics in Soil

SVOCs were not detected in any of the soil samples (Table 3.2). There are no Table 1 Standards in MOE O.Reg. 153/04 for SVOC.

Table 3.2 Baseline Concentrations for SVOCs in Soil

Parameter	MOE O. Reg. 153/04 Table 1 (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	-	11	0	0.01	0.01
Hexachlorobutadiene	-	11	0	0.01	0.01
Pentachlorobenzene	-	11	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	-	11	0	0.01	0.01

3.2.3 Chlorophenols in Soil

Four different phenol compounds were analyzed by the laboratory. Concentrations of pentachlorophenol, 2,4-dichlorophenol, 2,4,6-trichlorophenol and 2,3,4,6-tetrachlorophenol were below the detection limits for all of the soil samples (Table 3.3). Results indicate that there were no soil chlorophenols concentrations above the Table 1 Standards.

Table 3.3 Baseline Concentrations for Chlorophenols in Soil

Parameter	MOE O. Reg. 153/04 Table 1 (ng/g)	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
2,4-Dichlorophenol	100	23	0	0.5	1.2
2,4,6-Trichlorophenol	100	23	0	0.5	1.2
2,3,4,6-Tetrachlorophenol	-	23	0	0.5	1.2
Pentachlorophenol	100	23	0	0.5	1.2

3.2.4 Chlorinated Polycyclic Aromatics in Soil

3.2.4.1 Polychlorinated Biphenyls (PCBs)

PCBs were not detected in any of the eleven soil samples (Table 3.4). The total PCBs were below the Table 1 Standards of the MOE O.Reg. 153/04.

Table 3.4 Baseline Concentrations for PCBs in Soil

Parameter	MOE O. Reg. 153/04 Table 1 (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	-	11	0	0.01	0.05
Aroclor 1248	-	11	0	0.01	0.05
Aroclor 1254	-	11	0	0.01	0.05
Aroclor 1260	-	11	0	0.01	0.05
Total PCBs	0.3	11	0	0.01	0.05

3.2.4.2 Polychlorinated Dioxins and Furans

Thirteen soil samples were collected in the sampling area described in Section 2.1 for dioxin and furan anaylsis. Each of the PCDD/PCDF congeners was detected in at least one sample of the 13 soil samples analyzed (Table 3.5). The baseline soil concentrations (maximum, mean, UCLM, 95th percentile) were used to determine the TEQ of PCDD/PCDF for mammals (including humans). Additional details regarding the methodology used are provided in Section 2.4.2.

Results indicate that, with the exception of the PCDD/PCDF congeners concentrations (and the corresponding calculated TEQ) for the sample collected at E1 site, there were no soil PCDD/PCDF congeners concentrations (and the corresponding calculated TEQ) above the Table 1 Standards.

Given that E1site sampling location is a field where intensive agriculture (cash crop rotation) has been practiced over the last few years, it is possible that the level of PCDD/PCDF measured in the soil to be a consequence of earlier pesticide applications. In addition, background concentrations of PCDD/F can vary considerably and the measured concentration of 9.5 pg/g PCDD/F TEQ could still be representative of background conditions. In addition, the measured concentration at location E1 was well below the contaminated sites standard in Ontario for agricultural landuse.

Table 3.5 Baseline Concentrations for PCDD/PCDF in Soil

Parameter	MOE O. Reg. 153/04 Table 1 (pg/g)	No. Analyzed	No. Detected	Min (pg/g)	Max (pg/g)	Mean (pg/g)	95% UCLM (pg/g)	95th % (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}	$TEF_{H/M}$ X C_{mean}	$TEF_{H/M}$ X C_{UCLM}	$TEF_{H/M}$ X $C_{Percentile}$
2,3,7,8-TCDD	-	13	4	0.027	1.58	0.15 [a]	0.225 [a]	0.38 [a]	1.0	1.58	0.15	0.23	0.38
1,2,3,7,8-PeCDD	-	13	5	0.045	4.22	0.185 [b]	0.373 [b]	1.20 [b]	1.0	4.22	0.185	0.373	1.200
1,2,3,4,7,8-HxCDD	-	13	9	0.026	1.22	0.473	0.615	1.22	0.1	0.122	0.0473	0.0615	0.122
1,2,3,6,7,8-HxCDD	-	13	8	0.058	10.4	0.899 [a]	1.54 [a]	2.69 [a]	0.1	1.04	0.0899	0.154	0.269
1,2,3,7,8,9-HxCDD	-	13	11	0.0896	8.1	0.6047 [b]	1.28 [b]	2.88 [b]	0.1	0.81	0.0605	0.1281	0.2881
1,2,3,4,6,7,8-HpCDD	-	13	13	1.05	36.9	17.1	22.15	36.9	0.01	0.37	0.17	0.22	0.37
OCDD	-	13	13	8.73	206	90.06	114.14	206	0.0001	0.06	0.03	0.03	0.06
2,3,7,8-TCDF	-	13	11	0.083	1.7	0.716	0.906	1.7	0.1	0.17	0.072	0.091	0.17
1,2,3,7,8-PeCDF	-	13	9	0.053	1.35	0.578	0.717	1.35	0.03	0.041	0.017	0.022	0.041
2,3,4,7,8-PeCDF	-	13	8	0.04	1.19	0.438	0.547	1.19	0.3	0.357	0.1314	0.1641	0.357
1,2,3,4,7,8-HxCDF	-	13	5	0.082	1.59	0.828	1.216	1.59	0.1	0.159	0.0828	0.1216	0.159
1,2,3,6,7,8-HxCDF	-	13	9	0.0576	1.42	0.572	0.772	1.42	0.1	0.142	0.0572	0.0772	0.142
2,3,4,6,7,8-HxCDF	-	13	5	0.0583	1.51	0.547	0.702	1.51	0.1	0.151	0.0547	0.0702	0.151
1,2,3,7,8,9-HxCDF	-	13	1	0.023	0.062 [c]	0.111 [a]	0.169 [a]	0.31 [a]	0.1	0.006	0.011	0.017	0.031
1,2,3,4,6,7,8-HpCDF	-	13	11	0.33	19.2	6.32	7.43	19.2	0.01	0.192	0.0632	0.0743	0.192
1,2,3,4,7,8,9-HpCDF	-	13	6	0.039	1.03	0.416	0.529	1.03	0.01	0.010	0.004	0.005	0.010
OCDF	-	13	12	0.93	90.2	8.64 [a]	14.35 [a]	24.9 [a]	0.0001	0.027	0.003	0.004	0.007
TEQ	7	-	-	-	-	-	-	-	-	**9.5**	**1.2**	**1.8**	**3.9**

Notes:

a - Outlier(s) removed

b - Lognormally distributed data

c - Maximum value is a detected concentration, but is below a detection limit

TEF = Toxic equivalency factor for humans/mammals based on WHO (2005)

C_{Max} = Maximum concentration

3.2.5 Polycyclic Aromatic Hydrocarbons in Soil

PAHs were generally not detected in more than one sample (Table 3.6). Results indicate that there were no soil PAHs concentrations above the Table 1 Standards.

Table 3.6 Baseline Concentrations for PAHs in Soil

Parameter	MOE O. Reg. 153/04 Table 1 (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Naphthalene	0.05	11	0	0.01	0.05 [a]	-	-	-
1-Methylnaphthalene	0.05	11	0	0.01	0.05 [a]	-	-	-
2-Methylnaphthalene	0.05	11	0	0.01	0.05 [a]	-	-	-
Acenaphthylene	0.08	11	0	0.01	0.05 [a]	-	-	-
Acenaphthene	0.05	11	0	0.01	0.05 [a]	-	-	-
Fluorene	0.05	11	0	0.01	0.05 [a]	-	-	-
Phenanthrene	0.19	11	1	0.01	0.01	- [b]	- [b]	- [b]
Anthracene	0.05	11	0	0.01	0.05 [a]	-	-	-
Fluoranthene	0.24	11	1	0.02	0.05 [c]	- [b]	- [b]	- [b]
Pyrene	0.19	11	1	0.02	0.05 [c]	- [b]	- [b]	- [b]
Benzo(a)anthracene	0.1	11	1	0.01	0.05 [c]	- [b]	- [b]	- [b]
Chrysene	0.18	11	1	0.02	0.05 [c]	- [b]	- [b]	- [b]
Benzo(b)fluoranthene	0.3	11	1	0.01	0.05 [c]	- [b]	- [b]	- [b]
Benzo(k)fluoranthene	0.05	11	1	0.01	0.05 [c]	- [b]	- [b]	- [b]
Benzo(a)pyrene	0.1	11	1	0.01	0.02 [c]	- [b]	- [b]	- [b]
Perylene	-	11	0	0.01	0.01 [a]	-	-	-
Indeno(1,2,3-cd)pyrene	0.11	11	1	0.01	0.05 [c]	- [b]	- [b]	- [b]
Dibenzo(ah)anthracene	0.15	11	0	0.01	0.05 [a]	-	-	-
Benzo(g,h,i)perylene	0.2	11	1	0.01	0.05 [c]	- [b]	- [b]	- [b]

Notes:

a - Maximum value is the detection limit

b - Statistical analysis cannot be performed due to insufficient number of unique data points

c - Maximum value is a detected concentration, but is below a detection limit

3.2.6 Volatile Organic Compounds in Soil

Concentrations of VOCs were below the detection limits in each of the soil samples (Table 3.7). Of note several VOCs had analytical detection limits greater than Table 1 Standards.

Table 3.7 Baseline Concentrations for VOCs in Soil

Parameter	MOE O. Reg. 153/04 Table 1 (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
1,1,1,2-Tetrachloroethane	-	23	0	0.008	0.008
1,1,2,2-Tetrachloroethane	0.004	23	0	0.003	0.008
1,1,1-Trichloroethane	0.008	23	0	0.003	0.008
1,1,2-Trichloroethane	0.002	23	0	0.010	0.010
1,1-Dichloroethane	0.002	23	0	0.005	0.005
1,1-Dichloroethylene	0.002	23	0	0.002	0.002
1,1-Dichloropropene	-	20	0	0.010	0.010
1,2-Dibromoethane	-	23	0	0.002	0.005
1,2-Dichlorobenzene	0.002	23	0	0.020	0.020
1,2-Dichloroethane	0.002	23	0	0.002	0.002
1,2-Dichloropropane	0.002	23	0	0.001	0.001
1,3-Dichloropropane	-	20	0	0.02	0.02
1,3-Dichlorobenzene	0.002	23	0	0.02	0.02
1,4-Dichlorobenzene	0.002	23	0	0.02	0.02
2,2-Dichloropropane	-	20	0	0.1	0.1
2-Hexanone	-	22	0	0.2	0.2
Isopropylbenzene	-	20	0	0.1	0.1
Isopropyltoluene	-	20	0	0.1	0.1
Acrolein		20	0	0.5	0.5
Benzene	0.002	23	0	0.02	0.02
Bromobenzene	-	20	0	0.1	0.1
Bromochloromethane	-	20	0	0.1	0.1
Bromodichloromethane	-	23	0	0.001	0.005
Bromoform	0.002	23	0	0.02	0.02
Bromomethane	0.003	23	0	0.01	0.01
n-Butylbenzene	-	20	0	0.1	0.1
sec-Butylbenzene	-	20	0	0.1	0.1
tert-Butylbenzene	-	20	0	0.1	0.1
Carbon Disulfide	-	22	0	0.02	0.02
Carbon tetrachloride	0.002	23	0	0.01	0.01
Chlorobenzene	0.002	23	0	0.02	0.02
Chloroethane	-	22	0	0.02	0.02
Chloroform	0.006	23	0	0.01	0.01
Chloromethane	-	22	0	0.02	0.02
2-Chlorotoluene	-	20	0	0.1	0.1

Parameter	MOE O. Reg. 153/04 Table 1 (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
4-Chlorotoluene	-	20	0	0.1	0.1
1,2-Dibromo-3-chloropropane	-	20	0	0.1	0.1
Dibromomethane	0.004	20	0	0.01	0.01
cis-1,2-Dichloroethylene	-	23	0	0.02	0.02
cis-1,3-Dichloropropene	0.003	23	0	0.002	0.002
Dibromochloromethane	0.003	23	0	0.001	0.001
Dichlorodifluoromethane	-	23	0	0.03	0.03
Dichloromethane	-	23	2	0.1	0.2 [a]
1,2-Dichlorotetrafluoroethane		20	0	0.05	0.05
Ethyl Benzene	0.002	23	0	0.02	0.02
MTBE	-	23	0	0.2	0.2
m+p-Xylenes	-	23	0	0.04	0.04
Methyl Ethyl Ketone	-	23	0	0.2	0.2
Methyl Isobutyl Ketone	-	23	0	0.2	0.2
o-Xylene	-	23	0	0.02	0.02
Styrene	0.002	23	0	0.02	0.02
Tetrachloroethylene	0.002	23	0	0.02	0.02
Toluene	0.002	23	0	0.05	0.05
1,1,2-Trichloro-1,2,2-trifluoroethane	-	20	0	0.05	0.05
trans-1,2-Dichloroethylene	0.003	23	0	0.06	0.06
trans-1,3-Dichloropropene	0.003	23	0	0.002	0.002
Trichloroethylene	0.004	23	0	0.05	0.05
Trichlorofluoromethane	-	23	0	0.02	0.02
Trihalomethanes (total)	-	22	0	0.02	0.03
Vinyl chloride	0.003	23	0	0.003	0.003
Xylenes (Total)	0.002	22	0	0.04	0.06
Hexachlorobutadiene	-	20	0	0.1	0.1
Naphthalene	-	20	0	0.1	0.1
n-Propylbenzene	-	20	0	0.1	0.1
1,2,3-Trichlorobenzene	-	20	0	0.1	0.1
1,2,4-Trichlorobenzene	-	20	0	0.1	0.1
1,2,4-Trimethylbenzene	-	20	0	0.1	0.1
1,3,5-Trimethylbenzene	-	20	0	0.1	0.1
1,2,3-Trichloropropane	-	20	0	0.1	0.1

Notes:

a - Maximum value is a detected concentration

3.2.7 Formaldehyde and Acetaldehyde in Soil

Formaldehyde and acetaldehyde were detected in all soil samples (Table 3.8). No data is available in Table 1 Standards for formaldehyde and acetaldehyde.

Table 3.8 Baseline Concentrations for Aldehydes in Soil

Parameter	MOE O. Reg. 153/04 Table 1 (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Ammonia as N	-	23	23	24	302	146	180	300
Acetaldehyde	-	23	23	0.22	1	0.45 [a]	0.55 [a]	0.90 [a]
Formaldehyde	-	23	23	0.77	4.6	1.68 [b]	0.60 [b]	2.4 [b]

Notes:

a - Lognormally distributed data

b - Outlier(s) removed

3.2.8 Soil Baseline Findings

All COPCs soil baseline concentrations were compared to the Table 1 Standards of the MOE O.Reg. 153/04 (where data was available):

- All metals baseline concentrations measured were below the guideline reference values.
- In the case of dioxins and furans (and the corresponding TEQ), the baseline soil concentrations were below Table 1 Standards with the exception of the sample collected at site E1.
- SVOCs, chlorophenols, PAHs, PCBs and the majority of VOCs were below their respective detection limits in the soil samples. Of note, some of the VOCs had analytical detection limits greater than Table 1 Standards.

3.3 Forage

Eleven samples were collected (including a duplicate) from ten locations. All samples were analyzed for metals. Some of the COPCs such as SVOCs, PCBs, PCDD/PCDF, PAHs, and VOCs do not commonly accumulate in vegetation. Nevertheless, five forage samples were selected for analysis of the above listed chemicals. Comparison to provincial or federal guidelines was not possible as these values were not available.

3.3.1 Trace Metals in Forage

Table 3.9 provides a summary of the baseline concentration of trace metals forage concentrations. No provincial or federal standards are available for comparison. Several trace metals from the list of COPCs, such as beryllium, boron and silver were less than the detection limits in all eleven forage samples (Table 3.9). All other trace metals were detected in one or more of the samples.

Table 3.9 Baseline Concentrations for Metals in Forage

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Aluminum (Al)-Total	11	11	9.7	100	25.3 [d]	34.8 [d]	42.3 [d]
Antimony (Sb)-Total	11	6	0.01	1	0.019 [d]	0.025 [d]	0.034 [d]
Arsenic (As)-Total	11	7	0.01	0.029	0.019	0.024	0.029
Barium (Ba)-Total	11	11	1.73	16	8.05	11.51	16
Beryllium (Be)-Total	11	0	0.1	0.2 [a]	-	-	-
Bismuth (Bi)-Total	11	0	0.03	0.06 [a]	-	-	-
Boron (B)-Total	11	8	2	16	8.83	11.39	16
Cadmium (Cd)-Total	11	10	0.005	0.295	0.028 [d]	0.039 [d]	0.056 [d]
Calcium (Ca)-Total	11	11	1400	11400	5129	7178	11400
Chromium (Cr)-Total	11	10	0.1	0.91	0.37	0.53	0.91
Cobalt (Co)-Total	11	4	0.02	0.095	- [c]	- [c]	- [c]
Copper (Cu)-Total	11	11	1.26	6.79	3.19	4.47	6.79
Iron (Fe)-Total	11	11	18	135	65	92	135
Lead (Pb)-Total	11	11	0.047	0.298	0.153	0.209	0.298
Lithium (Li)-Total	11	1	0.1	0.13	- [b]	- [b]	- [b]
Magnesium (Mg)-Total	11	11	211	1360	595	838	1360
Manganese (Mn)-Total	11	11	7.1	28.7	16.0	20.9	28.7
Mercury (Hg)-Total	11	11	0.0047	0.0109	0.0073	0.0087	0.0109
Molybdenum (Mo)-Total	11	11	0.111	1.34	0.272 [d]	0.391 [d]	0.557 [d]
Nickel (Ni)-Total	11	4	0.1	0.6	- [c]	- [c]	- [c]
Phosphorus (P)-Total	11	11	443	1830	868	1216	1830
Potassium (K)-Total	11	11	2090	11000	5817	7786	11000
Selenium (Se)-Total	11	7	0.04	0.13	0.065	0.085	0.13
Silver (Ag)-Total	11	0	0.01	0.02 [a]	-	-	-
Sodium (Na)-Total	11	3	20	128	- [c]	- [c]	- [c]
Strontium (Sr)-Total	11	11	2.98	20.6	9.4	13.2	20.6
Thallium (Tl)-Total	11	0	0.01	0.02 [a]	-	-	-
Tin (Sn)-Total	11	1	0.05	0.18	- [c]	- [c]	- [c]
Titanium (Ti)-Total	11	11	0.34	6.56	1.35 [d]	1.92[d]	2.35 [d]

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Uranium (U)-Total	11	3	0.002	0.0055	- [c]	- [c]	- [c]
Vanadium (V)-Total	11	2	0.1	0.29	- [c]	- [c]	- [c]
Zinc (Zn)-Total	11	11	4.52	30.3	14.13	19.96	30.3

Notes:

a - Maximum value is the detection limit

b - Statistical analysis cannot be performed due to insufficient number of unique data points

c - Data distribution was not normal or lognormal

d - Outlier(s) removed

3.3.2 Chlorinated Monocyclic Aromatics in Forage

SVOCs were not detected in any of the forage samples (Table 3.10).

Table 3.10 Baseline Concentrations for SVOCs in Forage

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	5	0	0.01	0.01
Hexachlorobutadiene	5	0	0.01	0.01
Pentachlorobenzene	5	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	5	0	0.01	0.01

3.3.3 Chlorinated Polycyclic Aromatics in Forage

3.3.3.1 Polychlorinated Biphenyls (PCBs) in Forage

PCBs were not detected in any of the five forage samples (Table 3.11).

Table 3.11 Baseline Concentrations for PCBs in Forage

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	5	0	0.01	0.01
Aroclor 1248	5	0	0.01	0.01
Aroclor 1254	5	0	0.01	0.01
Aroclor 1260	5	0	0.01	0.01
Total PCBs	5	0	0.01	0.01

3.3.3.2 Polychlorinated Dioxins and Furans in Forage

Several of the PCDD/PCDF congeners were detected in several of the five forage samples submitted for analysis (Table 3.12). The measured baseline forage concentrations were used to determine the TEQ of PCDD/PCDF for mammals (Table 3.12). Additional details regarding the methodology used are provided in Section 2.4.2.

Table 3.12 Baseline Concentrations for PCDD/PCDF in Forage

Parameter	No. Analyzed	No. Detected	Min (pg/g)	Max (pg/g)	Mean (pg/g)	95% UCLM (pg/g)	95th Percentile (pg/g)	TEF$_M$	TEF$_M$ X C$_{Max}$	TEF$_M$ X C$_{Mean}$	TEF$_M$ X C$_{UCLM}$	TEF$_M$ X C$_{95\%}$
2,3,7,8-TCDD	5	0	0.047	0.17 [a]	-	-	-	1.0	0.17	-	-	-
1,2,3,7,8-PeCDD	5	1	0.039	0.0701	0.0554	0.0878	0.0701	1.0	0.0701	0.0554	0.0878	0.0701
1,2,3,4,7,8-HxCDD	5	0	0.022	0.067 [a]	-	-	-	0.1	0.0067	-	-	-
1,2,3,6,7,8-HxCDD	5	0	0.021	0.066 [a]	-	-	-	0.1	0.0066	-	-	-
1,2,3,7,8,9-HxCDD	5	1	0.059	0.086	0.068	0.0674	0.086	0.1	0.0086	0.0068	0.00674	0.0086
1,2,3,4,6,7,8-HpCDD	5	4	0.337	0.76	0.489	1.062	0.76	0.01	0.0076	0.00489	0.0106	0.0076
OCDD	5	4	0.748	1.38 [c]	1.45	4.11	2.7	0.0003	0.000414	0.000435	0.00123	0.00081
2,3,7,8-TCDF	5	0	0.021	0.077 [a]	-	-	-	0.1	0.0077	-	-	-
1,2,3,7,8-PeCDF	5	1	0.013	0.0571	0.0306	0.0467	0.0571	0.03	0.001713	0.000918	0.001401	0.001713
2,3,4,7,8-PeCDF	5	0	0.038	0.067 [a]	-	-	-	0.3	0.0201	-	-	-
1,2,3,4,7,8-HxCDF	5	2	0.018	0.121	0.0484	0.0819	0.121	0.1	0.0121	0.00484	0.00819	0.0121
1,2,3,6,7,8-HxCDF	5	1	0.0186	0.0186 [c]	0.0265	0.0576	0.041	0.1	0.00186	0.00265	0.00576	0.0041
2,3,4,6,7,8-HxCDF	5	1	0.021	0.238	0.032 [b]	0.060 [b]	0.044 [b]	0.1	0.0238	0.0032	0.006	0.0044
1,2,3,7,8,9-HxCDF	5	0	0.023	0.035 [a]	-	-	-	0.1	0.0035	-	-	-
1,2,3,4,6,7,8-HpCDF	5	1	0.06	0.104 [c]	0.119	0.233	0.16	0.01	0.00104	0.00119	0.00233	0.0016
1,2,3,4,7,8,9-HpCDF	5	0	0.033	0.054 [a]	-	-	-	0.01	0.00054	-	-	-
OCDF	5	2	0.038	0.153 [c]	0.134	0.407	0.27	0.0003	0.0000459	0.0000402	0.0001221	0.000081
TEQ	-	-	-	-	-	-	-	-	**0.34**	**0.08**	**0.13**	**0.11**

Notes:
a - Maximum value is the detection limit
b - Outlier(s) removed
c - Maximum value is a detected concentration, but is below a detection limit
TEF$_M$ - Toxic Equivalency Factor for Humans/Mammals based on WHO (2005)
C$_{MAX}$ - Maximum Concentration
C$_{MEAN}$ - Mean Concentration
C$_{UCLM}$ - 95% Upper Confidence Limit of the Mean
C$_{95\%}$ - 95th Percentile Concentration

3.3.4 Polycyclic Aromatic Hydrocarbons in Forage

PAHs were detected at very low concentrations (ng/g) in several of the five forage samples submitted for analysis.

Table 3.13 Baseline Concentrations for PAHs in Forage

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max (ng/g)	Mean (ng/g)	95% UCLM (ng/g)	95th Percentile (ng/g)
Naphthalene	5	5	0.87	6.65	3.01	6.18	6.65
2-Methylnaphthalene	5	5	0.5	8.64	1.02 [c]	2.104 [c]	1.98 [c]
1-Methylnaphthalene	5	5	0.25	5.2	1.79	4.47	5.2
Acenaphthylene	5	0	0.2	0.2 [a]	-	-	-
Acenaphthene	5	0	0.2	5.87 [a]	-	-	-
Fluorene	5	2	0.2	16.7	- [b]	- [b]	- [b]
Phenanthrene	5	5	0.77	58.1	3.26 [c]	8.74 [c]	8.24 [c]
Anthracene	5	1	0.2	2.74	- [b]	- [b]	- [b]
Fluoranthene	5	4	0.69	25.1	1.82 [c]	3.76 [c]	2.89 [c]
Pyrene	5	5	0.6	11.9	1.15 [c]	2.14 [c]	1.86 [c]
Benzo(a)anthracene	5	2	0.19	0.73	0.36	0.66	0.73
Chrysene/Triphenylene	5	1	0.63	3.19	1.39	2.74	3.19
Benzo(b)flouranthene	5	1	0.42	0.83 [d]	0.68	1.08	1.17
Benzo(k)fluoranthene	5	0	0.21	1.04 [a]	-	-	-
Benzo(e)pyrene	5	2	0.35	1.05	0.58	0.93	1.05
Benzo(a)pyrene	5	0	0.44	3.72 [a]	-	-	-
Perylene	5	0	0.2	0.2 [a]	-	-	-
Indeno(1,2,3-cd)pyrene	5	2	0.2	0.63 [d]	0.45	0.70	0.69
Dibenzo(a,h/a,c)anthracene	5	0	0.2	0.2 [a]	-	-	-
Benzo(g,h,i)perylene	5	0	0.2	1.04 [a]	-	-	-

Notes:

a - Maximum value is the detection limit

b - Statistical analysis cannot be performed due to insufficient number of unique data points

c - Outlier(s) removed

d - Maximum value is a detected concentration, but is below a detection limit

3.3.5 Volatile Organic Compounds in Forage

None of the VOCs identified in the COPC list were detected in any of the forage samples collected as shown in Table 3.14.

Table 3.14 Baseline Concentrations for VOCs in Forage

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Acrolein	5	0	3	5	-	-	-
Benzene	5	0	0.1	0.2	-	-	-
Bromobenzene	5	0	0.5	1	-	-	-
Bromochloromethane	5	0	0.5	1	-	-	-
Bromodichloromethane	5	0	0.005	0.01	-	-	-
Bromoform	5	0	0.1	0.2	-	-	-
Bromomethane	5	0	0.05	0.1	-	-	-
n-Butylbenzene	5	0	0.5	1	-	-	-
sec-Butylbenzene	5	0	0.5	1	-	-	-
tert-Butylbenzene	5	0	0.5	1	-	-	-
Carbon Disulfide	5	0	0.1	0.2	-	-	-
Carbon tetrachloride	5	0	0.05	0.1	-	-	-
Chlorobenzene	5	0	0.1	0.2	-	-	-
Dibromochloromethane	5	0	0.005	0.01	-	-	-
Chloroethane	5	0	0.1	0.2	-	-	-
Chloroform	5	0	0.05	0.1	-	-	-
Chloromethane	5	0	0.1	0.2	-	-	-
2-Chlorotoluene	5	0	0.5	1	-	-	-
4-Chlorotoluene	5	0	0.5	1	-	-	-
1,2-Dibromo-3-chloropropane	5	0	0.5	1	-	-	-
1,2-Dibromoethane	5	0	0.03	0.05	-	-	-
Dibromomethane	5	0	0.05	0.1	-	-	-
1,2-Dichlorobenzene	5	0	0.1	0.2	-	-	-
1,3-Dichlorobenzene	5	0	0.1	0.2	-	-	-
1,4-Dichlorobenzene	5	0	0.1	0.2	-	-	-
Dichlorodifluoromethane	5	0	0.2	0.3	-	-	-
1,1-Dichloroethane	5	0	0.03	0.05	-	-	-
1,2-Dichloroethane	5	0	0.01	0.02	-	-	-
1,1-Dichloroethylene	5	0	0.01	0.02	-	-	-
cis-1,2-Dichloroethylene	5	0	0.1	0.2	-	-	-
trans-1,2-Dichloroethylene	5	0	0.3	0.6	-	-	-
Dichloromethane	5	0	0.5	1	-	-	-
1,2-Dichloropropane	5	0	0.005	0.01	-	-	-
1,3-Dichloropropane	5	0	0.1	0.2	-	-	-
2,2-Dichloropropane	5	0	0.5	1	-	-	-
1,1-Dichloropropene	5	0	0.05	0.1	-	-	-
cis-1,3-Dichloropropene	5	0	0.01	0.02	-	-	-
trans-1,3-Dichloropropene	5	0	0.01	0.02	-	-	-
1,2-Dichlorotetrafluoroethane	5	0	0.3	0.5	-	-	-
Ethyl Benzene	5	0	0.1	0.2	-	-	-
Hexachlorobutadiene	5	0	0.5	1	-	-	-
2-Hexanone	5	0	1	2	-	-	-

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Isopropylbenzene	5	0	0.5	1	-	-	-
Isopropyltoluene	5	1	0.5	0.8 [b]	0.76	1.07	1
Methyl Ethyl Ketone	5	0	1	2	-	-	-
Methyl Isobutyl Ketone	5	0	1	2	-	-	-
MTBE	5	0	1	2	-	-	-
Naphthalene	5	0	0.5	1	-	-	-
n-Propylbenzene	5	0	0.5	1	-	-	-
Styrene	5	0	0.1	0.2	-	-	-
1,1,1,2-Tetrachloroethane	5	0	0.04	0.08	-	-	-
1,1,2,2-Tetrachloroethane	5	0	0.04	0.08	-	-	-
Tetrachloroethylene	5	0	0.1	0.2	-	-	-
Toluene	5	2	0.3	0.6 [a]	0.42	0.58	0.6
1,1,2-Trichloro-1,2,2-trifluoroethane	5	0	0.3	0.5	-	-	-
1,2,3-Trichlorobenzene	5	0	0.5	1	-	-	-
1,2,4-Trichlorobenzene	5	0	0.5	1	-	-	-
1,1,1-Trichloroethane	5	0	0.02	0.03	-	-	-
1,1,2-Trichloroethane	5	0	0.05	0.1	-	-	-
Trichloroethylene	5	0	0.3	0.5	-	-	-
Trichlorofluoromethane	5	0	0.1	0.2	-	-	-
1,2,3-Trichloropropane	5	0	0.5	1	-	-	-
Trihalomethanes (total)	5	0	0.2	0.3	-	-	-
1,2,4-Trimethylbenzene	5	0	0.5	1	-	-	-
1,3,5-Trimethylbenzene	5	0	0.5	1	-	-	-
Vinyl chloride	5	0	0.02	0.03	-	-	-
o-Xylene	5	0	0.1	0.2	-	-	-
m+p-Xylenes	5	0	0.2	0.4	-	-	-
Xylenes (Total)	5	0	0.3	0.6	-	-	-

Notes:
a - Maximum value is a detected concentration
b - Maximum value is a detected concentration, but is below a detection limit

3.3.1 Forage Baseline Findings

Guideline reference values were not available for comparison purposes in forage. However, the trace metals concentrations appear to be within the expected ranges for vegetation reported in the scientific literature. In the case of the COPCs of organic nature, most of the results were not detected or detected at very low levels.

