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Urban Seattle Area Soil Dioxin and PAH Concentrations Initial Summary Report

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Urban Seattle Area Soil Dioxin and PAH Concentrations
Initial Summary Report

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Toxics Cleanup Program

Washington State Department of Ecology

Olympia, Washington

Table of Contents

List of Figures and Tables

Page

Figures

Tables

Acknowledgements

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Abstract/Executive Summary

This report documents the results of Ecology's investigation of surface soils collected from six Seattle neighborhoods, South Park, Georgetown, West Seattle, Ballard, Capitol Hill, and Ravenna (Figure 1). This investigation is in support of the Washington State Department of Ecology's (Ecology) Toxics Cleanup Program (TCP).

The purpose of this investigation was to collect sufficient data from various Seattle neighborhoods to determine the range and magnitude of concentrations and toxic equivalents (TEQs) of dioxins and furans in urban areas. Soil samples were also analyzed for polycyclic aromatic hydrocarbon (PAH) TEQ data for surface soil.

Twenty shallow soil samples (0 to 3 inches deep) were collected from each neighborhood for a total of 120 samples. To ensure samples were distributed throughout each neighborhood, each neighborhood was divided into quadrants (ten subsections in South Park only) containing an approximately equal number of properties per quadrant. The number of properties per quadrant differed in each neighborhood because the neighborhoods differ in size. An equal number of samples were collected from randomly selected locations within each quadrant. Each sample was a composite of five individual samples collected from City of Seattle right-of-way (ROW) land in front of a single property.

The cPAH TEQ concentrations ranged from 1.9 to 8,900 ug/kg with an average concentration of 260 ug/kg. The median and nonparametric 90th percentile concentrations were 84 and 390 ug/kg, respectively.

Dioxin TEQ concentrations ranged from 1.7 to 110 ng/kg with an average concentration of 19 ng/kg. The median and nonparametric 90th percentile concentrations were 12 and 46 ng/kg, respectively.

In general, the lowest cPAH and dioxin TEQ concentrations were in samples collected from West Seattle and the highest median concentrations for dioxin were in samples from the Georgetown area, while the highest median concentrations for cPAH TEQ were in samples from Ballard (See Table 1). The project schedule did not allow for detailed statistical evaluations. However, preliminary evaluations indicate that soil concentrations in Ravenna, South Park, Ballard and Capitol Hill were not significantly different.

URBAN SEATTLE AREA SOIL DIOXIN AND PAH CONCENTRATIONS INITIAL SUMMARY REPORT

1.0 Introduction

This report documents the results of our investigation of surface soils collected from six Seattle neighborhoods, South Park, Georgetown, West Seattle, Ballard, Capitol Hill, and Ravenna (Figure 1). This investigation is in support of the Washington State Department of Ecology's (Ecology) Toxics Cleanup Program (TCP).

The purpose of this investigation was to collect sufficient data from various Seattle neighborhoods in support of determining the range and magnitude of concentrations and toxic equivalents (TEQs) of dioxins and furans in surface soils in the Seattle urban area. Soil samples were also analyzed for polycyclic aromatic hydrocarbon (PAH) TEQ data for surface soil.

Twenty shallow soil samples (0 to 3 inches deep) were collected from each neighborhood for a total of 120 samples. To ensure samples were spread throughout each neighborhood, each neighborhood was divided into quadrants (ten subsections in South Park only) containing an approximately equal number of properties per quadrant. The number of properties per quadrant differed in each neighborhood because the neighborhoods differ in size. An equal number of samples were collected from randomly selected locations within each quadrant. Each sample was a composite of five individual samples collected from City of Seattle right-of-way (ROW) land in front of a single property.

The cPAH TEQ concentrations ranged from 1.9 to 8,900 micrograms per kilogram (ug/kg) with an average concentration of 260 ug/kg. The median and nonparametric 90th percentile concentrations were 84 and 390 ug/kg, respectively.

Dioxin TEQ concentrations ranged from 1.7 to 110 nanograms per kilogram (ng/kg) with an average concentration of 19 ng/kg. The median and nonparametric 90th percentile concentrations were 12 and 46 ng/kg, respectively.

In general, the lowest cPAH and dioxin TEQ concentrations were in samples collected from West Seattle. The highest median concentrations for dioxin were in samples from the Georgetown area, while the highest median concentrations for cPAH TEQ were in samples from Ballard. The project schedule did not allow for detailed statistical evaluations. However, preliminary evaluations indicate that soil concentrations in Ravenna, South Park, Ballard and Capitol Hill were not significantly different.

2.0 Surface Soil Sampling Locations

Urban soil samples were collected and analyzed for dioxin/furans and cPAHs in the following six Seattle neighborhoods, shown on Figure 1:

- South Park (SP);
- Georgetown (GP);
- West Seattle (WS);
- Capitol Hill (CH);
- Ballard (BA); and
- Ravenna (RA).

The neighborhoods selected were intended to represent the range of historical conditions likely to be found in Seattle residential areas. Neighborhoods were selected based on presumed differences in land use history (industrial, non-industrial) and factors affecting deposition or accumulation.

South Park

The South Park neighborhood is located south of downtown Seattle and west of the Duwamish River. The town of South Park was annexed to Seattle in 1907. In the early 1900s, South Park was an agricultural community, but with the straightening of the Duwamish River in the 1920s, industrial growth developed in the area. The neighborhood is now zoned as both residential and industrial.

Georgetown

The Georgetown neighborhood is located south of downtown Seattle, and east of the Duwamish River. While originally agricultural, the neighborhood was developed by strong commercial and industrial interests including a brewery, race track, railroad, and steam power plant. By the mid- to late twentieth century, the neighborhood was primarily industrial.

West Seattle

The West Seattle neighborhood is located west of downtown Seattle, on a peninsula in Puget Sound. Business and commercial districts developed in the late 1800s surrounded by multiple residential areas. It was incorporated as an independent town in 1902 and annexed by Seattle in 1907. West Seattle contains many parks, greenbelts, and beaches and is primarily residential.

Capitol Hill

The Capitol Hill neighborhood is located east of downtown Seattle. In the late 1880s, the hill was logged and was quickly developed into a primarily residential area. In the first half of the

twentieth century, automobile dealerships and furniture retail stores were located along Broadway, the main thoroughfare. These commercial spaces gave way to smaller shops and studios. The neighborhood remains primarily residential and includes parks, museums, schools, and churches. This neighborhood was selected as it represented a residential area with no industrial activities.

Ballard

The Ballard neighborhood is located north of downtown Seattle and north of the Lake Washington Ship Canal. Ballard was incorporated as a separate city between 1890 and 1907, than voted to join the City of Seattle. Ballard's early growth was linked to lumber and maritime industries. Additional industry developed following construction of the Hiram M. Chittenden Locks (Ballard Locks) and the Lake Washington Ship Canal, which linked the saltwater Puget Sound to the freshwater Lake Union and Lake Washington. Historically, Ballard has been the traditional center for an ethnic Scandinavian community. Ballard experienced a real estate boom at the end of the 20th century, with multiple condominium/retail projects. This neighborhood was selected as it represented a residential area that had a history of light industrial development.

Ravenna

The Ravenna neighborhood is located northeast of downtown Seattle and north of the University of Washington. Due to the location of a creek and ravine, the neighborhood has remained primarily residential since the 1800s.

Most neighborhoods were divided into quadrants with approximately equal numbers of single-family residential properties in each quadrant. South Park was divided into 10 sections. Equal numbers of residences (plus or minus a few) in each quadrant were necessary to ensure an equal probability of each parcel being sampled in each neighborhood. Quadrants for each neighborhood are presented on Figures 2 through 7.

Samples were collected from City of Seattle right-of-ways (ROW). In most instances, this property consisted of soil between a sidewalk and the curb, often called planting strips. Twenty shallow soil samples (0 to 3 inch depth) were collected from each neighborhood for a total of 120 soil samples. Five sample locations were randomly selected from each of the quadrants established for each neighborhood (ten areas with two samples each in South Park).

For each neighborhood, properties that did not meet the exclusion criteria described in Section 3.2 were preassessed by Ecology using web-based tools and a drive-by survey conducted by the City. Based on the surveys, a minimum of 10 acceptable right-of-way properties in each study area were preselected to ensure that field crews had a sufficient number of final locations to randomly select from based on exclusion criteria applied by the field crew at the time of sampling.

A randomized list of all single-family residential properties built before 1975 within each neighborhood sampling area was generated. Addresses for the first ten properties on the list were printed and cut to the size of a business card. City of Seattle personnel reviewed each of these properties for acceptability by driving by the property and assessing if it met the exclusion criteria. Properties that met the exclusion criteria were removed from further consideration for soil sampling and the printed address was destroyed. With the exception of the Ravenna neighborhood, the first 10 acceptable right-of-way properties in each study area were adequate for field crews to select from based on exclusion criteria.

Soil sampling was conducted by two teams consisting of a field crew from the Ecology contractor and City of Seattle staff. During sampling, the field leader of each field team randomly selected five (or two for South Park) addresses by blindly drawing the address slips of paper from an envelope. The field crews then drove to the first selected property and determined if the site met the exclusion criteria. If it did not, it was sampled. If it did, then the field leader selected another address from the envelope. This process was repeated until the required number of properties had been sampled in each quadrant. The addresses pulled from the envelope were discarded in a second envelope and both envelopes were collected by a City representative at the end of the sampling day and the printed addresses were destroyed.

3.0 Field Sampling Methods

3.1 Subsample locations and collection methods

After selecting a sampling point at a right-of-way property, five subsample locations were established and marked on the ground using pin flags. The default design was to collect five subsamples from equidistant locations at each address. Samples were collected along the center of the right-of-way, parallel to the street. The first and fifth subsample locations were three feet from the ends of the property right-of-way. This layout was modified by field personnel using their best judgment on collecting representative samples if obstacles or excluded ground surfaces occurred.

At each subsample location, the surface groundcover was carefully removed and set aside. Surface soil samples were collected from the targeted 0 to 3-inch-depth profile using a precleaned stainless steel spoon or shovel and placed in a pre-cleaned stainless steel bowl. An equal amount of soil was collected from each of the five sub-sampling points and homogenized. Organic material such as worms, rootlets, leaves, twigs, landscaping materials, and debris were removed, after shaking off excess soil, and noted on the sampling forms.

After homogenization, the sample in the bowl was separated into quarters by drawing an "X." A subsample from each of these quarters was transferred into a pre-cleaned 16-ounce jar for grain size analysis. Care was taken to include all soil fractions to ensure sample representativeness. Equal aliquots were collected from each of the quarters of the bowl until the container was full. Then the remaining sample was re-homogenized and any large rocks or gravel were removed after shaking or carefully brushing off clinging soil. The sample was again separated into quarters by drawing an "X," and equal aliquots were collected from the quarters to fill a pre-cleaned, 32-ounce glass container for chemical analysis, plus sufficient sample for a 16-once split sample for the City of Seattle. Sample jars were labeled with area and quadrant only. Any remaining soil was returned to the sub-sampling locations, and the groundcover was replaced.

Visual sample descriptions of the surface soil samples are presented in Table A-1 through A-6 in Appendix A. The stainless steel collecting equipment was decontaminated between sampling locations following the procedure in the SAP.

During sampling, no information including parcel addresses, area photographs, descriptions, and GPS coordinates were recorded that could identify the location of the sampled parcel. GPS coordinates for the center of each quadrant within each neighborhood are presented in Table 2, but no coordinates were recorded for the individual properties. After marking subsample locations with pin flags, a photograph of the immediate sampling location was taken and recorded on the sampling form. Any other pertinent information was also recorded on the field sampling form. Representative photographs of field activities are provided in Appendix B.

3.2 Sample exclusion criteria

Surface soil samples were collected from City of Seattle right-of-way areas. The overall appearance of the right-of-way area sampled should be similar to the appearance of the adjacent residential yard. For example, if the yard of the residence was a green, well-maintained grassy area and the right-of-way area was also a green, well-maintained grassy area, then the site was considered a suitable location for surface soil sampling. If the yard of the residence had mature tree cover and the right-of-way area also had mature tree cover (including overhanging cover from the yard), then the site was considered a suitable location for surface soil sampling. During site selection by field crews, a strong preference was given to areas where the right-of-way was isolated from the street by a curb to reduce the possibility that the right-of-way was affected by street runoff or vehicle parking or passage.

Note: Few curbs exist in many of the subareas of the South Park neighborhood. Therefore, more than 10 to 20 randomly listed properties were used to select acceptable curbed and non-curbed right-of-ways for sampling. For the acceptable non-curbed right-of-ways, field crews made a visual assessment of similarities and differences between the residential yard and the adjacent right-of-way and made their best professional judgment in consultation with both the City and Ecology representative, as needed, before sampling. Out of the 20 surface soil samples collect in South Park, five samples were from acceptable non-curbed right-of-ways. The five acceptable non-curbed right-of-ways were all sloped toward the street. None had evidence of water or were inundated with water, none had evidence of parked vehicles, and none had areas of stained or dead vegetation.

Any of the following conditions that differentiated a residence yard and right-of-way were sufficient to categorize the right-of-way as unrepresentative of the yard and, therefore, were rejected from further consideration for soil sampling. Exclusion criteria include:

- The right-of-way area was paved or bricked over.
- The right-of-way area was less than three feet wide.
- The ground within the right-of-way area was disturbed (e.g., footprints, tire tracks, recent digging).
- The right-of-way area had large landscaped areas (e.g., the grade was raised for use as a planter or garden).
- The right-of-way area contained dissimilar planting from the residence yard (e.g., grass in yard is green and grass in right-of-way area is brown or yellow).
- Tree cover was distinctly different in the residence yard and right-of-way (e.g., tree canopy covers the majority of the right-of-way area but not the residence yard).
- Vehicles were parked on the right-of-way area.

- The right-of-way area had evidence of water or was inundated with water, or it was below the grade of the residence yard, sidewalk, and road so that it would collect runoff.
- Staining or areas of dead vegetation were observed.
- Unusual quantities of litter, other garbage, or derelict cars were present within the right-of-way area.

Field staff applied best professional judgment in the application of these exclusion criteria, and to identify any other conditions that may differentiate residence yards from the adjacent right-of-way.

If charcoal, landscaping materials, or other foreign materials were observed in any of the sub-samples, the sub-sample location was abandoned and a new sub-sample location was selected for the composite surface soil sample.

3.3 Deviations from the 2011 SAP

Minor deviations from the SAP were made, as necessary, based on adaptations to the field conditions encountered. Deviations from the Ecology-approved SAP are summarized below and are discussed in more detail in the applicable report sections.

- The chemistry data were reviewed and validated by Hart Crowser senior chemists, rather than by Ecochem, as stated in the SAP.
- Hart Crowser received notification in mid-May 2011 that archived samples should be analyzed for polycyclic aromatic hydrocarbons (PAHs). The laboratory was subsequently notified, and the samples were prepared and analyzed for PAHs by EPA Method 8270C-SIM. The PAH data was reviewed and validated by Hart Crowser, using the quality control procedures detailed in the Washington State Background Soil Concentration Study SAP (Hart Crowser 2010).
- An additional sample was collected from the Ballard neighborhood. After collecting sample BA-3-E, the sampling crew was informed by a neighbor of the residential property where the sample was collected, that within the last few years, the owner of the property had replaced surface soil and/or resodded and fertilized throughout the yard. There was a strong probability that the planting strip was not representative of the residential property. An additional sample from the next random address was collected, and labeled BA-3-F. Sample BA-3-F was subsequently submitted to the laboratory for analysis, and BA-3-E was discarded.

4.0 Soil Chemical Analysis Results

Soil sample results are summarized in Tables 3 through 8. Samples were submitted to CAS in Kelso, Washington. At CAS, the samples for chemical analysis were air dried and sieved using an ASTM No. 10 (2 mm) screen, to obtain finer-grained material consistent with MTCA requirements. The sieved material than underwent a Multi-Increment Sampling (MIS) procedure to create a composite sample. This procedure included spreading the fine fraction (less than 2 mm diameter) of the sieved sample evenly on a clean steel tray to approximately 1/2 inch in depth. The tray was divided into 30 to 50 sections and approximately 1 g was collected from each of the sections using a small spatula. The spatula was scraped along the bottom of the tray to make sure that every particle size was equally represented in the subsample. For each analysis, all scoops were placed into a single sample jar (2 or 4 ounce as appropriate) and the entire jar was extracted for analysis.

The composite sample was than analyzed for the following:

- Total Organic Carbon (TOC) by EPA Method 9060 Modified;
- Total solids by EPA Method 160.3 modified;
- Polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270C - SIM; and
- Grain size by ASTM D422 modified.

CAS submitted an aliquot of each sieved/MIS sample to the CAS laboratory in Houston, Texas for analysis of the following:

- Dioxins/furans by EPA Method 1613B.

No field duplicates or equipment rinse blanks were collected for analysis.

4.1 Data quality review summary

All analyses were performed in a manner consistent with the methods and guidelines stated in the SAP/QAPP. The chemistry data were reviewed and validated by Hart Crowser chemists. Overall, the data quality objectives (DQOs), as set forth in the SAP, were achieved, and the data for this project are acceptable for use, as qualified. No results were rejected as a result of the QA/QC review; therefore, data for this project are 100 percent complete. Results for several analytes were qualified as estimated concentrations based on exceedances of quality control criteria. A detailed chemical data quality review and chemical laboratory reports are presented in Appendix C.

4.2 Physical/chemical parameters

Analytical results for samples collected from the various study areas are presented by neighborhood in Tables 3 through 8.

Total organic carbon

The total organic carbon concentrations from samples collected from all study areas ranged from 0.786 to 8.38 percent.

Total solids

Samples were air dried before performing multi-incremental sampling (MIS) in the laboratory. The total solids results are for the air-dried samples and were used to correct chemical results to a dry weight reporting basis. The total solids for the areas of the city are described below, by study area. Total solids on air-dried samples collected from all study areas ranged from 93.2 to 99.8 percent.

Grain size

The citywide distribution of surface soil grain size ranged from Clay to gravelly sandy Silt to gravelly silty Sand to sandy silty Gravel. Grain size analytical results are provided in Tables 3 through 8. Visual sample descriptions of the surface soil samples are presented in Tables A-1 through A-6. Note that soil classifications based on field observations may vary from the grain size analytical results.

During surface soil sample collection, field crews removed the surface layer of grass, leaves, or twigs at each sub-location point. Once surface soil was exposed, an effort was made by field crews to exclude identifiable organic matter such as worms, roots, leaves, and twigs from the soil sample.

4.3 Dioxins/furans

Analytical results for dioxins/furans expressed as 2,3,7,8-TCDD toxic equivalent concentrations (TEQs) are presented in Tables 3 through 8, separated by study area. TEQs were calculated using the World Health Organization (WHO) 2005 toxic equivalency factors (TEF) for mammals. Total dioxin TEQs are reported using two conventions: adding only detected congeners, and using 1/2 the detection limit for non-detected congeners. The substitution method did not make a significant difference in reported totals since all congeners were detected in most samples.

Citywide, dioxin TEQ concentrations ranged from 1.66 to 114.65 ng/kg with an average concentration of 19.08 ng/kg. The median and nonparametric 90th percentile concentrations were 11.70 and 46.10 ng/kg, respectively.

In general, the lowest median and maximum dioxin TEQ concentrations were in samples collected from West Seattle and the highest median and maximum concentrations were in samples from the Georgetown area. Results summarized by study area are presented in Table 10.

4.4 Polycyclic aromatic hydrocarbons (PAHs)

PAHs were found in all samples, from all study areas. Analytical results are presented in Tables 3 through 8, by study area. The samples are described below by study area, but not separated by quadrant. The samples from the known South Park residences were not analyzed for PAHs.