3.4 Browse

Eleven samples were collected (including a duplicate) from ten locations. All samples were analyzed for metals. As in the case of forage, some of the COPCs such as SVOCs, PCBs, PCDD/PCDF, PAHs, and VOCs do not commonly accumulate in vegetation. Furthermore, in the case of browse these chemicals are expected to accumulate even less than in the forage vegetation, as chemical transport of these chemicals to the woody parts of shrubs and trees is less likely to occur. Nevertheless three browse samples were selected for analysis of the above listed chemicals (with the exception of VOCs). As in the case of forage there were no provincial or federal guidelines available for comparison purposes.

3.4.1 Trace Metals in Browse

Several trace metals from the list of COPCs, beryllium and silver were not detected in any of the browse samples. All other metals were detected in at least one of the browse samples (Table 3.15).

Table 3.15 Baseline Concentrations for Metals in Browse

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Aluminum (Al)-Total	11	11	11.9	49.2	28.1	35.3	49.2
Antimony (Sb)-Total	11	11	0.01	0.053	0.018	0.022	0.027
Arsenic (As)-Total	11	10	0.01	0.032	0.0203	0.0247	0.032
Barium (Ba)-Total	11	11	3.21	39.1	7.06	10.39	13.8
Beryllium (Be)-Total	11	0	0.1	0.2 [a]	-	-	-
Bismuth (Bi)-Total	11	0	0.03	0.06 [a]	-	-	-
Boron (B)-Total	11	11	5.6	27.9	12.3	14.2	15.2
Cadmium (Cd)-Total	11	11	0.0053	0.377	0.046[c]	0.11[c]	0.377[c]
Calcium (Ca)-Total	11	11	6200	18800	9585[c]	11968[c]	18770[c]
Chromium (Cr)-Total	11	11	0.18	0.84	0.31	0.39	0.55
Cobalt (Co)-Total	11	5	0.02	0.146	0.035	0.044	0.061
Copper (Cu)-Total	11	11	2.2	14	3.70[d]	4.46[d]	5.69[d]
Iron (Fe)-Total	11	11	23.7	87.8	51.61	64.25	87.8
Lead (Pb)-Total	11	11	0.085	0.41	0.205	0.268	0.41
Lithium (Li)-Total	11	0	0.1	0.2 [a]	-	-	-
Magnesium (Mg)-Total	11	11	423	1540	966	1201	1540
Manganese (Mn)-Total	11	11	10.4	57.6	17.0[d]	21.1[d]	30.2[d]
Mercury (Hg)-Total	11	10	0.001	0.0223	0.0114	0.0155	0.0223
Molybdenum (Mo)-Total	11	11	0.042	0.182	0.108	0.139	0.182
Nickel (Ni)-Total	11	9	0.1	0.39	0.23	0.29	0.39
Phosphorus (P)-Total	11	11	428	1030	700[d]	834[d]	1030[d]
Potassium (K)-Total	11	11	2320	6050	4058[d]	4896[d]	6050[d]
Selenium (Se)-Total	11	4	0.04	0.1	-[e]	-[e]	-[e]
Silver (Ag)-Total	11	0	0.01	0.02 [a]	-	-	-
Sodium (Na)-Total	11	7	20	66 [f]	40[d]	51[d]	66[d]

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Strontium (Sr)-Total	11	11	11.2	84.2	17.8[d]	22.4[d]	33.6[d]
Thallium (Tl)-Total	11	0	0.01	0.02 [a]	-	-	-
Tin (Sn)-Total	11	0	0.05	0.1 [a]	-	-	-
Titanium (Ti)-Total	11	11	0.5	2.27	1.33	1.68	2.27
Uranium (U)-Total	11	1	0.002	0.002 [f]	-[b]	-[b]	-[b]
Vanadium (V)-Total	11	1	0.1	0.2	-[b]	-[b]	-[b]
Zinc (Zn)-Total	11	11	7.31	67.2	17.14[d]	24.25[d]	42.2[d]
Zirconium (Zr)	0	0	-	-	-	-	-

Notes:

a - Maximum value is the detection limit

b - Statistical analysis cannot be performed due to insufficient number of unique data points

c - Lognormally distributed data

d - Outlier(s) removed

e - Data distribution was not normal or lognormal

f - Maximum value is a detected concentration, but is below a detection limit

3.4.2 Chlorinated Monocyclic Aromatics in Browse

SVOCs were not detected in any of the three browse samples analyzed (Table 3.16).

Table 3.16 Baseline Concentrations for SVOCs in Browse

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	3	0	0.01	0.01
Hexachlorobutadiene	3	0	0.01	0.01
Pentachlorobenzene	3	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	3	0	0.01	0.01

3.4.3 Chlorinated Polycyclic Aromatics in Browse

3.4.3.1 Polychlorinated Biphenyls (PCBs) in Browse

PCBs were not detected in any of the three browse samples analyzed (Table 3.17).

Table 3.17 Baseline Concentrations for PCBs in Browse

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	3	0	0.01	0.01
Aroclor 1248	3	0	0.01	0.01
Aroclor 1254	3	0	0.01	0.01
Aroclor 1260	3	0	0.01	0.01
Total PCBs	3	0	0.01	0.01

3.4.3.2 Polychlorinated Dioxins and Furans in Browse

Several of the PCDD/F congeners were detected in the browse samples (Table 3.18). The maximum baseline browse concentrations were used to determine the TEQ of PCDD/PCDF for mammals. Additional details regarding the methodology used are provided in Section 2.4.2.

Table 3.18 Baseline Concentrations for PCDD/PCDF in Browse

Parameter	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	TEF_M	TEF_M X C_{Max}
2,3,7,8-TCDD	3	0	0.087	0.17	1.0	0.17
1,2,3,7,8-PeCDD	3	0	0.035	0.068	1.0	0.068
1,2,3,4,7,8-HxCDD	3	0	0.023	0.075	0.1	0.0075
1,2,3,6,7,8-HxCDD	3	1	0.034	0.105 [a]	0.1	0.0105
1,2,3,7,8,9-HxCDD	3	0	0.038	0.075	0.1	0.0075
1,2,3,4,6,7,8-HpCDD	3	2	0.27	0.767 [a]	0.01	0.0077
OCDD	3	3	0.813	1.69 [a]	0.0003	0.0005
2,3,7,8-TCDF	3	0	0.027	0.081	0.1	0.0081
1,2,3,7,8-PeCDF	3	1	0.03	0.12 [a]	0.03	0.0036
2,3,4,7,8-PeCDF	3	0	0.039	0.1	0.3	0.03
1,2,3,4,7,8-HxCDF	3	0	0.039	0.082	0.1	0.0082
1,2,3,6,7,8-HxCDF	3	0	0.018	0.053	0.1	0.0053
2,3,4,6,7,8-HxCDF	3	0	0.046	0.36	0.1	0.0360
1,2,3,7,8,9-HxCDF	3	0	0.023	0.056	0.1	0.0056
1,2,3,4,6,7,8-HpCDF	3	1	0.059	0.196 [a]	0.01	0.0020
1,2,3,4,7,8,9-HpCDF	3	0	0.064	0.17	0.01	0.0017
OCDF	3	1	0.048	0.205 [a]	0.0003	0.0001
TEQ	-	-	-	-	-	**0.37**

Notes:
a - Maximum value is a detected concentration
TEF_M = Toxic equivalency factor for humans/mammals based on WHO (2005)
C_{Max} = Maximum concentration

3.4.4 Polycyclic Aromatic Hydrocarbons in Browse

Several PAHs were detected in the three browse samples analyzed (Table 3.19).

Table 3.19 Baseline Concentrations for PAHs in Browse

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max (ng/g)
Naphthalene	3	3	1.38	5.58
2-Methylnaphthalene	3	3	1.07	3.91
1-Methylnaphthalene	3	3	0.48	2.16
Acenaphthylene	3	1	0.2	0.24
Acenaphthene	3	1	0.46	0.87
Fluorene	3	3	0.46	1.7
Phenanthrene	3	3	3.05	10.4
Anthracene	3	2	0.2	0.75
Fluoranthene	3	3	2.89	8.74
Pyrene	3	3	2.01	4.66
Benzo(a)anthracene	3	2	0.6	0.78
Chrysene/Triphenylene	3	0	1.72	3.51 [a]
Benzo(b)flouranthene	3	0	1.18	1.53 [a]
Benzo(k)fluoranthene	3	0	0.43	0.9 [a]
Benzo(e)pyrene	3	0	0.67	1.41 [a]
Benzo(a)pyrene	3	0	1.47	19.7 [a]
Perylene	3	0	0.2	0.2 [a]
Indeno(1,2,3-cd)pyrene	3	1	0.33	0.81
Dibenzo(a,h/a,c)anthracene	3	0	0.2	0.2 [a]
Benzo(g,h,i)perylene	3	1	0.2	1.36 [b]

Notes:

a - Maximum value is the detection limit

b - Maximum value is a detected concentration, but is below a detection limit

3.4.5 Browse Baseline Findings

As in the case of forage samples, guideline reference values were not available for comparison purposes in browse. However, the trace metals concentrations appear to be within the expected ranges for vegetation reported in the scientific literature. In the case of the COPCs of organic nature most of the results were not detected or detected at very low levels.

3.5 Small Mammals

Eleven small mammal samples were collected at five sampling locations. All 11 small mammal samples were analyzed separately for metals and % lipid content, while three of the small mammal samples were selected for analysis of PAHs, PCBs and PCDD/PCDF.

3.5.1 Trace Metals in Small Mammals

Several trace metals from the list of COPCs such as antimony, beryllium, boron and silver were not detected in any of the small mammal samples (Table 3.20). All other metal parameters were detected in at least one of the samples. Guidelines comparison with the Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota was not possible as trace metals concentrations guidelines values were not available.

Table 3.20 Baseline Concentrations for Metals in Small Mammals

Parameter	CCME	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Aluminum (Al)-Total	-	11	11	5.2	39.4	12.6 [e]	16.6 [e]	19.6 [e]
Antimony (Sb)-Total	-	11	0	0.01	0.01[a]	-	-	-
Arsenic (As)-Total	-	11	4	0.01	0.072	- [d]	- [d]	- [d]
Barium (Ba)-Total	-	11	11	0.632	5.2	- [d]	- [d]	- [d]
Beryllium (Be)-Total	-	11	0	0.1	0.1[a]	-	-	-
Bismuth (Bi)-Total	-	11	0	0.03	0.03[a]	-	-	-
Boron (B)-Total	-	11	0	6	8[a]	-	-	-
Cadmium (Cd)-Total	-	11	10	0.005	0.225	- [d]	- [d]	- [d]
Calcium (Ca)-Total	-	11	11	6440	13000	9608	10771	13000
Chromium (Cr)-Total	-	11	11	0.1	0.26	0.15	0.17	0.26
Cobalt (Co)-Total	-	11	8	0.02	0.063	0.031 [b]	0.050 [b]	0.063 [b]
Copper (Cu)-Total	-	11	11	1.85	6.24	3.23	3.44	6.24
Iron (Fe)-Total	-	11	11	58.3	164	- [d]	- [d]	- [d]
Lead (Pb)-Total	-	11	11	0.026	0.263	0.037 [e]	0.044 [e]	0.046 [e]
Lithium (Li)-Total	-	11	0	0.1	0.1[a]	-	-	-
Magnesium (Mg)-Total	-	11	11	334	462	413	460	462
Manganese (Mn)-Total	-	11	11	1.19	2.94	1.93	2.53	2.94
Mercury (Hg)-Total	-	11	9	0.001	0.102	0.001 [b]	0.002 [b]	0.004 [b]
Molybdenum (Mo)-Total	-	11	11	0.107	0.266	0.177	0.224	0.266
Nickel (Ni)-Total	-	11	10	0.1	0.58	0.25	0.31	0.58
Phosphorus (P)-Total	-	11	11	5970	10500	7521	8756	10500
Potassium (K)-Total	-	11	11	2350	3520	3033	3252	3520
Selenium (Se)-Total	-	11	8	0.2	1.24	0.28 [e]	0.34 [e]	0.35 [e]
Silver (Ag)-Total	-	11	0	0.01	0.01[a]	-	-	-
Sodium (Na)-Total	-	11	11	901	1450	1216	1299	1450
Strontium (Sr)-Total	-	11	11	2.71	7.43	4.29 [e]	5.79 [e]	7.43 [e]
Thallium (Tl)-Total	-	11	0	0.01	0.01[a]	-	-	-
Tin (Sn)-Total	-	11	5	0.05	0.096	- [c]	- [c]	- [c]

Parameter	CCME	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Titanium (Ti)-Total	-	11	11	0.44	2.9	0.82 [e]	1.03 [e]	1.07 [e]
Uranium (U)-Total	-	11	1	0.002	0.0029	- [c]	- [c]	- [c]
Vanadium (V)-Total	-	11	1	0.1	0.11	- [c]	- [c]	- [c]
Zinc (Zn)-Total	-	11	11	22	33.8	27.3	29.8	33.8

Notes:
a - Maximum value is the detection limit
b - Lognormally distributed data
c - Statistical analysis cannot be performed due to insufficient number of unique data points
d - Data distribution was not normal or lognormal
e - Outlier(s) removed
CCME - Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota. Canadian Environmental Quality Guidelines. 1999. Updated 2001.

3.5.2 Chlorinated Monocyclic Aromatics in Small Mammals

SVOCs were not detected in any of the samples (Table 3.21). Guidelines comparison with the Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota was not possible as SVOCs concentrations guidelines values were not available.

Table 3.21 Baseline Concentrations for SVOCs in Small Mammals

Parameter	CCME	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	-	3	0	0.01	0.01
Hexachlorobutadiene	-	3	0	0.01	0.01
Pentachlorobenzene	-	3	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	-	3	0	0.01	0.01

Notes:

CCME Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota. Canadian Environmental Quality Guidelines. 1999. Updated 2001.

3.5.3 Chlorinated Polycyclic Aromatics in Small Mammals

3.5.3.1 Polychlorinated Biphenyls (PCBs) in Small Mammals

PCBs were not detected in any of the small mammal samples (Table 3.22). Guidelines comparison with the Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota was not possible as SVOCs concentrations guidelines values were not available.

Table 3.22 Baseline Concentrations for PCBs in Small Mammals

Parameter	CCME	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	-	3	0	0.01	0.01
Aroclor 1248	-	3	0	0.01	0.01
Aroclor 1254	-	3	0	0.01	0.01
Aroclor 1260	-	3	0	0.01	0.01
Total PCBs	-	3	0	0.01	0.01

Notes:

CCME - Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota. Canadian Environmental Quality Guidelines. 1999. Updated 2001.

3.5.3.2 Polychlorinated Dioxins and Furans in Small Mammals

None of the PCDD/F congeners were detected in any of the small mammal samples analyzed (Table 3.23). The maximum detected limit concentrations (DL) were used to determine the TEQ of PCDD/PCDF for small mammals (Table 3.23). Additional details regarding the methodology used are provided in section 2.4.2. The comparison of the TEQ developed for the small mammals collected during the baseline study with the Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota, indicated that the TEQ based on maximum detection limit (0.61 pg/g) was lower than the CCME guideline (0.71 pg/g).

Table 3.23 Baseline Concentrations for PCDD/PCDF in Small Mammals

Parameter	CCME (pg/g)	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	TEF_M	TEF_M X C_{Max}
2,3,7,8-TCDD	-	3	0	0.12	0.23	1.0	0.23
1,2,3,7,8-PeCDD	-	3	0	0.12	0.18	1.0	0.18
1,2,3,4,7,8-HxCDD	-	3	0	0.083	0.11	0.1	0.011
1,2,3,6,7,8-HxCDD	-	3	0	0.083	0.12	0.1	0.012
1,2,3,7,8,9-HxCDD	-	3	0	0.083	0.12	0.1	0.012
1,2,3,4,6,7,8-HpCDD	-	3	0	0.079	0.19	0.01	0.0019
OCDD	-	3	0	0.28	0.56	0.0003	0.000168
2,3,7,8-TCDF	-	3	0	0.067	0.091	0.1	0.0091
1,2,3,7,8-PeCDF	-	3	0	0.1	0.16	0.03	0.0048
2,3,4,7,8-PeCDF	-	3	0	0.094	0.15	0.3	0.045
1,2,3,4,7,8-HxCDF	-	3	0	0.14	0.27	0.1	0.027
1,2,3,6,7,8-HxCDF	-	3	0	0.13	0.24	0.1	0.024
2,3,4,6,7,8-HxCDF	-	3	0	0.13	0.24	0.1	0.024
1,2,3,7,8,9-HxCDF	-	3	0	0.15	0.28	0.1	0.028
1,2,3,4,6,7,8-HpCDF	-	3	0	0.056	0.089	0.01	0.00089
1,2,3,4,7,8,9-HpCDF	-	3	0	0.075	0.12	0.01	0.0012
OCDF	-	3	0	0.16	0.19	0.0003	0.000057
TEQ	0.71	-	-	-	-	-	**0.61**

Notes:

$TEF_{H/M}$ - Toxic Equivalency Factor for Humans/Mammals based on WHO (2005)

C_{MAX} - Maximum Concentration

CCME Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota. Canadian Environmental Quality Guidelines. 1999. Updated 2001.

3.5.4 Polycyclic Aromatic Hydrocarbons in Small Mammals

With the exception of naphthalene, no other PAHs from the list of COPCs were detected in the three small mammal samples analyzed (Table 3.24). Guidelines comparison with the Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota was not possible as PAHs concentrations guidelines values were not available.

Table 3.24 Baseline Concentrations for PAHs in Small Mammals

Parameter	CCME	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Naphthalene	-	3	3	1.79	1.82[a]
2-Methylnaphthalene	-	3	3	0.74	3.32[a]
1-Methylnaphthalene	-	3	2	0.4	1.7[a]
Acenaphthylene	-	3	0	0.4	0.4
Acenaphthene	-	3	0	0.4	0.4
Fluorene	-	3	0	0.4	0.4
Phenanthrene	-	3	0	0.4	0.4
Anthracene	-	3	0	0.4	0.4
Fluoranthene	-	3	0	0.4	0.4
Pyrene	-	3	0	0.4	0.4
Benzo(a)anthracene	-	3	0	0.4	0.4
Chrysene/Triphenylene	-	3	0	0.4	0.4
Benzo(b)flouranthene	-	3	0	0.4	0.4
Benzo(k)fluoranthene	-	3	0	0.4	0.4
Benzo(e)pyrene	-	3	0	0.4	0.4
Benzo(a)pyrene	-	3	0	0.4	0.4
Perylene	-	3	0	0.4	0.4
Indeno(1,2,3-cd)pyrene	-	3	0	0.4	0.4
Dibenzo(a,h/a,c)anthracene	-	3	0	0.4	0.4
Benzo(g,h,i)perylene	-	3	0	0.4	0.4

Notes:

a - Maximum value is a detected concentration

CCME Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota. Canadian Environmental Quality Guidelines. 1999. Updated 2001.

3.5.5 % Lipids in Small Mammals

Each of the small mammal samples was submitted for analysis of lipid content. As indicated in Table 3.25, the percent lipid content in small mammals ranged 1.68 to 11.61. Guidelines comparison with the Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota was not possible as % lipid guidelines values were not available.

Table 3.25 Baseline Concentrations for Lipid Content in Small Mammals

Parameter	CCME	No. Analyzed	No. Detected	Min (%)	Max (%)	Mean (%)	95% UCLM (%)	95th Percentile (%)
% Lipids	-	11	11	1.68	11.61	5.05	6.81	11.61

Notes:

CCME Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota. Canadian Environmental Quality Guidelines. 1999. Updated 2001.

3.5.6 Small Mammals Baseline Findings

Guideline reference values were not available for comparison purposes for most of the COPCs, however most of the COPCs results were not detected or detected at very low levels. In the case of dioxins and furans the comparison of the TEQ developed for the small mammals collected during the baseline study with the Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota indicated that the TEQ measured (0.61 pg/g) was lower than the CCME guideline (0.71 pg/g).

4.0 SUMMARY OF FRESHWATER STREAM RESULTS

Media assessed for chemical concentration of the freshwater stream sampling locations included: sediment, water, and fish. A permit to "collect fish for scientific purpose" was obtained from the Ontario Ministry of Natural Resources before any fish collection occurred. The baseline program included five freshwater stream sampling locations described below in Section 4.1. Descriptions of the media obtained for analysis and the recommended baseline concentrations of selected chemicals in each of these media are provided in the following sections. Copies of the laboratory certificates are on record at Jacques Whitford while tabular summaries of the analytical results and the statistical calculations are provided in Appendix A.

4.1 Description of Freshwater Stream Sampling Locations


Freshwater Site S7

Freshwater Site S7 was located approximately 100 m north of the outlet of Tooley Creek into Lake Ontario. This site is situated in a cattle pasture with very limited riparian cover. The canopy was 100% open. The creek ranged from 3 – 5 m in width and 0.20 – 0.90 m in depth in the area where electrofishing was conducted. Electrofishing is a common scientific survey method used to sample fish populations to determine abundance, density, and species composition. It uses electricity to stun fish before they are caught. Further details can be found in the Baseline Sampling Program, (Jacques Whitford 2008b). The Tooley Creek mainstream at this sampling site was a low gradient (0.0-1.5 % rise over run in topography), sinuous channel exhibiting little to no flow. In stream cover was comprised of overhanging banks, small and large woody debris, deep pools and aquatic vegetation (*Potomagetan* sp.).

The bottom composition was comprised of soft organics with isolated cobble and boulders. Sediment was also taken at this location from the stream banks at 10 locations within the area electrofished and composited onsite.

Approximately 30 m of creek was electrofished to obtain the required sample weight for laboratory analysis. The sample consisted of 63 individual fish of fourteen (14) species totalling 187.9 g. Juvenile white sucker accounted for a third of the total weight of fish captured.

Freshwater Site W3 was located upstream from S7 in the same area as Terrestrial Site W3 adjacent to a radio tower facility west of Courtice Road. Although not as impacted as Site S7, there was evidence that cattle had been in the creek at this location as well. The site is situated in a cultured meadow and the creek was bordered by moderate riparian vegetation (willows and other native shrubs and trees). The canopy was approximately 40% open. The creek ranged from 1.0 – 2.0 m in width and 0.10 – 0.60 m in depth deep in the area electrofished. Sediment was also taken at this location from the stream banks at 10 locations within the area electrofished


Freshwater Site W3

and composited onsite. The Tooley Creek mainstream at this sampling site was a low gradient, riffle-pool channel morphology exhibiting moderate flow.

In stream cover was comprised of overhanging banks, small and large woody debris, deep pools and aquatic vegetation. The bottom composition was comprised of gravel with isolated cobble and boulders, as well as sections of sand and silt. The change in channel morphology from Site S7 to Site W3 was reflected in the shift of representative fish species captured. Many more cool to coldwater indicator species, such as dace species and rainbow trout, were captured upstream in this shaded riffle section. Site W3 is likely an important juvenile rearing area, as well as a potentially important spawning area for salmonids in the spring and possibly in the fall. Three individual creek chub accounted for almost 35% of the fish capture by weight.

Freshwater Site W4 was located in the same area as Terrestrial Site W4 where Tooley Creek exits from passing under Hwy 401. The banks of the creek at this location were rocky and there was little evidence of erosion. Large trees in the area completely shade the creek at this location. Approximately 30 m of creek was electrofished to get enough fish for the sample requirements. Blacknose dace (29%), creek chub (27%) and pumpkin seed (13%) accounted for almost 70% of the fish capture by weight. The creek ranged from 3.0 – 5.0 m in width and 0.20 – 1.0 m in depth in the area electrofished. Sediment was also taken at this location from the stream banks at 10 locations within the area electrofished had a low gradient and somewhat sinuous channel that exhibited little flow. Riparian canopy cover was approximately 30% open and in stream cover was comprised primarily of overhanging banks coupled with small and large woody debris.


Freshwater Site W4

Freshwater Site N3 was located in Tooley Creek north of Hwy 401 in the same area as Terrestrial Site N3. The terrestrial samples were collected at the edge of the ravine whereas the surface water samples were collected at the bottom of the ravine. The ravine was characterized by a canopy of large trees, approximately 10 to 20% open, with small shade tolerant shrubs beneath. The banks of the creek at this location were very rocky and showed no evidence of erosion. Sediment was also taken from the stream banks at 10 locations within about 30 composited onsite. The creek ranged from 3.0 – 5.0 m in width and 0.2 – 0.5 m in depth in the area in which sediment was collected, and consiste sinuous channel that exhibited little to no flow. In stream cover was comprised of overhanging banks and small and large woody debris.


Freshwater Site N3

Freshwater Site N4 was located in a small tributary to Tooley Creek north of Hwy 401 in the same area as Terrestrial Site N4. The terrestrial samples were collected at the edge of the ravine whereas the surface water samples were collected at the bottom of the ravine. The ravine is characterized by a few large willow trees with thick vegetation growing around the creek and riparian canopy cover was 90 % open. The Tooley Creek mainstream at this sampling location was a low gradient, somewhat sinuous channel exhibiting little to no flow. In stream cover consisted of highly vegetated overhanging banks and in stream aquatic vegetation. Sediment was taken from the stream banks at 10 locations within about 30 composited onsite. The creek ranged from 0.5 – 1.5 m wide and 0.1 – 0.50 cm deep in the area in which sediment was collected.


Freshwater Site N4

4.2 Sediment

Six sediment samples (including a duplicate) were collected during the sampling program, one from each stream location. All of the sediment samples were analyzed for metals, VOCs, ammonia, acetaldehyde and formaldehyde; four samples were analyzed for SVOCs, PAHs, PCBs and PCDD/PCDFs.

4.2.1 Trace Metals in Sediment

Table 4.1 provides a summary of the baseline concentrations of trace metals in sediment and also provides the Provincial Sediment Quality Guidelines (PSQG) for the Protection and Management of Aquatic Sediment Quality in Ontario as well as the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life for comparison purposes. Several trace metals from the list of COPCs such as antimony, beryllium, cadmium, mercury and silver were not detected in any of the sediment samples (Table 4.1). All other metals were detected in at least one of the sediment samples. Results indicate that with the exception of one chromium sample, there were no sediment trace metals COPCs above the standards.

Table 4.1 Baseline Concentrations for Metals in Sediment

Parameter	PSQG (LEL) (mg/kg)	MOE O. Reg. 153/04 Table 1 (mg/kg)	CCME (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th % (mg/kg)
Aluminum (Al)	-	-	-	6	6	3790	10800	6378	9079	10800
Antimony (Sb)	-	-	-	6	0	1	1 [a]	-	-	-
Arsenic (As)	6	6	5.9	6	1	1	2	- [b]	- [b]	- [b]
Barium (Ba)	-	-	-	6	6	28	94	54	79	94
Beryllium (Be)	-	-	-	6	0	0.5	0.5 [a]	-	-	-
Bismuth (Bi)	-	-	-	6	0	1	1 [a]	-	-	-
Boron (B)	-	-	-	6	6	10	14	12	14	14
Cadmium (Cd)	0.6	0.6	0.6	6	0	0.5	0.5 [a]	-	-	-
Calcium (Ca)	-	-	-	6	6	46900	77400	- [b]	- [b]	- [b]
Chromium (Cr)	26	26	37.3	6	6	6	32	10.8 [c]	14 [c]	13 [c]
Cobalt (Co)	50	50	-	6	6	3	6	4	5	6
Copper (Cu)	16	16	35.7	6	6	2	13	7.17	11	13
Iron (Fe)	2%	-	-	6	6	7640	15200	10112	13002	15200
Lead (Pb)	31	31	35	6	6	4	13	5 [c]	6 [c]	6 [c]
Magnesium (Mg)	-	-	-	6	6	2610	5010	4112	5201	5010
Manganese (Mn)	460	-	-	6	6	197	462	226 [c]	261 [c]	254 [c]
Mercury (Hg)	0.2	0.2	0.17	6	0	0.05	0.05 [a]	-	-	-
Molybdenum (Mo)	-	-	-	6	0	1	1 [a]	-	-	-
Nickel (Ni)	16	16	-	6	6	3	10	6	9	10
Phosphorus (P)	-	-	-	6	6	550	680	- [b]	- [b]	- [b]
Potassium (K)	-	-	-	6	6	470	1130	- [b]	- [b]	- [b]
Selenium (Se)	-	-	-	6	0	1	1 [a]	-	-	-
Silver (Ag)	0.5	0.5	-	6	0	0.2	0.2 [a]	-	-	-
Sodium (Na)	-	-	-	6	6	310	640	463	616	640
Strontium (Sr)	-	-	-	6	6	61	103	80	95	103
Thallium (Tl)	-	-	-	6	0	1	1 [a]	-	-	-
Tin (Sn)	-	-	-	6	6	4	5	- [b]	- [b]	- [b]
Titanium (Ti)	-	-	-	6	6	232	450	341	422	450
Uranium (U)	-	-	-	6	0	1	1 [a]	-	-	-
Vanadium (V)	-	-	-	6	6	11	29	17	23	29
Zinc (Zn)	120	120	123	6	6	21	81	41	63	81
Zirconium (Zr)	-	-	-	6	6	3	6	4	5	6
Chromium VI (CrVI)	-	-	-	6	0	2	2 [a]	-	-	-

Notes:
PSQG - Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, 1993
(LEL: Lowest Effect Level)
CCME - Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Canadian Environmental Quality Guidelines. 1999. Update 2002. Interim freshwater sediment quality guidelines (dry weight) (unless otherwise indicated)
a - Maximum value is the detection limit
b - Statistical analysis cannot be performed due to insufficient number of unique data points
c - Outlier(s) removed

4.2.2 Chlorinated Monocyclic Aromatic in Sediment

SVOCs were not detected in any of the sediment samples (Table 4.2).