Analytical results for carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(123-cd)pyrene) expressed as benzo(a)pyrene toxicity equivalent concentrations (TEQs) are also presented in the tables. TEQs were calculated using the MTCA toxic equivalency factors (TEFs) under WAC 173-340-708. cPAH TEQs are reported using two conventions: adding only detected cPAHs, and using 1/2 the detection limit for non-detected cPAHs. The substitution method did not make any difference in reported totals since all cPAHs were detected in all samples.

Citywide, cPAH TEQ concentrations ranged from 1.91 to 8,851 ug/kg with an average concentration of 260 ug/kg. The median and nonparametric 90th percentile concentrations were 84.5 and 393 ug/kg, respectively.

In general, the lowest median cPAH TEQ concentrations were in samples collected from West Seattle and the highest median concentrations were in samples from the Georgetown area. The maximum concentration was detected in a sample from the Ravenna neighborhood. Results summarized by study area are presented in Table 9.

5.0 References

American Society of Testing Materials (ASTM) 2007. ASTM Standard D422 Standard Test Method for Particle-Size Analysis of Soils. ASTM International West Conshohocken, PA, 2007.

Hart Crowser, 2010. Sampling and Analysis Plan/Quality Assurance Project Plan, Washington State Background Soil Concentration Study. Prepared for Washington State Department of Ecology, November 12, 2010.

Hart Crowser, 2011. Sampling and Analysis Plan/Quality Assurance Project Plan, Washington State Urban Background Soil Concentration Study. Prepared for Washington State Department of Ecology, March 18, 2011.

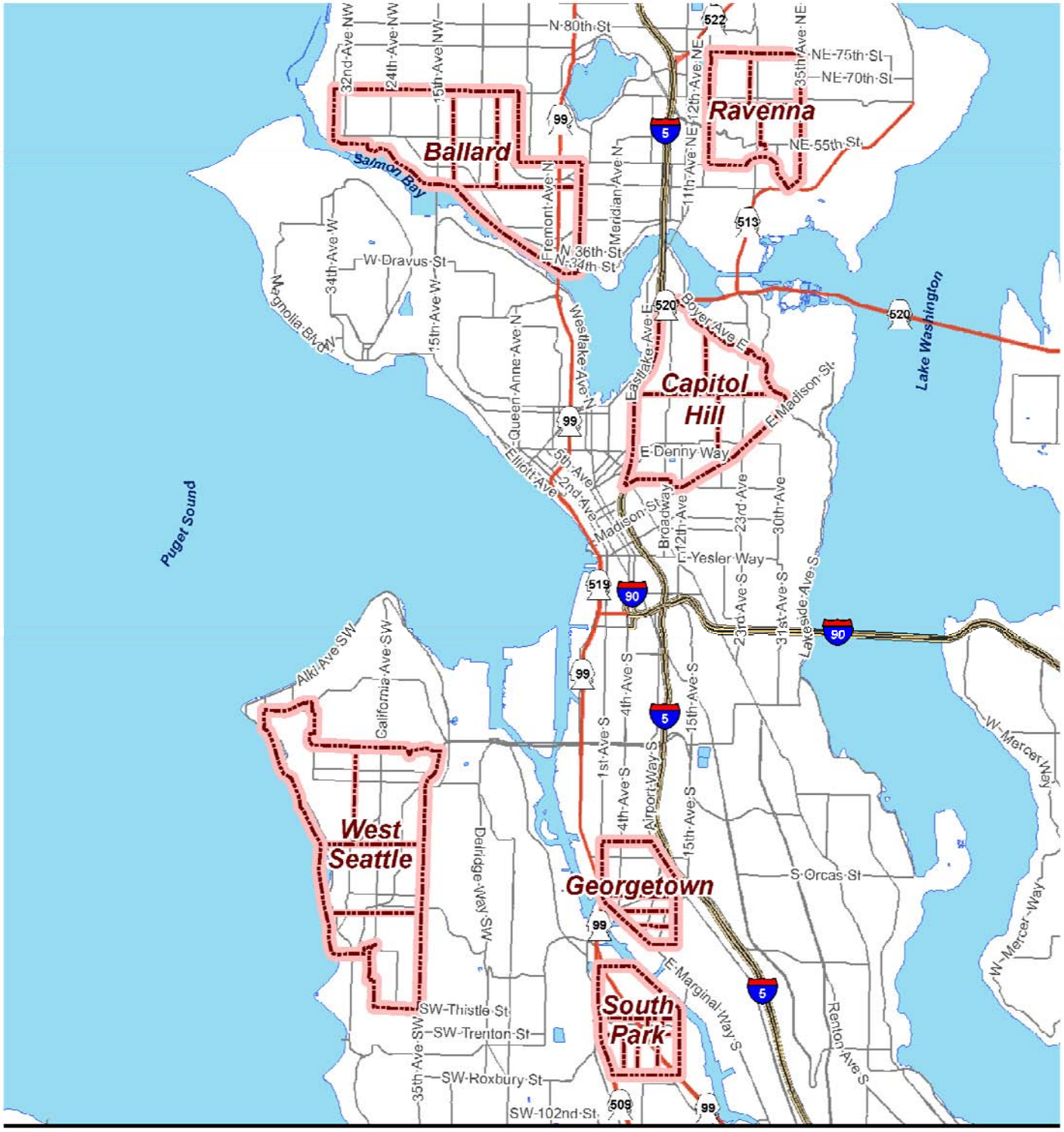
US Environmental Protection Agency (EPA) 1994. Method 1613, Revision B, Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS. U.S. Environmental Protection Agency, Office of Water.

EPA 1986. Test Methods for Evaluating Solid Waste; Physical/Chemical Methods, SW-846, 3rd Update.

EPA 2005. National Functional Guidelines for Chlorinated Dibenzo-p-Dioxin (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review, USEPA Analytical Operations/Data Quality Center, OSWER 9240.1-37, EPA 540-R-05-001, September 2005.

EPA 2008. US EPA Contract Laboratory Program National Functional Guidelines for Organic Superfund Data Review. EPA-540-R-08-01, June 2008.

Figures



Study Area Boundary

N
W E
S

0 0.8 1.6
Miles

Urban Soil
Seattle, Washington

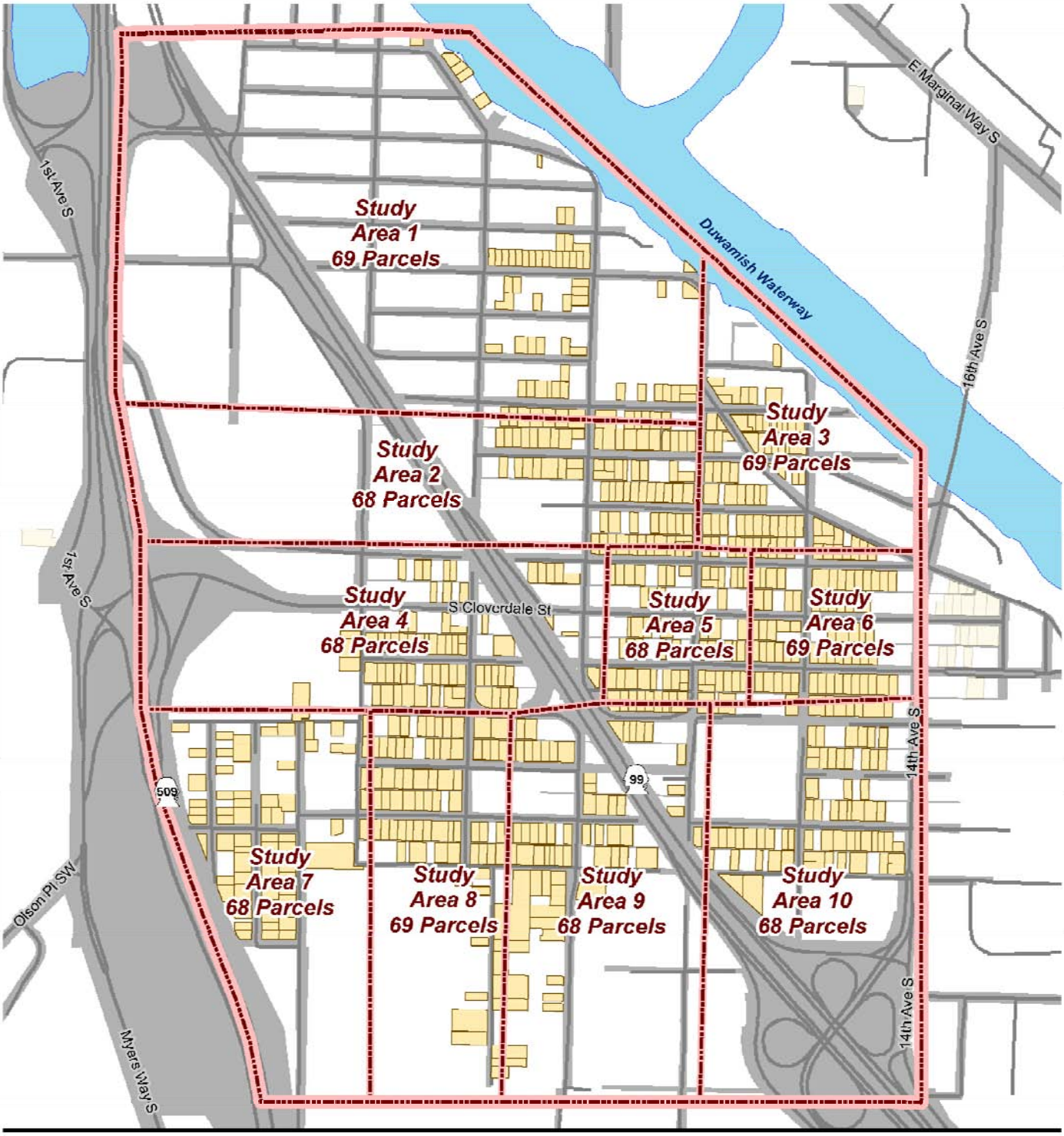
Seattle Study Areas

17330-29 9/11

Figure
1

Source: Prepared from figure created by the Washington State Department of Ecology.

EAL 09/8/11 1733029-002.dwg



Study Area Boundary
Residential parcels built before 1976
Roads
Approximate Right-of-Way

N
W
E
S

0 380 760
Feet

Residential parcel includes single family(residential and commercial zoned) and duplexes built before1976.
Study area parcel counts based on parcel centroid.

Urban Soil
Seattle, Washington

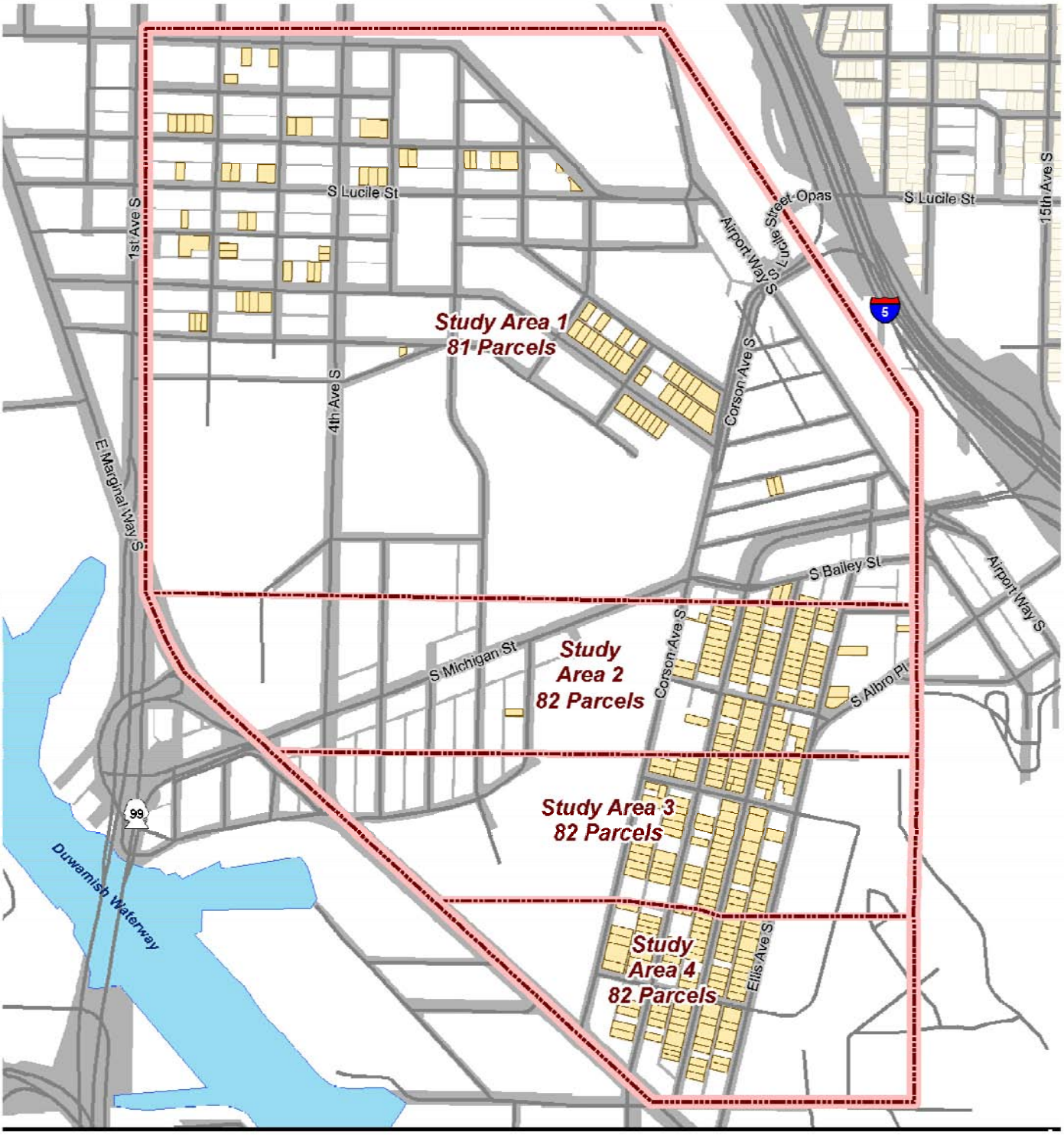
South Park Study Areas

17330-29 9/11

Figure
2

Source: Prepared from figure created by the Washington State Department of Ecology.

EAL 09/8/11 1733029-003.dwg



Study Area Boundary
Residential parcels built before 1976
Roads
Approximate Right-of-Way

N W E S

0 360 720
Feet

Residential parcel includes single family(residential and commercial zoned) and duplexes built before1976.
Study area parcel counts based on parcel centroid.

Urban Soil
Seattle, Washington

Georgetown Study Areas

17330-29 9/11

Figure
3

Source: Prepared from figure created by the Washington State Department of Ecology.

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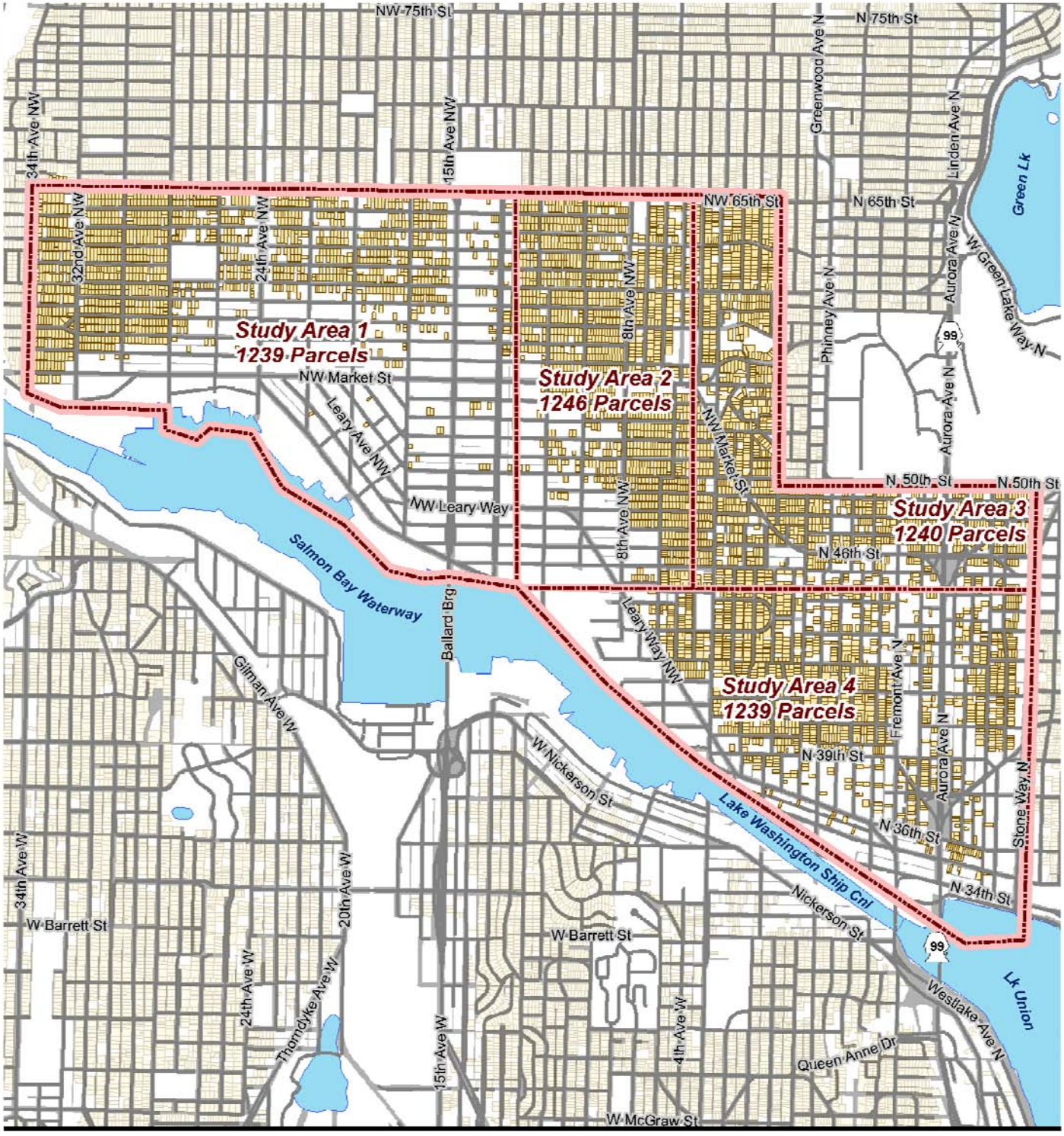


Study Area Boundary
Residential parcels built before 1976
Roads
Approximate Right-of-Way

N
W E
S

0 920 1,840
Feet

Residential parcel includes single family(residential and commercial zoned) and duplexes built before1976.
Study area parcel counts based on parcel centroid.