Table 4.2 Baseline Concentrations for SVOCs in Sediment

Parameter	PSQG (LEL) (mg/kg)	MOE O. Reg. 153/04 Table 1 (mg/kg)	CCME (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	-	-	-	4	0	0.01	0.01
Hexachlorobutadiene	-	-	-	4	0	0.01	0.01
Pentachlorobenzene	-	-	-	4	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	-	-	-	4	0	0.01	0.01

Notes: PSQG - Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, 1993 (LEL: Lowest Effect Level)
CCME - Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Canadian Environmental Quality Guidelines. 1999. Update 2002. Interim freshwater sediment quality guidelines (dry weight) (unless otherwise indicated)

4.2.3 Chlorophenols in Sediment

Concentrations of chlorophenols were below the detection limits in all of the sediment samples (Table 4.3).

Table 4.3 Baseline Concentrations for Chlorophenols in Sediment

Parameter	PSQG (LEL)	MOE O. Reg. 153/04 Table 1	CCME	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
2,4-Dichlorophenol	-	-	-	6	0	0.6	0.7
2,4,6-Trichlorophenol	-	-	-	6	0	0.6	0.7
2,3,4,6-Tetrachlorophenol	-	-	-	6	0	0.6	0.7
Pentachlorophenol	-	-	-	6	0	0.6	0.7

Notes: PSQG - Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, 1993 (LEL: Lowest Effect Level)
CCME - Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Canadian Environmental Quality Guidelines. 1999. Update 2002. Interim freshwater sediment quality guidelines (dry weight) (unless otherwise indicated)

4.2.4 Chlorinated Polycyclic Aromatics in Sediment

4.2.4.1 Polychlorinated Biphenyls (PCBs) in Sediment

Table 4.4 provides a summary of the baseline PCBs in sediment as well as a comparison with the available provincial and federal guidelines. Results indicate that PCBs were not detected in any of the samples; the total PCBs reported were less than the PSQG and MOE O.Reg. 153/04 and above the CCME guideline, but this was due to a greater detection limit.

Table 4.4 Baseline Concentrations for PCBs in Sediment

Parameter	PSQG (LEL) (mg/kg)	MOE O. Reg. 153/04 Table 1 (mg/kg)	CCME (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	-	-	-	4	0	0.05	0.05
Aroclor 1248	0.03	-	-	4	0	0.05	0.05
Aroclor 1254	0.06	-	0.06	4	0	0.05	0.05
Aroclor 1260	0.005	-	-	4	0	0.05	0.05
Total PCBs	0.07	0.07	0.0341	4	0	0.05	0.05

Notes:

PSQG - Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, 1993 (LEL: Lowest Effect Level)

CCME - Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Canadian Environmental Quality Guidelines. 1999. Update 2002. Interim freshwater sediment quality guidelines (dry weight) (unless otherwise indicated)

4.2.4.2 Polychlorinated Dioxins and Furans in Sediment

Most of the PCDD/F congeners were detected in at least one of the sediment samples (Table 4.5). The maximum baseline sediment concentrations were used to determine the TEQ of PCDD/PCDF for fish (Table 4.5). Additional details regarding the methodology used are provided in Section 2.4.2. The TEQ levels in sediment were above the 0.85 pg/g interim freshwater sediment quality guidelines (dry weight) but under the 21.5 pg/g Probable Effect Level of the CCME guidelines.

Table 4.5 Baseline Concentrations for PCDD/PCDF in Sediment

Parameter	PSQG (LEL) (pg/g)	MOE O. Reg. 153/04 Table 1 (pg/g)	CCME (pg/g)	No. Analyzed	No. Detected	Min (pg/g)	Max (pg/g)	TEF_F	TEF_F X C_{Max}
2,3,7,8-TCDD	-	-	-	4	0	0.09	1.1 [c]	1.0	1.1
1,2,3,7,8-PeCDD	-	-	-	4	2	0.0585	0.196	1.0	0.196
1,2,3,4,7,8-HxCDD	-	-	-	4	1	0.067	0.339	0.5	0.1695
1,2,3,6,7,8-HxCDD	-	-	-	4	1	0.1	0.725	0.01	0.00725
1,2,3,7,8,9-HxCDD	-	-	-	4	3	0.145	0.842	0.01	0.00842
1,2,3,4,6,7,8-HpCDD	-	-	-	4	4	1.1	18.2	0.001	0.0182
OCDD	-	-	-	4	4	6.89	93.1	0.0001	0.00931
2,3,7,8-TCDF	-	-	-	4	4	0.0967	0.648	0.05	0.0324
1,2,3,7,8-PeCDF	-	-	-	4	3	0.084	0.411	0.05	0.02055
2,3,4,7,8-PeCDF	-	-	-	4	2	0.0809	0.22 [d]	0.5	0.11
1,2,3,4,7,8-HxCDF	-	-	-	4	2	0.11	0.327	0.1	0.0327
1,2,3,6,7,8-HxCDF	-	-	-	4	2	0.08	0.369	0.1	0.0369
2,3,4,6,7,8-HxCDF	-	-	-	4	1	0.0749	0.32 [d]	0.1	0.032
1,2,3,7,8,9-HxCDF	-	-	-	4	1	0.025	0.0867	0.1	0.00867
1,2,3,4,6,7,8-HpCDF	-	-	-	4	2	0.4	4.09	0.01	0.0409
1,2,3,4,7,8,9-HpCDF	-	-	-	4	1	0.088	0.31 [d]	0.01	0.0031
OCDF	-	-	-	4	4	1.04	11	0.0001	0.0011
TEQ	-	-	0.85 –21.5 [a b]	-	-	-	-	-	**1.8**

Notes: PSQG - Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, 1993 (LEL: Lowest Effect Level)

CCME - Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Canadian Environmental Quality Guidelines. 1999. Update 2002. Interim freshwater sediment quality guidelines (dry weight) (unless otherwise indicated)

a - Values are expressed as toxic equivalency (TEQ) units, based on WHO 1998 TEF values for fish.

b - Probable Effect Level = 21.5 ng TEQ/kg

c - Maximum value is the detection limit

d - Maximum value is a detected concentration, but is below a detection limit

TEF = Toxic equivalency factor for fish based on WHO (1998)

C_{Max} = Maximum concentration

4.2.5 Polycyclic Aromatic Hydrocarbons in Sediment

Table 4.6 provides a summary of the baseline COPC sediment PAHS concentrations and also provides the comparison to available provincial of federal standards. Results indicate that, with the exception of perylene which was detected in two of the four sediment samples submitted for analysis, all other PAHs were not detected in any of the samples.

Table 4.6 Baseline Concentrations for PAHs in Sediment

Parameter	PSQG (LEL) (mg/kg)	MOE O. Reg. 153/04 Table 1 (mg/kg)	CCME (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Naphthalene	-	-	0.0346	4	0	0.05	0.05
1-Methylnaphthalene	-	-	-	4	0	0.05	0.05
2-Methylnaphthalene	-	-	0.0202	4	0	0.05	0.05
Acenaphthylene	-	-	0.00587	4	0	0.05	0.05
Acenaphthene	-	-	0.00671	4	0	0.05	0.05
Fluorene	0.19	0.19	0.0212	4	0	0.05	0.05
Phenanthrene	0.56	0.56	0.0419	4	0	0.05	0.05
Anthracene	0.22	0.22	0.0469	4	0	0.05	0.05
Fluoranthene	0.75	0.75	0.111	4	0	0.05	0.05
Pyrene	0.49	0.49	0.053	4	0	0.05	0.05
Benzo(a)anthracene	0.32	0.32	0.0317	4	0	0.05	0.05
Chrysene	0.34	0.34	0.0571	4	0	0.05	0.05
Benzo(b)fluoranthene	-	-	-	4	0	0.05	0.05
Benzo(k)fluoranthene	0.24	0.24	-	4	0	0.05	0.05
Benzo(a)pyrene	0.37	0.37	0.0319	4	0	0.02	0.02
Perylene	-	-	-	4	2	0.01	0.02 [a]
Indeno(1,2,3-cd)pyrene	0.2	0.2	-	4	0	0.05	0.05
Dibenzo(ah)anthracene	0.06	0.06	0.00622	4	0	0.05	0.05
Benzo(g,h,i)perylene	0.17	0.17	-	4	0	0.05	0.05

Notes: PSQG - Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, 1993 (LEL: Lowest Effect Level)

CCME - Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Canadian Environmental Quality Guidelines. 1999. Update 2002. Interim freshwater sediment quality guidelines (dry weight) (unless otherwise indicated)

a - Maximum value is a detected concentration

4.2.6 Volatile Organic Compounds in Sediment

VOCs were not detected in any of the samples (Table 4.7).

Table 4.7 Baseline Concentrations for VOCs in Sediment

Parameter	PSQG (LEL) (mg/kg)	MOE O. Reg. 153/04 Table 1 (mg/kg)	CCME (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Acrolein	-	-	-	6	0	0.5	0.5
Benzene	-	-	-	6	0	0.02	0.02
Bromobenzene	-	-	-	6	0	0.1	0.1
Bromochloromethane	-	-	-	6	0	0.1	0.1
Bromodichloromethane	-	-	-	6	0	0.001	0.001
Bromoform	-	-	-	6	0	0.02	0.02
Bromomethane	-	-	-	6	0	0.01	0.01
n-Butylbenzene	-	-	-	6	0	0.1	0.1
sec-Butylbenzene	-	-	-	6	0	0.1	0.1
tert-Butylbenzene	-	-	-	6	0	0.1	0.1
Carbon Disulfide	-	-	-	6	0	0.02	0.02
Carbon tetrachloride	-	-	-	6	0	0.01	0.01
Chlorobenzene	-	-	-	6	0	0.02	0.02
Dibromochloromethane	-	-	-	6	0	0.001	0.001
Chloroethane	-	-	-	6	0	0.02	0.02
Chloroform	-	-	-	6	0	0.01	0.01
Chloromethane	-	-	-	6	0	0.02	0.02
2-Chlorotoluene	-	-	-	6	0	0.1	0.1
4-Chlorotoluene	-	-	-	6	0	0.1	0.1
1,2-Dibromo-3-chloropropane	-	-	-	6	0	0.1	0.1
1,2-Dibromoethane	-	-	-	6	0	0.005	0.005
Dibromomethane	-	-	-	6	0	0.01	0.01
1,2-Dichlorobenzene	-	-	-	6	0	0.02	0.02
1,3-Dichlorobenzene	-	-	-	6	0	0.02	0.02
1,4-Dichlorobenzene	-	-	-	6	0	0.02	0.02
Dichlorodifluoromethane	-	-	-	6	0	0.03	0.03
1,1-Dichloroethane	-	-	-	6	0	0.005	0.005
1,2-Dichloroethane	-	-	-	6	0	0.002	0.002
1,1-Dichloroethylene	-	-	-	6	0	0.002	0.002
cis-1,2-Dichloroethylene	-	-	-	6	0	0.02	0.02
trans-1,2-Dichloroethylene	-	-	-	6	0	0.06	0.06
Dichloromethane	-	-	-	6	0	0.1	0.1
1,2-Dichloropropane	-	-	-	6	0	0.001	0.001
1,3-Dichloropropane	-	-	-	6	0	0.02	0.02
2,2-Dichloropropane	-	-	-	6	0	0.1	0.1
1,1-Dichloropropene	-	-	-	6	0	0.01	0.01

Parameter	PSQG (LEL) (mg/kg)	MOE O. Reg. 153/04 Table 1 (mg/kg)	CCME (mg/kg)	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
cis-1,3-Dichloropropene	-	-	-	6	0	0.002	0.002
trans-1,3-Dichloropropene	-	-	-	6	0	0.002	0.002
1,2-Dichlorotetrafluoroethane	-	-	-	6	0	0.05	0.05
Ethyl Benzene	-	-	-	6	0	0.02	0.02
Hexachlorobutadiene	-	-	-	6	0	0.1	0.1
2-Hexanone	-	-	-	6	0	0.2	0.2
Isopropylbenzene	-	-	-	6	0	0.1	0.1
Isopropyltoluene	-	-	-	6	0	0.1	0.1
Methyl Ethyl Ketone	-	-	-	6	0	0.2	0.2
Methyl Isobutyl Ketone	-	-	-	6	0	0.2	0.2
MTBE	-	-	-	6	0	0.2	0.2
Naphthalene	-	-	-	6	0	0.1	0.1
n-Propylbenzene	-	-	-	6	0	0.1	0.1
Styrene	-	-	-	6	0	0.02	0.02
1,1,1,2-Tetrachloroethane	-	-	-	6	0	0.008	0.008
1,1,2,2-Tetrachloroethane	-	-	-	6	0	0.008	0.008
Tetrachloroethylene	-	-	-	6	0	0.02	0.02
Toluene	-	-	-	6	0	0.05	0.05
1,1,2-Trichloro-1,2,2-trifluoroethane	-	-	-	6	0	0.05	0.05
1,2,3-Trichlorobenzene	-	-	-	6	0	0.1	0.1
1,2,4-Trichlorobenzene	-	-	-	6	0	0.1	0.1
1,1,1-Trichloroethane	-	-	-	6	0	0.003	0.003
1,1,2-Trichloroethane	-	-	-	6	0	0.01	0.01
Trichloroethylene	-	-	-	6	0	0.05	0.05
Trichlorofluoromethane	-	-	-	6	0	0.02	0.02
1,2,3-Trichloropropane	-	-	-	6	0	0.1	0.1
Trihalomethanes (total)	-	-	-	6	0	0.03	0.03
1,2,4-Trimethylbenzene	-	-	-	6	0	0.1	0.1
1,3,5-Trimethylbenzene	-	-	-	6	0	0.1	0.1
Vinyl chloride	-	-	-	6	0	0.003	0.003
o-Xylene	-	-	-	6	0	0.02	0.02
m+p-Xylenes	-	-	-	6	0	0.04	0.04
Xylenes (Total)	-	-	-	6	0	0.06	0.06

Notes: PSQG - Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, 1993 (LEL: Lowest Effect Level)

CCME - Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Canadian Environmental Quality Guidelines. 1999. Update 2002. Interim freshwater sediment quality guidelines (dry weight) (unless otherwise indicated)

4.2.7 Formaldehyde and Acetaldehyde in Sediment

Formaldehyde and acetaldehyde were detected in all six sediments samples submitted for analysis as shown in Table 4.8.

Table 4.8 Baseline Concentrations for Formaldehyde and Acetaldehyde in Sediment

Parameter	PSQG (LEL)	MOE O. Reg. 153/04 Table 1	CCME	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th % (mg/kg)
Acetaldehyde	-	-	-	6	6	0.06	0.4	0.24	0.37	0.40
Formaldehyde	-	-	-	6	6	0.81	6	3.8	5.7	6.0
Ammonia as N	-	-	-	6	6	24	95	56	84	95

Notes:

PSQG - Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, 1993 (LEL: Lowest Effect Level)

CCME - Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Canadian Environmental Quality Guidelines. 1999. Update 2002. Interim freshwater sediment quality guidelines (dry weight) (unless otherwise indicated)

4.2.1 Sediment Baseline Findings

Sediment results for the COPCs were compared to the Lowest Effect Level of the Provincial Sediment Quality Guidelines (Ontario Ministry of the Environment and Energy, 1993b) or to the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. PAHs, PCBs and most metals with the exception of chromium were measured at concentrations below the PSQG. Chromium was measured in one sample at a maximum concentration of 32 mg/kg compared to the PSQG of 26 mg/kg.

The PCDD/PCDF levels in sediment (reported as TEQ levels) were above the 0.85 pg/g interim freshwater sediment quality guidelines (dry weight), but under the 21.5 pg/g Probable Effect Level of the CCME guidelines.

4.3 Surface Water

Six surface water samples (including a duplicate) were obtained, one from each stream location. All samples were submitted for analysis of metals, VOCs, SVOCs, PCBs, ammonia, formaldehyde, acetaldehyde and general chemistry. Four of the samples were submitted for PAHs, and PCDD/PCDFs. Surface water samples were collected during periods of clear flow and were not filtered. Hence, concentrations represent the total chemical concentration in water. Surface water sample results are presented in the following sections.

4.3.1 Trace Metals in Surface Water

Table 4.9 provides a summary of the baseline concentrations of trace metals in surface water and also provides the Provincial Water Quality Guidelines (PWQO) in Ontario as well as the Canadian Water Quality Guidelines (CCME). Several trace metals from the list of COPCs, such as antimony, beryllium, cadmium, lead, mercury, silver and chromium (hexavalent) were not detected in any of the surface water samples (Table 4.9). Results indicate that, with the exception of phosphorus, vanadium, zinc and hexavalent chromium, all other trace metals were below the guidelines. Of note, hexavalent chromium had analytical detection limits greater than the provincial standards.

Table 4.9 Baseline Concentrations for Metals in Surface Water

Parameter	PWQO (mg/L)	CCME (mg/L)	No. Analyzed	No. Detected	Min (mg/L)	Max (mg/L)	Mean (mg/L)	95% UCLM (mg/L)	95th Percentile (mg/L)
Aluminum (Al)-Total	-	5-100 [i]	6	6	0.05	0.36	0.14	0.27	0.36
Antimony (Sb)-Total	0.02 [a]	-	6	0	0.005	0.005 [m]	-	-	-
Arsenic (As)-Total	0.005 [a]	0.005	6	1	0.001	0.002	- [n]	- [n]	- [n]
Barium (Ba)-Total	-	-	6	6	0.06	0.09	0.08	0.09	0.09
Beryllium (Be)-Total	1.1 [b]	-	6	0	0.001	0.001 [m]	-	-	-
Bismuth (Bi)-Total	-	-	6	0	0.001	0.001 [m]	-	-	-
Boron (B)-Total	0.2 [a]	-	6	1	0.05	0.06	- [n]	- [n]	- [n]
Cadmium (Cd)-Total	0.0005 [a c]	0.017 [l]	6	0	0.0001	0.0001 [m]	-	-	-
Calcium (Ca)-Total	-	-	6	6	108	131	120	128	131
Chromium (Cr)-Total	0.0089 [d]	0.0089 [a]	6	6	0.001	0.006	- [n]	- [n]	- [n]
Cobalt (Co)-Total	0.0009	-	6	1	0.0005	0.0005	- [n]	- [n]	- [n]
Copper (Cu)-Total	0.005 [a e]	2-4 [k]	6	6	0.001	0.002	- [n]	- [n]	- [n]
Iron (Fe)-Total	0.3	0.3	6	6	0.32	0.8	0.52	0.71	0.8
Lead (Pb)-Total	0.005 [a f]	0.001-0.007 [l]	6	0	0.001	0.001 [m]	-	-	-
Magnesium (Mg)-Total	-	-	6	6	12	16.9	15.0	16.7	16.9
Manganese (Mn)-Total	-	-	6	6	0.027	0.093	0.064	0.089	0.093
Mercury (Hg)	0.0002 [g]	0.00026	6	0	0.0001	0.0001 [m]	-	-	-
Molybdenum (Mo)-Total	0.04 [a]	-	6	3	0.001	0.006	- [n]	- [n]	- [n]
Nickel (Ni)-Total	0.025	25-150 [j]	6	6	0.004	0.006	- [n]	- [n]	- [n]
Phosphorus (P)-Total	0.03 [h]	-	6	2	0.05	0.16	- [n]	- [n]	- [n]
Potassium (K)-Total	-	-	6	6	3	24	- [n]	- [n]	- [n]
Selenium (Se)-Total	0.1	0.001	6	0	0.005	0.005 [m]	-	-	-
Silicon (Si)-Total	-	-	6	6	4	6.2	- [o]	- [o]	- [o]
Silver (Ag)-Total	0.0001	0.0001	6	0	0.0001	0.0001 [m]	-	-	-
Sodium (Na)-Total	-	-	6	6	21.9	65	- [o]	- [o]	- [o]

Parameter	PWQO (mg/L)	CCME (mg/L)	No. Analyzed	No. Detected	Min (mg/L)	Max (mg/L)	Mean (mg/L)	95% UCLM (mg/L)	95th Percentile (mg/L)
Strontium (Sr)-Total	-	-	6	6	0.321	0.408	0.373	0.404	0.408
Thallium (Tl)-Total	0.0003 [a]	0.00008	6	0	0.0003	0.0003 [m]	-	-	-
Tin (Sn)-Total	-	-	6	0	0.001	0.001 [m]	-	-	-
Titanium (Ti)-Total	-	-	6	6	0.003	0.02	0.008	0.0148	0.02
Tungsten (W)-Total	-	-	6	0	0.01	0.01 [m]	-	-	-
Uranium (U)-Total	0.005 [a]	-	6	0	0.005	0.005 [m]	-	-	-
Vanadium (V)-Total	0.006 [a]	-	6	5	0.001	0.008	- [n]	- [n]	- [n]
Zinc (Zn)-Total	0.02 [a]	0.03	6	6	0.006	0.045	0.0176	0.0329	0.045
Zirconium (Zr)-Total	0.004 [a]	-	6	0	0.004	0.004 [m]	-	-	-
Chromium, Hexavalent	0.001	0.001	6	0	0.01	0.01 [m]	-	-	-

Notes: a - Interim value

b - PWQO of beryllium is 1100 µg/L when hardness as $CACO_3$ is greater than 75 mg/L
c - Interim PWQO is 5 µg/L when hardness as $CaCO_3$ is greater than 20 mg/L
d - 1 µg/L for hexavalent chromium, 8.9 µg/L for trivalent chromium
e - Interim PWQO is 5 µg/L when hardness as $CaCO_3$ is greater than 20 mg/L
f - Interim PWQO is 5 µg/L when hardness as $CaCO_3$ is greater than 80 mg/L
g - In a filtered water sample
h - Excessive plant growth in rivers and streams should be eliminated at a total P concentration below 30µg/L
i - Aluminum guideline = 5 µg/L at pH < 6.5, 100 µg/L at pH >6.5
j - Nickel guideline = 25 µg/L at a water hardness of 0-60 mg/L (soft) as $CaCO_3$,
65 µg/L at a water hardness of 60-120 mg/L (medium) as $CaCO_3$
110 µg/L at a water hardness of 120-180 mg/L (hard) as $CaCO_3$
150 µg/L at a water hardness >180 mg/L (very hard) as $CaCO_3$
k - Copper guideline = 2 µg/L at a water hardness of 0-120 mg/L (soft to medium) as $CaCO_3$,
3 µg/L at a water hardness of 120-180 mg/L (hard) as $CaCO_3$
4 µg/L at a water hardness >180 mg/L (very hard) as $CaCO_3$
l - Cadmium guideline = 10 ^ {0.86[log(hardness)]-3.2}
m - Maximum value is the detection limit
n - Statistical analysis cannot be performed due to insufficient number of unique data points
o - Data distribution was not normal or lognormal
PWQO: Provincial Water Quality Objectives, Ministry of Environment and Energy, July 1994
CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life. Update 7.1, 1999. Update December 2007. Canadian Environmental Quality Guidelines

4.3.2 Chlorinated Monocyclic Aromatics in Surface Water

SVOCs were not detected in any of the samples (Table 4.10). However with the exception of 1,2,4,5-Tetrachlorobenzene, all other SVOCs had analytical detection limits greater than the provincial guidelines.

Table 4.10 Baseline Concentrations for SVOCs in Surface Water

Parameter	PWQO (µg/L)	CCME (µg/L)	No. Analyzed	No. Detected	Min (µg/L)	Max as the DL (µg/L)
Hexachlorobenzene	0.0065	-	6	0	0.05	0.05
Hexachlorobutadiene	0.009 [a]	-	6	0	0.05	0.05
Pentachlorobenzene	0.03	-	6	0	0.05	0.05
1,2,4,5-Tetrachlorobenzene	0.15	-	6	0	0.05	0.05

Notes: a - Interim value
PWQO: Provincial Water Quality Objectives, Ministry of Environment and Energy, July 1994
CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life. Update 7.1, 1999. Update December 2007. Canadian Environmental Quality Guidelines

4.3.3 Chlorophenols in Surface Water

Chlorophenols were not detected in any of the samples (Table 4.11) and were all below the provincial guidelines.

Table 4.11 Baseline Concentrations for Chlorophenols in Surface Water

Parameter	PWQO (ng/L)	CCME (ng/L)	No. Analyzed	No. Detected	Min (ng/L)	Max as the DL (ng/L)
2,4-Dichlorophenol	200	-	6	0	10	10
2,4,6-Trichlorophenol	18000	-	6	0	10	10
2,3,4,6-Tetrachlorophenol	1000	-	6	0	10	10
Pentachlorophenol	500	500	6	0	10	10

Notes:
PWQO: Provincial Water Quality Objectives, Ministry of Environment and Energy, July 1994
CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life. Update 7.1, 1999. Update December 2007. Canadian Environmental Quality Guidelines

4.3.4 Chlorinated Polycyclic Aromatics in Surface Water

4.3.4.1 Polychlorinated biphenyls (PCBs) in Surface Water

Table 4.12 provides a summary of baseline PCBs concentration in surface water and also provides a comparison to the provincial and federal guidelines. As indicated in Table 4.12 the results indicate that there were no PCBs concentration above the guidelines (all were below their detection limit).

Table 4.12 Baseline Concentrations for PCBs in Surface Water

Parameter	PWQO (µg/L)	CCME (µg/L)	No. Analyzed	No. Detected	Min (µg/L)	Max as the DL (µg/L)
Aroclor 1242	0.001	-	6	0	0.02	0.02
Aroclor 1248	0.001	-	6	0	0.02	0.02
Aroclor 1254	0.001	-	6	0	0.02	0.02
Aroclor 1260	0.001	-	6	0	0.02	0.02
Total PCBs	0.001	-	6	0	0.02	0.02

Notes:
PWQO: Provincial Water Quality Objectives, Ministry of Environment and Energy, July 1994
CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life. Update 7.1, 1999. Update December 2007. Canadian Environmental Quality Guidelines

4.3.4.2 Polychlorinated Dioxins and Furans in Surface Water

Most of the PCDD/F congeners were detected in at least one of the surface water samples (Table 4.13). The maximum baseline surface water concentrations were used to determine the TEQ of PCDD/PCDF for fish (Table 4.13). The TEQ level in surface water for fish was 3.68 pg/g. Additional details regarding the methodology used are provided in Section 2.4.2.

Table 4.13 Baseline Concentrations for PCDD/PCDF in Surface Water

Parameter	PWQO (pg/L)	CCME (pg/L)	No. Analyzed	No. Detected	Min (pg/L)	Max as the DL (pg/L)	TEF_F	$TEF_F X C_{Max}$
2,3,7,8-TCDD	-	-	4	0	0.42	1.5	1.0	1.50
1,2,3,7,8-PeCDD	-	-	4	0	0.3	1	1.0	1.00
1,2,3,4,7,8-HxCDD	-	-	4	0	0.35	0.57	0.5	0.29
1,2,3,6,7,8-HxCDD	-	-	4	0	0.33	0.62	0.01	0.01
1,2,3,7,8,9-HxCDD	-	-	4	0	0.36	0.63	0.01	0.01
1,2,3,4,6,7,8-HpCDD	-	-	4	1	0.68	1.38 [b]	0.001	0.00
OCDD	-	-	4	3	2.9	21 [a]	0.0001	0.00
2,3,7,8-TCDF	-	-	4	0	0.23	1.2	0.05	0.06
1,2,3,7,8-PeCDF	-	-	4	0	0.29	0.83	0.05	0.04
2,3,4,7,8-PeCDF	-	-	4	1	0.26	0.552 [b]	0.5	0.28
1,2,3,4,7,8-HxCDF	-	-	4	0	0.31	0.54	0.1	0.05
1,2,3,6,7,8-HxCDF	-	-	4	0	0.31	3	0.1	0.30
2,3,4,6,7,8-HxCDF	-	-	4	0	0.3	0.5	0.1	0.05
1,2,3,7,8,9-HxCDF	-	-	4	0	0.39	0.73	0.1	0.07
1,2,3,4,6,7,8-HpCDF	-	-	4	0	0.36	0.8	0.01	0.01
1,2,3,4,7,8,9-HpCDF	-	-	4	0	0.27	1.3	0.01	0.01
OCDF	-	-	4	0	0.5	1.2	0.0001	0.00
TEQ	-	-	-	-	-	-	-	**3.68**

Notes:

a - Maximum value is a detected concentration

b - Maximum value is a detected concentration, but is below a detection limit

$TEF_{H/M}$ - Toxic Equivalency Factor for Humans/Mammals based on WHO (2005)

C_{MAX} - Maximum Concentration

PWQO: Provincial Water Quality Objectives, Ministry of Environment and Energy, July 1994
CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life. Update 7.1, 1999. Update December 2007. Canadian Environmental Quality Guidelines

4.3.5 Polycyclic Aromatic Hydrocarbons in Surface Water

Table 4.14 provides a summary of the baseline concentrations of PAHs in surface water and also provides the Provincial Water Quality Guidelines (PWQO) in Ontario as well as the Canadian Water Quality Guidelines (CCME) for comparison. With the exception of anthracene and naphthalene which were detected in one of the four samples submitted, the remaining PAHs were not detected in any of the other samples (Table 4.14). Of note, anthracene, flouranthene, pyrene, benzo(a)anthracene, crysene, benzo(a)pyrene, perylene had detection limits greater than the provincial guidelines but lower than the federal guidelines. In the case of dibenzo(ah)anthracene and benzo(g,h,i)perylene the detection limits were greater than the provincial guidelines.