Urban Soil
Seattle, Washington

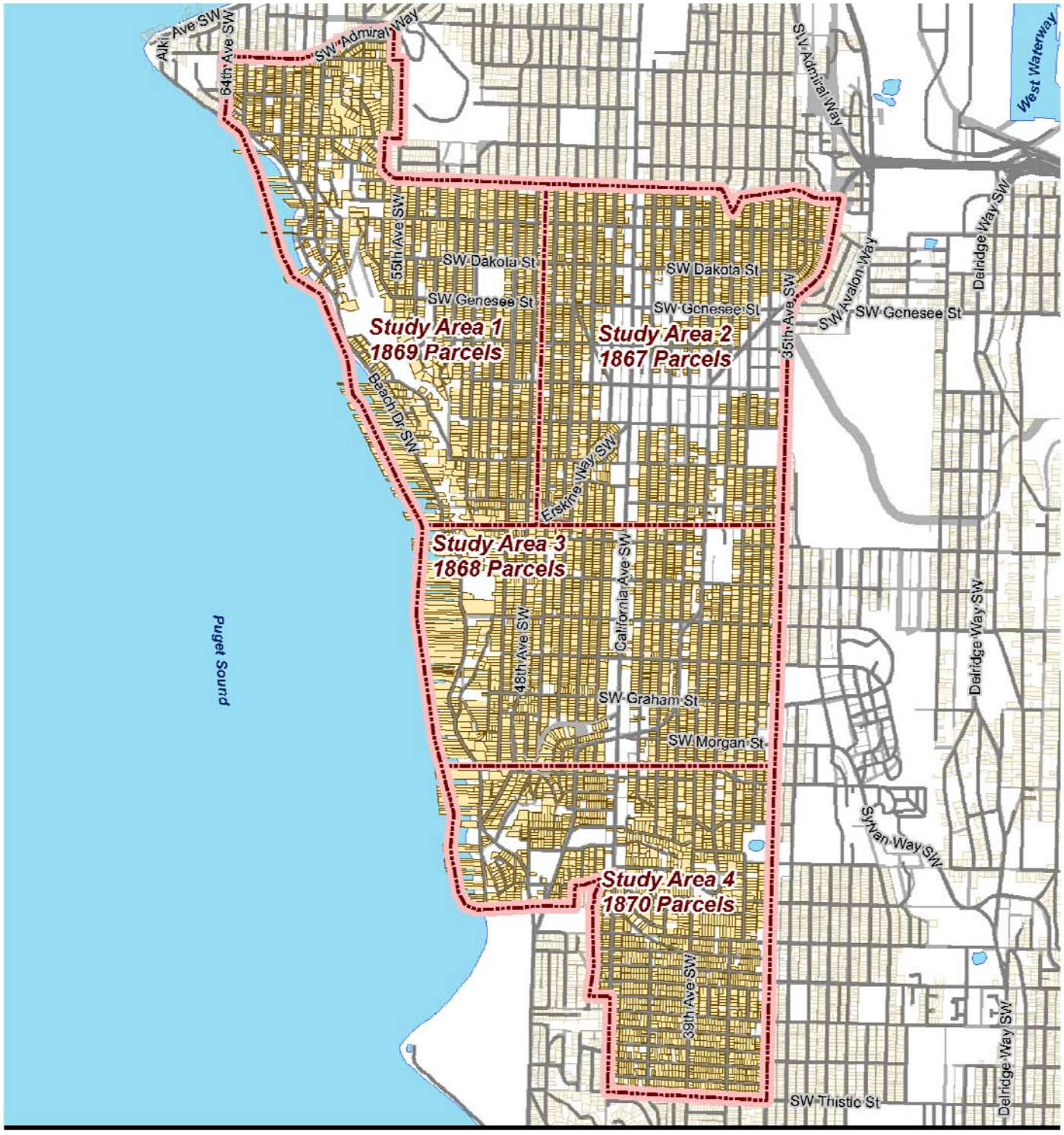
Ballard Study Areas

17330-29 9/11

Figure
4

Source: Prepared from figure created by the Washington State Department of Ecology.

EAL 09/8/11 1733029-005.dwg



Residential parcel includes single family(residential and commercial zoned) and duplexes built before1976.
Study area parcel counts based on parcel centroid.

Urban Soil
Seattle, Washington

West Seattle Study Areas

17330-29 9/11

Figure
5

Source: Prepared from figure created by the Washington State Department of Ecology.

EAL 09/8/11 1733029-006.dwg

Residential parcel includes single family(residential and commercial zoned) and duplexes built before1976.
Study area parcel counts based on parcel centroid.

Source: Prepared from figure created by the Washington State Department of Ecology.

Urban Soil
Seattle, Washington

Capitol Hill Study Areas

17330-29 9/11

Figure
6

EAL 09/8/11 1733029-007.dwg

Residential parcel includes single family(residential and commercial zoned) and duplexes built before1976.
Study area parcel counts based on parcel centroid.

Urban Soil
Seattle, Washington

Ravenna Study Areas

17330-29 9/11

Figure
7

Source: Prepared from figure created by the Washington State Department of Ecology.

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Tables

Table 1 - Median and Average Carcinogenic PAH and Dioxin Toxicity Equivalent Concentrations

Neighborhood	Median cPAH TEQ in ug/kg	Average cPAH TEQ in ug/kg	Median Dioxin TEQ in ng/kg	Average Dioxin TEQ in ng/kg
Ballard	230	340	22	26
Capitol Hill	170	680	8.1	18
Georgetown	150	240	23	36
Ravenna	67	260	10	15
South Park	81	100	12	12
West Seattle	9.9	54	4.5	7.5
All Areas	84	260	12	19

Non-detected Results = 1/2 Detection Limit

Table 2 - Sample Names and Neighborhood Locations

Seattle Neighborhood	Sample Number	GPS Coordinates WGS84 Decimal Degrees		Notes
		Latitude	Longitude	
South Park (SP)				
	SP-1-A	47.532467	-122.327835	
	SP-1-B			
	SP-2-A	47.528564	-122.327164	
	SP-2-B			
	SP-3-A	47.529285	-122.317993	
	SP-3-B			
	SP-4-A	47.526138	-122.328003	
	SP-4-B			
	SP-5-A	47.526249	-122.320663	
	SP-5-B			
	SP-6-A	47.526295	-122.316887	
	SP-6-B			
	SP-7-A	47.521984	-122.330063	
	SP-7-B			
	SP-8-A	47.521633	-122.326271	
	SP-8-B			
	SP-9-A	47.521702	-122.322243	
	SP-9-B			
	SP-10-A	47.521770	-122.317268	
	SP-10-B			
Georgetown (GT)				
	GT-1-A	47.55122757	-122.3259583	
	GT-1-B			
	GT-1-C			
	GT-1-D			
	GT-1-E			
	GT-2-A	47.54598618	-122.324501	
	GT-2-B			
	GT-2-C			
	GT-2-D			
	GT-2-E			
	GT-3-A	47.54365158	-122.3225021	
	GT-3-B			
	GT-3-C			
	GT-3-D			
	GT-3-E			
	GT-4-A	47.54108047	-122.3205795	
	GT-4-B			
	GT-4-C			
	GT-4-D			
	GT-4-E			

Table 2 - Sample Names and Neighborhood Locations

Seattle Neighborhood	Sample Number	GPS Coordinates WGS84 Decimal Degrees		Notes
		Latitude	Longitude	
West Seattle (WS)				
	WS-1-A	47.56583405	-122.4021301	
	WS-1-B			
	WS-1-C			
	WS-1-D			
	WS-1-E			
	WS-2-A	47.56263351	-122.3841705	
	WS-2-B			
	WS-2-C			
	WS-2-D			
	WS-2-E			
	WS-3-A	47.54912186	-122.3883972	
	WS-3-B			
	WS-3-C			
	WS-3-D			
	WS-3-E			
	WS-4-A	47.53723145	-122.3852539	
	WS-4-B			
	WS-4-C			
	WS-4-D			
	WS-4-E			
Capitol Hill (CH)				
	CH-1-A	47.63412857	-122.3183899	
	CH-1-B			
	CH-1-C			
	CH-1-D			
	CH-1-E			
	CH-2-A	47.63193512	-122.3049622	
	CH-2-B			
	CH-2-C			
	CH-2-D			
	CH-2-E			
	CH-3-A	47.62083054	-122.3187027	
	CH-3-B			
	CH-3-C			
	CH-3-D			
	CH-3-E			
	CH-4-A	47.62383652	-122.3022461	
	CH-4-B			
	CH-4-C			
	CH-4-D			
	CH-4-E			

Table 2 - Sample Names and Neighborhood Locations

Seattle Neighborhood	Sample Number	GPS Coordinates WGS84 Decimal Degrees		Notes
		Latitude	Longitude	
Ballard (BA)				
	BA-1-A	47.66988754	-122.3849869	
	BA-1-B			
	BA-1-C			
	BA-1-D			
	BA-1-E			
	BA-2-A	47.66836548	-122.3673782	
	BA-2-B			
	BA-2-C			
	BA-2-D			
	BA-2-E			
	BA-3-A	47.66289139	-122.3588486	
	BA-3-B			
	BA-3-C			
	BA-3-D			
	BA-3-E			Not shipped to CAS
	BA-3-F			Replaces BA-3-E
	BA-4-A	47.65547943	-122.3529129	
	BA-4-B			
	BA-4-C			
	BA-4-D			
	BA-4-E			
Ravenna (RA)				
	RA-1-A	47.67885208	-122.3071747	
	RA-1-B			
	RA-1-C			
	RA-1-D			
	RA-1-E			
	RA-2-A	47.67892075	-122.296402	
	RA-2-B			
	RA-2-C			
	RA-2-D			
	RA-2-E			
	RA-3-A	47.66986465	-122.3057785	
	RA-3-B			
	RA-3-C			
	RA-3-D			
	RA-3-E			
	RA-4-A	47.66919708	-122.2943497	
	RA-4-B			
	RA-4-C			
	RA-4-D			
	RA-4-E			

Notes:
The latitude and longitude coordinates for the six Seattle neighborhoods, South Park (SP), Georgetown (GP), West Seattle (WS), Capitol Hill (CH), Ballard (BA), and Ravenna (RA), have an accuracy of +/- 2000 feet.

Table 3 - Analytical Results for Surface Soil Samples from South Park Study Areas

Sample ID	SP-1-A	SP-1-B	SP-2-A	SP-2-B	SP-3-A	SP-3-B	SP-4-A	SP-4-B	SP-5-A	SP-5-B	SP-6-A	SP-6-B	SP-7-A
Sampling Date	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/6/2011	4/6/2011
Conventionals in %													
Total Solids	98.9	97.2	94.6	98.4	95.3	93.2	98.6	98	94.8	96.2	97.8	97.1	98.1
Total Organic Carbon	2.97	3.67	3.68	2.23	5.02	4.3	1.9	2.1	2.91	3.13	3.2	4.56	3.08
Dioxins in ng/kg													
2,3,7,8-TCDD	0.829 T	3.92	1.41	1.73	2.24	7.53	0.944	1.1 UK	5.91	1.47	2.25	4.99	8.48
1,2,3,7,8-PeCDD	3.51 T	2.03 T	2.78 T	1.7 T	3.66 T	2.18 T	4.43	3.83 T	2.74 T	1.88 T	2 T	3.11 T	3.02 T
1,2,3,4,7,8-HxCDD	4.59	2.8 T	3.03 T	2.24 T	4.67	2.94 T	5.43	5.22	3.21 T	2.54 T	3.23 T	3.56 T	3.42 T
1,2,3,6,7,8-HxCDD	14.4	8.23	9.5	6.62	16.4	11.8	16.4	14.9	7.96	6.4	8.89	8.39	9.59
1,2,3,7,8,9-HxCDD	13.3	8.41	9.71	6.51	13.8	8.93	15.9	15.1	9.32	7.21	7.45	9.85	9.25
1,2,3,4,6,7,8-HpCDD	254	158	179	126	359	310	308	274	143	125	167	164	174
OCDD	2170	1240	1700	1020	2660	3300	2150	1970	1140	921	1210	1220	1420
2,3,7,8-TCDF	4.18	2.24	4.21	2.3	5.67	3.24	5.49	3.9	3.89	3.11	2.97	5.13	3.55
1,2,3,7,8-PeCDF	2.07 JT	1.06 T	1.49 JT	1.33 JT	2.69 JT	1.32 T	2.32 T	1.92 T	1.47 T	1.44 T	1.32 T	2.39 T	1.87 T
2,3,4,7,8-PeCDF	5.3 J	1.93 T	2.92 T	1.88 T	4.11 T	2.54 T	3.6 T	2.94 T	2.23 UK	2.81 T	2.47 T	4.67	2.26 T
1,2,3,4,7,8-HxCDF	14.9	5.63	6.24 J	3.76 T	9.69 J	4.8	10.3	9.75	5.43	5.02	5.03	6.17	6.19
1,2,3,6,7,8-HxCDF	5.75	2.39 T	2.78 T	1.94 T	4.85	2.87 T	3.98 T	4.03 T	2.91 T	3.23 T	2.83 T	4.64	2.43 T
1,2,3,7,8,9-HxCDF	0.141 U	0.194 U	0.132 T	0.0882 U	0.241 T	0.104 U	0.213 T	0.159 U	0.125 U	0.686 U	0.504 U	0.718 U	0.203 U
2,3,4,6,7,8-HxCDF	11	3.93 T	3.33 T	1.97 T	5.54	4.87	5.07	5.92	4.58 T	5.26	4.81	8.85	2.96 T
1,2,3,4,6,7,8-HpCDF	59.2	25.4	29.6	24	70.7	36.3	44.4	51.5	20.5	20	44.9	27.2	30.9
1,2,3,4,7,8,9-HpCDF	4.76	1.83 T	2.14 T	1.43 T	4.3 T	2.48 T	3.54 T	3.55 T	1.74 T	1.32 UK	1.8 T	2.07 T	2.29 T
OCDF	212	57.8	84.4	75.9	266	120	113	107	45.6	45.3	82.9	68.9	158
Total TCDD	18.4	14.9	24.1	14.6	26.4	20.9	24.1	12.1	22.4	13.5	13.4	39.1	72.3
Total PeCDD	38.4	20.8	39	28.7	51.9	31	63.8	51.8	49.9	32.9	29.5	67.3	111
Total HxCDD	116	75.5	83.4	61	127	86	145	133	91.6	67.4	72	104	123
Total HpCDD	488	310	340	237	643	547	586	515	279	241	307	307	316
Total TCDF	74.2	12.9	69.4	45.2	114	49.4	61.3	49.1	50.3	57.5	44	148	27.1
Total PeCDF	195	54.3	80.8	49.2	136	98.1	121	93.5	95.8	132	101	300	42.7
Total HxCDF	160	57.4	48.1	29.5	128	75.7	95	108	45.5	72.2	74.8	84.5	48
Total HpCDF	154	62.1	80.4	63.1	218	115	134	147	51.2	48.5	102	70.7	97.1
TEQ-Detects only	17	12	12	8.4	19	19	17	15	14	9.3	11	17	19
TEQ-1/2 MDL	17	12	12	8.4	19	19	17	15	15	9.3	11	17	19
PAHs (8270 SIM) in ug/kg													
Acenaphthene	2	0.85	9.5	2.9	8.2	15	5.3	12	7.2	12	7.3	11	0.79
Acenaphthylene	2.6	2	4.6	2.7	6.9	2.3	1.8	4.7	3.8	2.9	3.9	17	1.5
Anthracene	5.6	2.6	13	5.1	22	16	9.4	15	11	17	13	29	3.5
Benzo(a)anthracene	37	14	74	41	140	88	63	78	95	110	73	230	43
Benzo(a)pyrene	60	23	110	52	180	110	79	84	120	120	96	290	59
Benzo(b)fluoranthene	97	33	120	68	240	110	92	120	150	150	100	340	83
Benzo(k)fluoranthene	26	8.8	38	20	63	36	25	38	44	43	30	97	24
Benzo(ghi)perylene	68	26	84	42	110	65	52	54	82	77	68	250	50
Chrysene	65	21	100	58	230	110	83	150	130	130	89	260	48
Dibenzo(a,h)anthracene	15	5.2	20	11	31	18	14	15	20	23	18	44	15
Fluoranthene	84	41	140	86	280	180	120	320	180	250	110	360	79
Fluorene	2.2	0.99	7.3	2.2	8	11	4.3	12	5.4	8.5	5.3	9.4	1
Indeno(1,2,3-cd)pyrene	66	24	87	45	120	73	58	60	93	88	70	250	54
Naphthalene	7	3.8	4.5	4.4	15	2.7	3.3	5.2	6.8	4.9	5.4	12	3.5
Phenanthrene	43	24	100	57	160	160	86	330	120	160	96	210	31
Pyrene	78	37	170	97	320	240	150	350	250	300	170	450	79
TEQ-Detects only	85	32	140	71	240	140	110	120	160	160	130	390	81
TEQ-1/2 MDL	85	32	140	71	240	140	110	120	160	160	130	390	81

Table 3 - Analytical Results for Surface Soil Samples from South Park Study Areas

Sample ID	SP-1-A	SP-1-B	SP-2-A	SP-2-B	SP-3-A	SP-3-B	SP-4-A	SP-4-B	SP-5-A	SP-5-B	SP-6-A	SP-6-B	SP-7-A
Sampling Date	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/6/2011	4/6/2011
Grain Size in %													
Particle/Grain Size, Gravel, Medium	0.15	0.03	0.14	0.03	1.89	0.17	0.08	0.04	0.07	0.05	0.21	1.36	0.84
Particle/Grain Size, Gravel, Fine	0.86	0.14	0.82	0.96	2.12	1.31	0.11	0.66	0.75	0.13	0.13	0.39	3.65
Particle/Grain Size, Sand, Very Coarse	2.24	0.6	2.06	0.52	2.35	1.69	2.68	1.61	1.93	1.44	1.39	2.36	4.94
Particle/Grain Size, Sand, Coarse	6.3	3.46	4.84	0.95	5.74	6.09	7.61	6.4	5.95	4.42	7.82	6.74	8
Particle/Grain Size, Sand, Medium	11.5	10.7	8.65	3.91	6.93	5.15	17.5	19.6	9.97	5.26	16.1	12	12
Particle/Grain Size, Sand, Fine	29.4	22.1	15.4	30.3	19.8	10	27.5	26.8	21.7	15.7	31.8	18.9	22.3
Particle/Grain Size, Sand, Very Fine	13.2	7.66	6.07	13.8	6.69	3.77	6.49	6.43	7.4	7.39	6.97	5.4	6.32
Particle/Grain Size, Silt	31.5	47.8	51.7	46.1	43.2	54.5	29.9	31.5	43.7	53.9	27.9	47.1	38.2
Particle/Grain Size, Clay	2.14	4.8	9.01	0.73	8.22	8.58	6.53	4.83	8.31	11.7	4.06	7.08	6.31

Table 3 - Analytical Results for Surface Soil Samples from South Park Study Areas

Sample ID	SP-7-B	SP-8-A	SP-8-B	SP-9-A	SP-9-B	SP-10-A	SP-10-B
Sampling Date	4/6/2011	4/6/2011	4/6/2011	4/6/2011	4/6/2011	4/6/2011	4/6/2011
Conventionals in %							
Total Solids	98.6	96.4	97.7	96.9	95.3	97.1	97.4
Total Organic Carbon	2.56	3.38	4.16	3.75	4.28	3	3.37
Dioxins in ng/kg							
2,3,7,8-TCDD	0.832	0.954	0.722 U	0.207 UK	0.357 UK	0.514 UK	1.56
1,2,3,7,8-PeCDD	2.22 T	1.02 T	0.677 T	0.44 T	0.395 UK	2.43 T	3.54 T
1,2,3,4,7,8-HxCDD	3.04 T	1.09 T	0.853 UK	0.502 UK	0.704 T	3.41 T	7.74
1,2,3,6,7,8-HxCDD	8.2	5.39	4.15	5.51	6.22	8.52	21.6
1,2,3,7,8,9-HxCDD	9.23	4.56	2.79 T	2.01 T	2.23 T	8.78	17.8
1,2,3,4,6,7,8-HpCDD	163	78.4	86.7	183	205	176	714
OCDD	1170	419	673	1790	1950	1150	6100
2,3,7,8-TCDF	3.18	0.982	0.624 T	0.601 T	0.865 T	3.44	2.71
1,2,3,7,8-PeCDF	1.21 T	0.576 T	0.399 UK	0.313 UK	0.438 UK	1.86 JT	1.45 JT
2,3,4,7,8-PeCDF	2.13 T	0.609 T	0.533 T	0.419 T	0.503 UK	3.07 T	2.04 T
1,2,3,4,7,8-HxCDF	5.41	1.65 T	2.29 T	1.41 T	1.37 T	5.65	9.12
1,2,3,6,7,8-HxCDF	2.35 T	0.615 T	0.658 UK	0.707 T	0.61 T	3.4 T	3.58 T
1,2,3,7,8,9-HxCDF	0.157 U	0.216 U	0.293 U	0.303 U	0.121 U	0.138 U	0.199 U
2,3,4,6,7,8-HxCDF	3.65	0.88 T	0.889 T	0.79 T	1.28 T	5.92	5.04 J
1,2,3,4,6,7,8-HpCDF	22.6	6.81	10	27.4	27.9	41	99.8
1,2,3,4,7,8,9-HpCDF	1.94 T	0.424 T	0.67 UK	1.52 T	1.65 T	2.36 T	7.6
OCDF	50.7	20	29.4	174	196	128	521
Total TCDD	9.12	27.2	4.96	2.65	3.72	16.1	11
Total PeCDD	32	82.1	12.8	7.85	3.82 T	38.9	36.8
Total HxCDD	77	145	34.7	28.8	36.7	84.4	128
Total HpCDD	317	146	160	307	340	329	1110
Total TCDF	33.7	2.81	2.9	2.85	6.2	47.7	20
Total PeCDF	65.6	12.8	10.1	12.6	11.5	103	49
Total HxCDF	53	13.6	16.5	33.7	34.8	62.3	67.2
Total HpCDF	58	18.9	31.6	124	135	114	327
TEQ-Detects only	9.5	4.7	3.1	4.4	4.3	9.9	23
TEQ-1/2 MDL	9.5	4.7	3.5	4.5	4.8	10	23
PAHs (8270 SIM) in ug/kg							
Acenaphthene	0.44 T	0.74	0.14 T	1	1.3	3.5	1.9
Acenaphthylene	1.2	0.63	0.39 T	2.2	1.8	2.4	5
Anthracene	1.7	2.1	0.44 T	3.5	3.2	5.8	6
Benzo(a)anthracene	14	8.9	3	13	16	32	31
Benzo(a)pyrene	19	12	5.3	20	19	22	40
Benzo(b)fluoranthene	39	18	7.9	28	28	55	53
Benzo(k)fluoranthene	8	5.7	2.1	7.7	7.7	18	17
Benzo(ghi)perylene	27	12	6.3	21	19	33	34
Chrysene	32	14	5.6	18	23	53	43
Dibenzo(a,h)anthracene	8.1	2.7	1.3	4.7	4	9.7	7.8
Fluoranthene	29	21	7.1	33	36	95	62
Fluorene	0.67	0.95	0.49 U	1.5	1.9	3.2	3.1
Indeno(1,2,3-cd)pyrene	22	11	5.7	19	18	33	36
Naphthalene	9	1.8	1.5	4.9	5.7	6.4	3.9
Phenanthrene	15	15	3.5	18	21	59	42
Pyrene	24	18	5.9	31	35	89	62
TEQ-Detects only	28	17	7.4	27	27	37	55
TEQ-1/2 MDL	28	17	7.4	27	27	37	55

Table 3 - Analytical Results for Surface Soil Samples from South Park Study Areas

Sample ID	SP-7-B	SP-8-A	SP-8-B	SP-9-A	SP-9-B	SP-10-A	SP-10-B
Sampling Date	4/6/2011	4/6/2011	4/6/2011	4/6/2011	4/6/2011	4/6/2011	4/6/2011
Grain Size in %							
Particle/Grain Size, Gravel, Medium	0.98	4.4	23.3 J	4.68	7.71	2.14	3.46
Particle/Grain Size, Gravel, Fine	1.73	7.81	6.22	9.04	7.59	0.94	3.56
Particle/Grain Size, Sand, Very Coarse	3.67	8.91	7.84	9.32	11.4	3.7	5.48
Particle/Grain Size, Sand, Coarse	10.1	9.16	9.42	8.68	14.6	7.85	8.96
Particle/Grain Size, Sand, Medium	25.9	13.1	11.3	10.6	9.22	10	11.7
Particle/Grain Size, Sand, Fine	30.1	17.9	13.4	16.7	15.5	18.5	18.4
Particle/Grain Size, Sand, Very Fine	5.78	4.96	3.46	4.27	3.75	5.12	4.07
Particle/Grain Size, Silt	20	34.4	15.6	23.1	30.4	39.4	35.9
Particle/Grain Size, Clay	1.49	0.79	1.85 J	5.87	5.36	9.55	9.75

Table 4 - Analytical Results for Surface Soil Samples from Georgetown Study Areas

Sample ID	GT-1-A	GT-1-B	GT-1-C	GT-1-D	GT-1-E	GT-2-A	GT-2-B	GT-2-C	GT-2-D	GT-2-E	GT-3-A	GT-3-B	GT-3-C
Sampling Date	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011
Conventionals in %													
Total Solids	95.5	99.3	96.3	98.6	99.2	97.9	99	98.5	99.1	99.1	98.3	98.3	96.9
Total Organic Carbon	5.08	1.98	5.18	3.64	2.08	3.8	2.54	3.04	2.44	1.55	3.62	3.44	4.81
Dioxins in ng/kg													
2,3,7,8-TCDD	2.65	10	0.812 UK	0.777 UK	1.02	97.6	0.921	0.642 UK	0.611 T	0.208 UK	1.08	5.28	6.82
1,2,3,7,8-PeCDD	2.44 UK	3.07 UK	2.29 T	4.05	5.33	2.69 T	2.72 T	2.55 T	3.29 T	1.04 T	3.42 T	3.53 T	14.5
1,2,3,4,7,8-HxCDD	2.76 T	3.96	2.42 T	4.75	6.9	2.77 T	3.19 T	2.66 T	4.75	1.24 T	3.96 T	4.04	7.11 UK
1,2,3,6,7,8-HxCDD	9.54	12.1	6.88	15.5	21.2	11.5	11.4	8.41	53.4	5.44	15.1	13.4	59.8
1,2,3,7,8,9-HxCDD	6.54	11.1	6.6	11.9	16.8	8.09	8.42	5.73	13.2	3.96	12.3	12.2	42.2
1,2,3,4,6,7,8-HpCDD	188	201	125	302	439	259	301	146	964	109	240	224	1130
OCDD	1460	1460	1380	2230	3580	2170	3290	1050	11800	1070	1720	1670	10400
2,3,7,8-TCDF	4.3	5.95	4.1	5.56	3.17	4.76	2.33	5.12	2.7	1.03	6.87	6.76	12
1,2,3,7,8-PeCDF	1.64 JT	2.25 JT	1.38 JT	2.45 JT	2.5 JT	2.53 JT	1.8 T	2.08 T	2.8 T	0.612 T	3.26 JT	3.27 JT	5.87
2,3,4,7,8-PeCDF	3.78 T	4.63	2.98 T	4.74	7.01	4.93	3.88	4.5	6.2	1.62 T	7.51	7.2	13.1
1,2,3,4,7,8-HxCDF	6.18	8.95 J	4.63	11.1	11.4 J	8.39	6.66	6.43	11.5	2.7 T	9.48	9.21	27.6
1,2,3,6,7,8-HxCDF	3.83 T	5.65	3.06 T	5.86	8.39	4.88	4.25	4.63	7.67	1.95 T	8.79 J	7.11	13.9
1,2,3,7,8,9-HxCDF	0.112 U	0.135 U	0.101 U	0.174 T	0.149 U	0.112 U	0.174 U	0.112 UK	0.348 T	0.0907 T	0.207 T	0.182 U	0.47 T
2,3,4,6,7,8-HxCDF	6.42	9.45	5.46	9.42	15.6	8.2	7.75	8.37	16.1	3.76	15 J	12	22.4
1,2,3,4,6,7,8-HpCDF	41.6	49.4	21.8	68.9	97.5	52.9	56.1	30.7	81	21	55.7	50.3	209
1,2,3,4,7,8,9-HpCDF	1.92 T	2.76 T	1.3 T	3.95	4.64	2.64 T	3.6	1.86 T	3.59 T	1.33 T	3.7 T	3.32 T	13.3
OCDF	108	122	58.8	193	363	165	328	67.6	178	58.8	117	108	964
Total TCDD	32.4	52.8	24.7	48	36.5	125	24.3	42.5	19.9	7.02	48.3	63	58.6
Total PeCDD	25.5	50.3	33.8	75	65	38.5	26.1	65.9	41.4	8.64	56	39.8	88.9
Total HxCDD	84.4	115	69.8	127	149	96.2	76.8	85.9	180	38.2	121	123	417
Total HpCDD	349	384	244	524	783	472	522	285	1680	210	449	423	2050
Total TCDF	66.3	91.8	50.8	84	136	74.3	80.8	107	102	30.8	189	178	254
Total PeCDF	119	189	99.5	140	324	166	171	177	258	81.4	366	255	487
Total HxCDF	92.5	98.9	51.8	151	162	123	76.1	78.7	166	38.3	156	116	238
Total HpCDF	116	119	56.7	189	275	162	193	71.8	235	58	140	128	772
TEQ-Detects only	11	20	8.5	16	23	110	14	10	31	5.2	18	21	60
TEQ-1/2 MDL	12	22	8.9	17	23	110	14	11	31	5.3	18	21	61
PAHs (8270 SIM) in ug/kg													
Acenaphthene	7.9	1.5	2.3	2	4	2.5	1.5	4.1	3.4	1.4	8.5	8	2
Acenaphthylene	4.6	3.7	5	14	4.4	10	3.2	23	6.4	2.5	6.6	7	4.7
Anthracene	12	4.2	7.2	10	11	9.5	5.1	20	12	5	23	73	8.2
Benzo(a)anthracene	56	32	40	81	72	73	33	210	79	23	160	860	64
Benzo(a)pyrene	75	41	55	120	100	100	44	270	93	33	160	700	84
Benzo(b)fluoranthene	110	72	82	190	210	150	83	410	150	50	260	970	160
Benzo(k)fluoranthene	32	19	23	54	59	44	22	110	41	14	71	350	36
Benzo(ghi)perylene	73	49	54	110	100	95	49	240	84	44	140	330	110
Chrysene	79	55	62	140	150	120	62	310	120	36	220	940	110
Dibenzo(a,h)anthracene	14	8.8	11	27	23	22	10	49	27	7.9	40	100	28
Fluoranthene	140	81	94	170	170	160	86	380	170	49	320	1100	120
Fluorene	5.4	1.6	3.3	2.7	4.2	3.2	1.5	5.6	4.9	1.4	8.5	6.7	2.3
Indeno(1,2,3-cd)pyrene	74	47	56	110	110	95	50	250	84	36	140	360	110
Naphthalene	11	13	9	16	15	10	9.5	26	9.8	5.2	11	11	8.5
Phenanthrene	91	46	58	73	88	77	45	150	100	27	160	240	62
Pyrene	140	78	95	240	150	160	81	500	140	54	310	1700	120
TEQ-Detects only	100	59	77	170	150	140	64	380	130	46	230	970	130
TEQ-1/2 MDL	100	59	77	170	150	140	64	380	130	46	230	970	130

Table 4 - Analytical Results for Surface Soil Samples from Georgetown Study Areas

Sample ID	GT-1-A	GT-1-B	GT-1-C	GT-1-D	GT-1-E	GT-2-A	GT-2-B	GT-2-C	GT-2-D	GT-2-E	GT-3-A	GT-3-B	GT-3-C
Sampling Date	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011
Grain Size in %													
Particle/Grain Size, Gravel, Medium	0.04	23.9	0.04	0.06	3.93	0.02	0.06 J	0	0.06	23.1	2.76	0.02	0.01
Particle/Grain Size, Gravel, Fine	0.22	1.5	0.27	1.79	1.56	0.31	0.05 J	0.63	0.61	6.99	1.47	0.1	0.41
Particle/Grain Size, Sand, Very Coarse	0.94	2.75	2.37	3.48	4.32	1.96	0.96	3.28	1.63	7.55	3.43	0.75	1.47
Particle/Grain Size, Sand, Coarse	3.12	7.63	6.32	7.67	10.3	5.8	2.1 J	8.32	5.87	14	7.19	2.56	7.44
Particle/Grain Size, Sand, Medium	7.68	25	8.69	12.6	26.2	11.4	7.26	14.3	14.4	16.6	15.6	10.8	20
Particle/Grain Size, Sand, Fine	16.3	22.8	12	18.7	28.3	34.2	29.1	32.6	38.4	13.9	31.2	30.1	25.9
Particle/Grain Size, Sand, Very Fine	7.83	3.73	5.47	6.65	4.15	11.4	16.1	11.1	12.6	3.15	7.9	9.69	8.07
Particle/Grain Size, Silt	55.9	14.3	54.7	43.1	16.3	30.7	42	25.4	23.2	10.8	27.8	41.9	29.5
Particle/Grain Size, Clay	5.33	0.94	7.1	3.12	2.82	2.75	2.12	1.43	0.84	1.78	0.8	2.55	4.29

Table 4 - Analytical Results for Surface Soil Samples from Georgetown Study Areas

Sample ID	GT-3-D	GT-3-E	GT-4-A	GT-4-B	GT-4-C	GT-4-D	GT-4-E
Sampling Date	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011
Conventionals in %							
Total Solids	98.4	98.6	98.2	98.6	97.6	98.4	97.9
Total Organic Carbon	3.38	4.53	4.45	4.29	3.68	2	4.43
Dioxins in ng/kg							
2,3,7,8-TCDD	5.36	1.6	13.1	2.35	9.48	1.75	2.9
1,2,3,7,8-PeCDD	25.1	9.59	7.35	6.22	3.09	5.19	8.16
1,2,3,4,7,8-HxCDD	39.3	13.5	8.47 UK	7.79	4.07	8.28	8.77
1,2,3,6,7,8-HxCDD	125	53.5	33.9	29.3	11.2	89	32.2
1,2,3,7,8,9-HxCDD	142	37.6	28	21.4	11.6	22.8	23.2
1,2,3,4,6,7,8-HpCDD	3090	985	1130	527	196	1540	615
OCDD	28800 J	8230	11200	4220	1470	16200 J	6780
2,3,7,8-TCDF	8.76	11	9.82	11.2	5.74	3.89	14.6
1,2,3,7,8-PeCDF	5.64 J	6.88 J	7.13 J	5.47 J	2.74 JT	3.66 J	6.89 J
2,3,4,7,8-PeCDF	10.5	13.8 J	10.4 J	11.1 J	5.67	5.69	15.1 J
1,2,3,4,7,8-HxCDF	29.4 J	29.6 J	21.6 J	20.7 J	9.33 J	14.1 J	22.5 J
1,2,3,6,7,8-HxCDF	15.2	17.9	12	12.2	5.5	7.68	14.2
1,2,3,7,8,9-HxCDF	0.554 UK	0.647 T	0.441 T	0.29 UK	0.182 UK	0.497 T	0.358 UK
2,3,4,6,7,8-HxCDF	22.7	27.6	16.8 J	18.9	9.06	14.3	23 J
1,2,3,4,6,7,8-HpCDF	266	231	109	114	39.6	112	135
1,2,3,4,7,8,9-HpCDF	16.6	14	9.11	7.8	3.15	5.47	7.86
OCDF	802	657	375	287	95.5	227	469
Total TCDD	144	101	184	58	45.5	18.8	134
Total PeCDD	191	78.9	180	82.1	51.8	36.2	101
Total HxCDD	816	327	333	216	112	275	265
Total HpCDD	6110	1760	1740	975	375	2670	1240
Total TCDF	248	281	243	228	115	72.3	360
Total PeCDF	300	365	321	326	158	153	418
Total HxCDF	282	346	194	218	90.5	182	255
Total HpCDF	737	682	308	310	98.5	335	403
TEQ-Detects only	120	50	52	32	23	46	39
TEQ-1/2 MDL	120	50	52	32	23	46	39
PAHs (8270 SIM) in ug/kg							
Acenaphthene	3	97	8.8	16	2	1.1	19
Acenaphthylene	12	15	5.7	11	1.8	3.2	28
Anthracene	26	80	21	40	5.4	4	51
Benzo(a)anthracene	160	230	160	210	35	25	380
Benzo(a)pyrene	170	270	210	240	47	35	410
Benzo(b)fluoranthene	380	450	370	450	75	57	780
Benzo(k)fluoranthene	110	150	110	140	20	16	260
Benzo(ghi)perylene	130	420	250	270	48	37	410
Chrysene	450	240	250	360	53	41	560
Dibenzo(a,h)anthracene	35	70	50	52	9.4	6.5	91
Fluoranthene	510	500	360	490	78	66	710
Fluorene	3.4	68	7.1	16	2	1.5	18
Indeno(1,2,3-cd)pyrene	130	290	230	280	47	36	440
Naphthalene	14	150	13	21	5.2	3.9	23
Phenanthrene	110	400	150	220	38	39	290
Pyrene	770	460	330	420	71	65	690
TEQ-Detects only	260	390	310	360	66	49	610
TEQ-1/2 MDL	260	390	310	360	66	49	610

Table 4 - Analytical Results for Surface Soil Samples from Georgetown Study Areas

Sample ID	GT-3-D	GT-3-E	GT-4-A	GT-4-B	GT-4-C	GT-4-D	GT-4-E
Sampling Date	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011
Grain Size in %							
Particle/Grain Size, Gravel, Medium	0.07	0	0.91	0.09	0.39	1.5	3.64
Particle/Grain Size, Gravel, Fine	0.18	1.23	1.49	2.24	1.15	3.18	0.33
Particle/Grain Size, Sand, Very Coarse	2.08	3.88	3.79	3.94	2.67	4.05	2.79
Particle/Grain Size, Sand, Coarse	13.5	12.6	16.7	16.9	4.67	6.34	13.8
Particle/Grain Size, Sand, Medium	29.4	19.9	21.3	21.6	8.33	15.6	21.3
Particle/Grain Size, Sand, Fine	24.4	26.2	22	22.2	19.1	35.3	22.2
Particle/Grain Size, Sand, Very Fine	4.82	9.14	6.35	6.6	6.54	8.09	6.5
Particle/Grain Size, Silt	23.3	23.9	23.9	23.5	47.9	21.7	24.6
Particle/Grain Size, Clay	1.39	1.3	2.4	1.62	6.21	3.27	0.9