Table 4.14 Baseline Concentrations for PAHs in Surface Water

Parameter	PWQO (µg/L)	CCME (µg/L)	No. Analyzed	No. Detected	Min (µg/L)	Max as the DL (µg/L)
Naphthalene	7 [a]	1.1 [a]	4	1	0.01	0.01 [b]
1-Methylnaphthalene	2 [a]	-	4	0	0.01	0.01
2-Methylnaphthalene	2 [a]	-	4	0	0.01	0.01
Acenaphthylene	-	-	4	0	0.01	0.01
Acenaphthene	-	5.8 [a]	4	0	0.01	0.01
Fluorene	0.2	3.0 [a]	4	0	0.01	0.02
Phenanthrene	0.03 [a]	0.4 [a]	4	0	0.01	0.01
Anthracene	0.0008 [a]	0.012 [a]	4	1	0.01	0.01 [b]
Fluoranthene	0.0008 [a]	0.04 [a]	4	0	0.01	0.01
Pyrene	-	0.025 [a]	4	0	0.01	0.01
Benzo(a)anthracene	0.0004 [a]	0.018 [a]	4	0	0.01	0.01
Chrysene	0.0001 [a]	-	4	0	0.01	0.01
Benzo(b)fluoranthene	-	-	4	0	0.01	0.01
Benzo(k)fluoranthene	0.0002 [a]	-	4	0	0.01	0.01
Benzo(a)pyrene	-	0.015 [a]	4	0	0.01	0.01
Perylene	0.00007 [a]	-	4	0	0.01	0.01
Indeno(1,2,3-cd)pyrene	-	-	4	0	0.01	0.01
Dibenzo(ah)anthracene	0.002 [a]	-	4	0	0.01	0.01
Benzo(g,h,i)perylene	0.00002 [a]	-	4	0	0.01	0.01

Notes:

a - Interim value

b - Maximum value is a detected concentration

PWQO: Provincial Water Quality Objectives, Ministry of Environment and Energy, July 1994

CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life. Update 7.1, 1999. Update December 2007. Canadian Environmental Quality Guidelines

4.3.6 Volatile Organic Compounds in Surface Water

With the exception of dichloromethane, all other VOCs were not detected in any of the samples and were all under the provincial guidelines (Table 4.15).

Table 4.15 Baseline Concentrations for VOCs in Surface Water

Parameter	PWQO (µg/L)	CCME (µg/L)	No. Analyzed	No. Detected	Min (µg/L)	Max as the DL (µg/L)	Mean (µg/L)	95% UCLM (µg/L)	95th % (µg/L)
Acrolein	-	-	6	0	10	10	-	-	-
Benzene	100 [a]	370 [a]	6	0	0.5	0.5	-	-	-
Bromobenzene	-	-	6	0	0.5	0.5	-	-	-
Bromochloromethane	-	-	6	0	0.5	0.5	-	-	-
Bromodichloromethane	200 [a]	-	6	0	0.5	0.5	-	-	-
Bromoform	60 [a]	-	6	0	0.5	0.5	-	-	-
Bromomethane	0.9 [a]	-	6	0	1	1	-	-	-
n-Butylbenzene	-	-	6	0	0.5	0.5	-	-	-
sec-Butylbenzene	-	-	6	0	0.5	0.5	-	-	-
tert-Butylbenzene	-	-	6	0	0.5	0.5	-	-	-
Carbon Disulfide	-	-	6	0	0.5	0.5	-	-	-
Carbon tetrachloride	5	13.3 [a]	6	0	0.5	0.5	-	-	-
Chlorobenzene	15	-	6	0	0.5	0.5	-	-	-
Dibromochloromethane	-	-	6	0	0.5	0.5	-	-	-
Chloroethane	-	-	6	0	1	1	-	-	-
Chloroform	-	1.8 [a]	6	0	0.5	0.5	-	-	-
Chloromethane	700 [a]	-	6	0	1	1	-	-	-
2-Chlorotoluene	-	-	6	0	20	20	-	-	-
4-Chlorotoluene	-	-	6	0	0.5	0.5	-	-	-
1,2-Dibromo-3-chloropropane	-	-	6	0	0.5	0.5	-	-	-
1,2-Dibromoethane	-	-	6	0	0.5	0.5	-	-	-
Dibromomethane	100 [a]	-	6	0	0.5	0.5	-	-	-
1,2-Dichlorobenzene	2.5	0.7 [a]	6	0	0.5	0.5	-	-	-
1,3-Dichlorobenzene	2.5	150 [a]	6	0	0.5	0.5	-	-	-
1,4-Dichlorobenzene	4	26 [a]	6	0	0.5	0.5	-	-	-
Dichlorodifluoromethane	-	-	6	0	1	1	-	-	-
1,1-Dichloroethane	200 [a]	-	6	0	0.5	0.5	-	-	-
1,2-Dichloroethane	100 [a]	100 [a]	6	0	0.5	0.5	-	-	-
1,1-Dichloroethylene	40 [a]	-	6	0	0.5	0.5	-	-	-
cis-1,2-Dichloroethylene	200 [a]	-	6	0	0.5	0.5	-	-	-
trans-1,2-Dichloroethylene	200 [a]	-	6	0	0.5	0.5	-	-	-

Parameter	PWQO (µg/L)	CCME (µg/L)	No. Analyzed	No. Detected	Min (µg/L)	Max as the DL (µg/L)	Mean (µg/L)	95% UCLM (µg/L)	95th % (µg/L)
Dichloromethane	100 [a]	98.1 [a]	6	6	0.7	1.5 [c]	1.2	1.5	1.5
1,2-Dichloropropane	0.7 [a]	-	6	0	0.5	0.5	-	-	-
1,3-Dichloropropane	-	-	6	0	0.5	0.5	-	-	-
2,2-Dichloropropane	-	-	6	0	0.5	0.5	-	-	-
1,1-Dichloropropene	-	-	6	0	0.5	0.5	-	-	-
cis-1,3-Dichloropropene	-	-	6	0	0.5	0.5	-	-	-
trans-1,3-Dichloropropene	7 [a]	-	6	0	0.5	0.5	-	-	-
1,2-Dichlorotetrafluoroethane	-	-	6	0	10	10	-	-	-
Ethyl Benzene	8 [a]	90 [a]	6	0	0.5	0.5	-	-	-
Hexachlorobutadiene	-	1.3 [a]	6	0	0.5	0.5	-	-	-
2-Hexanone	-	-	6	0	20	20	-	-	-
Isopropylbenzene	-	-	6	0	0.5	0.5	-	-	-
Isopropyltoluene	-	-	6	0	0.5	0.5	-	-	-
Methyl Ethyl Ketone	-	-	6	0	20	20	-	-	-
Methyl Isobutyl Ketone	400 [a]	-	6	0	20	20	-	-	-
MTBE	-	10000 [a]	6	0	0.5	0.5	-	-	-
Naphthalene	7 [a]	-	6	0	0.5	0.5	-	-	-
n-Propylbenzene	-	-	6	0	0.5	0.5	-	-	-
Styrene	4 [a]	72 [a]	6	0	0.5	0.5	-	-	-
1,1,1,2-Tetrachloroethane	20 [a]	-	6	0	0.5	0.5	-	-	-
1,1,2,2-Tetrachloroethane	70 [a]	-	6	0	0.5	0.5	-	-	-
Tetrachloroethylene	50 [a]	-	6	0	0.5	0.5	-	-	-
Toluene	0.8 [a]	-	6	0	0.5	0.5	-	-	-
1,1,2-Trichloro-1,2,2-trifluoroethane	-	-	6	0	10	10	-	-	-
1,2,3-Trichlorobenzene	0.9	8.0 [a]	6	0	0.5	0.5	-	-	-
1,2,4-Trichlorobenzene	0.5	24 [a]	6	0	0.5	0.5	-	-	-
1,1,1-Trichloroethane	10 [a]	-	6	0	0.5	0.5	-	-	-
1,1,2-Trichloroethane	800 [a]	21 [a]	6	0	0.5	0.5	-	-	-
Trichloroethylene	20 [a]	-	6	0	0.5	0.5	-	-	-
Trichlorofluoromethane	-	-	6	0	1	1	-	-	-
1,2,3-Trichloropropane	-	-	6	0	0.5	0.5	-	-	-
Trihalomethanes (total)	-	-	6	0	2	2	-	-	-
1,2,4-Trimethylbenzene	-	-	6	0	0.5	0.5	-	-	-
1,3,5-Trimethylbenzene	-	-	6	0	0.5	0.5	-	-	-
Vinyl chloride	600 [a]	-	6	0	0.5	0.5	-	-	-

Parameter	PWQO (µg/L)	CCME (µg/L)	No. Analyzed	No. Detected	Min (µg/L)	Max as the DL (µg/L)	Mean (µg/L)	95% UCLM (µg/L)	95th % (µg/L)
o-Xylene	40 [a]	-	6	0	0.5	0.5	-	-	-
m+p-Xylenes	40 [ab]	-	6	0	1	1	-	-	-
Xylenes (Total)	-	-	6	0	1.5	1.5	-	-	-

Notes:

a - Interim value

b - m-xylene (2 µg/L) + p-xylene (38 µg/L)

c - Maximum value is a detected concentration

PWQO: Provincial Water Quality Objectives, Ministry of Environment and Energy, July 1994

CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life. Update 7.1, 1999. Update December 2007. Canadian Environmental Quality Guidelines

4.3.7 Formaldehyde and Acetaldehyde in Surface Water

Formaldehyde and acetaldehyde were not detected in any of the six surface water samples submitted for analysis as shown in Table 4.16. Of note formaldehyde had detection limits greater than the provincial guidelines.

Table 4.16 Baseline Concentrations for Formaldehyde and Acetaldehyde in Surface Water

Parameter	PWQO (mg/L)	CCME (mg/L)	No. Analyzed	No. Detected	Min (mg/L)	Max as the DL (mg/L)
Acetaldehyde	-	-	6	0	0.01	0.01
Formaldehyde	0.0008 [a]	-	6	0	0.01	0.01

Notes: a - Interim value

PWQO: Provincial Water Quality Objectives, Ministry of Environment and Energy, July 1994

CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life. Update 7.1, 1999. Update December 2007. Canadian Environmental Quality Guidelines

4.3.8 General Chemistry

General chemistry parameters were analyzed in all six surface water samples submitted for analysis as shown in Table Table 4.17.

4.3.9 Surface Water Baseline Findings

The COPCs measured in the surface water were compared to the Provincial Water Quality Objectives (MOEE 1994) or to the CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life (2007). Phosphorous, vanadium and zinc exceeded marginally the PWQO Concentrations of PCDD/PCDF, VOCs and chlorophenols were all below their respective PWQO. Concentrations of PAHs, formaldehydes, SVOCs, PCBs were all measured below or at the detection limit; however these detection limits were generally greater than the PWQO.

Table 4.17 Baseline Concentrations for General Chemistry in Surface Water

Parameter	Units	PWQO	CCME	No. Analyzed	No. Detected	Min	Max	Mean	95% UCLM	95th Percentile
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	6	6	221	354	309	358	354
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	6	0	10	10 [e]	-	-	-
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	6	0	10	10 [e]	-	-	-
Alkalinity, Total (as CaCO3)	mg/L	-	-	6	6	224	359	314	363	359
Ammonia as N	mg/L	-	[b]	6	6	0.07	0.75	0.13 [h]	0.2 [h]	0.22 [h]
Bromide	mg/L	-	-	6	1	0.1	0.1	- [f]	- [f]	- [f]
Chloride	mg/L	-	-	6	6	53	128	99	125	128
Computed Conductivity	uS/cm	-	-	6	6	690	921	832	913	921
Conductivity % Difference	%	-	-	6	6	-9.8	-6.1	-7.7	-5.9	-6.1
Fluoride	mg/L	-	-	6	6	0.1	0.2	- [f]	- [f]	- [f]
Hardness (as CaCO3)	mg/L	-	-	6	6	334	391	360	383	391
Ion Balance	%	-	-	6	6	105	116	112	116	116
Langelier Index	-	-	-	6	6	1	1.4	1.3	1.4	1.4
Nitrate and Nitrite as N	mg/L	-	-	6	6	0.3	3	- [f]	- [f]	- [f]
Nitrate-N	mg/L	-	13 [a c]	6	6	0.3	3	- [f]	- [f]	- [f]
Nitrite-N	mg/L	-	0.060 [d]	6	0	0.1	0.1 [e]	-	-	-
Saturation pH	pH	-	-	6	6	6.81	7.09	6.91	7.01	7.09
Phosphate-P (ortho)	mg/L	-	-	6	4	0.003	0.007	0.0045	0.006	0.007
TDS (Calculated)	mg/L	-	-	6	6	432	574	512	560	574
Sulphate	mg/L	-	-	6	6	14	52	- [g]	- [g]	- [g]
Anion Sum	me/L	-	-	6	6	7.5	9.6	8.6	9.3	9.6
Cation Sum	me/L	-	-	6	6	7.9	10.8	9.7	10.7	10.8
Cation - Anion Balance	%	-	-	6	6	2.3	7.4	5.7	7.6	7.4
Dissolved Organic Carbon	mg/L	-	-	6	6	4	22	- [g]	- [g]	- [g]
Silica	mg/L	-	-	6	6	8.6	13.3	9.4 [h]	9.8 [h]	9.9 [h]
Color, Apparent	C.U.	-	-	6	6	15	28 [h]	40 [h]	41 [h]	28 [h]
Conductivity	umhos/cm	-	-	6	6	761	898	978	997	898
% Moisture	-	-	-	0	0	-	-	-	-	-
pH	pH units	-	6.5-9	6	6	8.13	8.18	8.22	8.24	8.18
Total Dissolved Solids	mg/L	-	-	6	6	460	528	580	600	528
Turbidity	NTU	-	-	6	6	1.1	3.6	5.5	6.1	3.6

Notes:
a - Interim value,
b - Total ammonia guideline varies with temperature and pH
c - For protection from direct toxic effects; the guidelines do not consider indirect effects due to eutrophication. Guidelines are expressed in mg nitrate/L. These values are equivalent to 2.9 mg nitrate-nitrogen/L for freshwater.
d - Guideline is expressed as mg nitrite-nitrogen/L. This value is equivalent to 0.197 mg nitrite/L.
e - Maximum value is the detection limit
f - Statistical analysis cannot be performed due to insufficient number of unique data points
g- Data distribution was not normal or lognormal
h - Outlier(s) removed
PWQO: Provincial Water Quality Objectives (July 1994), CCME Protection Aquatic Life (2008)

4.4 Fish

Six fish samples (including a duplicate) were collected from locations were the aquatic habitat was identified to support a large enough population of fish to allow the collection of fish samples. These locations were Freshwater Locations S7 (two composite samples), W3 (two samples: one composite, one single fish) and W4 (two samples: one composite, one single fish). Two of the fish samples were medium sized fish submitted as a single sample to the laboratory whereas the other three samples were composite samples of many small fish. All samples were analyzed for metals, SVOCs, PCBs PAHs, PCDD/PCDFs, arsenic speciation, and % lipid content. No comparison of the baseline measured values in fish was possible to provincial or federal guidelines as data was not available.

4.4.1 Trace Metals in Fish

Several trace metals from the list of COPCs such as antimony, beryllium, boron and silver were not detected in any of the six samples submitted for analysis (Table 4.18). Concentrations of arsenic in the fish from S7 were generally higher than the concentrations of arsenic in fish from the sample locations.

Table 4.18 Recommended Baseline Concentrations for Metals in Fish

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Aluminum (Al)-Total	6	6	3.5	54.8	22.8	43.3	54.8
Antimony (Sb)-Total	6	0	0.01	0.01 [a]	-	-	-
Arsenic (As)-Total	6	6	0.018	0.166	0.077	0.131	0.166
Barium (Ba)-Total	6	6	0.661	2.43	1.55	2.31	2.43
Beryllium (Be)-Total	6	0	0.1	0.1 [a]	-	-	-
Bismuth (Bi)-Total	6	0	0.03	0.03 [a]	-	-	-
Boron (B)-Total	6	0	6	6 [a]	-	-	-
Cadmium (Cd)-Total	6	6	0.0067	0.0215	0.0156	0.022	0.0215
Calcium (Ca)-Total	6	6	8370	10200	8908	9639	10200
Chromium (Cr)-Total	6	6	0.1	0.33	0.18	0.28	0.33
Cobalt (Co)-Total	6	2	0.02	0.028	- [b]	- [b]	- [b]
Copper (Cu)-Total	6	6	0.847	1.61	1.23	1.515	1.61
Iron (Fe)-Total	6	6	12.4	68.5	36.7	59.1	68.5
Lead (Pb)-Total	6	4	0.02	0.07	0.04	0.06	0.07
Lithium (Li)-Total	6	0	0.1	0.1 [a]	-	-	-
Magnesium (Mg)-Total	6	6	354	397	369	385	397
Manganese (Mn)-Total	6	6	1.4	7.17	4.32	6.99	7.17
Mercury (Hg)-Total	6	6	0.0437	0.0935	0.0718	0.0944	0.0935
Molybdenum (Mo)-Total	6	6	0.021	0.039	0.028	0.036	0.039
Nickel (Ni)-Total	6	4	0.1	0.48	0.14 [c]	0.19 [c]	0.2 [c]
Phosphorus (P)-Total	6	6	5460	6090	5758	5999	6090
Potassium (K)-Total	6	6	2640	2840	2727	2818	2840

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Selenium (Se)-Total	6	6	0.557	1.28	0.973	1.26	1.28
Silver (Ag)-Total	6	0	0.01	0.01 [a]	-	-	-
Sodium (Na)-Total	6	6	771	883	823	866	883
Strontium (Sr)-Total	6	6	8.47	10.9	9.6	10.9	10.9
Thallium (Tl)-Total	6	0	0.01	0.01 [a]	-	-	-
Tin (Sn)-Total	6	0	0.05	0.05 [a]	-	-	-
Titanium (Ti)-Total	6	6	0.18	3.5	1.35	2.66	3.5
Uranium (U)-Total	6	3	0.002	0.0032	- [b]	- [b]	- [b]
Vanadium (V)-Total	6	3	0.1	0.21	- [b]	- [b]	- [b]
Zinc (Zn)-Total	6	6	19.3	38.3	27.1	34.6	38.3

Notes:

a - Maximum value is the detection limit
b - Statistical analysis cannot be performed due to insufficient number of unique data points
c - Outlier(s) removed

4.4.2 Chlorinated Monocyclic Aromatics in Fish

Chlorinated Monocyclic Aromatics, specifically SVOCs were not detected in any of the samples (Table 4.19).

Table 4.19 Baseline Concentrations for SVOCs in Fish

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	6	0	0.01	0.01
Hexachlorobutadiene	6	0	0.01	0.01
Pentachlorobenzene	6	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	6	0	0.01	0.01

4.4.3 Chlorinated Polycyclic Aromatics in Fish

4.4.3.1 Polychlorinated Biphenyls (PCBs) in Fish

Total PCBs were detected in five of the six samples submitted for analysis (Table 4.20).

Table 4.20 Baseline Concentrations for PCBs in Fish

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Aroclor 1242	6	0	0.01	0.01	-	-	-
Aroclor 1248	6	0	0.01	0.01	-	-	-
Aroclor 1254	6	2	0.01	0.01 [a]	- [b]	- [b]	- [b]
Aroclor 1260	6	0	0.01	0.01	-	-	-
Total PCBs	6	5	0.01	0.02 [a]	- [b]	- [b]	- [b]

Notes:

a - Maximum value is a detected concentration

b - Statistical analysis cannot be performed due to insufficient number of unique data points

4.4.3.2 Polychlorinated Dioxins and Furans in Fish

2,3,7,8 TCDD was not detected in any of the samples (Table 4.21). Some of the congeners were however detected in at least one of the samples. The recommended baseline fish concentrations were used to determine the TEQ of PCDD/PCDF for fish (Table 4.21). Additional details regarding the methodology used are provided in Section 2.4.2.

Table 4.21 Recommended Baseline Concentrations for PCDD/PCDF in Fish

Parameter	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	Mean (pg/g)	95% UCLM (pg/g)	95th Percentile (pg/g)	TEF_F	TEF_F X C_{Max}	TEF_F X C_{mean}	TEF_F X C_{UCLM}	TEF_F X $C_{95\%}$
2,3,7,8-TCDD	6	0	0.17	0.21	-	-	-	1.0	0.2100	-	-	-
1,2,3,7,8-PeCDD	6	1	0.059	0.233 [a]	0.16	0.244	0.233	1.0	0.2330	0.1600	0.2440	0.2330
1,2,3,4,7,8-HxCDD	6	0	0.048	0.15	-	-	-	0.5	0.0750	-	-	-
1,2,3,6,7,8-HxCDD	6	0	0.088	0.15	-	-	-	0.01	0.0015	-	-	-
1,2,3,7,8,9-HxCDD	6	0	0.049	0.15	-	-	-	0.01	0.0015	-	-	-
1,2,3,4,6,7,8-HpCDD	6	1	0.093	0.351 [a]	0.214	0.313	0.351	0.001	0.0004	0.0002	0.0003	0.0004
OCDD	6	2	0.2	0.945 [a]	0.568	0.904	0.945	0.0001	0.0001	0.0001	0.0001	0.0001
2,3,7,8-TCDF	6	5	0.26	0.71 [a]	0.46	0.63	0.71	0.05	0.0355	0.0230	0.0315	0.0355
1,2,3,7,8-PeCDF	6	2	0.12	0.239 [a]	0.168	0.216	0.239	0.05	0.0120	0.0084	0.0108	0.0120
2,3,4,7,8-PeCDF	6	1	0.068	0.568 [a]	-[b]	-[b]	-[b]	0.5	0.2840	-	-	-
1,2,3,4,7,8-HxCDF	6	0	0.079	0.23	-	-	-	0.1	0.0230	-	-	-
1,2,3,6,7,8-HxCDF	6	0	0.073	0.22	-	-	-	0.1	0.0220	-	-	-
2,3,4,6,7,8-HxCDF	6	0	0.077	0.22	-	-	-	0.1	0.0220	-	-	-
1,2,3,7,8,9-HxCDF	6	0	0.091	0.26	-	-	-	0.1	0.0260	-	-	-
1,2,3,4,6,7,8-HpCDF	6	1	0.033	0.143 [a]	0.165	0.135	0.21	0.01	0.0014	0.0017	0.0014	0.0021
1,2,3,4,7,8,9-HpCDF	6	0	0.045	0.13	-	-	-	0.01	0.0013	-	-	-
OCDF	6	1	0.12	0.193 [c]	0.151	0.199	0.233	0.0001	0.0000	0.0000	0.0000	0.0000
TEQ	-	-	-	-	-	-	-	-	**0.95**	**0.19**	**0.29**	**0.28**

Notes:
a - Maximum value is a detected concentration
b - Statistical analysis cannot be performed due to insufficient number of unique data points
c - Maximum value is a detected concentration, but is below a detection limit
TEF_F = Toxic equivalency factor for fish based on WHO (1998)
C_{Max} = Maximum concentration
C_{MEAN} = Mean Concentration
C_{UCLM} = 95% Upper Confidence Limit of the Mean
$C_{95\%}$ = 95th Percentile Concentration

4.4.4 Polycyclic Aromatic Hydrocarbons in Fish

Eight of the PAHs were detected in one or more of the fish samples (Table 4.22).

Table 4.22 Recommended Baseline Concentrations for PAHs in Fish

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)	Mean (ng/g)	95% UCLM (ng/g)	95th Percentile (ng/g)
Naphthalene	6	6	1.43	2.48 [a]	1.92	2.31	2.48
2-Methylnaphthalene	6	6	1.4	2.53 [a]	1.93	2.44	2.53
1-Methylnaphthalene	6	6	0.92	1.75 [a]	1.25	1.57	1.75
Acenaphthylene	6	0	0.3	0.3	-	-	-
Acenaphthene	6	6	0.74	1.11 [a]	0.99	1.14	1.11
Fluorene	6	5	0.71	1.29 [a]	0.92	1.15	1.29
Phenanthrene	6	6	0.63	2.72 [a]	1.36	2.24	2.72
Anthracene	6	1	0.3	0.3 [a]	-[b]	-[b]	-[b]
Fluoranthene	6	2	0.3	0.79 [c]	-[b]	-[b]	-[b]
Pyrene	6	0	0.3	0.44	-	-	-
Benzo(a)anthracene	6	0	0.3	0.3	-	-	-
Chrysene/Triphenylene	6	0	0.3	0.53	-	-	-
Benzo(b)flouranthene	6	0	0.3	0.3	-	-	-
Benzo(k)fluoranthene	6	0	0.3	0.3	-	-	-
Benzo(e)pyrene	6	0	0.3	0.3	-	-	-
Benzo(a)pyrene	6	0	0.3	0.3	-	-	-
Perylene	6	0	0.3	0.3	-	-	-
Indeno(1,2,3-cd)pyrene	6	0	0.3	0.3	-	-	-
Dibenzo(a,h/a,c)anthracene	6	0	0.3	0.3	-	-	-
Benzo(g,h,i)perylene	6	0	0.3	0.65	-	-	-

Notes:
a - Maximum value is a detected concentration
b - Statistical analysis cannot be performed due to insufficient number of unique data points
c - Maximum value is a detected concentration, but is below a detection limit

4.4.5 % Lipids in Fish

All of the six fish samples collected were submitted for analysis of lipid content. As indicated in Table 4.23, the lipid content in fish ranged from 4.5 to 6.27%.

Table 4.23 Baseline Concentrations for Lipid Content in Fish

Parameter	No. Analyzed	No. Detected	Min (%)	Max (%)	Mean (%)	95% UCLM (%)	95th Percentile (%)
% Lipids	6	6	4.5	6.27	5.28	5.98	6.27

4.4.6 Arsenic Speciation in Fish

As indicated in Table 4.24, As(III) was detected in five of the fish samples while As(V) was detected in two of the samples. The combined baseline concentration of inorganic arsenic in fish is therefore 0.008 mg/kg (i.e., the combined total of As(III) and As(V)). The measured baseline concentration of total arsenic in fish is 0.178 mg/kg (Table 4.18), indicating that the majority (i.e., greater than 95.5%) of the arsenic in fish appears to occur as organic arsenic.

Table 4.24 Baseline Concentrations for Arsenic Species in Fish

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
As(III)	6	5	0.002	0.005	-[b]	-[b]	-[b]
As(V)	6	2	0.002	0.003	-[b]	-[b]	-[b]
Dimethylarsinate DMA(V)	6	1	0.002	0.004	-[b]	-[b]	-[b]
Monomethylarsonate MMA(V)	6	0	0.002	0.002 [a]	-	-	-

Notes:

a - Maximum value is the detection limit

b - Statistical analysis cannot be performed due to insufficient number of unique data points

4.4.7 Fish Baseline Findings

Several of the COPCs such as trace metals, PAHs, PCBs, PCDD/PCDF were detected in the fish samples that were collected during the baseline study. Most of the chemical were detected at very low or close to the detection limits. Provincial and/or federal guidelines were not available for comparison purposes.

5.0 SUMMARY OF PRODUCE RESULTS

A variety of produce was purchased from local farmers markets, farm stands, farmer's fields and one residential garden, and then arranged into categories in order to obtain a representative sample of what is grown in the local area. The categories of produce sampled included:

- Above ground exposed vegetables (AGE), such as cucumbers, peas, peppers, and beans.
- Above ground protected vegetables (AGP), such as corn and squash.
- Below ground vegetables (BG), such as potatoes, beets, carrots and radishes.
- Fruit (F), such as strawberries, apples, and raspberries.

Agricultural products such as chicken, beef, pork, dairy (milk), and eggs were purchased from three farms located in the vicinity of the proposed facility. The categories of agricultural produce collected included:

- Chicken: two whole chickens with their internal organs removed, separated into 2 samples.
- Beef: T-bone steak, separated into 2 samples.
- Pork: sausage, separated into 2 samples.
- Dairy: 3 L of milk separated into 2 samples.
- Eggs: 30 eggs separated into 2 samples.

Descriptions of the produce locations and the produce sampled at each location are provided in Table 5.1.

Copies of the laboratory certificates are on record at Jacques Whitford while tabular summaries of the analytical results and the statistical calculations are provided in Appendix A. The recommended baseline concentrations of selected chemicals in each of the produce types are provided in the following sections.

Table 5.1 Produce Collected from Various Locations

Site	Above Ground Exposed	Above Ground Protected	Below Ground	Fruit	Agricultural Products
Racansky Home Garden				Mulberries	
Watson Farms Limited	Peas Beans	Corn		Raspberries Strawberries	
Fred's Fruit Market				Strawberries	
Fred's Apple Orchard				Apples	
Clarington Farmer's Market	Peppers Cucumbers	Corn	Beets Carrots Potatoes Radishes	Apples	
Price's Country Market	Beans Cucumbers	Corn Squash			
Bloomfield's Farm Market		Corn			
Metcalf Farm					Dairy Eggs
Foley Farm					Chicken
Found Farm					Beef Pork Eggs

5.1 Description of Produce Sampling Locations

A brief description of each produce sampling location is provided below.

5.1.1 Produce Sampling Locations

Racansky Residence

Soil and mulberry samples were collected from the residence of Libby Racansky located at 3200 Hancock Road, Courtice, Ontario.

Watson Farm Limited

Produce and soil samples were collected from Watson Farms Ltd. Located at 1583 Maple Grove Road, Bowmanville, Ontario during two sampling events (due to product seasonality). In the first sampling event soil and strawberry samples were collected from the "U-Pick" area of Watson Farms Ltd. During the second sampling event matching soil and produce samples were collected from the raspberry, bean, pea and corn crops at farm. However, only one soil sample representative of the site was sent for chemical analysis.

Fred's Fruit Market

Matching soil and strawberry samples were collected from Fred's Fruit Market located at 4303 Hwy 115, Orono, Ontario in the "Pick Your Own" field.

Fred's Fruit Orchard

The apple orchard is owned by Fred's Fruit Market and is located at the 3431 Gibson Road in Orono, Ontario. Macintosh apples from the apple orchard located at Ontario were collected randomly from 5 different trees located on the farm.

Clarington Farmer's Market

Produce from four farmers was collected from the Clarington Farmer's Market in Newcastle over the course of two sampling events (visits). Potatoes were purchased from one farmer that indicated that the potatoes were grown 15 Km north of Newcastle Radishes, carrots, beets, potatoes, yellow peppers and cucumbers grown 12 Km from Newcastle were purchased from a second farmer. Carrots, cucumbers, and corn grown either in Newcastle or in the town of Bowmanville were purchased from the third farmer. Apples grown in Newcastle were purchased from a fourth farmer.