Table 5 - Analytical Results for Surface Soil Samples from Ballard Study Areas

Sample ID	BA-1-A	BA-1-B	BA-1-C	BA-1-D	BA-1-E	BA-2-A	BA-2-B	BA-2-C	BA-2-D	BA-2-E	BA-3A	BA-3-B	BA-3-C
Sampling Date	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/31/2011	3/31/2011	3/31/2011	3/31/2011	3/31/2011
Conventionals in %													
Total Solids	97.5	98.6	98.5	98.4	98.7	98.2	98.2	98.8	97.1	98.5	97.6	98.4	99.1
Total Organic Carbon	8.21	5.61	6.09	2.79	5.66	8.1	7.15	5.62	5.58	7.69	7.76	6.67	2.47
Dioxins in ng/kg													
2,3,7,8-TCDD	0.0486 U	3.88	1.62	4.61	11	4.59	14.8	2.63	2.91	2.9	5.81	2.13	21.6
1,2,3,7,8-PeCDD	4.8 UK	5.27	1.62 T	2.23 T	5.75	4.33	2.56 T	2.88 T	1.44 T	9.42	2.71 T	2.77 T	2.47 T
1,2,3,4,7,8-HxCDD	3.71 T	6.65	1.08 T	2.25 T	12.1	3.82	1.68 T	2.87 T	1.07 T	6.56	5.68	5.64	3.36 T
1,2,3,6,7,8-HxCDD	8.18	23.8	3.62 T	6.92	52.1	11.5	4.54	9.03	3.93	25.7	23.7	17.9	32.6
1,2,3,7,8,9-HxCDD	7.7	19	3.2 T	5.2	22.4	8.56	3.71 T	6.81	2.98 T	29.6	14.3	12.9	16.6
1,2,3,4,6,7,8-HpCDD	94.1	448	52.1	122	2180	244	74.9	159	76.4	667	838	611	1160
OCDD	690	2130	419	871	20600 J	1840	636	1420	855	6820	10300	6750	5400
2,3,7,8-TCDF	16.5	8.93	4.29	4.87	6.43	6.72	4.66	5.03	2.85	4.9	2.46	2.85	2.74
1,2,3,7,8-PeCDF	5.82 J	3.5 JT	1.7 JT	1.71 JT	2.4 JT	2.75 JT	1.76 JT	2.39 JT	1.43 JT	2.36 JT	1.45 JT	1.69 JT	1.2 JT
2,3,4,7,8-PeCDF	9.73	5.17	2.67 T	3.13 T	3.96	4.46	3.23 T	4.6	3.12 T	5.42	2.93 T	3.64	2.19 JT
1,2,3,4,7,8-HxCDF	10.8	9.17	2.59 JT	3.73 T	14 J	5.25	3.36 T	5.11 J	3.62 T	8.78	7.03	7.74	3.87
1,2,3,6,7,8-HxCDF	7.69	9.2 J	1.72 T	2.88 T	5.47	3.47	2.4 T	4.4	2.67 T	5.78 J	4.19 J	4.37 J	1.94 T
1,2,3,7,8,9-HxCDF	0.241 UK	0.207 U	0.286 U	0.681 U	0.312 U	0.152 T	0.119 U	0.123 T	0.111 UK	0.157 T	0.158 UK	0.156 T	0.119 U
2,3,4,6,7,8-HxCDF	13.1 J	12.1	2.37 T	4.64 T	10.8 J	5.55 J	3.88 T	7.46	4.65	9.34	7.25	7.86	3.54 T
1,2,3,4,6,7,8-HpCDF	31.8	149	8.4	39.7	319	37.5	40.7	31.2	17	87.6	79.3	83.8	47.8
1,2,3,4,7,8,9-HpCDF	2.35 T	5.67	0.662 T	1.72 T	20.7	1.84 T	1.08 T	1.82 T	0.892 T	6.23	7.92	7.54	3.54 T
OCDF	55.8	185	18.2	161	2370	70.2	49.8	77.4	39.5	435	497	513	121
Total TCDD	197	102	36	32.6	78.4	68.1	58.2	44.3	21.1	42.2	22	21.8	43.5
Total PeCDD	138	110	42.1	30.1	84	72.4	50	39.6	22.1	60.8	27	27.1	35.1
Total HxCDD	131	215	44.9	52.9	250	110	56.6	78.5	35.7	223	128	103	192
Total HpCDD	182	771	95.4	205	3240	417	138	347	141	1190	1390	966	1790
Total TCDF	301	35.8	67.3	106	49.9	86.4	81.5	133	70.9	185	58.5	65.7	39.8
Total PeCDF	254	140	53.3	103	121	107	82.7	158	93.5	203	89.2	103	48.7
Total HxCDF	141	172	27	68.5	54.6	57.6	41.6	97.2	54.9	134	109	74.8	55.7
Total HpCDF	66.8	266	19.2	116	1380	97.8	79.6	80.4	43.8	275	280	278	122
TEQ-Detects only	11	26	6.7	13	62	18	22	13	8.7	33	28	21	45
TEQ-1/2 MDL	14	26	6.7	13	62	18	22	13	8.7	33	28	21	45
PAHs (8270 SIM) in ug/kg													
Acenaphthene	19	6.5	4.7	11	3.4	4.3	6.3	2.5	5	10	130	18	4.7
Acenaphthylene	26	12	62	8.4	10	37	8.1	5	3.9	9	5.1	6	2.4
Anthracene	49	19	45	19	22	49	17	5.8	37	52	220	34	11
Benzo(a)anthracene	240	150	380	130	120	330	74	40	170	170	520	180	41
Benzo(a)pyrene	250	180	570	150	140	360	91	49	180	160	480	180	46
Benzo(b)fluoranthene	450	300	760	250	240	510	130	120	260	250	650	300	70
Benzo(k)fluoranthene	110	76	240	66	66	130	38	28	67	67	160	77	20
Benzo(ghi)perylene	230	150	580	130	130	290	87	73	160	120	290	130	42
Chrysene	380	240	680	190	190	430	110	92	190	180	570	230	55
Dibenzo(a,h)anthracene	43	30	72	31	21	50	15	13	30	26	68	29	7.3
Fluoranthene	930	430	1100	350	410	760	200	130	350	440	1300	410	100
Fluorene	19	7	18	9.4	5.4	13	5.3	2.6	5.2	15	100	11	3.3
Indeno(1,2,3-cd)pyrene	240	180	580	140	140	310	88	63	170	140	370	150	40
Naphthalene	100	21	23	26	30	36	16	31	7.6	6.7	18	11	3.8
Phenanthrene	490	190	500	200	200	360	100	77	150	240	1200	210	59
Pyrene	690	370	1300	300	370	820	200	100	300	360	1200	390	96
TEQ-Detects only	360	260	780	210	200	500	130	76	250	230	660	260	64
TEQ-1/2 MDL	360	260	780	210	200	500	130	76	250	230	660	260	64

Table 5 - Analytical Results for Surface Soil Samples from Ballard Study Areas

Sample ID	BA-1-A	BA-1-B	BA-1-C	BA-1-D	BA-1-E	BA-2-A	BA-2-B	BA-2-C	BA-2-D	BA-2-E	BA-3A	BA-3-B	BA-3-C
Sampling Date	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/31/2011	3/31/2011	3/31/2011	3/31/2011	3/31/2011
Grain Size in %													
Particle/Grain Size, Gravel, Medium	1.58	0	0.04	1.9	0.1	0.19	1.04	0.01	0.56	0.51	2.35	0.13	0.2
Particle/Grain Size, Gravel, Fine	2.72	0.31	1.28	4.63	0.54	0.36	0	0.98	0.42	0.23	5.24	0.14	0.98
Particle/Grain Size, Sand, Very Coarse	8.67	3.93	1.72	7.59	3.87	2.47	3.37	2.99	2.54	1.51	9.42	3.84	2.32
Particle/Grain Size, Sand, Coarse	13.9	9.59	8.47	14.3	13.7	11.4	16	12.5	14.6	16.6	14.7	17.8	12.5
Particle/Grain Size, Sand, Medium	11.9	16.4	18.2	20.8	19.6	19.3	18.6	24	25.7	24.6	15.1	18.5	25.5
Particle/Grain Size, Sand, Fine	14.2	22	23.9	19.6	25.5	26.9	22.5	31.1	27.6	28.1	16	21.4	28.7
Particle/Grain Size, Sand, Very Fine	4.67	5.13	5.38	4.25	5.77	4.95	4.89	6.52	4.47	5.89	4.21	6.06	4.97
Particle/Grain Size, Silt	32.4	34.6	33.8	22.9	25.6	25.6	22.8	25.1	20.6	18	22.4	25.9	20.7
Particle/Grain Size, Clay	9.64	6.69	4.54	0.56	3.69	4.3	3.59	2.12	3.32	1.27	3.11	2.58	2.33

Table 5 - Analytical Results for Surface Soil Samples from Ballard Study Areas

Sample ID	BA-3-D	BA-3-F	BA-4-A	BA-4-B	BA-4-C	BA-4-D	BA-4-E
Sampling Date	3/31/2011	3/31/2011	3/31/2011	3/31/2011	3/31/2011	4/1/2011	4/1/2011
Conventionals in %							
Total Solids	99	98.7	99.3	98.8	97.8	99.8	98.8
Total Organic Carbon	2.69	4.25	3.71	5.21	3.56	3.41	2.9
Dioxins in ng/kg							
2,3,7,8-TCDD	4.17	1.05	12.9	2.02	0.37 UK	3.39	0.651 UK
1,2,3,7,8-PeCDD	5.5	7.22	5.74	6.24	2.1 T	2.12 T	0.4 UK
1,2,3,4,7,8-HxCDD	9.5	12	11	7.4	4.31	1.8 T	0.551 T
1,2,3,6,7,8-HxCDD	54.6	56.5	35.2	31.4	14.4	6.73	2.28 T
1,2,3,7,8,9-HxCDD	22.7	33.1	21.3	22.1	8.44	5.11	1.46 T
1,2,3,4,6,7,8-HpCDD	1100	1160	1170	895	459	111	46.2
OCDD	9660	9780	12500	14400 J	4720	863	465
2,3,7,8-TCDF	4.3	4.74	5.18	11.7	1.53	4.1	0.379 T
1,2,3,7,8-PeCDF	3.6 J	4.79 J	2.56 JT	5.47 J	0.761 T	2.1 JT	0.176 UK
2,3,4,7,8-PeCDF	7.45	6.9	7.53	20.2 J	1.74 T	3.91 T	0.314 UK
1,2,3,4,7,8-HxCDF	27.4	13.3	21.6	15.7	4.35	4.28 T	0.676 T
1,2,3,6,7,8-HxCDF	10.8	9.9	12.6	23.5 J	2.44 T	3.08 T	0.443 T
1,2,3,7,8,9-HxCDF	0.65 T	0.52 UK	0.394 T	0.319 UK	0.123 U	0.167 U	0.135 U
2,3,4,6,7,8-HxCDF	16 J	16.1	24.6	50.2 J	4.41	5.02	0.731 T
1,2,3,4,6,7,8-HpCDF	205	144	306	166	69	18.8	6.54
1,2,3,4,7,8,9-HpCDF	9.97	6.38	27.2	12.8	5.69	1.02 T	1.1 T
OCDF	347	415	1370	1050	395	39.2	20.7
Total TCDD	27.7	23	49.5	77.3	9.09	33.9	3.49
Total PeCDD	42.9	46.9	52.8	86.6	14.3	29.1	2.4 T
Total HxCDD	245	259	180	204	70.7	53.2	15.3
Total HpCDD	1850	1970	1840	1580	687	201	80.6
Total TCDF	89.2	130	238	935	41.1	107	7.53
Total PeCDF	155	240	480	1380	58.9	115	9.57
Total HxCDF	493	322	271	447	47.4	66.8	11.2
Total HpCDF	626	435	1140	577	233	44.3	18.5
TEQ-Detects only	43	41	53	46	14	11	1.3
TEQ-1/2 MDL	43	41	53	46	14	11	1.9
PAHs (8270 SIM) in ug/kg							
Acenaphthene	24	72	2.1	67	8.1 J	1.8	0.54
Acenaphthylene	6.2	45	7.5	23	4.5 J	8	2.8
Anthracene	41	150	8.2	100	14 J	6.2	2.8
Benzo(a)anthracene	230	750	50	550	67 J	33	19
Benzo(a)pyrene	250	900	62	640	82 J	50	26
Benzo(b)fluoranthene	380	1300	120	930	110 J	84	34
Benzo(k)fluoranthene	94	380	30	280	37 J	23	10
Benzo(ghi)perylene	190	720	75	540	63 J	52	23
Chrysene	300	1000	93	740	95 J	63	26
Dibenzo(a,h)anthracene	38	130	11	130	15 J	10	4.4
Fluoranthene	570	2100	140	1300	140 J	90	42
Fluorene	15	58	2.3	41	4.8 J	2.4	0.74
Indeno(1,2,3-cd)pyrene	220	810	73	560	68 J	52	22
Naphthalene	14	48	32	52	13 J	13	2.2
Phenanthrene	300	1100	76	890	87 J	53	16
Pyrene	530	2000	130	1300	140 J	87	48
TEQ-Detects only	350	1200	91	890	110	71	35
TEQ-1/2 MDL	350	1200	91	890	110	71	35

Table 5 - Analytical Results for Surface Soil Samples from Ballard Study Areas

Sample ID	BA-3-D	BA-3-F	BA-4-A	BA-4-B	BA-4-C	BA-4-D	BA-4-E
Sampling Date	3/31/2011	3/31/2011	3/31/2011	3/31/2011	3/31/2011	4/1/2011	4/1/2011
Grain Size in %							
Particle/Grain Size, Gravel, Medium	0.26	0.09	10.6	1.84	1.45 J	0.12	0.58
Particle/Grain Size, Gravel, Fine	0.19	0.55	6.01	2.11	4.56	1.22	0.96
Particle/Grain Size, Sand, Very Coarse	2.99	2.56	7.55	5.78	6.77	3.94	5.01
Particle/Grain Size, Sand, Coarse	12.5	13.4	11.6	14.8	17.4 J	12.2	10.1
Particle/Grain Size, Sand, Medium	17.3	31.5	15	20.3	16	17.5	17.4
Particle/Grain Size, Sand, Fine	23.7	31.2	19.1	24.8	19.9	23.1	25
Particle/Grain Size, Sand, Very Fine	5.59	5.55	5.16	6.57	5.56 J	5.91	6.06
Particle/Grain Size, Silt	29.4	12.3	21.8	21.5	22.5	30.8	31
Particle/Grain Size, Clay	4.17	0.59	1.96	0.78	1.68 J	3.07	5.13

Table 6 - Analytical Results for Surface Soil Samples from West Seattle Study Areas

Sample ID	WS-1-A	WS-1-B	WS-1-C	WS-1-D	WS-1-E	WS-2-A	WS-2-B	WS-2-C	WS-2-D	WS-2-E	WS-3-A	WS-3-B	WS-3-C
Sampling Date	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/31/2011	3/31/2011	3/31/2011
Conventionals in %													
Total Solids	98.7	98.5	98.5	97.1	99	98.7	98.9	98	96.5	97.6	96.9	98.9	99.1
Total Organic Carbon	0.786	2.23	4.27	8.38	4.17	4.93	3.19	4.83	1.67	4.57	1.16 J	1.59	1.57
Dioxins in ng/kg													
2,3,7,8-TCDD	2.62	16.1	0.366 T	0.603 T	0.638 T	29.4	1.47	0.852	5.66	2.07	0.212 UK	0.745 UK	0.564 T
1,2,3,7,8-PeCDD	0.103 UK	4.12	0.339 T	1.02 T	0.5 T	0.905 T	2.2 T	0.71 T	0.436 T	1.16 T	1.01 T	0.575 T	0.651 T
1,2,3,4,7,8-HxCDD	0.142 UK	1.68 T	0.24 UK	1.02 T	0.668 UK	0.545 T	1.95 T	0.712 T	0.374 UK	0.903 T	0.646 T	0.466 T	0.556 T
1,2,3,6,7,8-HxCDD	0.526 UK	20.2	1.12 T	4.87	4.5	3.52	8.63	2.5 T	1.56 T	2.38 T	2.54 T	1.54 T	1.88 T
1,2,3,7,8,9-HxCDD	0.386 UK	10.9	0.86 T	2.97 T	2.51 T	1.98 T	5.49	2.07 T	1.19 T	2.21 T	1.59 T	1.28 T	1.61 T
1,2,3,4,6,7,8-HpCDD	13.5	448	27.5	143	132	87	152	44.7	21.5	35.3	19.5	21.4	31.5
OCDD	110	4560	426	2080	1430	721	1210	348	141	279	115	151	270
2,3,7,8-TCDF	0.28 T	3.31	0.5 UK	1.56	1.37	0.798	4.59	1.31	0.772 T	1.95	1.31	0.967	1.19
1,2,3,7,8-PeCDF	0.0896 UJK	1.43 JT	0.181 UJK	0.682 JT	0.497 JT	0.252 UJK	2.35 JT	0.532 JT	0.336 JT	0.883 UJK	0.74 JT	0.504 JT	0.741 JT
2,3,4,7,8-PeCDF	0.126 T	3.09 T	0.327 T	1.26 T	0.884 T	0.538 T	4.79 T	1.3 T	0.637 T	1.95 T	4.91 T	1.06 T	1.26 T
1,2,3,4,7,8-HxCDF	0.225 UK	6.06	0.57 T	2.35 T	1.67 T	1.33 T	5.2	1.27 T	0.918 T	2.12 T	3.82 T	1.28 T	2.23 T
1,2,3,6,7,8-HxCDF	0.11 T	2.91 T	0.392 T	1.49 T	0.79 T	0.479 T	2.98 UK	1.13 T	0.434 UK	1.95 T	6.49	1.01 T	1 T
1,2,3,7,8,9-HxCDF	0.0642 U	0.0325 U	0.158 U	0.344 U	0.251 U	0.213 U	0.414 U	0.273 U	0.0471 U	0.0747 U	0.431 U	0.111 U	0.179 U
2,3,4,6,7,8-HxCDF	0.183 T	4.72	0.351 T	2.3 T	1.27 T	0.897 T	4.96 T	2.1 T	0.702 T	4.07	19.8	1.75 T	1.31 T
1,2,3,4,6,7,8-HpCDF	1.69 T	62	6.72	25.1	17.1	10.7	23.9	6.57	3.62 T	8.51	11.3	6.08	6.41
1,2,3,4,7,8,9-HpCDF	0.183 T	2.74 T	0.265 T	1.4 T	0.769 T	0.592 UK	1.23 T	0.306 UK	0.337 T	0.697 T	0.891 T	0.335 T	0.421 T
OCDF	5.11 U	269	22.8	111	65.4	30.3	41.3	12.7	10.5	17.1	10.6	9.15 U	13.6
Total TCDD	3.37	29.7	1.81	8.69	2.17	35.5	18.5	6.72	10.2	22	3.41	7.5	4.72
Total PeCDD	0.554 T	16.4	2.37 T	13.7	5.36	10.5	29.9	9.15	5.85	22.5	11	10.1	3.15 T
Total HxCDD	3.13 T	131	8.77	32.2	26	28.8	57.5	20.5	12.8	27.1	22.1	13.4	16
Total HpCDD	23.9	792	57.7	242	238	154	274	84.4	41.3	71.5	38.7	43.4	58
Total TCDF	0.297 T	39.5	2.97	9.44	7.02	6.06	77.3	22	9.06	33.6	72.2	18.4	15
Total PeCDF	1.5 T	94.7	7.94	36.1	18.8	10.8	92.8	52.1	9.05	65.2	417	30.9	16.2
Total HxCDF	1.99 T	86.1	8.65	35.8	20.2	15	59.9	25.6	8.32	52.9	247	22.1	13.7
Total HpCDF	4.54	213	6.98	83.6	51.1	32	58.3	15.6	8.84	21.3	29.6	14	14.9
TEQ-Detects only	2.9	33	1.6	6.0	4.6	33	10	3.7	7.1	5.9	6.5	2.1	3.1
TEQ-1/2 MDL	3.0	33	1.7	6.0	4.6	33	11	3.7	7.2	5.9	6.6	2.4	3.1
PAHs (8270 SIM) in ug/kg													
Acenaphthene	0.04 T	31	0.15 T	0.9	0.22 T	0.24 T	19	2.4	0.27 T	0.28 T	3.4	0.22 T	0.094 T
Acenaphthylene	0.22 T	3.6	0.34 T	10	0.47	0.37 T	28	0.85	0.71	0.83	2	0.92	0.25 T
Anthracene	0.37 T	44	0.49	9.9	0.59	0.74	37	3.3	0.88	0.92	7	0.87	0.3 T
Benzo(a)anthracene	1.6	230	3.7	34	3.5	4.3	260	29	5.3	5.8	20	4.1	1.7
Benzo(a)pyrene	1.9	230	4.4	49	5.5	5.6	300	30	5.7	7.6	22	5.9	1.7
Benzo(b)fluoranthene	3.2	310	10	72	9	10	380	47	11	17	31	13	5.2
Benzo(k)fluoranthene	0.88	75	2.7	23	2.8	2.9	98	14	3.1	4.1	7.7	3.4	1.3
Benzo(ghi)perylene	2.1	130	7.9	41	7.2	7.3	160	25	7.6	12	44	8.8	3.8
Chrysene	2.6	280	6.9	59	6.2	7.8	330	40	9.2	14	30	10	4.5
Dibenzo(a,h)anthracene	0.45	35	1.2	9.6	1.3	1.2	40	6.1	1.3	2	6.5	1.4	0.67
Fluoranthene	3.6	490	10	81	6.9	11	510	63	14	19	32	13	5.2
Fluorene	0.1 T	19	0.23 T	2.3	0.21 T	0.31 T	14	1.6	0.33 T	0.38 T	2.6	0.33 T	0.19 T
Indeno(1,2,3-cd)pyrene	1.9	150	5.8	46	5.9	6.3	230	25	7.6	9.8	20	8.5	3.2
Naphthalene	0.88 U	4.9	2.6	13	1.3 U	1.9	14	3.1	2.9	4.3	6.7	4.7	1.3 U
Phenanthrene	1.5	360	4.5	48	3.9	6.3	350	40	8.6	13	38	10	3.3
Pyrene	3.8	620	10	83	7.7	11	700	66	15	17	50	12	5.3
TEQ-Detects only	2.7	310	6.8	68	7.8	8.1	400	43	8.6	12	31	9.0	3.0
TEQ-1/2 MDL	2.7	310	6.8	68	7.8	8.1	400	43	8.6	12	31	9.0	3.0

Table 6 - Analytical Results for Surface Soil Samples from West Seattle Study Areas

Sample ID	WS-1-A	WS-1-B	WS-1-C	WS-1-D	WS-1-E	WS-2-A	WS-2-B	WS-2-C	WS-2-D	WS-2-E	WS-3-A	WS-3-B	WS-3-C
Sampling Date	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/30/2011	3/31/2011	3/31/2011	3/31/2011
Grain Size in %													
Particle/Grain Size, Gravel, Medium	1.91	0.04	20.8	0.31	5.19	0.63	0.02	0	12.9	13.4	49	2.86	6.02
Particle/Grain Size, Gravel, Fine	1.85	2.08	4.62	2.97	0.98	0.55	5.13	0.02	4.66	5.21	8.72	5.24	6.79
Particle/Grain Size, Sand, Very Coarse	2.23	2.35	5.29	2.84	3.63	1.94	8.53	0.78	4.33	4.11	6.06	5.65	4.43
Particle/Grain Size, Sand, Coarse	5.3	8.25	7.84	4.38	10.8	8.43	16.8	2.54	6.87	5.64	6.29	11.3	5.76
Particle/Grain Size, Sand, Medium	23.3	24.5	16.3	11.4	25	22.4	26.7	3.6	11.8	10.8	7.99	23.3	10
Particle/Grain Size, Sand, Fine	37.1	28.5	17.5	17.6	31	29.1	24.1	6.25	16.7	14.5	8.38	24.7	14.2
Particle/Grain Size, Sand, Very Fine	4.55	4.22	3.01	3.82	4.95	4.42	3.85	3.8	5.42	4.72	1.94	4.05	3.8
Particle/Grain Size, Silt	18.7	23.7	23.2	57.1	15.4	25.9	13.7	71.9	30	31.6	18.2	19	33.9
Particle/Grain Size, Clay	7.5	5.68	4.23	0.66	1.69	5.5	1.34	9.52	6.33	11.5	2.32	2.98	9.49

Table 6 - Analytical Results for Surface Soil Samples from West Seattle Study Areas

Sample ID	WS-3-D	WS-3-E	WS-4-A	WS-4-B	WS-4-C	WS-4-D	WS-4-E
Sampling Date	3/31/2011	3/31/2011	3/31/2011	3/31/2011	3/31/2011	3/31/2011	4/1/2011
Conventionals in %							
Total Solids	99.6	98.6	99.6	98.8	97.4	99.6	99.3
Total Organic Carbon	0.885	2.67	1.26	0.876	0.816	3.12	1.65
Dioxins in ng/kg							
2,3,7,8-TCDD	1.87	3.38	0.436 UK	0.221 UK	2.69	0.381 UK	0.784
1,2,3,7,8-PeCDD	0.177 T	0.998 T	0.663 T	0.586 T	0.116 UK	1.25 T	0.648 T
1,2,3,4,7,8-HxCDD	0.16 T	1.01 T	0.844 T	0.405 T	0.185 T	1.48 T	0.811 T
1,2,3,6,7,8-HxCDD	0.808 T	4.03 T	4.07 T	2.2 T	0.511 UK	4.79	2.94 T
1,2,3,7,8,9-HxCDD	0.476 UK	2.84 T	2.67 T	1.12 T	0.469 T	3.9	2.16 T
1,2,3,4,6,7,8-HpCDD	16.6	74.8	125	40.7	10.9	107	71
OCDD	187	697	1220	320	96.3	911	652
2,3,7,8-TCDF	0.243 T	1.31	1.34	0.683 T	0.277 UK	1.28	0.695 T
1,2,3,7,8-PeCDF	0.108 JT	0.75 JT	0.504 JT	0.305 JT	0.0983 UJK	0.582 JT	0.32 T
2,3,4,7,8-PeCDF	0.214 T	1.51 UK	1.04 T	1.43 T	0.231 T	1.72 T	0.627 T
1,2,3,4,7,8-HxCDF	0.339 T	2.69 T	1.54 T	1.15 T	0.305 T	2.81 T	1.19 UK
1,2,3,6,7,8-HxCDF	0.208 T	1.72 T	0.753 T	1.8 T	0.227 T	1.83 T	0.729 T
1,2,3,7,8,9-HxCDF	0.0713 U	0.158 U	0.114 U	0.147 U	0.0652 U	0.458 U	0.173 U
2,3,4,6,7,8-HxCDF	0.238 T	2.9 T	1.23 T	4.4 T	0.133 UK	4.38	1.52 T
1,2,3,4,6,7,8-HpCDF	2.57 T	13.1	17.7	10.3	2.22 T	21.5	11.9
1,2,3,4,7,8,9-HpCDF	0.134 UK	0.845 T	0.918 T	0.636 T	0.0836 U	1.32 T	0.577 T
OCDF	7.61 U	35.4	78.4	42.4	5.81 U	69.1	33.7 U
Total TCDD	2.18	13.9	7.53	2.82	2.69	4.31	1.41
Total PeCDD	1.53 T	15.8	8.59	6.19	0.645 T	13	7.4
Total HxCDD	5.09	32.1	28.5	14.6	2.86 T	35.2	22.3
Total HpCDD	33.1	145	227	73.1	20.5	185	132
Total TCDF	2.71	25.6	14.2	20.3	1.48	15.7	4.11
Total PeCDF	4.08 T	49.2	18.9	96.1	7.16	72.1	25.6
Total HxCDF	4.64	38.7	26	64.6	4.45 T	59.8	13.5
Total HpCDF	7.17	33.2	71.1	38.7	5.37	61.3	33.2
TEQ-Detects only	2.6	7.2	4.1	2.8	3.0	5.4	3.5
TEQ-1/2 MDL	2.6	7.4	4.3	2.9	3.1	5.6	3.6
PAHs (8270 SIM) in ug/kg							
Acenaphthene	0.12 T	0.42 T	0.11 T	0.2 T	0.034 T	0.61	0.51
Acenaphthylene	0.41 T	4.5	0.49	1	0.17 T	0.89	1
Anthracene	0.42 T	2.5	0.8	1.1	0.12 T	2.4	1.7
Benzo(a)anthracene	2.6	23	5.7	4.2	0.75	16	11
Benzo(a)pyrene	3.9	27	6.9	6.6	1.3	22	14
Benzo(b)fluoranthene	5.4	35	11	7.6	2.7	56	22
Benzo(k)fluoranthene	1.5	10	2.7	2	0.62	14	6.4
Benzo(ghi)perylene	4.3	23	9.6	10	2.1	22	18
Chrysene	4.5	30	11	5.2	1.1	40	17
Dibenzo(a,h)anthracene	0.67	4.4	2	2.2	0.31 T	4.9	2.7
Fluoranthene	5.8	31	9.4	8.1	2.1	28	22
Fluorene	0.19 T	0.58	0.22 T	0.33 T	0.086 T	0.7	0.9
Indeno(1,2,3-cd)pyrene	3.7	22	7	5.9	1.6	24	14
Naphthalene	1.4	3.2	2.5	1.6	1.7	1.3	2
Phenanthrene	3	11	7	5.2	1.5	11	14
Pyrene	7.4	39	11	9.6	2.1	28	25
TEQ-Detects only	5.3	37	9.9	8.8	1.9	34	20
TEQ-1/2 MDL	5.3	37	9.9	8.8	1.9	34	20

Table 6 - Analytical Results for Surface Soil Samples from West Seattle Study Areas

Sample ID	WS-3-D	WS-3-E	WS-4-A	WS-4-B	WS-4-C	WS-4-D	WS-4-E
Sampling Date	3/31/2011	3/31/2011	3/31/2011	3/31/2011	3/31/2011	3/31/2011	4/1/2011
Grain Size in %							
Particle/Grain Size, Gravel, Medium	2.38	12.3	29.1	10.8	14	13.4	5.07 J
Particle/Grain Size, Gravel, Fine	4.13	5.97	12.1	10.8	9 J	6.76	7.86 J
Particle/Grain Size, Sand, Very Coarse	5.2	5.74	8.24	7.15	7.36	6.6	8.25
Particle/Grain Size, Sand, Coarse	11.3	11.5	11.4	11	9.81	10.1	15.9
Particle/Grain Size, Sand, Medium	27.4	18.2	15.8	18	19.3	16.1	26.3
Particle/Grain Size, Sand, Fine	22.5	21	10.5	17	20.9	18	18.7
Particle/Grain Size, Sand, Very Fine	2.08	4.62	1.59	3.17	3.8	4.44	2.54
Particle/Grain Size, Silt	15.8	19.1	9.4	16.2	14.3	23.3	10.9
Particle/Grain Size, Clay	7.45	0.61	2.76	3.52	0.89	2.09	1.59

Table 7 - Analytical Results for Surface Soil Samples from Capitol Hill Study Areas

Sample ID	CH-1-A	CH-1-B	CH-1-C	CH-1-D	CH-1-E	CH-2-A	CH-2-B	CH-2-C	CH-2-D	CH-2-E	CH-3-A	CH-3-B	CH-3-C
Sampling Date	4/4/2011	4/4/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/6/2011	4/6/2011
Conventionals in %													
Total Solids	97.9	97.9	97.6	98.4	98.6	98.2	97.7	98.1	98	97.6	98	98.9	98.6
Total Organic Carbon	3.27	4.89	5.51	3.97	2.87	3.93	3.41	3.84	4.36	3.65	3.75	3.12	3.32
Dioxins in ng/kg													
2,3,7,8-TCDD	16.5	0.411 T	26.5	3.75	0.351 UK	5.66	0.958	1.27	0.691 UK	1.85	1.71	0.462 T	0.528 T
1,2,3,7,8-PeCDD	2.31 T	0.77 T	4 T	1.05 T	0.507 T	2.69 T	2.8 T	1.31 T	1.38 T	2.36 T	7.62	1.43 T	1.83 T
1,2,3,4,7,8-HxCDD	2.54 T	0.939 T	5.31	1.09 T	0.805 T	2.76 T	2.56 T	1.29 T	1.41 T	2.35 T	12.5	1.47 T	1.71 T
1,2,3,6,7,8-HxCDD	10.9	6.69	73.5	3.18 T	3.74	9.13	8.94	6.48	8.29	10	52.6	5.13	5.63
1,2,3,7,8,9-HxCDD	7.69	2.68 T	19.7	2.33 T	2.3 T	7.13	6.23	4.9	5.31	9.29	39.4	4.87	5.05
1,2,3,4,6,7,8-HpCDD	240	178	2070	60	89.4	172	165	155	141	187	1470	93.9	89.1
OCDD	1890	2140	19600 J	534	957	1290	1290	675	1160	1670	12700	690	615
2,3,7,8-TCDF	4.33	2.75	5.55	2.21	0.736	5.52	7.06	3.62	3.18	4.98	7.98	2.61	3.79
1,2,3,7,8-PeCDF	1.76 JT	0.619 T	2.91 JT	0.954 UK	0.25 T	2.3 JT	3.1 JT	1.65 JT	1.7 JT	2.23 JT	5.17 J	1.59 JT	1.98 UK
2,3,4,7,8-PeCDF	3.36 UK	1.42 T	6.22	1.77 T	0.471 T	5.55	5.35	2.91 T	2.65 T	3.41	12.2	3.05 T	4.14 T
1,2,3,4,7,8-HxCDF	5.39 J	2.25 T	117 J	2.81 JT	1.31 T	6	6.29 J	3.15 JT	3.87 JT	4.42 J	16 J	3.62 T	4.23 T
1,2,3,6,7,8-HxCDF	3.73 T	1.35 T	18.6	1.75 T	0.637 UK	5.39 J	4.05	2.21 T	2.42 T	2.51 T	14.3	2.51 UK	3.57 T
1,2,3,7,8,9-HxCDF	0.111 U	0.0999 U	0.421 T	0.126 U	0.111 U	0.193 U	0.113 UK	0.45 U	1.04 U	0.922 U	3.74 U	0.711 U	0.159 U
2,3,4,6,7,8-HxCDF	6.86	1.38 T	36	3.16 T	1.13 T	10.7 J	6.74 J	3.67 T	4.63 T	4.23	30.5 J	5.46	7.34
1,2,3,4,6,7,8-HpCDF	41	25.3	829	13	13	28.3	26.9	16.6	76.8	21.6	304	17.6	19.2
1,2,3,4,7,8,9-HpCDF	2.12 T	1.37 T	71.9	0.798 T	0.634 T	1.9 T	1.85 T	0.905 T	1.59 T	1.62 T	13.1	1.1 T	1.07 UK
OCDF	141	100	1770	27.2	41.9	73	76.2	36.5	87	80.7	1840	49.1	42.5
Total TCDD	35.2	4.6	44.7	11.7	2.94	32	31.3	12.7	10.8	18.1	34.5	14.3	23
Total PeCDD	38.9	7.83	61.5	21.9	3.9	52.4	62	23.4	21.5	24.3	77.7	24.6	33.8
Total HxCDD	76.2	43.6	265	33.5	23.9	90.2	86.6	53.6	69	84.9	324	52.4	55.7
Total HpCDD	419	371	3450	117	173	333	330	256	282	346	2600	179	168
Total TCDF	56.2	13.2	58.3	15.8	3.75	187	74.8	57.7	55.7	69.7	365	59.9	107
Total PeCDF	106	39.4	213	65.3	13.5	353	155	66.2	69.5	85.2	647	99.1	152
Total HxCDF	93.2	42.9	505	41.6	19.5	136	88.4	43.9	101	41.8	552	67	90.5
Total HpCDF	117	81.8	3420	33.4	40.1	71.9	75.9	37	181	67.1	1240	47.7	47.6
TEQ-Detects only	26	6.1	96	7.9	3.0	17	12	8.0	7.7	12	53	6.5	8.0
TEQ-1/2 MDL	27	6.2	96	7.9	3.2	17	12	8.0	8.1	12	53	6.7	8.1
PAHs (8270 SIM) in ug/kg													
Acenaphthene	2.1	5.1	7.3	1.2	1.8	2.1	120	4.2	5.4	18	4.6	1.9	2.4
Acenaphthylene	6	6	21	7.7	2.8	15	9.1	16	58	5.6	18	13	13
Anthracene	8.5	14	31	6.9	5.5	13	400	15	41	24	19	17	14
Benzo(a)anthracene	45	58	240	43	27	88	1200	99	290	130	110	100	92
Benzo(a)pyrene	57	73	270	63	34	120	930	140	430	130	150	130	120
Benzo(b)fluoranthene	110	120	410	98	50	200	1300	230	600	200	320	200	200
Benzo(k)fluoranthene	32	34	88	28	14	54	360	57	170	59	74	57	49
Benzo(ghi)perylene	64	79	200	57	32	110	540	120	420	110	210	100	120
Chrysene	93	92	360	84	39	160	1200	200	480	180	240	160	160
Dibenzo(a,h)anthracene	12	17	48	10	6.7	19	160	22	57	23	38	20	23
Fluoranthene	130	140	540	130	60	270	2100	360	860	330	330	280	270
Fluorene	2.6	6.8	13	3.1	2.2	6.4	130	8.2	16	12	6.8	6.5	5.9
Indeno(1,2,3-cd)pyrene	64	73	230	60	32	120	620	130	420	120	190	110	130
Naphthalene	9	11	14	8.9	3.3	16	9.2	13	33	6.4	35	14	17
Phenanthrene	68	81	270	74	31	150	1700	220	430	230	180	150	150
Pyrene	120	130	530	130	61	280	2200	370	920	350	320	280	260
TEQ-Detects only	84	100	380	88	47	170	1300	200	590	190	230	180	170
TEQ-1/2 MDL	84	100	380	88	47	170	1300	200	590	190	230	180	170

Table 7 - Analytical Results for Surface Soil Samples from Capitol Hill Study Areas

Sample ID	CH-1-A	CH-1-B	CH-1-C	CH-1-D	CH-1-E	CH-2-A	CH-2-B	CH-2-C	CH-2-D	CH-2-E	CH-3-A	CH-3-B	CH-3-C
Sampling Date	4/4/2011	4/4/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/5/2011	4/6/2011	4/6/2011
Grain Size in %													
Particle/Grain Size, Gravel, Medium	0.66	18.2	0 J	0.11	20.5	3.48	0.15	2.47	1.3	0.15	0.37	5.69	0.17
Particle/Grain Size, Gravel, Fine	1.94	12.1	0.56 J	0.91	8.6	1.12	1.8	2.41	2.21	1.09	0.63	0.17	2.2
Particle/Grain Size, Sand, Very Coarse	10.8	12.2	1.68	5.26	8.84	2.81	3.56	5.16	2.79	2.73	3.57	1.84	5.89
Particle/Grain Size, Sand, Coarse	13.3	11.3	15.5	11.7	9.18	8.76	11.6	11.9	19.6	9.94	15.9	9.9	13.2
Particle/Grain Size, Sand, Medium	15.2	11.2	17.1	19.2	11.3	22.8	17.6	19.3	31.3	13	22.5	26.4	21.3
Particle/Grain Size, Sand, Fine	19	13.1	22.9	20.4	14.8	27.8	16.7	21.8	19.4	14.4	27.3	30	23.9
Particle/Grain Size, Sand, Very Fine	5.92	1.05	6.71	5.73	3.85	6.06	5.53	4.93	3.16	3.63	6.61	4.63	4.99
Particle/Grain Size, Silt	30.4	18.4	31.1	31.9	20.4	19.6	34.4	31.9	15.5	36.6	25.8	18.6	22.7
Particle/Grain Size, Clay	4.98	0.78	2.58	3.94	6.25	4.48	10.1	0.73	1.65	10.9	2.08	2.74	2.77

Table 7 - Analytical Results for Surface Soil Samples from Capitol Hill Study Areas