Price's Farm Market

All produce purchased at Price's Farm Market was grown on-site in Bowmanville, Ontario. Yellow corn, vegetable spaghetti (Squash), and beans were purchased at this location over the course of two sampling events (visits) to the site.

Bloomfield's Farm Market

Only sweet corn was purchased at the Bloomfield's Farm Market after it was confirmed that it had been grown on-site.

Metcalf Farm

Two samples each of milk and eggs were obtained from the Metcalf Farm located at 1261 Holt Rd., Bowmanville, Ontario. Operations at the farm include dairy, laying hens, and cash crops (edible beans, corn, grains and hay).

Foley Farm

The Foley farm located at 1108 Holt Road, Bowmanville, Ontario is a family farm which raises chicken and turkeys, and grows various vegetables (potatoes, carrots, etc.) for their own consumption. Two whole chickens with their internal organs removed were purchased from the Foley farm and sent to the analytical laboratory for analysis.

Found Family Farm

The Found Family Farm, located at 1246 Prestonvale Rd. Courtice, ON, sells beef, pork, lamb, roasting chickens, turkeys, fresh brown eggs and sweet corn. According to the owners, all animals are raised on the farm and are fed grains and legumes grown on the farm. The animals are raised without growth hormones or steroids. Samples collected from the Found Family Farm include two beef samples (T-bone steaks), two pork samples (sausage), and 1 sample of eggs.

5.2 Above Ground Exposed Produce

Seven above-ground exposed produces (including a duplicate) were obtained. All samples were analyzed for metals, while three samples were submitted for analysis of PAHs, PCBs, dioxins and furans; four samples were submitted for VOC analysis (including a duplicate). For most of the COPCs, provincial of federal guidelines were not available for comparison purposes.

5.2.1 Trace Metals in Above Ground Exposed Produce

Several trace metals from the list of COPCs such as antimony, beryllium, chromium, cobalt, lead, nickel, silver and vanadium were not detected in any of the above ground exposed produce (Table 5.2).

Table 5.2 Baseline Concentrations for Metals in Above Ground Exposed Produce

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Aluminum (Al)-Total	7	5	2	4.5	2.77	3.62	4.5
Antimony (Sb)-Total	7	0	0.01	0.01 [a]	-	-	-
Arsenic (As)-Total	7	1	0.01	0.01	-[b]	-[b]	-[b]
Barium (Ba)-Total	7	7	0.026	0.417	0.232	0.388	0.417
Beryllium (Be)-Total	7	0	0.1	0.1 [a]	-	-	-
Bismuth (Bi)-Total	7	0	0.03	0.03 [a]	-	-	-
Boron (B)-Total	7	2	2.0	6.0	3.0 [c]	4.7 [c]	6.0 [c]
Cadmium (Cd)-Total	7	1	0.005	0.0105	-[b]	-[b]	-[b]
Calcium (Ca)-Total	7	7	118	666	375.86	593.93	666
Chromium (Cr)-Total	7	0	0.1	0.1 [a]	-	-	-
Cobalt (Co)-Total	7	0	0.02	0.02 [a]	-	-	-
Copper (Cu)-Total	7	7	0.198	0.963	0.549	0.803	0.963
Iron (Fe)-Total	7	7	2.42	15.9	7.9	12.56	15.9
Lead (Pb)-Total	7	0	0.02	0.02 [a]	-	-	-
Lithium (Li)-Total	7	0	0.1	0.1 [a]	-	-	-
Magnesium (Mg)-Total	7	7	77.4	257	170.34	242.28	257
Manganese (Mn)-Total	7	7	0.47	2.29	1.35	2.1	2.29
Mercury (Hg)-Total	7	1	0.001	0.0016	-[b]	-[b]	-[b]
Molybdenum (Mo)-Total	7	7	0.024	0.279	0.134	0.237	0.279
Nickel (Ni)-Total	7	0	0.1	0.1 [a]	-	-	-
Phosphorus (P)-Total	7	7	152	676	400.86	565.99	676
Potassium (K)-Total	7	7	1340	3130	2358.57	3011.56	3130
Selenium (Se)-Total	7	0	0.04	0.04 [a]	-	-	-
Silver (Ag)-Total	7	0	0.01	0.01 [a]	-	-	-
Sodium (Na)-Total	7	0	20	20 [a]	-	-	-
Strontium (Sr)-Total	7	7	0.111	1.26	0.693	1.14	1.26
Thallium (Tl)-Total	7	0	0.01	0.01 [a]	-	-	-
Tin (Sn)-Total	7	3	0.05	0.122	-[b]	-[b]	-[b]
Titanium (Ti)-Total	7	2	0.1	0.34	-[b]	-[b]	-[b]
Uranium (U)-Total	7	0	0.002	0.002 [a]	-	-	-
Vanadium (V)-Total	7	0	0.1	0.1 [a]	-	-	-
Zinc (Zn)-Total	7	7	1.17	5.39	2.5	3.95	5.39

Notes:
a - Maximum value is the detection limit
b - Statistical analysis cannot be performed due to insufficient number of unique data points
c - Lognormally distributed data

5.2.2 Chlorinated Monocyclic Aromatics in Above Ground Exposed Produce

SVOCs were not detected in any of the above ground exposed produce samples (Table 5.3).

Table 5.3 Baseline Concentrations for SVOCs in Above Ground Exposed Produce

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	3	0	0.01	0.01
Hexachlorobutadiene	3	0	0.01	0.01
Pentachlorobenzene	3	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	3	0	0.01	0.01

5.2.3 Chlorinated Polycyclic Aromatics in Above Ground Exposed Produce

5.2.3.1 Polychlorinated Biphenyls (PCBs) in Above Ground Exposed Produce

PCBs were not detected in any of the samples (Table 5.4).

Table 5.4 Baseline Concentrations for PCBs in Above Ground Exposed Produce

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	3	0	0.01	0.01
Aroclor 1248	3	0	0.01	0.01
Aroclor 1254	3	0	0.01	0.01
Aroclor 1260	3	0	0.01	0.01
Total PCBs	3	0	0.01	0.01

5.2.3.2 Polychlorinated Dioxins and Furans in Above Ground Exposed Produce

Three PCDD/F congeners (1,2,3,4,6,7,8-HpCDD, OCDD and OCDF) were identified in the above ground exposed produce samples (Table 5.5). The maximum measured (or detected) baseline concentration of the above ground exposed produce were used to determine the TEQ of PCDD/PCDF for mammals (including humans). Additional details regarding the methodology used are provided in Section 2.4.2.

Table 5.5 Baseline Concentrations for PCDD/PCDF in Above Ground Exposed Produce

Parameter	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}
2,3,7,8-TCDD	3	0	0.05	0.25	1.0	0.25
1,2,3,7,8-PeCDD	3	0	0.027	0.11	1.0	0.11
1,2,3,4,7,8-HxCDD	3	0	0.033	0.088	0.1	0.0088
1,2,3,6,7,8-HxCDD	3	0	0.031	0.091	0.1	0.0091
1,2,3,7,8,9-HxCDD	3	0	0.032	0.089	0.1	0.0089
1,2,3,4,6,7,8-HpCDD	3	1	0.056	0.139 [a]	0.01	0.00139
OCDD	3	2	0.14	0.214 [a]	0.0003	0.0000642
2,3,7,8-TCDF	3	0	0.027	0.13	0.1	0.013
1,2,3,7,8-PeCDF	3	0	0.016	0.063	0.03	0.00189
2,3,4,7,8-PeCDF	3	0	0.034	0.084	0.3	0.0252
1,2,3,4,7,8-HxCDF	3	0	0.011	0.049	0.1	0.0049
1,2,3,6,7,8-HxCDF	3	0	0.01	0.046	0.1	0.0046
2,3,4,6,7,8-HxCDF	3	0	0.011	0.075	0.1	0.0075
1,2,3,7,8,9-HxCDF	3	0	0.013	0.068	0.1	0.0068
1,2,3,4,6,7,8-HpCDF	3	0	0.02	0.063	0.01	0.00063
1,2,3,4,7,8,9-HpCDF	3	0	0.028	0.095	0.01	0.00095
OCDF	3	1	0.062	0.1 [a]	0.0003	0.00003
TEQ	-	-	-	-	-	**0.45**

Notes:

a - Maximum value is a detected concentration

TEF = Toxic equivalency factor for humans/mammals based on WHO (2005)

C_{Max} = Maximum concentration

5.2.4 Polycyclic Aromatic Hydrocarbons in Above Ground Exposed Produce

Four of the PAHs were detected at very low levels (ng/g) in more than one above ground exposed sample (Table 5.6).

Table 5.6 Baseline Concentrations for PAHs in Above Ground Exposed Produce

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Naphthalene	3	3	0.6	2.45 [a]
2-Methylnaphthalene	3	2	0.2	1.05 [a]
1-Methylnaphthalene	3	1	0.2	0.52 [a]
Acenaphthylene	3	0	0.2	0.2
Acenaphthene	3	0	0.2	0.2
Fluorene	3	0	0.2	0.2
Phenanthrene	3	2	0.2	0.42 [a]
Anthracene	3	0	0.2	0.2

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Fluoranthene	3	0	0.2	0.2
Pyrene	3	0	0.2	0.2
Benzo(a)anthracene	3	0	0.2	0.2
Chrysene/Triphenylene	3	0	0.2	0.2
Benzo(b)flouranthene	3	0	0.2	0.2
Benzo(k)fluoranthene	3	0	0.2	0.2
Benzo(e)pyrene	3	0	0.2	0.2
Benzo(a)pyrene	3	0	0.2	0.2
Perylene	3	0	0.2	0.2
Indeno(1,2,3-cd)pyrene	3	0	0.2	0.2
Dibenzo(a,h/a,c)anthracene	3	0	0.2	1.72
Benzo(g,h,i)perylene	3	0	0.2	0.2

Notes:

a - Maximum value is a detected concentration

5.2.5 Volatile Organic Compounds in Above Ground Exposed Produce

From the list of COPCs, none of the VOCs were detected in any of the samples (Table 5.7).

Table 5.7 Baseline Concentrations for VOCs in Above Ground Exposed Produce

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
1,1,1,2-Tetrachloroethane	4	0	0.04	0.04
1,1,1-Trichloroethane	4	0	0.02	0.02
1,1,2,2-Tetrachloroethane	4	0	0.04	0.04
1,1,2-Trichloroethane	4	0	0.05	0.05
1,2,3-Trichlorobenzene	2	0	0.5	0.5
1,2,3-Trichloropropane	2	0	0.5	0.5
1,2,4-Trichlorobenzene	2	0	0.5	0.5
1,2,4-Trimethylbenzene	2	0	0.5	0.5
1,1-Dichloroethane	4	0	0.03	0.03
1,1-Dichloroethylene	4	0	0.01	0.01
1,1-Dichloropropane	2	0	0.05	0.05
1,2-Dibromoethane	4	0	0.03	0.03
1,2-Dichlorobenzene	4	0	0.1	0.1
1,2-Dichloroethane	4	0	0.01	0.01
1,2-Dichloropropane	4	0	0.005	0.005
1,3-Dichloropropane	2	0	0.1	0.1
1,3-Dichlorobenzene	4	0	0.1	0.1
1,3,5-Trimethylbenzene	2	0	0.5	0.5
1,4-Dichlorobenzene	4	0	0.1	0.1
2,2-Dichloropropane	2	0	0.5	0.5

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Benzene	4	0	0.1	0.1
Bromobenzene	2	0	0.5	0.5
Bromodichloromethane	4	0	0.005	0.03
Bromoform	4	0	0.1	0.1
Bromomethane	4	0	0.05	0.05
n-Butylbenzene	2	0	0.5	0.5
sec-Butylbenzene	2	0	0.5	0.5
tert-Butylbenzene	2	0	0.5	0.5
Carbon disulfide	2	0	0.1	0.1
Carbon tetrachloride	4	0	0.05	0.05
Chlorobenzene	4	0	0.1	0.1
Chloroethane	2	0	0.1	0.1
Chloroform	4	0	0.05	0.05
Chloromethane	2	0	0.1	0.1
2-Chlorotoluene	2	0	0.5	0.5
4-Chlorotoluene	2	0	0.5	0.5
1,2-Dibromo-3-chloropropane	2	0	0.5	0.5
Dibromomethane	2	0	0.05	0.05
cis-1,2-Dichloroethylene	4	0	0.1	0.1
cis-1,3-Dichloropropene	4	0	0.01	0.01
Dibromochloromethane	4	0	0.005	0.005
Dichlorodifluoromethane	4	0	0.2	0.2
Dichloromethane	4	0	0.5	0.5
Ethyl Benzene	4	0	0.1	0.1
Hexachlorobutadiene	2	0	0.5	0.5
2-Hexanone	2	0	1	1
Isopropylbenzene	2	0	0.5	0.5
Isopropyltoluene	2	0	0.5	0.5
m+p-Xylenes	4	0	0.2	0.2
Methyl Ethyl Ketone	4	0	1	1
Methyl Isobutyl Ketone	4	0	1	1
MTBE	4	0	1	1
Naphthalene	2	0	0.5	0.5
n-Propylbenzene	2	0	0.5	0.5
o-Xylene	4	0	0.1	0.1
Styrene	4	0	0.1	0.1
Tetrachloroethylene	4	0	0.1	0.1
Toluene	4	0	0.3	0.3
trans-1,2-Dichloroethylene	4	0	0.3	0.3
trans-1,3-Dichloropropene	4	0	0.01	0.01
Trichloroethylene	4	0	0.3	0.3
Trichlorofluoromethane	4	0	0.1	0.1

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Trihalomethanes	2	0	0.2	0.2
Vinyl chloride	4	0	0.02	0.02
Xylenes (Total)	4	0	0.3	0.3

5.2.6 Above Ground Exposed Produce Baseline Findings

Several of the COPCs such as trace metals, PAHs, PCDD/PCDF and VOCs were detected in the above ground exposed produce samples collected and analyzed. However, most of the values were very low or close to the detection limits. Provincial and federal guidelines for comparison purposes were not available.

5.3 Above Ground Protected Produce

Seven above-ground protected produce (including a duplicate sample) were obtained. All above-ground protected produce samples were analyzed for metals, while three samples were submitted for analysis of PAHs, PCBs, SVOCs, and dioxins and furans.

5.3.1 Trace Metals in Above Ground Protected Produce

Several trace metals from the COPC list such as antimony, arsenic, beryllium, chromium, cobalt, lead, mercury, nickel and vanadium were not detected in any of the above ground protected samples (Table 5.8).

Table 5.8 Baseline Concentrations for Metals in Above Ground Protected Produce

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Aluminum (Al)-Total	7	0	2	2 [a]	-	-	-
Antimony (Sb)-Total	7	0	0.01	0.01 [a]	-	-	-
Arsenic (As)-Total	7	0	0.01	0.01 [a]	-	-	-
Barium (Ba)-Total	7	7	0.015	0.318	0.049 [c]	0.134 [c]	0.318 [c]
Beryllium (Be)-Total	7	0	0.1	0.1 [a]	-	-	-
Bismuth (Bi)-Total	7	0	0.03	0.03 [a]	-	-	-
Boron (B)-Total	7	1	2	3.1	- [b]	- [b]	- [b]
Cadmium (Cd)-Total	7	1	0.005	0.0063	- [b]	- [b]	- [b]
Calcium (Ca)-Total	7	7	21.4	259	51.9 [c]	115.6 [c]	259 [c]
Chromium (Cr)-Total	7	0	0.1	0.1 [a]	-	-	-
Cobalt (Co)-Total	7	0	0.02	0.02 [a]	-	-	-
Copper (Cu)-Total	7	7	0.235	0.703	0.499	0.654	0.703
Iron (Fe)-Total	7	7	2.16	5.9	3.93	5.21	5.9
Lead (Pb)-Total	7	0	0.02	0.02 [a]	-	-	-
Lithium (Li)-Total	7	0	0.1	0.1 [a]	-	-	-
Magnesium (Mg)-Total	7	7	97.2	307	229	304.8	307

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Manganese (Mn)-Total	7	7	0.672	2.66	1.63	2.32	2.66
Mercury (Hg)-Total	7	0	0.001	0.001 [a]	-	-	-
Molybdenum (Mo)-Total	7	6	0.01	0.072	0.0409	0.0644	0.072
Nickel (Ni)-Total	7	0	0.1	0.1 [a]	-	-	-
Phosphorus (P)-Total	7	7	149	974	677	1018	974
Potassium (K)-Total	7	7	1400	3030	2434.29	2986.56	3030
Selenium (Se)-Total	7	1	0.04	0.054	- [b]	- [b]	- [b]
Silver (Ag)-Total	7	1	0.01	0.011	- [b]	- [b]	- [b]
Sodium (Na)-Total	7	0	20	20 [a]	-	-	-
Strontium (Sr)-Total	7	7	0.028	0.998	- [d]	- [d]	- [d]
Thallium (Tl)-Total	7	0	0.01	0.01 [a]	-	-	-
Tin (Sn)-Total	7	2	0.05	0.062	- [d]	- [d]	- [d]
Titanium (Ti)-Total	7	0	0.1	0.1 [a]	-	-	-
Uranium (U)-Total	7	0	0.002	0.002 [a]	-	-	-
Vanadium (V)-Total	7	0	0.1	0.1 [a]	-	-	-
Zinc (Zn)-Total	7	7	0.81	6.8	- [d]	- [d]	- [d]

Notes:

a - Maximum value is the detection limit
b - Statistical analysis cannot be performed due to insufficient number of unique data points
c - Lognormally distributed data
d - Data distribution was not normal or lognormal

5.3.2 Chlorinated Monocyclic Aromatics in Above Ground Protected Produce

SVOCs were not detected in any of the above ground protected produce samples (Table 5.9).

Table 5.9 Baseline Concentrations for SVOCs in Above Ground Protected Produce

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	3	0	0.01	0.01
Hexachlorobutadiene	3	0	0.01	0.01
Pentachlorobenzene	3	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	3	0	0.01	0.01

5.3.3 Chlorinated Polycyclic Aromatics

5.3.3.1 Polychlorinated Biphenyls (PCBs) in Above Ground Protected Produce

PCBs were not detected in any of the above-ground protected produce samples (Table 5.10).

Table 5.10 Baseline Concentrations for PCBs in Above Ground Protected Produce

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	3	0	0.01	0.01
Aroclor 1248	3	0	0.01	0.01
Aroclor 1254	3	0	0.01	0.01
Aroclor 1260	3	0	0.01	0.01
Total PCBs	3	0	0.01	0.01

5.3.3.2 Polychlorinated Dioxins and Furans in Above Ground Protected Produce

Three congeners (1,2,3,4,6,7,8-HpCDD, 1,2,3,4,7,8-HxCDF and OCDF) were detected in the above ground protected produce samples (Table 5.11). The measured baseline concentration (as maximum detect or the detection limit) of the above ground protected produce concentrations were used to determine the TEQ of PCDD/PCDF for mammals (including humans) (Table 5.11). Additional details regarding the methodology used are provided in Section 2.4.2.

Table 5.11 Baseline Concentrations for PCDD/PCDF in Above Ground Protected Produce

Parameter	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}
2,3,7,8-TCDD	3	0	0.043	0.12	1.0	0.12
1,2,3,7,8-PeCDD	3	0	0.028	0.083	1.0	0.083
1,2,3,4,7,8-HxCDD	3	0	0.027	0.041	0.1	0.0041
1,2,3,6,7,8-HxCDD	3	0	0.027	0.042	0.1	0.0042
1,2,3,7,8,9-HxCDD	3	0	0.027	0.041	0.1	0.0041
1,2,3,4,6,7,8-HpCDD	3	1	0.034	0.0528 [b]	0.01	0.000528
OCDD	3	0	0.049	0.089	0.0003	0.0000267
2,3,7,8-TCDF	3	0	0.036	0.11	0.1	0.011
1,2,3,7,8-PeCDF	3	0	0.017	0.058	0.03	0.00174
2,3,4,7,8-PeCDF	3	0	0.017	0.087	0.3	0.0261
1,2,3,4,7,8-HxCDF	3	1	0.0177	0.0177 [b]	0.1	0.00177
1,2,3,6,7,8-HxCDF	3	0	0.014	0.026	0.1	0.0026
2,3,4,6,7,8-HxCDF	3	0	0.016	0.05	0.1	0.005
1,2,3,7,8,9-HxCDF	3	0	0.017	0.036	0.1	0.0036
1,2,3,4,6,7,8-HpCDF	3	0	0.021	0.041	0.01	0.00041
1,2,3,4,7,8,9-HpCDF	3	0	0.029	0.057	0.01	0.00057
OCDF	3	1	0.039	0.0483 [a]	0.0003	0.00001449
TEQ	-	-	-	-	-	**0.27**

Notes:

a - Maximum value is a detected concentration

b - Maximum value is a detected concentration, but is below a detection limit

$TEF_{H/M}$ - Toxic Equivalency Factor for Humans/Mammals based on WHO (2005)

Parameter	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}

C_{MAX} - Maximum Concentration

5.3.4 Polycyclic Aromatic Hydrocarbons in Above Ground Protected Produce

Three of the PAHs (naphthalene, 1 and 2 methyl-naphthalene) were detected at very low levels (ng/g) in more than one above ground protected sample (Table 5.12).

Table 5.12 Baseline Concentrations for PAHs in Above Ground Protected Produce

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Naphthalene	3	3	0.41	2.02 [a]
2-Methylnaphthalene	3	1	0.2	0.37 [a]
1-Methylnaphthalene	3	1	0.2	0.24 [a]
Acenaphthylene	3	0	0.2	0.2
Acenaphthene	3	0	0.2	0.2
Fluorene	3	0	0.2	0.2
Phenanthrene	3	0	0.2	0.2
Anthracene	3	0	0.2	0.2
Fluoranthene	3	0	0.2	0.2
Pyrene	3	0	0.2	0.2
Benzo(a)anthracene	3	0	0.2	0.2
Chrysene/Triphenylene	3	0	0.2	0.2
Benzo(b)flouranthene	3	0	0.2	0.2
Benzo(k)fluoranthene	3	0	0.2	0.2
Benzo(e)pyrene	3	0	0.2	0.2
Benzo(a)pyrene	3	0	0.2	0.2
Perylene	3	0	0.2	0.2
Indeno(1,2,3-cd)pyrene	3	0	0.2	0.2
Dibenzo(a,h/a,c)anthracene	3	0	0.2	0.2
Benzo(g,h,i)perylene	3	0	0.2	0.2

Notes:

a - Maximum value is a detected concentration

5.3.5 Above Ground Protected Produce Baseline Findings

Several of the COPCs such as trace metals, PAHs, PCDD/PCDF were detected in the above ground protected produce samples collected and analyzed. However, most of the values were very low or close to the detection limits. Provincial and federal guidelines for comparison purposes were not available.

5.4 Below Ground Produce

Seven below ground vegetables (including a duplicate sample) were obtained. All six samples were analyzed for metals, while three samples were submitted for analysis of SVOCs, PAHs, PCBs, and dioxins and furans. Provincial and federal guidelines for comparison purposes were not available.

5.4.1 Trace Metals in Below Ground Produce

From the COPC list antimony, beryllium, chromium, cobalt, nickel, silver and vanadium were not detected in any of the below ground produce samples (Table 5.13).

Table 5.13 Baseline Concentrations for Metals in Below Ground Produce

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Aluminum (Al)-Total	7	5	2	18.4	7.0	12.5	18.4
Antimony (Sb)-Total	7	0	0.01	0.01 [a]	-	-	-
Arsenic (As)-Total	7	2	0.01	0.011	- [c]	- [c]	- [c]
Barium (Ba)-Total	7	7	0.104	4.3	0.235 [e]	0.35 [e]	0.417 [e]
Beryllium (Be)-Total	7	0	0.1	0.1 [a]	-	-	-
Bismuth (Bi)-Total	7	0	0.03	0.03 [a]	-	-	-
Boron (B)-Total	7	3	2	3.7	- [d]	- [d]	- [d]
Cadmium (Cd)-Total	7	7	0.0079	0.0575	0.018 [b]	0.037 [b]	0.057 [b]
Calcium (Ca)-Total	7	7	44	407	236	382	407
Chromium (Cr)-Total	7	0	0.1	0.1 [a]	-	-	-
Cobalt (Co)-Total	7	0	0.02	0.02 [a]	-	-	-
Copper (Cu)-Total	7	7	0.213	0.949	0.57	0.782	0.949
Iron (Fe)-Total	7	7	1.82	20.5	7.28	13.2	20.5
Lead (Pb)-Total	7	1	0.02	0.026	- [c]	- [c]	- [c]
Lithium (Li)-Total	7	0	0.1	0.1 [a]	-	-	-
Magnesium (Mg)-Total	7	7	103	218	170	207	218
Manganese (Mn)-Total	7	7	0.577	3.64	1.136 [b]	2.085 [b]	3.632 [b]
Mercury (Hg)-Total	7	1	0.001	0.001	- [c]	- [c]	- [c]
Molybdenum (Mo)-Total	7	7	0.025	0.084	0.053	0.076	0.084
Nickel (Ni)-Total	7	0	0.1	0.1 [a]	-	-	-
Phosphorus (P)-Total	7	7	230	523	405	499	523
Potassium (K)-Total	7	7	1760	4600	3296	4087	4600
Selenium (Se)-Total	7	1	0.04	0.05	- [c]	- [c]	- [c]
Silver (Ag)-Total	7	0	0.01	0.01 [a]	-	-	-
Sodium (Na)-Total	7	4	20	698	246	477	698
Strontium (Sr)-Total	7	7	0.124	1.97	1.005	1.75	1.97
Thallium (Tl)-Total	7	0	0.01	0.01 [a]	-	-	-
Tin (Sn)-Total	7	3	0.05	0.258	- [d]	- [d]	- [d]
Titanium (Ti)-Total	7	5	0.1	1.19	0.28 [b]	0.60 [b]	1.19 [b]
Uranium (U)-Total	7	1	0.002	0.0025	- [c]	- [c]	- [c]
Vanadium (V)-Total	7	0	0.1	0.1 [a]	-	-	-
Zinc (Zn)-Total	7	7	1.92	3.83	2.72	3.33	3.83

Notes:
a - Maximum value is the detection limit
b - Lognormally distributed data
c - Statistical analysis cannot be performed due to insufficient number of unique data points
d - Data distribution was not normal or lognormal
e - Outlier(s) removed

5.4.2 Chlorinated Monocyclic Aromatics in Below Ground Produce

SVOCs were not detected in any of the below ground produce samples (Table 5.14).

Table 5.14 Baseline Concentrations for SVOCs in Below Ground Produce

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	3	0	0.01	0.01
Hexachlorobutadiene	3	0	0.01	0.01
Pentachlorobenzene	3	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	3	0	0.01	0.01

5.4.3 Chlorinated Polycyclic Aromatics in Below Ground Produce

5.4.3.1 Polychlorinated Biphenyls (PCBs) in Below Ground Produce

PCBs were not detected in any of the samples (Table 5.15).

Table 5.15 Baseline Concentrations for PCBs in Below Ground Produce

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	3	0	0.01	0.01
Aroclor 1248	3	0	0.01	0.01
Aroclor 1254	3	0	0.01	0.01
Aroclor 1260	3	0	0.01	0.01
Total PCBs	3	0	0.01	0.01

5.4.3.2 Polychlorinated Dioxins and Furans in Below Ground Produce

Three samples (carrots, potato and radishes) were submitted for analysis of PCDD/PCDF. Concentrations of PCDD/PCDF in both of the potato samples were less than the detection limits. Six or more of the congeners were detected in one or more of the samples (Table 5.16). The measured baseline (maximum detected of the detection limits) of the below ground produce concentrations were used to determine the TEQ of PCDD/PCDF for mammals (including humans) (Table 5.16). Additional details regarding the methodology used are provided in Section 2.4.2. Concentrations of PCCD/PCDF levels measured in the below ground produce were compared (where available) to the dioxin and furan levels in Canada (Birmingham et al., 1989). The levels measured were lower than the levels reported in the scientific literature.

Table 5.16 Baseline Concentrations for PCDD/PCDF in Below Ground Produce

Parameter	Typical Levels in Canada [a]	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}
2,3,7,8-TCDD	-	3	0	0.055	0.29	1	0.29
1,2,3,7,8-PeCDD	-	3	0	0.037	0.076	1	0.076
1,2,3,4,7,8-HxCDD	-	3	0	0.022	0.09	0.1	0.009
1,2,3,6,7,8-HxCDD	-	3	0	0.021	0.087	0.1	0.0087
1,2,3,7,8,9-HxCDD	-	3	0	0.021	0.088	0.1	0.0088
1,2,3,4,6,7,8-HpCDD	-	3	0	0.035	0.074	0.01	0.00074
OCDD	ND - 3	3	1	0.074	0.342 [b]	0.0003	0.0001026
2,3,7,8-TCDF	-	3	0	0.032	0.12	0.1	0.012
1,2,3,7,8-PeCDF	-	3	0	0.015	0.054	0.03	0.00162
2,3,4,7,8-PeCDF	-	3	1	0.027	0.07 [b]	0.3	0.021
1,2,3,4,7,8-HxCDF	-	3	0	0.015	0.046	0.1	0.0046
1,2,3,6,7,8-HxCDF	-	3	0	0.014	0.043	0.1	0.0043
2,3,4,6,7,8-HxCDF	-	3	0	0.015	0.069	0.1	0.0069
1,2,3,7,8,9-HxCDF	-	3	0	0.018	0.058	0.1	0.0058
1,2,3,4,6,7,8-HpCDF	-	3	0	0.016	0.053	0.01	0.00053
1,2,3,4,7,8,9-HpCDF	-	3	0	0.022	0.075	0.01	0.00075
OCDF	-	3	1	0.049	0.0533 [c]	0.0003	0.00001599
TEQ	-	-	-	-	-	-	**0.45**

Notes:

a - Dioxin and furan levels in Canada (Birmingham et al., 1989)

b - Maximum value is a detected concentration

c - Maximum value is a detected concentration, but is below a detection limit

$TEF_{H/M}$ - Toxic Equivalency Factor for Humans/Mammals based on WHO (2005)

C_{MAX} - Maximum Concentration

5.4.4 Polycyclic Aromatic Hydrocarbons in Below Ground Produce

Three samples (carrots, potato and radishes) were submitted for analysis of PAHs. Concentrations of PAHs were detected at very low detection limits (ng/g) in one or more of the samples (Table 5.17).