Sample ID	CH-3-D	CH-3-E	CH-4-A	CH-4-B	CH-4-C	CH-4-D	CH-4-E
Sampling Date	4/6/2011	4/6/2011	4/6/2011	4/6/2011	4/6/2011	4/6/2011	4/6/2011
Conventionals in %							
Total Solids	98.4	98.2	98.2	98.8	99	97.8	98.5
Total Organic Carbon	3.29	3.71	4.02	2.15	1.62	3.88	2.87
Dioxins in ng/kg							
2,3,7,8-TCDD	0.748	0.649 T	0.456 UK	0.771 T	0.638 UK	0.784 T	0.339 UK
1,2,3,7,8-PeCDD	2.19 T	1.77 T	1.76 T	0.667 T	11.3	1.32 T	1.06 T
1,2,3,4,7,8-HxCDD	2.83 T	1.67 T	1.81 UK	0.755 T	21.7	1.51 T	1.14 T
1,2,3,6,7,8-HxCDD	15	5.93	6.84	2.76 UK	64.3	4.78	3.42 T
1,2,3,7,8,9-HxCDD	8.11	5.32	5.59	2.69 T	62.8	4.16	3.36 T
1,2,3,4,6,7,8-HpCDD	266	117	111	57.2	1310	83.1	56.1
OCDD	1730	940	769	436	7860	831	403
2,3,7,8-TCDF	3.95	4.82	3.18	1.31	2.57	2.42	2.15
1,2,3,7,8-PeCDF	3.51 T	2.46 JT	2.04 JT	0.703 UK	5.58 J	1.47 JT	1.24 T
2,3,4,7,8-PeCDF	5.12	3.98	3.09 T	1.27 T	7.84	2.42 UK	2.73 T
1,2,3,4,7,8-HxCDF	6.91	4.74	3.99	1.88 T	33.9	3.41 T	3.36 T
1,2,3,6,7,8-HxCDF	5.12	2.91 T	2.72 T	0.971 UK	18.8	2.6 T	2.86 T
1,2,3,7,8,9-HxCDF	0.199 U	1.2 U	0.643 U	0.366 U	0.642 T	0.395 U	0.128 U
2,3,4,6,7,8-HxCDF	8.71	3.59 T	3.47 T	1.36 T	25.2	2.86 T	5.15
1,2,3,4,6,7,8-HpCDF	40.8	18.8	17.9	8.21	265	14.1	15.5
1,2,3,4,7,8,9-HpCDF	1.87 T	1.35 T	1.12 T	0.497 T	13.3	0.919 T	1.01 T
OCDF	64.2	60.1	41.9	17.1	445	27.7	50
Total TCDD	14	22.2	13.1	4.56	8.15	10.6	7.93
Total PeCDD	26.2	33.6	25.5	10.3	44.7	12.4	15.1
Total HxCDD	86.4	61.9	55.2	24.7	359	42.5	33.6
Total HpCDD	479	220	207	108	2160	159	105
Total TCDF	107	81.5	62.9	17	61.8	71.3	73.1
Total PeCDF	156	89.9	93.5	25.8	270	101	122
Total HxCDF	163	62.5	47.5	15.6	413	57.2	66.2
Total HpCDF	117	56.5	45.6	19.4	726	35.5	39.7
TEQ-Detects only	13	8.3	6.9	3.4	55	5.6	4.9
TEQ-1/2 MDL	13	8.3	7.2	3.6	56	5.9	5.1
PAHs (8270 SIM) in ug/kg							
Acenaphthene	3300	1.9	0.87	1.7	1.1	0.71	0.69
Acenaphthylene	35	16	6.5	14	2.6	2.2	2.3
Anthracene	4100	12	4.7	9.5	4.5	2.9	2.4
Benzo(a)anthracene	6000	88	37	76	29	21	16
Benzo(a)pyrene	6700	130	53	100	30	24	24
Benzo(b)fluoranthene	7300	200	88	160	55	53	43
Benzo(k)fluoranthene	2000	53	24	45	15	13	11
Benzo(ghi)perylene	5200	120	62	85	36	35	25
Chrysene	7000	160	68	120	47	41	37
Dibenzo(a,h)anthracene	710	21	9.6	17	7.2	7.1	5
Fluoranthene	18000	250	110	200	65	54	54
Fluorene	2900	4.7	2	5	1.7	1.2	2.1
Indeno(1,2,3-cd)pyrene	4800	130	59	92	35	32	25
Naphthalene	4100	13	6.8	7.6	7.1	5.1	4.2
Phenanthrene	25000	130	57	110	37	29	48
Pyrene	20000	270	120	220	70	51	57
TEQ-Detects only	8900	180	75	140	45	37	34
TEQ-1/2 MDL	8900	180	75	140	45	37	34

Table 7 - Analytical Results for Surface Soil Samples from Capitol Hill Study Areas

Sample ID	CH-3-D	CH-3-E	CH-4-A	CH-4-B	CH-4-C	CH-4-D	CH-4-E
Sampling Date	4/6/2011	4/6/2011	4/6/2011	4/6/2011	4/6/2011	4/6/2011	4/6/2011
Grain Size in %							
Particle/Grain Size, Gravel, Medium	0.79	0.41	0.31	10.2	4.32	0.05	0.61
Particle/Grain Size, Gravel, Fine	1.02	1.24	1.46	5.68	6.13	0.75	0.37
Particle/Grain Size, Sand, Very Coarse	3.92	3.63	7.77	7.58	5.67	1.53	0.86
Particle/Grain Size, Sand, Coarse	12.6	11.1	17.3	12.1	8.8	7.53	6.39
Particle/Grain Size, Sand, Medium	21.5	21.1	22.3	18.8	19.4	12.5	14.1
Particle/Grain Size, Sand, Fine	22.7	29	20	21.7	20.8	16.7	20.4
Particle/Grain Size, Sand, Very Fine	4.31	5.63	3.78	3.79	3.45	5.5	4.33
Particle/Grain Size, Silt	28.1	23.9	23.9	20.1	23.6	63.7	41.7
Particle/Grain Size, Clay	4.69	1.12	1.74	1.73	6.21	0.86	10.8

Table 8 - Analytical Results for Surface Soil Samples from Ravenna Study Areas

Sample ID	RA-1-A	RA-1-B	RA-1-C	RA-1-D	RA-1-E	RA-2-A	RA-2-B	RA-2-C	RA-2-D	RA-2-E	RA-3-A	RA-3-B	RA-3-C
Sampling Date	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/4/2011	4/4/2011	4/4/2011
Conventionals in %													
Total Solids	98.7	98.7	98.9	98.8	99	99.4	98	99.3	99.1	99	98	98.5	98.3
Total Organic Carbon	3.07	2.77	2.35	2.42	2.5	3.22	4.87	2.56	2.89	2.37	3.72	3.53	3.38
Dioxins in ng/kg													
2,3,7,8-TCDD	2.6	1.43	2.35	0.474 T	0.827 T	0.755	0.413 UK	0.861	11.8	1.83	2.71	0.395 UK	2.75
1,2,3,7,8-PeCDD	0.823 T	1.29 T	1.66 T	3.46 T	1.02 T	2.13 T	1.25 T	1.23 T	2.09 T	11.6	1.54 UK	2.01 T	1.22 T
1,2,3,4,7,8-HxCDD	0.835 T	1.25 T	2.05 T	8.8	0.843 T	2.06 T	1.46 T	1.05 UK	2.77 T	17.8	2.04 T	3.06 T	1.22 T
1,2,3,6,7,8-HxCDD	3.02 T	5.01	8.6	26.6	3.23 T	8.66	5.78	4.17	22.4	58.9	7.47	10.1	5.67
1,2,3,7,8,9-HxCDD	2.55 T	4.29	6.99	21.1	2.21 T	7.46	4.39	4.5	9.66	43.4	6.56	7.02	3.29 T
1,2,3,4,6,7,8-HpCDD	46.2	79.5	190	901	47.4	124	134	70.8	457	1080	131	293	103
OCDD	435	602	1640	7770	359	867	1510	601	3560	6700	953	2360	910
2,3,7,8-TCDF	1.54	2.19	1.97	1.63	1.85	1.83	1.84	2.12	2.65	3.57	2.69	2.2	2.43
1,2,3,7,8-PeCDF	0.847 JT	1.29 JT	1.18 JT	0.885 JT	1.02 JT	0.929 JT	0.97 JT	1.11 JT	1.64 T	1.98 T	1.17 JT	1.05 JT	0.908 JT
2,3,4,7,8-PeCDF	1.65 T	2.91 JT	2.36 T	1.96 T	2.36 T	2.73 T	2 T	2.57 T	5.8	4.94	3.08 T	2.62 T	2.11 T
1,2,3,4,7,8-HxCDF	2.21 JT	3.45 JT	4.05	7.38 J	3.11 T	3.9 J	3.26 JT	3.46 JT	9.53	18.5	4.87 T	4.1 T	3.04 T
1,2,3,6,7,8-HxCDF	1.65 T	2.95 T	2.88 T	4.35	2.35 T	3.61	2.22 T	2.1 T	8.94	13.7	4.2 T	3.14 T	1.95 T
1,2,3,7,8,9-HxCDF	0.0758 U	0.103 U	0.0818 U	0.129 U	0.0803 U	0.0648 T	0.103 U	0.0641 U	0.147 U	0.252 U	0.119 U	0.142 U	0.091 U
2,3,4,6,7,8-HxCDF	2.7 T	4.83	4.24	6.92	3.93 T	7.55	2.62 T	3.69	19.7	21.8	8.24	3.63 T	3.41 T
1,2,3,4,6,7,8-HpCDF	12.4	22.5	29.8	162	20.6	27.1	35	17.4	63.5	352	32.8	48.9	19.7
1,2,3,4,7,8,9-HpCDF	0.828 T	1.11 T	2.28 T	9.66	0.945 T	1.6 T	1.62 T	1 T	2.49 T	13.7	1.43 T	2.79 T	1.04 T
OCDF	40.5	42.9	86.5	768	39.7	73.9	96.3	47.4	152	1310	85.7	241	54.7
Total TCDD	11.1	13.3	24.2	7.37	11.7	14.6	9.86	12.9	18.8	15	13.8	12.9	13.7
Total PeCDD	14.5	16.7	30.1	22.6	14.5	17.4	13.5	18.5	15	61.8	23.1	25.6	19.5
Total HxCDD	30.8	43.4	72.5	153	30.6	68.7	46.6	43	105	326	63.2	76.7	43.8
Total HpCDD	91.9	148	322	1420	91.5	228	264	139	796	1860	247	556	193
Total TCDF	24.2	52.8	39.8	27.9	53.3	44.2	35.6	36	75.7	88.1	70.4	66	19
Total PeCDF	41.7	92.7	63.2	43.2	75.5	116	58	51.7	359	236	160	112	62.2
Total HxCDF	33.2	50.8	46.5	89.3	49.6	66.7	41.8	34.9	187	276	77.1	53.9	45.1
Total HpCDF	31.6	49.6	78.7	481	44.1	70.1	98.2	47.2	180	995	83	153	53.7
TEQ-Detects only	6.1	7.3	11	26	5.1	9.1	6.2	6.0	30	50	9.2	10	8.3
TEQ-1/2 MDL	6.1	7.3	11	26	5.2	9.1	6.4	6.0	30	50	10	11	8.3
PAHs (8270 SIM) in ug/kg													
Acenaphthene	18	2.7	1.6	11	39	0.68	0.85	0.81	0.46	1.7	36	50	17
Acenaphthylene	2.3	3.2	2.2	1.7	7.2	1.7	1.3	4.7	2.2	2.2	9.1	14	33
Anthracene	27	6.2	3.9	14	62	2.9	2.6	3.2	1.9	5.1	70	83	45
Benzo(a)anthracene	140	50	31	93	250	14	18	21	13	34	380	500	260
Benzo(a)pyrene	150	65	41	100	280	21	24	29	18	44	390	480	300
Benzo(b)fluoranthene	210	95	68	150	360	35	47	41	29	94	570	750	400
Benzo(k)fluoranthene	55	24	19	38	100	8.7	14	12	8.9	28	170	170	130
Benzo(ghi)perylene	130	61	42	71	170	32	36	33	24	50	290	330	200
Chrysene	170	77	49	120	330	29	35	30	22	76	470	610	360
Dibenzo(a,h)anthracene	27	12	7.7	17	41	7.1	5	4.8	4	10	62	82	43
Fluoranthene	330	120	75	230	570	36	47	36	28	78	860	1200	710
Fluorene	11	2.4	1.4	6.6	25	1.3	1.2	1.4	0.91	1.7	26	43	21
Indeno(1,2,3-cd)pyrene	120	60	42	81	230	26	31	28	22	54	340	410	260
Naphthalene	6.1	5.8	5.2	3.4	11	3.8	3.6	3.5	8.4	7.7	13	15	25
Phenanthrene	180	61	35	120	380	21	20	19	16	33	450	660	420
Pyrene	330	120	72	230	560	35	40	39	29	78	780	960	670
TEQ-Detects only	210	90	58	140	380	30	36	40	26	67	550	680	410
TEQ-1/2 MDL	210	90	58	140	380	30	36	40	26	67	550	680	410

Table 8 - Analytical Results for Surface Soil Samples from Ravenna Study Areas

Sample ID	RA-1-A	RA-1-B	RA-1-C	RA-1-D	RA-1-E	RA-2-A	RA-2-B	RA-2-C	RA-2-D	RA-2-E	RA-3-A	RA-3-B	RA-3-C
Sampling Date	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/1/2011	4/4/2011	4/4/2011	4/4/2011
Grain Size in %													
Particle/Grain Size, Gravel, Medium	1.73	0	0.85	1.55	2.84	4.22	0.32	1.87	7.43	0.73	4.77	3.1	8.61
Particle/Grain Size, Gravel, Fine	1.86	0.59	0.84	1.64	2.84	3.95	2.96	1.07	6.57	2	2.25	2.72	7.48
Particle/Grain Size, Sand, Very Coarse	3.42	5.96	3.93	4.24	6.61	9.62	5.61	3.74	8.46	3.36	5.71	5.78	7.95
Particle/Grain Size, Sand, Coarse	9.69	11.4	15	14.8	15.8	20.6	11.4	14.4	11.7	6	25.3	14	14.5
Particle/Grain Size, Sand, Medium	13.5	15.1	16.3	26.2	19.8	22.2	18.4	30.4	16.9	11.9	27.4	23.5	23.9
Particle/Grain Size, Sand, Fine	18.3	16.9	17.9	27.8	22.2	17.1	20.9	28.1	19.6	45.6	17.2	22.6	18.5
Particle/Grain Size, Sand, Very Fine	6.62	5.46	6.18	4.64	5.03	3.21	4.42	4.14	4.8	7.61	3.34	5.32	2.8
Particle/Grain Size, Silt	35.6	36.5	32.4	17.7	22.1	16.2	31	12.7	22.3	21.4	12.8	20.3	15.5
Particle/Grain Size, Clay	2.89	0.83	3.29	1.79	1.83	1.55	7.78	0.97	1.72	2.3	0.71	1.15	0.72

Table 8 - Analytical Results for Surface Soil Samples from Ravenna Study Areas

Sample ID	RA-3-D	RA-3-E	RA-4-A	RA-4-B	RA-4-C	RA-4-D	RA-4-E
Sampling Date	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/5/2011
Conventionals in %							
Total Solids	98.4	98.1	97.8	98.7	98.5	98	98.6
Total Organic Carbon	2.54	3.31	3.22	2.72	3.17	3.27	3.58
Dioxins in ng/kg							
2,3,7,8-TCDD	0.483 UK	17.2	0.712 T	11.2	4.07	3.63 UK	0.455 T
1,2,3,7,8-PeCDD	1.11 UK	2.65 T	1.87 T	1.33 T	0.862 T	2.51 T	1.75 T
1,2,3,4,7,8-HxCDD	1.22 T	2.93 T	2.38 T	1.32 T	0.781 T	4.33	2.25 T
1,2,3,6,7,8-HxCDD	5.06	16.1	9.95	4.51 T	2.94 T	16.9	23
1,2,3,7,8,9-HxCDD	3.45 T	12.3	7.02	4.18 T	2.69 T	11.4	12.9
1,2,3,4,6,7,8-HpCDD	77.2	392	197	75.6	59.7	445	795
OCDD	560	3610	1490	520	489	3550	3170
2,3,7,8-TCDF	2.34	4.31	2.38	1.8	1.51	2.96	3.55
1,2,3,7,8-PeCDF	1.19 JT	2.03 T	1.1 JT	0.156 U	0.692 JT	0.159 U	2.08 T
2,3,4,7,8-PeCDF	2.86 T	4.47	3.79 T	2.34 T	1.63 T	3.59 T	4.06
1,2,3,4,7,8-HxCDF	3.48 T	9.39 J	4.93	2.93 T	2.45 T	7.35	3.78 T
1,2,3,6,7,8-HxCDF	3.27 T	4.36	4.87	2.85 T	1.73 T	3.97 T	3.8 T
1,2,3,7,8,9-HxCDF	0.0894 U	0.261 T	0.211 U	0.176 U	0.0845 U	0.136 U	0.135 U
2,3,4,6,7,8-HxCDF	6.81 J	5.45	9.25	5.96	3.06 T	7.88	7.07
1,2,3,4,6,7,8-HpCDF	17.8	91.2	51.4	28.5	14.6	135	19
1,2,3,4,7,8,9-HpCDF	0.828 T	4.32	1.96 T	0.979 UK	0.519 UK	3.09 T	1.42 T
OCDF	33.8 U	308	120	49.1 U	34.2 U	256	46.6
Total TCDD	11.5	39.9	12.2	17.2	11	12.1	12
Total PeCDD	15.5	42.3	24.7	19.3	10.3	28.1	23.8
Total HxCDD	43.5	115	66.1	41.1	26.7	106	157
Total HpCDD	152	746	350	152	113	750	1270
Total TCDF	43.7	72.8	85.3	37.6	30.1	60	121
Total PeCDF	119	141	221	110	61	141	169
Total HxCDF	83	144	93.7	75.1	38.9	83.9	88.3
Total HpCDF	40.9	314	132	60.8	32.1	308	51.7
TEQ-Detects only	4.6	33	11	17	7.8	16	18
TEQ-1/2 MDL	5.4	33	11	17	7.9	18	18
PAHs (8270 SIM) in ug/kg							
Acenaphthene	1.8	110	1.1	0.66	1	1.2	2.8
Acenaphthylene	6.6	150	3.1	1.4	1.9	2.9	12
Anthracene	10	250	4	2.5	4.2	4.1	22
Benzo(a)anthracene	62	1300	25	24	36	32	100
Benzo(a)pyrene	82	1400	37	38	48	46	130
Benzo(b)fluoranthene	140	1900	62	49	77	80	190
Benzo(k)fluoranthene	40	760	22	12	21	18	47
Benzo(ghi)perylene	84	880	42	35	45	54	120
Chrysene	100	1500	48	39	51	57	140
Dibenzo(a,h)anthracene	15	240	6.4	16	7.7	10	23
Fluoranthene	170	2100	70	37	91	72	280
Fluorene	3.5	74	2.3	0.81	1.3	1.3	9.2
Indeno(1,2,3-cd)pyrene	91	1100	41	28	47	49	120
Naphthalene	11	20	5.5	3.6	4.6	9.1	10
Phenanthrene	81	1000	42	17	32	36	150
Pyrene	160	1900	63	37	78	68	290
TEQ-Detects only	120	1900	53	51	67	65	180
TEQ-1/2 MDL	120	1900	53	51	67	65	180

Table 8 - Analytical Results for Surface Soil Samples from Ravenna Study Areas

Sample ID	RA-3-D	RA-3-E	RA-4-A	RA-4-B	RA-4-C	RA-4-D	RA-4-E
Sampling Date	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/4/2011	4/5/2011
Grain Size in %							
Particle/Grain Size, Gravel, Medium	0.1	12.8	15.2	3.34	2.69	2.18	0.79
Particle/Grain Size, Gravel, Fine	0.65	4.36	1.66	1.45	1.65	3.54	1.4
Particle/Grain Size, Sand, Very Coarse	1.93	6.11	6.19	3.81	4.26	6.82	3.65
Particle/Grain Size, Sand, Coarse	15.8	13.7	13.7	15.3	13.8	20.8	10.9
Particle/Grain Size, Sand, Medium	33	18.7	23.7	26.4	26.1	27.6	27.6
Particle/Grain Size, Sand, Fine	26.2	21.9	23.2	27.2	26.7	23.5	32.9
Particle/Grain Size, Sand, Very Fine	2.62	5.35	4.06	5.75	4.82	3.86	4.83
Particle/Grain Size, Silt	13.6	16.7	12.7	18.1	17.8	12.5	16.9
Particle/Grain Size, Clay	2.1	1.42	0.83	1.24	2.14	1.06	0.77

Table 9 - Summary of Carcinogenic PAH Toxicity Equivalent Concentrations

	Non-detected Results = 0					Non-detected Results = 1/2 Detection Limit				
Neighborhood	**Minimum**	**Maximum**	**Average**	**Median**	**90th Percentile**	**Minimum**	**Maximum**	**Average**	**Median**	**90th Percentile**
Ballard	35	1200	340	230	800	35	1200	340	230	800
Capitol Hill	34	8900	680	170	730	34	8900	680	170	730
Georgetown	46	970	240	150	440	46	970	240	150	440
Ravenna	26	1900	260	67	570	26	1900	260	67	570
South Park	7.4	390	100	81	180	7.4	390	100	81	180
West Seattle	1.9	400	54	9.9	120	1.9	400	54	9.9	120
All Areas	1.9	8900	260	84	390	1.9	8900	260	84	390

Notes:
Units in ug/kg benzo(a)pyrene toxicity equivalents.
Non-parametric 90th percentile.