Table 5.17 Baseline Concentrations for PAHs in Below Ground Produce

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Naphthalene	3	3	0.57	1.56 [a]
2-Methylnaphthalene	3	3	0.21	0.8 [a]
1-Methylnaphthalene	3	1	0.2	0.45 [a]
Acenaphthylene	3	0	0.2	0.2
Acenaphthene	3	0	0.2	0.2
Fluorene	3	0	0.2	0.2

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Phenanthrene	3	2	0.2	0.34 [a]
Anthracene	3	0	0.2	0.2
Fluoranthene	3	0	0.2	0.2
Pyrene	3	0	0.2	0.2
Benzo(a)anthracene	3	0	0.2	0.2
Chrysene/Triphenylene	3	0	0.2	0.2
Benzo(b)flouranthene	3	0	0.2	0.2
Benzo(k)fluoranthene	3	0	0.2	0.2
Benzo(e)pyrene	3	0	0.2	0.2
Benzo(a)pyrene	3	0	0.2	0.2
Perylene	3	0	0.2	0.2
Indeno(1,2,3-cd)pyrene	3	0	0.2	0.2
Dibenzo(a,h/a,c)anthracene	3	0	0.2	0.2
Benzo(g,h,i)perylene	3	0	0.2	0.2

Notes:
a - Maximum value is a detected concentration

5.4.5 Below Ground Produce Summary Baseline Findings

Several of the COPCs such as trace metals, PAHs, PCDD/PCDF were detected in the below ground produce samples collected and analyzed. However, most of the values were very low or close to the detection limits. With the exception of dioxins and furans (where comparison for one congener was available and showed that the measured concentration of the below ground produce was lower than the recommended guideline), governmental and provincial guidelines for comparison purposes were not available.

5.5 Fruit

Seven fruit (including two duplicates) were collected and analyzed. All seven samples were analyzed for metals, while three samples were submitted for analysis of SVOCs, PAHs, PCBs, VOCs and dioxins and furans.

5.5.1 Trace Metals in Fruit

Several trace metals from the list of COPCs such as antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, mercury, silver and vanadium were less than the detection limits in all the samples, (Table 5.18).

Table 5.18 Baseline Concentrations for Metals in Fruit

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Aluminum (Al)-Total	7	4	2	4.6	2.7	3.86	4.6
Antimony (Sb)-Total	7	0	0.01	0.01 [a]	-	-	-
Arsenic (As)-Total	7	0	0.01	0.01 [a]	-	-	-

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Barium (Ba)-Total	7	7	0.079	0.881	0.405	0.74	0.881
Beryllium (Be)-Total	7	0	0.1	0.1 [a]	-	-	-
Bismuth (Bi)-Total	7	0	0.03	0.03 [a]	-	-	-
Boron (B)-Total	7	2	2	2.8 [e]	3.9	5.9	6
Cadmium (Cd)-Total	7	0	0.005	0.005 [a]	-	-	-
Calcium (Ca)-Total	7	7	39.3	641	252	512	641
Chromium (Cr)-Total	7	0	0.1	0.1 [a]	-	-	-
Cobalt (Co)-Total	7	0	0.02	0.02 [a]	-	-	-
Copper (Cu)-Total	7	7	0.179	1.2	0.539	1.02	1.2
Iron (Fe)-Total	7	7	0.72	8	4.58	7.9	8
Lead (Pb)-Total	7	0	0.02	0.02 [a]	-	-	-
Lithium (Li)-Total	7	0	0.1	0.1 [a]	-	-	-
Magnesium (Mg)-Total	7	7	35.5	255	114.9	223.2	255
Manganese (Mn)-Total	7	7	0.37	3.16	1.63	2.92	3.16
Mercury (Hg)-Total	7	0	0.001	0.001 [a]	-	-	-
Molybdenum (Mo)-Total	7	5	0.01	0.09	0.039	0.08	0.09
Nickel (Ni)-Total	7	1	0.1	0.17	-[b]	-[b]	-[b]
Phosphorus (P)-Total	7	7	69.8	521	285	478	521
Potassium (K)-Total	7	7	901	2250	1543	1984	2250
Selenium (Se)-Total	7	0	0.04	0.04 [a]	-	-	-
Silver (Ag)-Total	7	0	0.01	0.01 [a]	-	-	-
Sodium (Na)-Total	7	0	20	20 [a]	-	-	-
Strontium (Sr)-Total	7	7	0.06	1.01	0.501	0.934	1.01
Thallium (Tl)-Total	7	0	0.01	0.01 [a]	-	-	-
Tin (Sn)-Total	7	5	0.05	0.38	0.06[c]	0.07[c]	0.07[c]
Titanium (Ti)-Total	7	4	0.1	0.21	0.13	0.19	0.21
Uranium (U)-Total	7	0	0.002	0.002 [a]	-	-	-
Vanadium (V)-Total	7	0	0.1	0.1 [a]	-	-	-
Zinc (Zn)-Total	7	7	0.22	4.1	0.06[d]	0.07[d]	0.07[d]
Zirconium (Zr)	0	0	-	-	-	-	-

Notes:
a - Maximum value is the detection limit
b - Statistical analysis cannot be performed due to insufficient number of unique data points
c - Outlier(s) removed
d - Lognormally distributed data
e - Maximum value is a detected concentration, but is below a detection limit

5.5.2 Chlorinated Monocyclic Aromatics in Fruit

SVOCs were not detected in any of the fruit samples (Table 5.19).

Table 5.19 Baseline Concentrations for SVOCs in Fruit

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	3	0	0.01	0.01
Hexachlorobutadiene	3	0	0.01	0.01
Pentachlorobenzene	3	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	3	0	0.01	0.01

5.5.3 Chlorinated Polycyclic Aromatics

5.5.3.1 Polychlorinated Biphenyls (PCBs) in Fruit

PCBs were not detected in any of the fruit samples (Table 5.20).

Table 5.20 Baseline Concentrations for PCBs in Fruit

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	3	0	0.01	0.01
Aroclor 1248	3	0	0.01	0.01
Aroclor 1254	3	0	0.01	0.01
Aroclor 1260	3	0	0.01	0.01
Total PCBs	3	0	0.01	0.01

5.5.3.2 Polychlorinated Dioxins and Furans in Fruit

Several congeners (six) were detected in two out of the three samples (mostly in the apple sample) (Table 5.21). The maximum measured (or detected) fruit concentrations were used to determine the TEQ of PCDD/PCDF for mammals (including humans) (Table 5.21). Concentrations of PCCD/PCDF levels measured in the fruit produce were compared (where available) to the dioxin and furan levels in Canada (Birmingham et al., 1989). The levels measured were lower than the levels reported in the scientific literature.

Table 5.21 Baseline Concentrations for PCDD/PCDF in Fruit

Parameter	Typical Levels in Canada [a]	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}
2,3,7,8-TCDD	-	3	0	0.018	0.29	1.0	0.2900
1,2,3,7,8-PeCDD	-	3	0	0.049	0.14	1.0	0.1400
1,2,3,4,7,8-HxCDD	-	3	0	0.029	0.084	0.1	0.0084
1,2,3,6,7,8-HxCDD	-	3	0	0.062	0.084	0.1	0.0084
1,2,3,7,8,9-HxCDD	-	3	0	0.062	0.083	0.1	0.0083
1,2,3,4,6,7,8-HpCDD	-	3	1	0.078	0.084 [b]	0.01	0.0008
OCDD	ND - 46	3	1	0.066	0.75 [b]	0.0003	0.0002
2,3,7,8-TCDF	-	3	0	0.015	0.12	0.1	0.0120
1,2,3,7,8-PeCDF	-	3	0	0.021	0.075	0.03	0.0023
2,3,4,7,8-PeCDF	-	3	0	0.019	0.11	0.3	0.0330
1,2,3,4,7,8-HxCDF	-	3	1	0.0241	0.0241 [c]	0.1	0.0024
1,2,3,6,7,8-HxCDF	-	3	0	0.023	0.05	0.1	0.0050
2,3,4,6,7,8-HxCDF	-	3	0	0.011	0.1	0.1	0.0100
1,2,3,7,8,9-HxCDF	-	3	1	0.0208	0.0208 [c]	0.1	0.0021
1,2,3,4,6,7,8-HpCDF	-	3	1	0.021	0.066 [b]	0.01	0.0007
1,2,3,4,7,8,9-HpCDF	-	3	0	0.039	0.094	0.01	0.0009
OCDF	-	3	1	0.045	0.422 [b]	0.0003	0.0001
TEQ	-	-	-	-	-	-	**0.52**

Notes:
a - Dioxin and furan levels in Canada (Birmingham et al, 1989)
b - Maximum value is a detected concentration
c - Maximum value is a detected concentration, but is below a detection limit

Parameter	Typical Levels in Canada [a]	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}

$TEF_{H/M}$ = Toxic equivalency factor for humans/mammals based on WHO (2005)
C_{Max} = Maximum concentration

5.5.4 Polycyclic Aromatic Hydrocarbons in Fruit

Four of the PAHs were detected at very low levels (ng/g) in more than one fruit sample (Table 5.22).

Table 5.22 Baseline Concentrations for PAHs in Fruit

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Naphthalene	3	3	0.5	1.47 [a]
2-Methylnaphthalene	3	2	0.2	0.35 [a]
1-Methylnaphthalene	3	1	0.2	0.28 [a]
Acenaphthylene	3	0	0.2	0.2
Acenaphthene	3	0	0.2	0.2
Fluorene	3	0	0.2	0.26
Phenanthrene	3	2	0.2	1.23 [a]
Anthracene	3	0	0.2	0.2
Fluoranthene	3	0	0.2	0.57
Pyrene	3	0	0.2	0.37
Benzo(a)anthracene	3	0	0.2	0.2
Chrysene/Triphenylene	3	0	0.2	0.2
Benzo(b)flouranthene	3	0	0.2	0.2
Benzo(k)fluoranthene	3	0	0.2	0.2
Benzo(e)pyrene	3	0	0.2	0.2
Benzo(a)pyrene	3	0	0.2	1.18
Perylene	3	0	0.2	1.06
Indeno(1,2,3-cd)pyrene	3	0	0.2	0.2
Dibenzo(a,h/a,c)anthracene	3	0	0.2	1.89
Benzo(g,h,i)perylene	3	0	0.2	0.2

Notes:
a - Maximum value is a detected concentration

5.5.5 Volatile Organic Compounds in Fruit

With the exception of chloroform (in the strawberry sample), bromethane (in the raspberry sample) and styrene (in the raspberry and mulberry sample), VOCs included in the COPCs list were not detected in any of the fruits (Table 5.23). The occurrence of these particular VOCs could be attributed to the sample handling in the laboratory.

Table 5.23 Baseline Concentrations for VOCs in Fruit

Parameter	Units	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
1,1,1,2-Tetrachloroethane	mg/kg	3	0	0.04	0.04
1,1,1-Trichloroethane	mg/kg	3	0	0.02	0.02
1,1,2,2-Tetrachloroethane	mg/kg	3	0	0.04	0.04
1,1,2-Trichloroethane	mg/kg	3	0	0.05	0.05
1,1-Dichloroethane	mg/kg	3	0	0.03	0.03
1,1-Dichloroethylene	mg/kg	3	0	0.01	0.01
1,2-Dibromoethane	mg/kg	3	0	0.03	0.03
1,2-Dichlorobenzene	mg/kg	3	0	0.1	0.1
1,2-Dichloroethane	mg/kg	3	0	0.01	0.01
1,2-Dichloropropane	mg/kg	3	0	0.005	0.005
1,3-Dichlorobenzene	mg/kg	3	0	0.1	0.1
1,4-Dichlorobenzene	mg/kg	3	0	0.1	0.1
2-Hexanone	mg/kg	2	0	1	1
Benzene	mg/kg	3	0	0.1	0.1
Bromodichloromethane	mg/kg	3	0	0.03	0.03
Bromoform	mg/kg	3	0	0.1	0.1
Bromomethane	mg/kg	3	1	0.05	0.08 [a]
Carbon Disulfide	mg/kg	2	0	0.1	0.1
Carbon tetrachloride	mg/kg	3	0	0.05	0.05
Chlorobenzene	mg/kg	3	0	0.1	0.1
Chloroethane	mg/kg	2	0	0.1	0.1
Chloroform	mg/kg	3	1	0.05	0.06 [a]
Chloromethane	mg/kg	2	0	0.1	0.1
cis-1,2-Dichloroethylene	mg/kg	3	0	0.1	0.1
cis-1,3-Dichloropropene	mg/kg	3	0	0.01	0.01
Dibromochloromethane	mg/kg	3	0	0.005	0.005
Dichlorodifluoromethane	mg/kg	3	0	0.2	0.2
Dichloromethane	mg/kg	3	0	0.5	0.5
Ethyl Benzene	mg/kg	3	0	0.1	0.1
m+p-Xylenes	mg/kg	3	0	0.2	0.2
Methyl Ethyl Ketone	mg/kg	3	0	1	1
Methyl Isobutyl Ketone	mg/kg	3	0	1	1
MTBE	mg/kg	3	0	1	1
o-Xylene	mg/kg	3	0	0.1	0.1
Styrene	mg/kg	3	2	0.1	10.9 [a]
Tetrachloroethylene	mg/kg	3	0	0.1	0.1
Toluene	mg/kg	3	0	0.3	0.3
trans-1,2-Dichloroethylene	mg/kg	3	0	0.3	0.3
trans-1,3-Dichloropropene	mg/kg	3	0	0.01	0.01
Trichloroethylene	mg/kg	3	0	0.3	0.3
Trichlorofluoromethane	mg/kg	3	0	0.1	0.1

Parameter	Units	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Trihalomethanes (total)	mg/kg	2	1	0.02	0.06 [a]
Vinyl chloride	mg/kg	3	0	0.02	0.02
Xylenes (Total)	mg/kg	3	0	0.04	0.3

Notes:

a - Maximum value is a detected concentration

b - Dioxin and furan levels in Canada (Birmingham et al, 1989)

5.5.6 Fruit Produce Summary Baseline Findings

Several of the COPCs such as trace metals, VOCs PAHs, PCDD/PCDF were detected in fruit produce samples collected and analyzed. However, most of the values were very low or close to the detection limits. With the exception of dioxins and furans (where comparison for one congener was available and showed that the measured concentration of the fruit produces was lower than the recommended guideline), governmental and provincial guidelines for comparison purposes were not available.

5.6 Crops

Five corn crops samples (including a duplicate) were collected and analyzed. All samples were analyzed for metals, while three samples were submitted for analysis of PAHs, PCBs, dioxins and furans and two samples for SVOCs.

5.6.1 Trace Metals in Crops

Several trace metals from the list COPCs such as antimony, arsenic, beryllium, boron, cadmium, chromium, cobalt, lead, mercury, silver and vanadium were not detected in any of the samples, as indicated in Table 5.24.

Table 5.24 Baseline Concentrations for Metals in Crops

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)	Mean (mg/kg)	95% UCLM (mg/kg)	95th Percentile (mg/kg)
Aluminum (Al)-Total	5	1	2	2.5	-[b]	-[b]	-[b]
Antimony (Sb)-Total	5	0	0.01	0.01 [a]	-	-	-
Arsenic (As)-Total	5	0	0.01	0.01 [a]	-	-	-
Barium (Ba)-Total	5	5	0.015	0.034	0.023	0.034	0.034
Beryllium (Be)-Total	5	0	0.1	0.1 [a]	-	-	-
Bismuth (Bi)-Total	5	0	0.03	0.03 [a]	-	-	-
Boron (B)-Total	5	0	2	6 [a]	-	-	-
Cadmium (Cd)-Total	5	0	0.005	0.005 [a]	-	-	-
Calcium (Ca)-Total	5	5	19.2	38.4	27.1	37.6	38.4
Chromium (Cr)-Total	5	0	0.1	0.1 [a]	-	-	-
Cobalt (Co)-Total	5	0	0.02	0.02 [a]	-	-	-
Copper (Cu)-Total	5	5	0.417	0.66	0.497	0.634	0.66
Iron (Fe)-Total	5	5	3.3	16.7	8.6	14.7	16.7
Lead (Pb)-Total	5	0	0.02	0.02 [a]	-	-	-
Lithium (Li)-Total	5	0	0.1	0.1 [a]	-	-	-
Magnesium (Mg)-Total	5	5	201	653	268 [c]	343 [c]	310 [c]
Manganese (Mn)-Total	5	5	1.12	2.4	1.71	2.49	2.4
Mercury (Hg)-Total	5	0	0.001	0.001 [a]	-	-	-
Molybdenum (Mo)-Total	5	5	0.043	0.123	0.08	0.116	0.123
Nickel (Ni)-Total	5	1	0.1	0.11	-[b]	-[b]	-[b]
Phosphorus (P)-Total	5	5	731	1920	875 [c]	1050 [c]	996 [c]
Potassium (K)-Total	5	5	1530	2650	2050	2732	2650
Selenium (Se)-Total	5	3	0.04	0.061	0.046	0.075	0.061
Silver (Ag)-Total	5	0	0.01	0.01 [a]	-	-	-
Sodium (Na)-Total	5	0	20	20 [a]	-	-	-
Strontium (Sr)-Total	5	5	0.022	0.053	0.039	0.057	0.053
Thallium (Tl)-Total	5	0	0.01	0.01 [a]	-	-	-
Tin (Sn)-Total	5	2	0.05	0.1	-[b]	-[b]	-[b]
Titanium (Ti)-Total	5	0	0.1	0.1 [a]	-	-	-
Uranium (U)-Total	5	0	0.002	0.002 [a]	-	-	-
Vanadium (V)-Total	5	0	0.1	0.1 [a]	-	-	-
Zinc (Zn)-Total	5	5	4.53	16.3	8.8	14.5	16.3

Notes:
a - Maximum value is the detection limit
b - Statistical analysis cannot be performed due to insufficient number of unique data points
c - Outlier removed

5.6.2 Chlorinated Monocyclic Aromatics in Crops

SVOCs were not detected in the crop samples (Table 5.25).

Table 5.25 Baseline Concentrations for SVOCs in Crops

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	2	0	0.01	0.01
Hexachlorobutadiene	2	0	0.01	0.01
Pentachlorobenzene	2	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	2	0	0.01	0.01

5.6.3 Chlorinated Polycyclic Aromatics in Crops

5.6.3.1 Polychlorinated Biphenyls (PCBs) in Crops

PCBs were not detected in any of the crop samples (Table 5.26).

Table 5.26 Baseline Concentrations for PCBs in Crops

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	3	0	0.01	0.01
Aroclor 1248	3	0	0.01	0.01
Aroclor 1254	3	0	0.01	0.01
Aroclor 1260	3	0	0.01	0.01
Total PCBs	3	0	0.01	0.01

5.6.3.2 Polychlorinated Dioxins and Furans in Crops

PCDD/PCDF congeners were not detected in any of the crop samples sent for analysis (Table 5.27). The measured (maximum detected) crops concentrations were used to determine the TEQ of PCDD/PCDF for mammals (including humans). Additional details regarding the methodology used are provided in Section 2.4.

Table 5.27 Baseline Concentrations for PCDD/PCDF in Crops

Parameter	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}
2,3,7,8-TCDD	3	0	0.031	0.045	1.0	0.045
1,2,3,7,8-PeCDD	3	0	0.018	0.036	1.0	0.036
1,2,3,4,7,8-HxCDD	3	0	0.021	0.044	0.1	0.0044
1,2,3,6,7,8-HxCDD	3	0	0.019	0.043	0.1	0.0043
1,2,3,7,8,9-HxCDD	3	0	0.02	0.043	0.1	0.0043
1,2,3,4,6,7,8-HpCDD	3	0	0.02	0.031	0.01	0.0003
OCDD	3	0	0.013	0.044	0.0003	0.000013
2,3,7,8-TCDF	3	0	0.02	0.042	0.1	0.0042
1,2,3,7,8-PeCDF	3	0	0.013	0.033	0.03	0.0010
2,3,4,7,8-PeCDF	3	0	0.012	0.032	0.3	0.0096
1,2,3,4,7,8-HxCDF	3	0	0.015	0.027	0.1	0.0027
1,2,3,6,7,8-HxCDF	3	0	0.013	0.025	0.1	0.0025
2,3,4,6,7,8-HxCDF	3	0	0.014	0.029	0.1	0.0029
1,2,3,7,8,9-HxCDF	3	0	0.02	0.035	0.1	0.0035
1,2,3,4,6,7,8-HpCDF	3	0	0.014	0.026	0.01	0.0003
1,2,3,4,7,8,9-HpCDF	3	0	0.023	0.037	0.01	0.0004
OCDF	3	0	0.021	0.03	0.0003	0.00001
TEQ	-	-	-	-	-	**0.12**

Notes:
TEF = Toxic equivalency factor for humans/mammals based on WHO (2005)
C_{max} = Maximum Concentration

5.6.4 Chlorinated Polycyclic Aromatic Hydrocarbons in Crops

Only naphthalene and 2-methylnaphthlene were detected at very low levels in the crops (Table 5.28).

Table 5.28 Baseline Concentrations for PAHS in Crops

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Naphthalene	3	3	0.65	1.43 [a]
2-Methylnaphthalene	3	1	0.2	0.34 [a]
1-Methylnaphthalene	3	0	0.2	0.3
Acenaphthylene	3	0	0.2	0.3
Acenaphthene	3	0	0.2	0.3
Fluorene	3	0	0.2	0.3
Phenanthrene	3	0	0.2	0.3
Anthracene	3	0	0.2	0.3
Fluoranthene	3	0	0.2	0.3
Pyrene	3	0	0.2	0.3
Benzo(a)anthracene	3	0	0.2	0.3
Chrysene/Triphenylene	3	0	0.2	0.3
Benzo(b)flouranthene	3	0	0.2	0.3
Benzo(k)fluoranthene	3	0	0.2	0.3
Benzo(e)pyrene	3	0	0.2	0.3
Benzo(a)pyrene	3	0	0.2	0.3
Perylene	3	0	0.2	0.3
Indeno(1,2,3-cd)pyrene	3	0	0.2	0.3
Dibenzo(a,h/a,c)anthracene	3	0	0.2	0.3
Benzo(g,h,i)perylene	3	0	0.2	0.3

Notes:
a - Maximum value is a detected concentration

5.6.5 Crops Summary Baseline Findings

Several of the COPCs such as trace metals, VOCs, PAHs, PCDD/PCDF were detected in the crop samples collected and analyzed. However, most of the values were very low or close to the detection limits. Governmental and provincial guidelines for comparison purposes were not available.

5.7 Agricultural Products

A limited number of farms that produce or had available agricultural products exist within the immediate area of interest. As such a limited number of agricultural products were available to be collected (purchased) for the purposes of establishing baseline values. These products included poultry (chicken, two samples), beef (two samples), pork (two samples), milk (three samples) and eggs (three samples).

5.7.1 Trace Metals in Agricultural Products

Several trace metals from the list of COPCs such antimony, beryllium, boron, cadmium, cobalt, lead, mercury, silver and vanadium were not detected in any of the samples (Table 5.29) (for chicken).

Table 5.29 Baseline Concentrations for Metals in Chicken

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)
Aluminum (Al)-Total	2	0	2	2 [a]
Antimony (Sb)-Total	2	0	0.01	0.01 [a]
Arsenic (As)-Total	2	1	0.01	0.011
Barium (Ba)-Total	2	2	0.181	0.402
Beryllium (Be)-Total	2	0	0.1	0.1 [a]
Bismuth (Bi)-Total	2	0	0.03	0.03 [a]
Boron (B)-Total	2	0	2	2 [a]
Cadmium (Cd)-Total	2	0	0.005	0.005 [a]
Calcium (Ca)-Total	2	2	3720	5780
Chromium (Cr)-Total	2	2	0.52	2.54
Cobalt (Co)-Total	2	0	0.02	0.02 [a]
Copper (Cu)-Total	2	2	0.324	0.443
Iron (Fe)-Total	2	2	12.6	28
Lead (Pb)-Total	2	0	0.02	0.02 [a]
Lithium (Li)-Total	2	0	0.1	0.1 [a]
Magnesium (Mg)-Total	2	2	232	270
Manganese (Mn)-Total	2	2	0.236	0.288
Mercury (Hg)-Total	2	0	0.001	0.001 [a]
Molybdenum (Mo)-Total	2	2	0.044	0.07
Nickel (Ni)-Total	2	2	0.11	0.12
Phosphorus (P)-Total	2	2	3060	4170
Potassium (K)-Total	1	1	2380	2380
Selenium (Se)-Total	2	2	0.271	0.28
Silver (Ag)-Total	2	0	0.01	0.01 [a]
Sodium (Na)-Total	2	2	597	718
Strontium (Sr)-Total	2	2	0.949	2.11
Thallium (Tl)-Total	2	0	0.01	0.01 [a]
Tin (Sn)-Total	2	0	0.05	0.05 [a]
Titanium (Ti)-Total	2	0	0.1	0.1 [a]
Uranium (U)-Total	2	0	0.002	0.002 [a]

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)
Vanadium (V)-Total	2	0	0.1	0.1 [a]
Zinc (Zn)-Total	2	2	13	15.3

Notes:
a - Maximum value is the detection limit

Several trace metals from the list of COPCs such as antimony, arsenic, beryllium, boron, cadmium, chromium, cobalt, lead, mercury, nickel, silver and vanadium were not detected in any of the samples (Table 5.30) (for beef).

Table 5.30 Baseline Concentrations for Metals in Beef

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aluminum (Al)-Total	2	0	2	2
Antimony (Sb)-Total	2	0	0.01	0.01
Arsenic (As)-Total	2	0	0.01	0.01
Barium (Ba)-Total	2	2	0.041	0.065 [a]
Beryllium (Be)-Total	2	0	0.1	0.1
Bismuth (Bi)-Total	2	0	0.03	0.03
Boron (B)-Total	2	0	4	6
Cadmium (Cd)-Total	2	0	0.005	0.005
Calcium (Ca)-Total	2	2	145	237 [a]
Chromium (Cr)-Total	2	0	0.1	0.1
Cobalt (Co)-Total	2	0	0.02	0.02
Copper (Cu)-Total	2	2	0.228	0.365 [a]
Iron (Fe)-Total	2	2	8.77	11.3 [a]
Lead (Pb)-Total	2	0	0.02	0.02
Lithium (Li)-Total	2	0	0.1	0.1
Magnesium (Mg)-Total	2	2	91	113 [a]
Manganese (Mn)-Total	2	2	0.02	0.023 [a]
Mercury (Hg)-Total	2	0	0.001	0.001
Molybdenum (Mo)-Total	2	0	0.01	0.01
Nickel (Ni)-Total	2	0	0.1	0.1
Phosphorus (P)-Total	2	2	921	1160 [a]
Potassium (K)-Total	2	2	1580	2010 [a]
Selenium (Se)-Total	2	0	0.2	0.2
Silver (Ag)-Total	2	0	0.01	0.01
Sodium (Na)-Total	2	2	254	334 [a]
Strontium (Sr)-Total	2	2	0.069	0.11 [a]
Thallium (Tl)-Total	2	0	0.01	0.01
Tin (Sn)-Total	2	0	0.05	0.05
Titanium (Ti)-Total	2	0	0.1	0.1
Uranium (U)-Total	2	0	0.002	0.002
Vanadium (V)-Total	2	0	0.1	0.1
Zinc (Zn)-Total	2	2	16.1	20.3 [a]

Notes:
a - Maximum value is a detected concentration

Several trace metals from the list of COPCs such as antimony, arsenic, beryllium, boron, cadmium, chromium, lead, mercury, nickel, silver and vanadium were not detected in any of the samples (Table 5.31) (for pork).

Table 5.31 Baseline Concentrations for Metals in Pork

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aluminum (Al)-Total	2	0	2	2
Antimony (Sb)-Total	2	0	0.01	0.01
Arsenic (As)-Total	2	0	0.01	0.01
Barium (Ba)-Total	2	2	0.06	0.061 [a]
Beryllium (Be)-Total	2	0	0.1	0.1
Bismuth (Bi)-Total	2	0	0.03	0.03
Boron (B)-Total	2	0	4	6
Cadmium (Cd)-Total	2	0	0.005	0.005
Calcium (Ca)-Total	2	2	73.1	77.6 [a]
Chromium (Cr)-Total	2	0	0.1	0.1
Cobalt (Co)-Total	2	2	0.044	0.051 [a]
Copper (Cu)-Total	2	2	0.455	0.575 [a]
Iron (Fe)-Total	2	2	9.11	9.36 [a]
Lead (Pb)-Total	2	0	0.02	0.02
Lithium (Li)-Total	2	0	0.1	0.1
Magnesium (Mg)-Total	2	2	92.3	109 [a]
Manganese (Mn)-Total	2	2	0.223	0.245 [a]
Mercury (Hg)-Total	2	0	0.001	0.001
Molybdenum (Mo)-Total	2	2	0.02	0.024 [a]
Nickel (Ni)-Total	2	0	0.1	0.1
Phosphorus (P)-Total	2	2	1290	1310 [a]
Potassium (K)-Total	2	2	2090	2140 [a]
Selenium (Se)-Total	2	0	0.2	0.2
Silver (Ag)-Total	2	0	0.01	0.01
Sodium (Na)-Total	2	2	7970	8060 [a]
Strontium (Sr)-Total	2	2	0.365	0.402 [a]
Thallium (Tl)-Total	2	0	0.01	0.01
Tin (Sn)-Total	2	0	0.05	0.05
Titanium (Ti)-Total	2	0	0.1	0.1
Uranium (U)-Total	2	0	0.002	0.002
Vanadium (V)-Total	2	0	0.1	0.1
Zinc (Zn)-Total	2	2	11.7	13.4 [a]

Notes:

a - Maximum level is a detected concentration

Several trace metals from the list of COPC such as antimony, arsenic, beryllium, boron, cadmium, chromium, cobalt, lead, mercury, nickel, silver and vanadium were not detected in any of the samples (Table 5.32) (for dairy).

Table 5.32 Baseline Concentrations for Metals in Dairy

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aluminum (Al)-Total	2	0	2	2
Antimony (Sb)-Total	2	0	0.01	0.01
Arsenic (As)-Total	2	0	0.01	0.01
Barium (Ba)-Total	2	2	0.04	0.05 [a]
Beryllium (Be)-Total	2	0	0.1	0.1
Bismuth (Bi)-Total	2	0	0.03	0.03
Boron (B)-Total	2	0	2	2
Cadmium (Cd)-Total	2	0	0.005	0.005
Calcium (Ca)-Total	2	2	819	995 [a]
Chromium (Cr)-Total	2	0	0.1	0.1
Cobalt (Co)-Total	2	0	0.02	0.02
Copper (Cu)-Total	2	2	0.04	0.048 [a]
Iron (Fe)-Total	2	0	0.2	0.2
Lead (Pb)-Total	2	0	0.02	0.02
Lithium (Li)-Total	2	0	0.1	0.1
Magnesium (Mg)-Total	2	2	71.2	87.5 [a]
Manganese (Mn)-Total	2	2	0.015	0.018 [a]
Mercury (Hg)-Total	2	0	0.001	0.001
Molybdenum (Mo)-Total	2	2	0.031	0.039 [a]
Nickel (Ni)-Total	2	0	0.1	0.1
Phosphorus (P)-Total	2	2	697	814 [a]
Potassium (K)-Total	2	2	1110	1320 [a]
Selenium (Se)-Total	2	0	0.04	0.04
Silver (Ag)-Total	2	0	0.01	0.01
Sodium (Na)-Total	2	2	245	265 [a]
Strontium (Sr)-Total	2	2	0.392	0.483 [a]
Thallium (Tl)-Total	2	0	0.01	0.01
Tin (Sn)-Total	2	0	0.05	0.05
Titanium (Ti)-Total	2	0	0.1	0.1
Uranium (U)-Total	2	0	0.002	0.002
Vanadium (V)-Total	2	0	0.1	0.1
Zinc (Zn)-Total	2	2	2.89	3.49 [a]

Notes:

a - Maximum value is a detected concentration

Several trace metals from the list of COPCs such as antimony, arsenic, beryllium, boron, cadmium, chromium, cobalt, lead, mercury, nickel, silver and vanadium were not detected in any of the egg samples (Table 5.33) (for eggs).

Table 5.33 Baseline Concentrations for Metals in Eggs

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max (mg/kg)
Aluminum (Al)-Total	3	1	2	2.7
Antimony (Sb)-Total	3	0	0.01	0.01 [a]
Arsenic (As)-Total	3	0	0.01	0.01 [a]
Barium (Ba)-Total	3	3	0.062	0.398
Beryllium (Be)-Total	3	0	0.1	0.1 [a]
Bismuth (Bi)-Total	3	0	0.03	0.03 [a]
Boron (B)-Total	3	0	2	4 [a]
Cadmium (Cd)-Total	3	0	0.005	0.005 [a]
Calcium (Ca)-Total	3	3	242	495
Chromium (Cr)-Total	3	0	0.1	0.1 [a]
Cobalt (Co)-Total	3	0	0.02	0.02 [a]
Copper (Cu)-Total	3	3	0.275	0.588
Iron (Fe)-Total	3	3	12.8	15.8
Lead (Pb)-Total	3	0	0.02	0.02 [a]
Lithium (Li)-Total	3	0	0.1	0.1 [a]
Magnesium (Mg)-Total	3	3	57.9	108
Manganese (Mn)-Total	3	3	0.079	0.32
Mercury (Hg)-Total	3	0	0.001	0.001 [a]
Molybdenum (Mo)-Total	3	3	0.029	0.038
Nickel (Ni)-Total	3	0	0.1	0.1 [a]
Phosphorus (P)-Total	3	3	1550	1740
Potassium (K)-Total	3	3	1170	1670
Selenium (Se)-Total	3	3	0.197	0.21
Silver (Ag)-Total	3	0	0.01	0.01 [a]
Sodium (Na)-Total	3	3	1190	1550
Strontium (Sr)-Total	3	3	0.145	0.429
Thallium (Tl)-Total	3	0	0.01	0.01 [a]
Tin (Sn)-Total	3	0	0.05	0.05 [a]
Titanium (Ti)-Total	3	0	0.1	0.1 [a]
Uranium (U)-Total	3	0	0.002	0.002 [a]
Vanadium (V)-Total	3	0	0.1	0.1 [a]
Zinc (Zn)-Total	3	3	5.27	12.6

Notes:

a - Maximum value is the detection limit

5.7.2 Chlorinated Monocyclic Aromatics in Agricultural Products

SVOCs were not detected in any of the samples submitted for analysis (Table 5.34 to Table 5.38).

Table 5.34 Baseline Concentrations for SVOCs in Chicken

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	2	0	0.01	0.01
Hexachlorobutadiene	2	0	0.01	0.01
Pentachlorobenzene	2	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	2	0	0.01	0.01

Table 5.35 Baseline Concentrations for SVOCs in Beef

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	2	0	0.01	0.01
Hexachlorobutadiene	2	0	0.01	0.01
Pentachlorobenzene	2	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	2	0	0.01	0.01

Table 5.36 Baseline Concentrations for SVOCs in Pork

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	2	0	0.01	0.01
Hexachlorobutadiene	2	0	0.01	0.01
Pentachlorobenzene	2	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	2	0	0.01	0.01

Table 5.37 Baseline Concentrations for SVOCs in Dairy

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	2	0	0.01	0.01
Hexachlorobutadiene	2	0	0.01	0.01
Pentachlorobenzene	2	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	2	0	0.01	0.01

Table 5.38 Baseline Concentrations for SVOCs in Eggs

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Hexachlorobenzene	3	0	0.01	0.01
Hexachlorobutadiene	3	0	0.01	0.01
Pentachlorobenzene	3	0	0.01	0.01
1,2,4,5-Tetrachlorobenzene	3	0	0.01	0.01

5.7.3 Chlorinated Polycyclic Aromatics in Agricultural Products

5.7.3.1 Polychlorinated Biphenyls (PCBs) in Agricultural Products

PCBs were not detected in any of the samples (Table 5.39 to Table 5.43).

Table 5.39 Baseline Concentrations for PCBs in Chicken

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	2	0	0.01	0.01
Aroclor 1248	2	0	0.01	0.01
Aroclor 1254	2	0	0.01	0.01
Aroclor 1260	2	0	0.01	0.01
Total PCBs	2	0	0.01	0.01

Table 5.40 Baseline Concentrations for PCBs in Beef

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	2	0	0.01	0.01
Aroclor 1248	2	0	0.01	0.01
Aroclor 1254	2	0	0.01	0.01
Aroclor 1260	2	0	0.01	0.01
Total PCBs	2	0	0.01	0.01

Table 5.41 Baseline Concentrations for PCBs in Pork

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	2	0	0.01	0.01
Aroclor 1248	2	0	0.01	0.01
Aroclor 1254	2	0	0.01	0.01
Aroclor 1260	2	0	0.01	0.01
Total PCBs	2	0	0.01	0.01

Table 5.42 Baseline Concentrations for PCBs in Dairy

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	2	0	0.01	0.01
Aroclor 1248	2	0	0.01	0.01
Aroclor 1254	2	0	0.01	0.01
Aroclor 1260	2	0	0.01	0.01
Total PCBs	2	0	0.01	0.01

Table 5.43 Baseline Concentrations for PCBs in Eggs

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Aroclor 1242	3	0	0.01	0.01
Aroclor 1248	3	0	0.01	0.01
Aroclor 1254	3	0	0.01	0.01
Aroclor 1260	3	0	0.01	0.01
Total PCBs	3	0	0.01	0.01

5.7.3.2 Polychlorinated Dioxins and Furans in Agricultural Products

2,3,7, 8 was not detected in of the chicken, beef, pork, dairy or eggs samples (Table 5.44 to Table 5.48). OCDD was detected in beef, pork and eggs. Some of the other congeners were detected in at least two samples. The measured (maximum detected) produce concentrations were used to determine the TEQ of PCDD/PCDF for (humans) (Table 5.44 to Table 5.48). Additional details regarding the methodology used are provided in Section 2.4. Concentrations of PCCD/PCDF levels measured in the agricultural produce were compared (where available) to the dioxin and furan levels in Canada (Birmingham et al., 1989). The levels measured were lower than the levels reported in the scientific literature.

Table 5.44 Baseline Concentrations for PCDD/PCDF in Chicken

Parameter	Typical Levels in Canada [a]	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}
2,3,7,8-TCDD	-	2	0	0.075	0.1	1.0	0.1
1,2,3,7,8-PeCDD	-	2	0	0.041	0.1	1.0	0.1
1,2,3,4,7,8-HxCDD	-	2	0	0.023	0.057	0.1	0.0057
1,2,3,6,7,8-HxCDD	-	2	0	0.024	0.052	0.1	0.0052
1,2,3,7,8,9-HxCDD	-	2	0	0.035	0.054	0.1	0.0054
1,2,3,4,6,7,8-HpCDD	ND - 15	2	0	0.051	0.11	0.01	0.0011
OCDD	17-210	2	0	0.092	0.13	0.0003	0.00004
2,3,7,8-TCDF	-	2	0	0.044	0.071	0.1	0.0071
1,2,3,7,8-PeCDF	-	2	0	0.026	0.042	0.03	0.0013
2,3,4,7,8-PeCDF	-	2	0	0.034	0.091	0.3	0.027
1,2,3,4,7,8-HxCDF	-	2	0	0.016	0.038	0.1	0.0038
1,2,3,6,7,8-HxCDF	-	2	0	0.018	0.039	0.1	0.0039
2,3,4,6,7,8-HxCDF	-	2	0	0.02	0.049	0.1	0.0049
1,2,3,7,8,9-HxCDF	-	2	0	0.022	0.054	0.1	0.0054
1,2,3,4,6,7,8-HpCDF	-	2	0	0.051	0.074	0.01	0.00074
1,2,3,4,7,8,9-HpCDF	-	2	0	0.041	0.076	0.01	0.00076
OCDF	-	2	0	0.019	0.058	0.0003	0.000017
TEQ	-	-	-	-	-	-	**0.27**

Notes:
a - Dioxin and furan levels in Canada (Birmingham et al. 1989)
$TEF_{H/M}$ - Toxic Equivalency Factor for Humans/Mammals based on WHO (2005)
C_{Max} = Maximum concentration

Table 5.45 Baseline Concentrations for PCDD/PCDF in Beef

Parameter	Typical Levels in Canada [a]	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}
2,3,7,8-TCDD	-	2	0	0.042	0.053	1.0	0.053
1,2,3,7,8-PeCDD	-	2	0	0.02	0.037	1.0	0.037
1,2,3,4,7,8-HxCDD	-	2	0	0.031	0.032	0.1	0.0032
1,2,3,6,7,8-HxCDD	-	2	0	0.029	0.029	0.1	0.0029
1,2,3,7,8,9-HxCDD	-	2	0	0.029	0.03	0.1	0.003
1,2,3,4,6,7,8-HpCDD	-	2	0	0.024	0.049	0.01	0.00049
OCDD	ND-24	2	2	0.0274	0.0424 [b]	0.0003	0.000013
2,3,7,8-TCDF	-	2	0	0.033	0.043	0.1	0.0043
1,2,3,7,8-PeCDF	-	2	0	0.021	0.027	0.03	0.00081
2,3,4,7,8-PeCDF	-	2	0	0.02	0.027	0.3	0.0081
1,2,3,4,7,8-HxCDF	-	2	0	0.024	0.031	0.1	0.0031
1,2,3,6,7,8-HxCDF	-	2	0	0.019	0.023	0.1	0.0023
2,3,4,6,7,8-HxCDF	-	2	0	0.022	0.026	0.1	0.0026
1,2,3,7,8,9-HxCDF	-	2	0	0.031	0.04	0.1	0.004
1,2,3,4,6,7,8-HpCDF	-	2	0	0.019	0.032	0.01	0.00032
1,2,3,4,7,8,9-HpCDF	-	2	0	0.032	0.051	0.01	0.00051
OCDF	-	2	0	0.024	0.05	0.0003	0.00002
TEQ	-	-	-	-	-	-	**0.13**

Notes:
a - Dioxin and furan levels in Canada (Birmingham et al. 1989)
b - Maximum value is a detected concentration
$TEF_{H/M}$ - Toxic Equivalency Factor for Humans/Mammals based on WHO (2005)
C_{Max} = Maximum concentration

Table 5.46 Baseline Concentrations for PCDD/PCDF in Pork

Parameter	Typical Levels in Canada [a]	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}
2,3,7,8-TCDD	-	2	0	0.046	0.061	1.0	0.061
1,2,3,7,8-PeCDD	-	2	0	0.019	0.031	1.0	0.031
1,2,3,4,7,8-HxCDD	ND - 1.1	2	0	0.022	0.025	0.1	0.0025
1,2,3,6,7,8-HxCDD	ND - 1.1	2	0	0.021	0.024	0.1	0.0024
1,2,3,7,8,9-HxCDD	ND - 1.1	2	0	0.022	0.024	0.1	0.0024
1,2,3,4,6,7,8-HpCDD	3.6	2	0	0.027	0.061	0.01	0.00061
OCDD	9.8	2	2	0.2	0.252 [b]	0.0003	0.000076
2,3,7,8-TCDF	-	2	0	0.042	0.048	0.1	0.0048
1,2,3,7,8-PeCDF	-	2	0	0.013	0.022	0.03	0.00066
2,3,4,7,8-PeCDF	-	2	0	0.013	0.021	0.3	0.0063
1,2,3,4,7,8-HxCDF	-	2	1	0.0222	0.026 [b]	0.1	0.0026
1,2,3,6,7,8-HxCDF	-	2	0	0.031	0.042	0.1	0.0042
2,3,4,6,7,8-HxCDF	-	2	0	0.012	0.024	0.1	0.0024
1,2,3,7,8,9-HxCDF	-	2	0	0.016	0.031	0.1	0.0031
1,2,3,4,6,7,8-HpCDF	-	2	0	0.025	0.028	0.01	0.00028
1,2,3,4,7,8,9-HpCDF	-	2	0	0.039	0.043	0.01	0.00043
OCDF	-	2	0	0.037	0.038	0.0003	0.000011
	-	-	-	-	-	-	**0.12**

Notes:
a - Dioxin and furan levels in Canada (Birmingham et al. 1989)
b - Maximum value is a detected concentration
$TEF_{H/M}$ - Toxic Equivalency Factor for Humans/Mammals based on WHO (2005)

Table 5.47 Baseline Concentrations for PCDD/PCDF in Dairy

Parameter	Typical Levels in Canada [a]	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}
2,3,7,8-TCDD	-	2	0	0.046	0.058	1.0	0.058
1,2,3,7,8-PeCDD	-	2	0	0.034	0.035	1.0	0.035
1,2,3,4,7,8-HxCDD	-	2	1	0.029	0.0454	0.1	0.0045
1,2,3,6,7,8-HxCDD	-	2	0	0.03	0.036	0.1	0.0036
1,2,3,7,8,9-HxCDD	-	2	0	0.024	0.028	0.1	0.0028
1,2,3,4,6,7,8-HpCDD	ND - 0.43	2	1	0.051	0.0818 [b]	0.01	0.0008
OCDD	1	2	0	0.12	0.21	0.0003	0.00006
2,3,7,8-TCDF	-	2	0	0.028	0.048	0.1	0.0048
1,2,3,7,8-PeCDF	-	2	0	0.032	0.032	0.03	0.0010
2,3,4,7,8-PeCDF	-	2	1	0.038	0.0588 [b]	0.3	0.0176
1,2,3,4,7,8-HxCDF	-	2	1	0.022	0.0488 [b]	0.1	0.0049
1,2,3,6,7,8-HxCDF	-	2	1	0.0267	0.03 [b]	0.1	0.003
2,3,4,6,7,8-HxCDF	-	2	0	0.019	0.023	0.1	0.0023
1,2,3,7,8,9-HxCDF	-	2	0	0.024	0.027	0.1	0.0027
1,2,3,4,6,7,8-HpCDF	-	2	0	0.029	0.034	0.01	0.00034
1,2,3,4,7,8,9-HpCDF	-	2	0	0.031	0.038	0.01	0.00038
OCDF	-	2	1	0.0748	0.075 [b]	0.0003	0.000023
TEQ	-	-	-	-	-	-	**0.14**

Notes:
a - Dioxin and furan levels in Canada (Birmingham et al. 1989)
b - Maximum value is a detected concentration
$TEF_{H/M}$ - Toxic Equivalency Factor for Humans/Mammals based on WHO (2005)
C_{Max} = Maximum concentration

Table 5.48 Baseline Concentrations for PCDD/PCDF in Eggs

Parameter	Typical Levels in Canada [a]	No. Analyzed	No. Detected	Min (pg/g)	Max as the DL (pg/g)	$TEF_{H/M}$	$TEF_{H/M}$ X C_{Max}
2,3,7,8-TCDD	-	3	0	0.03	0.12	1.0	0.12
1,2,3,7,8-PeCDD	-	3	0	0.03	0.063	1.0	0.063
1,2,3,4,7,8-HxCDD	-	3	0	0.016	0.044	0.1	0.0044
1,2,3,6,7,8-HxCDD	-	3	2	0.0317	0.0636 [b]	0.1	0.0064
1,2,3,7,8,9-HxCDD	-	3	0	0.016	0.044	0.1	0.0044
1,2,3,4,6,7,8-HpCDD	ND - 8.8	3	2	0.0492	0.167 [b]	0.01	0.0017
OCDD	8 - 44	3	3	0.107	1.28 [b]	0.0003	0.00038
2,3,7,8-TCDF	-	3	0	0.02	0.05	0.1	0.005
1,2,3,7,8-PeCDF	-	3	0	0.019	0.034	0.03	0.0010
2,3,4,7,8-PeCDF	-	3	1	0.019	0.088 [b]	0.3	0.026
1,2,3,4,7,8-HxCDF	5	3	0	0.062	0.13	0.1	0.013
1,2,3,6,7,8-HxCDF	5	3	0	0.057	0.12	0.1	0.012
2,3,4,6,7,8-HxCDF	5	3	0	0.063	0.13	0.1	0.013
1,2,3,7,8,9-HxCDF	5	3	0	0.073	0.16	0.1	0.016
1,2,3,4,6,7,8-HpCDF	7	3	1	0.024	0.775 [b]	0.01	0.0078
1,2,3,4,7,8,9-HpCDF	7	3	0	0.033	0.056	0.01	0.00056
OCDF	12	3	1	0.036	0.072 [b]	0.0003	0.000022
TEQ	-	-	-	-	-	-	**0.29**

Notes:
a - Dioxin and furan levels in Canada (Birmingham et al. 1989)
b - Maximum value is a detected concentration
$TEF_{H/M}$ - Toxic Equivalency Factor for Humans/Mammals based on WHO (2005)

5.7.4 Polycyclic Aromatic Hydrocarbons in Agricultural Products

Naphthalene and 1 and 2-methylnaphthalene were detected at very low concentrations (ng/g) in the chicken samples submitted for analysis (Table 5.49). All other PAHs were not detected in any of the samples.

Table 5.49 Baseline Concentrations for PAHs in Chicken

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Naphthalene	2	2	1.26	1.5 [a]
2-Methylnaphthalene	2	2	0.48	0.8 [a]
1-Methylnaphthalene	2	2	0.24	0.42 [a]
Acenaphthylene	2	0	0.2	0.2
Acenaphthene	2	0	0.2	0.2
Fluorene	2	0	0.2	0.2
Phenanthrene	2	0	0.2	0.2
Anthracene	2	0	0.2	0.2
Fluoranthene	2	0	0.2	0.2
Pyrene	2	0	0.62	0.81
Benzo(a)anthracene	2	0	0.2	0.2
Chrysene/Triphenylene	2	0	0.2	0.2
Benzo(b)flouranthene	2	0	0.2	0.2
Benzo(k)fluoranthene	2	0	0.2	0.2
Benzo(e)pyrene	2	0	0.2	0.2
Benzo(a)pyrene	2	0	0.2	0.2
Perylene	2	0	0.2	0.2
Indeno(1,2,3-cd)pyrene	2	0	0.2	0.2
Dibenzo(a,h/a,c)anthracene	2	0	0.2	0.2
Benzo(g,h,i)perylene	2	0	0.2	0.25

Notes:
a - Maximum value is a detected concentration

Naphthalene, 1 and 2-methylnaphthalene and chrysene were detected at very low concentrations (ng/g) in the beef samples submitted for analysis (Table 5.50). All other PAHs were not detected in any of the samples.

Table 5.50 Baseline Concentrations for PAHs in Beef

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Naphthalene	2	2	1.34	1.4 [a]
2-Methylnaphthalene	2	2	0.61	0.77 [a]
1-Methylnaphthalene	2	2	0.35	0.43 [a]
Acenaphthylene	2	0	0.2	0.2
Acenaphthene	2	0	0.2	0.2
Fluorene	2	0	0.2	0.2
Phenanthrene	2	2	0.25	0.25 [a]
Anthracene	2	0	0.2	0.2
Fluoranthene	2	0	0.2	0.2
Pyrene	2	0	0.2	0.2
Benzo(a)anthracene	2	0	0.2	0.2

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Chrysene/Triphenylene	2	1	0.2	0.2 [a]
Benzo(b)flouranthene	2	0	0.2	0.2
Benzo(k)fluoranthene	2	0	0.2	0.2
Benzo(e)pyrene	2	0	0.2	0.2
Benzo(a)pyrene	2	0	0.2	0.2
Perylene	2	0	0.2	0.2
Indeno(1,2,3-cd)pyrene	2	0	0.2	0.2
Dibenzo(a,h/a,c)anthracene	2	0	0.2	0.2
Benzo(g,h,i)perylene	2	0	0.2	0.2

Notes:

a - Maximum value is a detected concentration

Naphthalene, 1 and 2-methylnaphthalene, acenaphthene, fluorene, phenanathrene and chrysene were detected at very low concentrations (ng/g) in the pork samples submitted for analysis (Table 5.51). All other PAHs were not detected in any of the samples.

Table 5.51 Baseline Concentrations for PAHs in Pork

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Naphthalene	2	2	2.32	3.1 [a]
2-Methylnaphthalene	2	2	1.02	1.68 [a]
1-Methylnaphthalene	2	2	0.58	0.87 [a]
Acenaphthylene	2	0	0.2	0.3
Acenaphthene	2	1	0.29	0.3 [a]
Fluorene	2	2	0.45	0.5 [a]
Phenanthrene	2	2	0.41	0.44 [a]
Anthracene	2	0	0.2	0.3
Fluoranthene	2	0	0.2	0.3
Pyrene	2	0	0.2	0.3
Benzo(a)anthracene	2	0	0.2	0.3
Chrysene/Triphenylene	2	1	0.2	0.3 [a]
Benzo(b)flouranthene	2	0	0.2	0.3
Benzo(k)fluoranthene	2	0	0.2	0.3
Benzo(e)pyrene	2	0	0.2	0.3
Benzo(a)pyrene	2	0	0.2	0.3
Perylene	2	0	0.2	0.3
Indeno(1,2,3-cd)pyrene	2	0	0.2	0.3
Dibenzo(a,h/a,c)anthracene	2	0	0.2	0.3
Benzo(g,h,i)perylene	2	0	0.2	0.3

Notes:

a - Maximum value is a detected concentration

Naphthalene was detected at very low concentrations (ng/g) in the dairy samples submitted for analysis

(Table 5.52). All other PAHs were not detected in any of the samples.

Table 5.52 Baseline Concentrations for PAHs in Dairy

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Naphthalene	2	2	0.46	0.48 [a]
2-Methylnaphthalene	2	0	0.2	0.2
1-Methylnaphthalene	2	0	0.2	0.2
Acenaphthylene	2	0	0.2	0.2
Acenaphthene	2	0	0.2	0.2
Fluorene	2	0	0.2	0.2
Phenanthrene	2	0	0.2	0.2
Anthracene	2	0	0.2	0.2
Fluoranthene	2	0	0.2	0.2
Pyrene	2	0	0.2	0.2
Benzo(a)anthracene	2	0	0.2	0.2
Chrysene/Triphenylene	2	0	0.2	0.2
Benzo(b)flouranthene	2	0	0.2	0.2
Benzo(k)fluoranthene	2	0	0.2	0.2
Benzo(e)pyrene	2	0	0.2	0.2
Benzo(a)pyrene	2	0	0.2	0.2
Perylene	2	0	0.2	0.2
Indeno(1,2,3-cd)pyrene	2	0	0.2	0.2
Dibenzo(a,h/a,c)anthracene	2	0	0.2	0.2
Benzo(g,h,i)perylene	2	0	0.2	0.2

Notes:

a - Maximum value is a detected concentration

Naphthalene and 2-methylnaphthalene were detected at very low concentrations (ng/g) in the eggs samples submitted for analysis (Table 5.53). All other PAHs were not detected in any of the samples.

Table 5.53 Baseline Concentrations for PAHs in Eggs

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Naphthalene	3	3	0.42	0.55 [a]
2-Methylnaphthalene	3	1	0.2	0.22 [a]
1-Methylnaphthalene	3	0	0.2	0.2
Acenaphthylene	3	0	0.2	0.2
Acenaphthene	3	0	0.2	0.2
Fluorene	3	0	0.2	0.2
Phenanthrene	3	0	0.2	0.2
Anthracene	3	0	0.2	0.2
Fluoranthene	3	0	0.2	0.2
Pyrene	3	0	0.2	0.2
Benzo(a)anthracene	3	0	0.2	0.2

Parameter	No. Analyzed	No. Detected	Min (ng/g)	Max as the DL (ng/g)
Chrysene/Triphenylene	3	0	0.2	0.2
Benzo(b)flouranthene	3	0	0.2	0.2
Benzo(k)fluoranthene	3	0	0.2	0.2
Benzo(e)pyrene	3	0	0.2	0.2
Benzo(a)pyrene	3	0	0.2	0.2
Perylene	3	0	0.2	0.2
Indeno(1,2,3-cd)pyrene	3	0	0.2	0.2
Dibenzo(a,h/a,c)anthracene	3	0	0.2	0.2
Benzo(g,h,i)perylene	3	0	0.2	0.2

Notes:

a - Maximum value is a detected concentration

5.7.5 Volatile Organic Compounds

VOCs were not detected in any of the samples submitted for analysis, (Table 5.54 to Table 5.58).

Table 5.54 Baseline Concentrations for VOCs in Chicken

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Acrolein	2	0	50	100
Benzene	2	0	2	4
Bromobenzene	2	0	10	20
Bromochloromethane	2	0	10	20
Bromodichloromethane	2	0	0.5	1
Bromoform	2	0	2	4
Bromomethane	2	0	1	2
n-Butylbenzene	2	0	10	20
sec-Butylbenzene	2	0	10	20
tert-Butylbenzene	2	0	10	20
Carbon Disulfide	2	0	2	4
Carbon tetrachloride	2	0	1	2
Chlorobenzene	2	0	2	4
Dibromochloromethane	2	0	0.1	0.2
Chloroethane	2	0	2	4
Chloroform	2	0	1	2
Chloromethane	2	0	2	4
2-Chlorotoluene	2	0	10	20
4-Chlorotoluene	2	0	10	20
1,2-Dibromo-3-chloropropane	2	0	10	20
1,2-Dibromoethane	2	0	0.5	1
Dibromomethane	2	0	1	2

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
1,2-Dichlorobenzene	2	0	2	4
1,3-Dichlorobenzene	2	0	2	4
1,4-Dichlorobenzene	2	0	2	4
Dichlorodifluoromethane	2	0	3	6
1,1-Dichloroethane	2	0	0.5	1
1,2-Dichloroethane	2	0	0.2	0.4
1,1-Dichloroethylene	2	0	0.2	0.4
cis-1,2-Dichloroethylene	2	0	2	4
trans-1,2-Dichloroethylene	2	0	6	10
Dichloromethane	2	0	10	20
1,2-Dichloropropane	2	0	0.1	0.2
1,3-Dichloropropane	2	0	2	4
2,2-Dichloropropane	2	0	10	20
1,1-Dichloropropene	2	0	1	2
cis-1,3-Dichloropropene	2	0	0.2	0.4
trans-1,3-Dichloropropene	2	0	0.2	0.4
1,2-Dichlorotetrafluoroethane	2	0	5	10
Ethyl Benzene	2	0	2	4
Hexachlorobutadiene	2	0	10	20
2-Hexanone	2	0	20	40
Isopropylbenzene	2	0	10	20
Isopropyltoluene	2	0	10	20
Methyl Ethyl Ketone	2	0	20	40
Methyl Isobutyl Ketone	2	0	20	40
MTBE	2	0	20	40
Naphthalene	2	0	10	20
n-Propylbenzene	2	0	10	20
Styrene	2	0	2	4
1,1,1,2-Tetrachloroethane	2	0	0.8	2
1,1,2,2-Tetrachloroethane	2	0	0.8	2
Tetrachloroethylene	2	0	2	4
Toluene	2	0	5	10
1,1,2-Trichloro-1,2,2-trifluoroethane	2	0	5	10
1,2,3-Trichlorobenzene	2	0	10	20
1,2,4-Trichlorobenzene	2	0	10	20
1,1,1-Trichloroethane	2	0	0.3	0.6
1,1,2-Trichloroethane	2	0	1	2
Trichloroethylene	2	0	5	10
Trichlorofluoromethane	2	0	2	4
1,2,3-Trichloropropane	2	0	10	20
Trihalomethanes (total)	0	0	0	0

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
1,2,4-Trimethylbenzene	2	0	10	20
1,3,5-Trimethylbenzene	2	0	10	20
Vinyl chloride	2	0	0.3	0.6
o-Xylene	2	0	2	4
m+p-Xylenes	2	0	4	8
Xylenes (Total)	0	0	0	0

Table 5.55 Baseline Concentrations for VOCs in Beef

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Acrolein	1	0	3	3
Benzene	1	0	0.1	0.1
Bromobenzene	1	0	0.5	0.5
Bromochloromethane	1	0	0.5	0.5
Bromodichloromethane	1	0	0.005	0.005
Bromoform	1	0	0.1	0.1
Bromomethane	1	0	0.05	0.05
n-Butylbenzene	1	0	0.5	0.5
sec-Butylbenzene	1	0	0.5	0.5
tert-Butylbenzene	1	0	0.5	0.5
Carbon Disulfide	1	0	0.1	0.1
Carbon tetrachloride	1	0	0.05	0.05
Chlorobenzene	1	0	0.1	0.1
Dibromochloromethane	1	0	0.005	0.005
Chloroethane	1	0	0.1	0.1
Chloroform	1	0	0.05	0.05
Chloromethane	1	0	0.1	0.1
2-Chlorotoluene	1	0	0.5	0.5
4-Chlorotoluene	1	0	0.5	0.5
1,2-Dibromo-3-chloropropane	1	0	0.5	0.5
1,2-Dibromoethane	1	0	0.03	0.03
Dibromomethane	1	0	0.05	0.05
1,2-Dichlorobenzene	1	0	0.1	0.1
1,3-Dichlorobenzene	1	0	0.1	0.1
1,4-Dichlorobenzene	1	0	0.1	0.1
Dichlorodifluoromethane	1	0	0.2	0.2
1,1-Dichloroethane	1	0	0.03	0.03
1,2-Dichloroethane	1	0	0.01	0.01

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
1,1-Dichloroethylene	1	0	0.01	0.01
cis-1,2-Dichloroethylene	1	0	0.1	0.1
trans-1,2-Dichloroethylene	1	0	0.3	0.3
Dichloromethane	1	0	0.5	0.5
1,2-Dichloropropane	1	0	0.005	0.005
1,3-Dichloropropane	1	0	0.1	0.1
2,2-Dichloropropane	1	0	0.5	0.5
1,1-Dichloropropene	1	0	0.05	0.05
cis-1,3-Dichloropropene	1	0	0.01	0.01
trans-1,3-Dichloropropene	1	0	0.01	0.01
1,2-Dichlorotetrafluoroethane	1	0	0.3	0.3
Ethyl Benzene	1	0	0.1	0.1
Hexachlorobutadiene	1	0	0.5	0.5
2-Hexanone	1	0	1	1
Isopropylbenzene	1	0	0.5	0.5
Isopropyltoluene	1	0	0.5	0.5
Methyl Ethyl Ketone	1	0	1	1
Methyl Isobutyl Ketone	1	0	1	1
MTBE	1	0	1	1
Naphthalene	1	0	0.5	0.5
n-Propylbenzene	1	0	0.5	0.5
Styrene	1	0	0.1	0.1
1,1,1,2-Tetrachloroethane	1	0	0.04	0.04
1,1,2,2-Tetrachloroethane	1	0	0.04	0.04
Tetrachloroethylene	1	0	0.1	0.1
Toluene	1	0	0.3	0.3
1,1,2-Trichloro-1,2,2-trifluoroethane	1	0	0.3	0.3
1,2,3-Trichlorobenzene	1	0	0.5	0.5
1,2,4-Trichlorobenzene	1	0	0.5	0.5
1,1,1-Trichloroethane	1	0	0.02	0.02
1,1,2-Trichloroethane	1	0	0.05	0.05
Trichloroethylene	1	0	0.3	0.3
Trichlorofluoromethane	1	0	0.1	0.1
1,2,3-Trichloropropane	1	0	0.5	0.5
Trihalomethanes (total)	1	0	0.2	0.2
1,2,4-Trimethylbenzene	1	0	0.5	0.5
1,3,5-Trimethylbenzene	1	0	0.5	0.5
Vinyl chloride	1	0	0.02	0.02
o-Xylene	1	0	0.1	0.1
m+p-Xylenes	1	0	0.2	0.2
Xylenes (Total)	1	0	0.3	0.3

Table 5.56 Baseline Concentrations for VOCs in Pork

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Acrolein	1	0	50	50
Benzene	1	0	2	2
Bromobenzene	1	0	10	10
Bromochloromethane	1	0	10	10
Bromodichloromethane	1	0	0.1	0.1
Bromoform	1	0	2	2
Bromomethane	1	0	1	1
n-Butylbenzene	1	0	10	10
sec-Butylbenzene	1	0	10	10
tert-Butylbenzene	1	0	10	10
Carbon Disulfide	1	0	2	2
Carbon tetrachloride	1	0	1	1
Chlorobenzene	1	0	2	2
Dibromochloromethane	1	0	0.1	0.1
Chloroethane	1	0	2	2
Chloroform	1	0	1	1
Chloromethane	1	0	2	2
2-Chlorotoluene	1	0	10	10
4-Chlorotoluene	1	0	10	10
1,2-Dibromo-3-chloropropane	1	0	10	10
1,2-Dibromoethane	1	0	0.5	0.5
Dibromomethane	1	0	1	1
1,2-Dichlorobenzene	1	0	2	2
1,3-Dichlorobenzene	1	0	2	2
1,4-Dichlorobenzene	1	0	2	2
Dichlorodifluoromethane	1	0	3	3
1,1-Dichloroethane	1	0	0.5	0.5
1,2-Dichloroethane	1	0	0.2	0.2
1,1-Dichloroethylene	1	0	0.2	0.2
cis-1,2-Dichloroethylene	1	0	2	2
trans-1,2-Dichloroethylene	1	0	6	6
Dichloromethane	1	0	10	10
1,2-Dichloropropane	1	0	0.1	0.1
1,3-Dichloropropane	1	0	2	2
2,2-Dichloropropane	1	0	10	10
1,1-Dichloropropene	1	0	1	1
cis-1,3-Dichloropropene	1	0	0.2	0.2
trans-1,3-Dichloropropene	1	0	0.2	0.2
1,2-Dichlorotetrafluoroethane	1	0	5	5

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Ethyl Benzene	1	0	2	2
Hexachlorobutadiene	1	0	10	10
2-Hexanone	1	0	20	20
Isopropylbenzene	1	0	10	10
Isopropyltoluene	1	0	10	10
Methyl Ethyl Ketone	1	0	20	20
Methyl Isobutyl Ketone	1	0	20	20
MTBE	1	0	20	20
Naphthalene	1	0	10	10
n-Propylbenzene	1	0	10	10
Styrene	1	0	2	2
1,1,1,2-Tetrachloroethane	1	0	0.8	0.8
1,1,2,2-Tetrachloroethane	1	0	0.8	0.8
Tetrachloroethylene	1	0	2	2
Toluene	1	0	5	5
1,1,2-Trichloro-1,2,2-trifluoroethane	1	0	5	5
1,2,3-Trichlorobenzene	1	0	10	10
1,2,4-Trichlorobenzene	1	0	10	10
1,1,1-Trichloroethane	1	0	0.3	0.3
1,1,2-Trichloroethane	1	0	1	1
Trichloroethylene	1	0	5	5
Trichlorofluoromethane	1	0	2	2
1,2,3-Trichloropropane	1	0	10	10
Trihalomethanes (total)	1	0	3	3
1,2,4-Trimethylbenzene	1	0	10	10
1,3,5-Trimethylbenzene	1	0	10	10
Vinyl chloride	1	0	0.3	0.3
o-Xylene	1	0	2	2
m+p-Xylenes	1	0	4	4
Xylenes (Total)	1	0	6	6

Table 5.57 Baseline Concentrations for VOCs in Dairy

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Acrolein	2	0	30	30
Benzene	2	0	1	1
Bromobenzene	2	0	5	5
Bromochloromethane	2	0	5	5

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Bromodichloromethane	2	0	0.3	0.3
Bromoform	2	0	1	1
Bromomethane	2	0	0.5	0.5
n-Butylbenzene	2	0	5	5
sec-Butylbenzene	2	0	5	5
tert-Butylbenzene	2	0	5	5
Carbon Disulfide	2	0	1	1
Carbon tetrachloride	2	0	0.5	0.5
Chlorobenzene	2	0	1	1
Dibromochloromethane	2	0	0.05	0.05
Chloroethane	2	0	1	1
Chloroform	2	0	0.5	0.5
Chloromethane	2	0	1	1
2-Chlorotoluene	2	0	5	5
4-Chlorotoluene	2	0	5	5
1,2-Dibromo-3-chloropropane	2	0	5	5
1,2-Dibromoethane	2	0	0.3	0.3
Dibromomethane	2	0	0.5	0.5
1,2-Dichlorobenzene	2	0	1	1
1,3-Dichlorobenzene	2	0	1	1
1,4-Dichlorobenzene	2	0	1	1
Dichlorodifluoromethane	2	0	2	2
1,1-Dichloroethane	2	0	0.3	0.3
1,2-Dichloroethane	2	0	0.1	0.1
1,1-Dichloroethylene	2	0	0.1	0.1
cis-1,2-Dichloroethylene	2	0	1	1
trans-1,2-Dichloroethylene	2	0	3	3
Dichloromethane	2	0	5	5
1,2-Dichloropropane	2	0	0.05	0.05
1,3-Dichloropropane	2	0	1	1
2,2-Dichloropropane	2	0	5	5
1,1-Dichloropropene	2	0	0.5	0.5
cis-1,3-Dichloropropene	2	0	0.1	0.1
trans-1,3-Dichloropropene	2	0	0.1	0.1
1,2-Dichlorotetrafluoroethane	2	0	3	3
Ethyl Benzene	2	0	1	1
Hexachlorobutadiene	2	0	5	5
2-Hexanone	2	0	10	10
Isopropylbenzene	2	0	5	5
Isopropyltoluene	2	0	5	5
Methyl Ethyl Ketone	2	0	10	10

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Methyl Isobutyl Ketone	2	0	10	10
MTBE	2	0	10	10
Naphthalene	2	0	5	5
n-Propylbenzene	2	0	5	5
Styrene	2	0	1	1
1,1,1,2-Tetrachloroethane	2	0	0.4	0.4
1,1,2,2-Tetrachloroethane	2	0	0.4	0.4
Tetrachloroethylene	2	0	1	1
Toluene	2	0	3	3
1,1,2-Trichloro-1,2,2-trifluoroethane	2	0	3	3
1,2,3-Trichlorobenzene	2	0	5	5
1,2,4-Trichlorobenzene	2	0	5	5
1,1,1-Trichloroethane	2	0	0.2	0.2
1,1,2-Trichloroethane	2	0	0.5	0.5
Trichloroethylene	2	0	3	3
Trichlorofluoromethane	2	0	1	1
1,2,3-Trichloropropane	2	0	5	5
Trihalomethanes (total)	0	0	0	0
1,2,4-Trimethylbenzene	2	0	5	5
1,3,5-Trimethylbenzene	2	0	5	5
Vinyl chloride	2	0	0.2	0.2
o-Xylene	2	0	1	1
m+p-Xylenes	2	0	2	2
Xylenes (Total)	0	0	0	0

Table 5.58 Baseline Concentrations for VOCs in Eggs

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Acrolein	2	0	30	30
Benzene	2	0	1	1
Bromobenzene	2	0	5	5
Bromochloromethane	2	0	5	5
Bromodichloromethane	2	0	0.3	0.3
Bromoform	2	0	1	1
Bromomethane	2	0	0.5	0.5
n-Butylbenzene	2	0	5	5
sec-Butylbenzene	2	0	5	5
tert-Butylbenzene	2	0	5	5

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
Carbon Disulfide	2	0	1	1
Carbon tetrachloride	2	0	0.5	0.5
Chlorobenzene	2	0	1	1
Dibromochloromethane	2	0	0.05	0.05
Chloroethane	2	0	1	1
Chloroform	2	0	0.5	0.5
Chloromethane	2	0	1	1
2-Chlorotoluene	2	0	5	5
4-Chlorotoluene	2	0	5	5
1,2-Dibromo-3-chloropropane	2	0	5	5
1,2-Dibromoethane	2	0	0.3	0.3
Dibromomethane	2	0	0.5	0.5
1,2-Dichlorobenzene	2	0	1	1
1,3-Dichlorobenzene	2	0	1	1
1,4-Dichlorobenzene	2	0	1	1
Dichlorodifluoromethane	2	0	2	2
1,1-Dichloroethane	2	0	0.3	0.3
1,2-Dichloroethane	2	0	0.1	0.1
1,1-Dichloroethylene	2	0	0.1	0.1
cis-1,2-Dichloroethylene	2	0	1	1
trans-1,2-Dichloroethylene	2	0	3	3
Dichloromethane	2	0	5	5
1,2-Dichloropropane	2	0	0.05	0.05
1,3-Dichloropropane	2	0	1	1
2,2-Dichloropropane	2	0	5	5
1,1-Dichloropropene	2	0	0.5	0.5
cis-1,3-Dichloropropene	2	0	0.1	0.1
trans-1,3-Dichloropropene	2	0	0.1	0.1
1,2-Dichlorotetrafluoroethane	2	0	3	3
Ethyl Benzene	2	0	1	1
Hexachlorobutadiene	2	0	5	5
2-Hexanone	2	0	10	10
Isopropylbenzene	2	0	5	5
Isopropyltoluene	2	0	5	5
Methyl Ethyl Ketone	2	0	10	10
Methyl Isobutyl Ketone	2	0	10	10
MTBE	2	0	10	10
Naphthalene	2	0	5	5
n-Propylbenzene	2	0	5	5
Styrene	2	0	1	1
1,1,1,2-Tetrachloroethane	2	0	0.4	0.4

Parameter	No. Analyzed	No. Detected	Min (mg/kg)	Max as the DL (mg/kg)
1,1,2,2-Tetrachloroethane	2	0	0.4	0.4
Tetrachloroethylene	2	0	1	1
Toluene	2	0	3	3
1,1,2-Trichloro-1,2,2-trifluoroethane	2	0	3	3
1,2,3-Trichlorobenzene	2	0	5	5
1,2,4-Trichlorobenzene	2	0	5	5
1,1,1-Trichloroethane	2	0	0.2	0.2
1,1,2-Trichloroethane	2	0	0.5	0.5
Trichloroethylene	2	0	3	3
Trichlorofluoromethane	2	0	1	1
1,2,3-Trichloropropane	2	0	5	5
Trihalomethanes (total)	0	0	0	0
1,2,4-Trimethylbenzene	2	0	5	5
1,3,5-Trimethylbenzene	2	0	5	5
Vinyl chloride	2	0	0.2	0.2
o-Xylene	2	0	1	1
m+p-Xylenes	2	0	2	2
Xylenes (Total)	0	0	0	0

5.7.6 % Lipids in Agricultural Products

Each of type of agricultural products samples were submitted for analysis of lipid content. As indicated in Table 5.59 to Table 5.63, the percent lipid content in agricultural products ranged from 2.76 in the chicken samples to 20.04 in beef samples.

Table 5.59 Baseline Concentrations for Lipid Content in Chicken

Parameter	No. Analyzed	No. Detected	Min (%)	Max (%)
% Lipids	2	2	13.67	17.05

Table 5.60 Baseline Concentrations for Lipid Content in Beef

Parameter	No. Analyzed	No. Detected	Min (%)	Max (%)
% Lipids	2	2	14.77	20.04

Table 5.61 Baseline Concentrations for Lipid Content in Pork

Parameter	No. Analyzed	No. Detected	Min (%)	Max (%)
% Lipids	2	2	20.04	20.04

Table 5.62 Baseline Concentrations for Lipid Content in Dairy

Parameter	No. Analyzed	No. Detected	Min (%)	Max (%)
% Lipids	2	2	2.76	3.37

Table 5.63 Baseline Concentrations for Lipid Content in Eggs

Parameter	No. Analyzed	No. Detected	Min (%)	Max (%)
% Lipids	3	3	9.9	10.01

5.7.7 Agricultural Produce Summary Baseline Findings

Several of the COPCs such as trace metals, PAHs, PCDD/PCDF were detected in the agricultural produce samples collected and analyzed. However, most of the values were very low or close to the detection limits. With the exception of dioxins and furans (where comparison for one congener was available and showed that the measured concentration of the agricultural produce was lower than the recommended guideline), governmental and provincial guidelines for comparison purposes were not available.

6.0 QUALITY ASSURANCE/QUALITY CONTROL

The following section presents a detailed assessment of the QA/QC program results for the Baseline Soil and Biota Sampling Program.

Field duplicates were carried out on approximately 10% of all terrestrial, surface water, and produce samples collected. This consisted of splitting a sample in the field and sending it for analysis labelled such that the laboratory cannot identify it as a duplicate.

Detailed operating procedures specific to the Project are available on record at Jacques Whitford.

6.1 Laboratory Methods and Instrumentation

ALS Laboratory Group has documented methods and internal protocols for the sample analysis, and is accredited by CAEAL for a wide range of analyses. Descriptions of the laboratory methods and instrumentation were provided on the laboratory certificates (available on record at Jacques Whitford), and described below.

Metals in soil and sediment - Portions of the samples were dried at room temperature, lightly pulverized to break up agglomerated material and sieved at 1 mm. Representative subsamples were digested according to USEPA Method 3050B. The resulting solutions were diluted prior to analysis for trace metals by ICP-MS (USEPA 200.8).

Metals in tissues and biota - Representative portions of the samples were prepared by microwave digestion in nitric acid prior to analysis by ICP-MS.

Metals in water - The samples were analyzed directly by ICP-MS.

Mercury in soil, sediment, and water - Portions of the samples were digested using mixed mineral acids, potassium permanganate and potassium persulphate. Excess permanganate and manganese oxides were reduced with hydroxylamine hydrochloride and the samples were diluted to volume prior to mercury analysis by cold vapour atomic absorption spectroscopy (CVAAS – as per SW846 Methods 7470A and 7471A).

Mercury in tissues and biota - Portions of the solutions prepared for trace metals (above) were further digested with nitric and sulphuric acids and potassium permanganate. Analysis was conducted by CVAAS.

PAHs in soil, water and sediment- Solvent extraction followed by selected ion monitoring (SIM) GC/LRMS analysis; based on USEPA 3540C/8270C.

PAHs in tissue - Solvent extraction followed by isotope solution SIM GC/LRMS analysis; based on California Air Resources Board Method 429.

Chlorophenols in soil and sediment - Based on USEPA 8270C, Capillary GC/MS.

Chlorophenols and phenol in water - Based on USEPA 625, Capillary GC/MS.

VOCs in soil and sediment – Purge and trap extraction followed by GC/MS analysis; based on USEPA SW846 Methods 5035/8260B.

VOCs in water – Purge and trap extraction followed by GC/MS analysis; based on USEPA SW846 Methods 5030B/8260B.

PCDD/PCDF in soil, sediment, biota, and tissue - Solvent extraction followed by cleanup chromatography and Gas Chromatography/High Resolution Mass Spectrometry (GC/HRMS); via USEPA Method 1613B.

Formaldehyde and acetaldehyde in water - Derivatization, followed by solvent extraction, GC/MSD analysis.

Formaldehyde and acetaldehyde in soil - Derivatization, followed by solvent extraction, GC/MSD analysis.

As speciation in tissue – Analysis by Liquid chromatography coupled with hydride generation inductively coupled plasma mass spectrometry (LC-HG-ICPMS).

General Chemistry in water – sodium, potassium, calcium, magnesium, iron, manganese, copper and zinc by ICP-MS analysis based on USEPA 200.8‡, ammonia (as N) analysis by Automated Phenate Colorimetry based on APHA 4500-NH3 G; pH analysis by pH Electrode – Electrometric based on APHA 4500-H+ B; Alkalinity (as CaCO3) analysis by Automated Methyl Orange Colorimetry based on USEPA 310.2; Chloride, sulphate, nitrate, nitrite and phosphate were analyzed by ion chromatography (IC) via EPA Method 300.0. r-Silica (as SiO_2) analysis by automated heteropoly blue colorimetry based on APHA 4500-Si F; Total Organic Carbon analysis by auto UV-Persulphate digestion, NDIR detection based on APHA 5310 C; Turbidity (NTU) analysis by manual nephelometry based on APHA 2130 B; Total Suspended Solids analysis by filtration on glass fibre filter, gravimetry (dry 105 ^{o}C) based on APHA 2540 D; Conductivity (µS/cm) analysis by Manual - Conductivity meter, Pt electrode based on APHA 2510 B; and calculated parameters were based on APHA 1000 series.

6.2 Method Blanks

A review of the method blank analysis indicated that the data quality objectives were generally met and that detectable concentrations of several PCDD/PCDF congeners, two metal analyses, two PAHs and one formaldehyde detection in one or more method blanks did not substantially affect the recommended baseline concentrations. A more detailed review of these results and the potential effect on the interpretation of the baseline conditions are provided below.

Trace Metals – With the exception of copper and iron, all metals parameters in method blanks were below the detection limits. The presence of metals in the blanks indicates the potential for analytical results to be biased high.

Chlorinated Monocyclic Aromatics – The concentrations of chlorinated monocyclic aromatics in the method blanks were less than the EQL for all of the analytes.

Chlorinated Polycyclic Aromatics – The concentrations of PCBs in the method blanks were less than the EQL for all of the analytes. A number of polychlorinated dioxin & furan congeners were detected above the EQL in the method blanks; however, the concentrations of 2,3,7,8-TCDD in the method blanks were below the EQL for all samples.

Polycyclic Aromatic Hydrocarbons – The concentrations of PAHs in the method blanks were less than the EQL for all of the analytes with the exceptions of naphthalene and 2-Methylnaphthalene which were detected in 53% and 8% (respectively) of method blanks. Naphthalene were detected in one out of two method blanks; however, since these parameters were either not detected in any of the surface water samples or were detected at the detection limit, there does not appear to have been any bias of the surface water results.

Naphthalene was detected in six out of six method blanks associated with tissue.

Volatile Organic Compounds – The concentrations of VOCs in the method blanks were less than the EQL for all of the analytes.

General Chemistry – The concentrations of parameters included in general chemistry in the method blanks were less than the EQL for all of the analytes.

Formaldehyde and Acetaldehyde – The concentrations of acetaldehyde in the method blanks were less than the EQL for all of the analytes. Formaldehyde was detected in the one method blank associated with surface water; however, since formaldehyde was not detected in any of the surface water samples, there does not appear to have been any bias of the results.

Arsenic Speciation– Data from method blanks were not available for speciated arsenic.

% Lipids – Data from method blanks were not available for % lipids.

6.3 Matrix Spikes

The matrix spike recoveries for PAH, chlorophenols, PCDD/PCDF, acetaldehyde and formaldehyde were compliant with the ALS's laboratory internal standard criteria. Laboratory control samples were reviewed for metals, VOCs, SVOCs and PCBs and were also compliant with the ALS's laboratory internal laboratory criteria.

6.4 Laboratory Duplicates

The RPD from the mean between some of the metals duplicates exceeded 40%. A review of the various samples involved was completed and the effects of these exceedances on the analytical results are summarized below.

Trace Metals – Duplicate results associated with most of the metal analytes were within the expected RPD from the mean as shown in Table 6.1. Because the percent compliance was greater than 85% for all parameters the metals data was acceptable for the study.

Table 6.1 Laboratory Duplicates not in Compliance with the Expected RPD from Mean

Parameter	% Non-Compliance
Aluminum (Al)	14.3%
Calcium (Ca)	14.3%
Copper (Cu)	14.3%
Iron (Fe)	14.3%
Magnesium (Mg)	14.3%
Phosphorus (P)	14.3%
Potassium (K)	14.3%
Sodium (Na)	14.3%
Zinc (Zn)	14.3%

Chlorinated Monocyclic Aromatics – The RPD for lab duplicates was within the acceptable range of 40% for all chlorinated monocyclic aromatics. The RPD for lab duplicates was within the acceptable range of 40% for all chlorophenols.

Chlorinated Polycyclic Aromatics – The RPD for lab duplicates was within the acceptable range of 40% for PCBs. The RPD for two dioxin and furan congeners exceeded 40%; however for all other 15 congeners it was within the acceptable range.

Polycyclic Aromatic Hydrocarbons – The RPD for lab duplicates was within the acceptable range of 50% for all PAH parameters.

Volatile Organic Compounds – Laboratory duplicates were available for only three VOC compounds (acrolein, 1,2-Dichlorotetrafluoroethane, and 1,1,2-Trichloro-1,2,2-trifluoroethane). For these parameters the RPD was within the acceptable range of 40%.

General Chemistry – The RPD for lab duplicates was within the acceptable range of 40% for all general chemistry parameters.

Formaldehyde and Acetaldehyde – The RPD for ammonia and formaldehyde were within the acceptable range of 40%, however, the RPD for one laboratory duplicate exceeded 40% for acetaldehyde.

Arsenic Speciation– Laboratory duplicates were not available.

% Lipids – The RPD for % lipids were within the acceptable range of 40%,

6.5 Field Duplicates

The RPD from the mean was calculated for those parameters where both samples had concentrations greater than five times the detection limit. Some of the field duplicates exceeded the expected amount of 40%. Results which were not 100% compliant include: dioxins and furans, and metals. A review of the various samples involved was completed and the effects of these exceedances on the analytical results are summarized below.

Table 6.2 Field Duplicates not in Compliance with the Expected RPD from Mean

Parameter	Number of Field Duplicates	Number of Non-Compliant Samples [1]	% Non-Compliance
Dioxins/Furans			
1,2,3,4,7,8-HxCDD	8	1	13%
1,2,3,4,6,7,8-HpCDD	8	1	13%
OCDD	8	3	38%
Metals			
Aluminum (Al)-Total	17	3	18%
Barium (Ba)-Total	17	3	18%
Bismuth (Bi)-Total	17	1	6%
Boron (B)-Total	17	1	6%
Cadmium (Cd)-Total	17	1	6%
Calcium (Ca)-Total	17	5	29%
Chromium (Cr)-Total	17	2	12%
Copper (Cu)-Total	17	3	18%
Iron (Fe)-Total	17	3	18%
Lead (Pb)-Total	17	2	12%
Magnesium (Mg)-Total	17	4	24%
Manganese (Mn)-Total	17	2	12%
Mercury (Hg)-Total	17	1	6%
Molybdenum (Mo)-Total	17	2	12%
Phosphorus (P)-Total	17	2	12%
Potassium (K)-Total	16	1	6%
Selenium (Se)-Total	17	1	6%
Sodium (Na)-Total	17	2	12%
Strontium (Sr)-Total	17	4	24%
Tin (Sn)-Total	17	1	6%
Titanium (Ti)-Total	17	2	12%
Tungsten (W)-Total	1	1	100%
Zinc (Zn)-Total	17	2	12%

Notes
1. Where RPD is greater than 40%

Trace Metals – Duplicate results associated with most of the metal analytes were within the expected RPD from the mean (Table 6.2). Duplicate samples taken for strawberries, beans, forage and chicken contained the most number of metals which exceeded the expected RPD where each sample had at least 5 metals which fell outside of the expected RPD of 40%. Cadmium had the most number of non-compliant duplicate samples where five out of 17 samples were non-compliant. The RPD for the non-compliant metals fell within the range of 40-100% with the exception of chromium in chicken which had an RPD of 132%. Chromium in the other agricultural products (dairy, eggs, beef and pork) was within the expected RPD of 40%.

Therefore, the precision of all metal results are considered acceptable for use in establishing a baseline concentration.

Chlorinated Monocyclic Aromatics – Duplicate results associated with 100% of the analytes were within the expected RPD from the mean for chlorinated monocyclic aromatics. Duplicate results associated with 100% of phenol results were greater than the expected RPD from the mean of 40%.

Chlorinated Polycyclic Aromatics – Duplicate results associated with 100% of the PCB analytes were within the expected RPD from the mean. Duplicate results associated with most of the dioxin and furan congeners were within the expected RPD from the mean. The precision of all dioxin & furan results are considered acceptable for use in establishing a baseline concentration.

Polycyclic Aromatic Hydrocarbons – Duplicate results associated with 100% of the PAH analytes were within the expected RPD from the mean of 50%.

Volatile Organic Compounds - Duplicate results associated with 100% of the VOC analytes were within the expected RPD from the mean.

Arsenic Speciation - Duplicate results associated with 100% of the arsenic species were within the expected RPD from the mean.

7.0 CONCLUSIONS

Jacques Whitford has completed a baseline sampling study of soil and biota in the Durham Region Ontario. The study was completed as background information for the site specific HHERA that is being completed for the Project. A summary of the media selected for analysis and the chemicals analyzed in each media type in order to establish baseline concentrations is provided in Table 7.1. The results of the study (i.e., the baseline concentrations of various media for the COPC) show that the vast majority of the collected samples from the various media have COPCs concentrations (concentrations were reported as wet weight or dry weight), at levels below the provincial or federal guidelines (where these exists).

Table 7.1 Summary of Chemicals for which Baseline Concentrations were Established by Media Type

	Media	Metals	Chlorinated Monocyclic Aromatics		Chlorinated Polycyclic Aromatics		PAHs	VOCs	General Chemistry	Acetaldehyde, Ammonia, Formaldehyde	Arsenic	% Lipids
			SVOCs	Chlorophenols	PCBs	Dioxins and Furans						
Terrestrial	Soil	✓	✓	✓	✓	✓	✓	✓		✓		
	Forage	✓	✓		✓	✓	✓	✓				
	Browse	✓	✓		✓	✓	✓					
	Small Mammals	✓	✓		✓	✓	✓					✓
Freshwater Stream	Surface Water	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	Sediment	✓	✓	✓	✓	✓	✓	✓		✓		
	Fish	✓	✓		✓	✓	✓				✓	✓
Produce	AGE	✓	✓		✓	✓	✓	✓				
	AGP	✓	✓		✓	✓	✓					
	BG	✓	✓		✓	✓	✓					
	Crops	✓	✓		✓	✓	✓					
	Fruit	✓	✓		✓	✓	✓	✓				
	Ag. Products	✓	✓		✓	✓	✓	✓				✓

PAH = Polycyclic Aromatic Hydrocarbons; PCBs = Polychlorinated Biphenyls; SVOCs = semi-volatile organic compounds; VOCs = volatile organic compounds; AGE = above ground exposed; AGP = above ground protected; BG = below ground; Ag. Products = agricultural products

8.0 CLOSING REMARKS

This report has been prepared by a team of Jacques Whitford professionals on behalf of Durham/York Regions. Statistical analysis support was provided by Dr. Michelle Edwards, Data Resource Coordinator at the Data Resource Centre, University of Guelph, Ontario. Jacques Whitford attests that to the best of our knowledge, the information presented in this Report is accurate. The use of this Report for other projects without written permission of Durham Region, York Region and Jacques Whitford is solely at the user's own risk.

This report was undertaken exclusively for the purpose outlined herein and was limited to the scope and purpose specifically expressed in this report. This report cannot be used or applied under any circumstances to another location or situation or for any other purpose without further evaluation of the data and related limitations. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties. Jacques Whitford accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

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This report represents the best professional judgment of Jacques Whitford personnel available at the time of its preparation. Jacques Whitford reserves the right to modify the contents of this report, in whole or in part, to reflect the any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the information and conclusions provided herein.

Respectfully submitted,

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APPENDIX A

Data Compilation and Statistical Calculations