Table 10 - Summary of Dioxin Total Toxicity Equivalent Concentrations

	Non-detected Results = 0					Non-detected Results = 1/2 Detection Limit				
Neighborhood	**Minimum**	**Maximum**	**Average**	**Median**	**90th Percentile**	**Minimum**	**Maximum**	**Average**	**Median**	**90th Percentile**
Ballard	1.3	62	26	22	47	1.9	62	26	22	47
Capitol Hill	3.0	96	18	8.0	53	3.2	96	18	8.1	53
Georgetown	5.2	110	35	23	65	5.3	110	36	23	66
Ravenna	4.6	50	15	9.8	30	5.2	50	15	10	30
South Park	3.1	23	12	12	19	3.5	23	12	12	19
West Seattle	1.6	33	7.4	4.3	13	1.7	33	7.5	4.5	13
All Areas	1.3	110	19	11	46	1.7	110	19	12	46

Notes:
Units in ng/kg 2,3,7,8-TCDD toxicity equivalents.
Non-parametric 90th percentile.

Appendices

Appendix A. Field Documentation

Table A-1 - Surface Soil Sample Descriptions - South Park

Sample Number	Sample Date	Median Strip Dimensions in Feet	Visual Soil Description	Comments
South Park (SP)				
SP-1-A	4/5/2011	41 x 7	(Soft), moist, dark brown, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site.
SP-1-B	4/5/2011	34 x 12	(Soft), moist, dark brown to black, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 3 inches, worms present. No curb present, lawn slopes down to street, no evidence of standing water or vehicles parking on the median strip.
SP-2-A	4/5/2011	38 x 11	(Soft), moist, dark brown, very slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 to 6 inches, worms present, power line over site, and tall grass present in median strip.
SP-2-B	4/5/2011	52 x 10	(Soft), moist, dark brown, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 3 to 4 inches, worms present.
SP-3-A	4/5/2011	38 x 10.5	(Soft), moist, dark brown, slightly sandy gravelly SILT (ML) to slightly sandy silty GRAVEL (GM), with gravels 0.5 to 4 inches.	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site. Small piece of plastic found just below grass sod in one sub-location, new sub-location collected for composite soil sample.
SP-3-B	4/5/2011	50 x 10	(Soft), moist, dark brown, slightly sandy slightly gravelly SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site.
SP-4-A	4/5/2011	35 x 6.5	(Soft), moist to wet, medium brown, slightly gravelly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site.
SP-4-B	4/5/2011	38 x 6.5	(Soft), moist, medium brown, slightly gravelly sandy SILT (ML) to slightly gravelly silty SAND (SM)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site. Small piece of plastic found just below grass sod in one sub-location, new sub-location collected for composite soil sample.
SP-5-A	4/5/2011	77 x 7.5	(Soft), moist, medium brown, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 to 6 inches, worms present.
SP-5-B	4/5/2011	49 x 7	(Soft), moist, medium brown, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present.
SP-6-A	4/5/2011	49 x 10.5	(Soft), moist, medium brown, slightly gravelly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present. Site located on the corner of two streets.
SP-6-B	4/6/2011	49 x 10	(Soft), moist, dark brown, sandy gravelly SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site.
SP-7-A	4/6/2011	76 x 10	(Soft), moist, medium brown, slightly gravelly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site. No curb present, lawn slopes down to street, no evidence of standing water or vehicles parking on the median strip. Site located on the corner of two streets.

Table A-1 - Surface Soil Sample Descriptions - South Park

Sample Number	Sample Date	Median Strip Dimensions in Feet	Visual Soil Description	Comments
South Park (SP)				
SP-7-B	4/6/2011	36 x 15	(Loose), moist, red-brown, gravelly silty fine SAND (SM)	Approximately 2 inches of grass sod, root zone approximately 4 to 6 inches, worms present. No curb present, lawn slopes down to street, no evidence of standing water or vehicles parking on the median strip. Site located one block from an elevated freeway.
SP-8-A	4/6/2011	52 x 10	(Soft), moist to wet, brown, gravelly sandy SILT (ML), gravels 0.25 to 3 inches	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present. Tall grass and weeds present at site, one small tire track near curb, sub-sample locations collected 8 feet from the curb.
SP-8-B	4/6/2011	51 x 11	(Soft), moist, brown, gravelly sandy SILT (ML) to gravelly silty SAND (SM), gravels 0.25 to 1 inch	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present. Tall trees overhanging both the yard and median strip.
SP-9-A	4/6/2011	39 x 10.5	(Soft), moist, brown, slightly gravelly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site.
SP-9-B	4/6/2011	61 x 10.5	(Soft), moist, brown, slightly gravelly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site. Site located on the corner of two streets. Small piece of wood found just below grass sod in two sub-locations, new sub-locations collected for composite soil sample.
SP-10-A	4/6/2011	21 x 11	(Soft), dry to moist, light brown, gravelly sandy SILT (ML), gravels 0.25 to 4 inches	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site. Site located on busy street on a hill. No curb present and no evidence of standing water or vehicles parking on the median strip, large rocks were placed to keep traffic off the median strip.
SP-10-B	4/6/2011	22 (no sidewalk)	(Soft), moist, brown, slightly gravelly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site. No curb or sidewalk present at site, sampled right-of-way.

20 Total SP Samples

ROW = right-of-way

NA - Not Available

Table A-2 - Surface Soil Sample Descriptions - Georgetown

Sample Number	Sample Date	Median Strip Dimensions in Feet	Visual Soil Description	Comments
Georgetown (GT)				
GT-1-A	4/1/2011	38 x 20.5	(Soft), moist, dark brown to black, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site.
GT-1-B	4/1/2011	70 x 10.5	(Soft), moist, dark brown, slightly silty fine SAND (SM), trace gravel	Approximately 2 inches of grass sod, root zone approximately 4 inches, no worms present. Site located on the corner of two streets.
GT-1-C	4/1/2011	76 x 21.5	(Soft), moist, dark brown to black, very slightly gravelly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site. Site located on the corner of two streets.
GT-1-D	4/1/2011	48.5 x 9	(Soft), moist, dark brown to black, very slightly gravelly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site.
GT-1-E	4/1/2011	52 x 6	(Loose), moist, light brown, gravelly silty SAND (SM), gravels 0.25 to 1 inch	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site.
GT-2-A	4/1/2011	41 x 5.5	(Soft), moist, dark brown to black, very slightly gravelly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site.
GT-2-B	4/4/2011	60 x 5.5	(Soft), dry to moist, dark brown, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site.
GT-2-C	4/4/2011	41 x 5.5	(Soft), dry to moist, dark brown, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present. Tall trees overhanging both the yard and median strip.
GT-2-D	4/4/2011	76 x 5.8	(Soft), dry to moist, dark brown, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site. Sub-sample locations avoided an area of pressed discolored grass where a replacement telephone poll laid on the grass median strip for a short period of time.
GT-2-E	4/4/2011	42 x 5.75	(Loose), dry to moist, medium brown, slightly silty gravelly SAND (SP)	Approximately 1 inch of grass sod, root zone approximately 2 to 3 inches, no worms present. Small pieces of concrete and one piece of plastic found in a few sub-locations, new sub-locations collected for composite soil sample.
GT-3-A	4/4/2011	33 x 6	(Soft), moist, dark brown to black, slightly sandy SILT (ML), trace gravel	Approximately 2 inches of grass sod, root zone approximately 3 to 4 inches, no worms present, power line over site. Small piece of charcoal in a sub-location, new sub-location collected for composite soil sample. Tall trees overhanging both the yard and median strip.
GT-3-B	4/4/2011	33 x 6	(Soft), moist, dark brown, slightly sandy SILT (ML), trace gravel	Approximately 2 inches of grass sod, root zone approximately 3 inches, worms present, power line over site.
GT-3-C	4/4/2011	81 x 5.5	(Soft), moist, medium brown, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 to 6 inches, no worms present.
GT-3-D	4/4/2011	40 x 6	(Loose), moist, dark brown to black, silty fine SAND (SM)	Approximately 2 inches of grass sod, root zone approximately 4 to 6 inches, worms present, power line over site.
GT-3-E	4/4/2011	72 x 6	(Soft), moist, medium brown, gravelly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 3 to 4 inches, worms present, power line over site.

Table A-2 - Surface Soil Sample Descriptions - Georgetown

Sample Number	Sample Date	Median Strip Dimensions in Feet	Visual Soil Description	Comments
GT-4-A	4/4/2011	37 x 6	(Soft), dry to moist, brown, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site. Site along a busy street.
GT-4-B	4/4/2011	43 x 5.5	(Soft), moist, dark brown, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site. Site along a busy street.
GT-4-C	4/4/2011	40 x 5.5	(Soft), dry to moist, dark brown, very slightly gravelly slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present.
GT-4-D	4/4/2011	27 x 5.5	(Soft), moist, medium brown, very slightly gravelly silty SAND (SM)	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present, power line over site. Narrow yard, close grouping of sub-locations. Small piece of plastic in a sub-location, new sub-location collected for composite soil sample.
GT-4-E	4/4/2011	37.5 x 6	(Soft), moist, dark brown, slightly sandy SILT (ML)	Approximately 2 inches of grass sod, root zone approximately 4 to 6 inches, worms present, power line over site. Site along a busy street.

20 Total GT Samples

ROW = right-of-way

NA - Not Available

Table A-3 - Surface Soil Sample Descriptions - West Seattle

Sample Number	Sample Date	Median Strip Dimensions in Feet	Visual Soil Description	Comments
West Seattle (WS)				
WS-1-A	3/30/2011	40 x 11.5	(Loose), moist to wet, grey-brown, slightly gravelly silty SAND (SM), gravels 0.25 to 2 inches	Approximately 2 to 3 inches of grass sod, root zone approximately 4 inches. Small piece of paper trash directly below grass sod in a sub-location, new sub-location collected for composite soil sample.
WS-1-B	3/30/2011	43.5 x 7	(Loose), moist, light brown, slightly gravelly silty SAND (SM), gravels 1 to 4 inches	Approximately 2 inches of grass sod, root zone approximately 3 inches, worms present.
WS-1-C	3/30/2011	48 x 10	(Loose), moist, brown to light brown, slightly gravelly silty SAND (SM), gravels 1 to 3 inches	Approximately 1 inch of grass sod, root zone approximately 4 inches, worms present.
WS-1-D	3/30/2011	49 x 10	(Soft), moist to wet, dark brown, slightly gravelly sandy SILT (ML), gravels 3 to 4 inches	Approximately 1 inch of grass sod, root zone approximately 3 to 4 inches, worms present.
WS-1-E	3/30/2011	38 x 9	(Loose), moist, light brown, silty fine SAND (SM)	Approximately 1 inch of grass sod, root zone approximately 3 to 4 inches, no worms present.
WS-2-A	3/30/2011	50.5 x 9.5	(Loose), dry to moist, light brown, slightly gravelly silty SAND (SM)	Approximately 1 inch of grass sod, root zone approximately 3 to 4 inches, worms present.
WS-2-B	3/30/2011	51 x 5.8	(Loose), moist, light brown, slightly gravelly silty fine SAND (SM)	Approximately 1 inch of grass sod, root zone approximately 2 to 3 inches, worms present.
WS-2-C	3/30/2011	48 x 11.8	(Soft), moist to wet, tan-brown, sandy to slightly sandy SILT (ML)	Approximately 1 inch of grass sod, root zone approximately 2 to 3 inches, worms present.
WS-2-D	3/30/2011	38 x 8.8	(Medium dense), moist, light tan-brown, slightly gravelly silty SAND (SM)	Approximately 2 to 3 inches of grass sod, root zone approximately 3 to 4 inches, worms present.
WS-2-E	3/30/2011	33 x 11	(Soft), moist to wet, tan brown, slightly gravelly sandy SILT (ML)	Approximately 1 to 2 inches of grass sod, root zone approximately 2 to 3 inches, worms present.
WS-3-A	3/31/2011	38 x 6	(Medium dense), moist, brown to tan-brown, silty gravelly SAND (SP), gravels 0.25 to 0.5 inches	Approximately 3 to 4 inches of grass sod, root zone approximately 3 to 4 inches, worms present.
WS-3-B	3/31/2011	49 x 10.2	(Loose), dry to moist, tan-brown, slightly gravelly silty SAND (SM)	Approximately 3 to 4 inches of grass sod, root zone approximately 3 to 4 inches, worms present.
WS-3-C	3/31/2011	63 x 10	(Soft), moist to wet, tan-brown, sandy gravelly SILT (ML) to sandy silty GRAVEL (GM), gravels 0.25 to 3 inches	Approximately 2 inches of grass sod, root zone approximately 3 to 4 inches, worms present.
WS-3-D	3/31/2011	34 x 9	(Loose), dry to moist, tan-brown, slightly silty gravelly fine SAND (SP)	Approximately 2 to 3 inches of grass sod, root zone approximately 3 inches, worms present. Narrow yard, close grouping of sub-locations.
WS-3-E	3/31/2011	26 x 9	(Loose), moist, red-brown, slightly silty gravelly SAND (SP), gravels 0.25 to 4 inches	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present. Narrow yard, close grouping of sub-locations.

Table A-3 - Surface Soil Sample Descriptions - West Seattle

Sample Number	Sample Date	Median Strip Dimensions in Feet	Visual Soil Description	Comments
WS-4-A	3/31/2011	42.8 x 10.2	(Loose), moist, brown, slightly silty sandy GRAVEL (GP) to slightly silty gravelly fine SAND (SP), gravels 0.25 to 5 inches	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present.
WS-4-B	3/31/2011	44 x 10	(Loose), moist, tan-brown, slightly gravelly SAND (SP), gravels 0.25 to 0.5 inches	Approximately 2 to 3 inches of grass sod, root zone approximately 3 to 4 inches, no worms present.
WS-4-C	3/31/2011	51 x 9	(Loose), dry to moist, orange-brown, slightly silty very gravelly find SAND (SP), gravels 0.25 to 12 inches	Approximately 1 inch of grass sod, root zone approximately 4 to 5 inches, no worms present.
WS-4-D	3/31/2011	40 x 10	(Loose), moist, dark brown, slightly silty slightly gravelly SAND (SP), gravels 0.25 to 3 inches	Approximately 2 inches of grass sod, root zone approximately 4 inches, worms present.
WS-4-E	4/1/2011	40.5 x 5	(Loose), dry to moist, tan-brown, slightly gravelly fine SAND (SP), gravels 0.25 to 0.5 inches	Approximately 2 inches of grass sod, root zone approximately 3 to 4 inches. Small piece of plastic directly below grass sod in a sub-location, new sub-location collected for composite soil sample.

20 Total WS Samples

ROW = right-of-way

NA - Not Available

Table A-4 - Surface Soil Sample Descriptions - Capitol Hill

Sample Number	Sample Date	Median Strip Dimensions in Feet	Visual Soil Description	Comments
Capitol Hill (CH)				
CH-1-A	4/4/2011	7.3 x 37	(Loose), damp to moist, dark brown, silty SAND (SM) to (soft) sandy SILT (ML) with trace gravel	Abundant roots from 0 to 2 inches, residence lot is elevated by approximately 3 feet with landscaping and young trees and shrubs.
CH-1-B	4/4/2011	5 x 42	(Loose), damp to moist, red-brown, sandy SILT (ML) over (loose), moist to damp, dark brown silty sandy GRAVEL (GM) to gravelly SAND (SP).	Approximately 0.5 to 1 inch of grass sod with abundant roots. Corner lot, residence protected by hedge and fence at sidewalk, grass in ROW, residence has mature trees and shrubs.
CH-1-C	4/5/2011	7.5 x 62	(Loose), damp, dark brown silty SAND (SM) to (soft) sandy SILT (ML)	Residence matches ROW, both have grass lawns, 1 young tree on residence, abundant roots from 0 to 1 inch and scattered worms.
CH-1-D	4/5/2011	8.5 x 39	(Loose), damp, dark brown, silty SAND (SM) to (soft) sandy SILT (ML) with trace gravel	Abundant roots and scattered worms, grass in ROW matches residence, small bushes border yard, residence elevated by approximately 3 feet above ROW grade with sloping grass landscaping.
CH-1-E	4/5/2011	8 x 40	(Loose), damp to moist, dark brown, silty gravelly SAND (SP) to (medium dense) silty sandy GRAVEL (SP)	Abundant roots, scattered wood fragments (excluded from subsamples), worms, grass in ROW, residence has landscaped yard with numerous shrubs and small large trees
CH-2-A	4/5/2011	NA	(Loose), damp, dark brown, silty SAND (SM) to (soft), sandy SILT (ML)	Abundant roots, scattered worms, residence has green lawn that matches ROW, mature and small trees at residence, two young trees in ROW.
CH-2-B	4/5/2011	4 x 28.5	(Loose), damp to moist, dark brown, silty SAND (SM) to (soft) sandy SILT (ML)	Abundant roots from 0 to 1 inch, residence landscaped had no grass, large hedge borders sidewalk.
CH-2-C	4/5/2011	9 x 41	(Loose), damp, dark brown to red brown, silty SAND (SM) with trace gravel	Abundant roots, scattered worms, residence matches ROW, both are covered by grass.
CH-2-D	4/5/2011	10.2 x 41	(Loose) damp to moist, dark brown, silty SAND (SM) to (soft) sandy SILT (ML) with trace gravel	Abundant roots from 0 to 1 inch, residence is elevated approximately 4 feet above ROW, small shrubs and flowered surround grassy lawn at residence, green grass in ROW.
CH-2-E	4/5/2011	8 x 53	(Loose), damp to moist, silty SAND (SM) to (soft), sandy SILT (ML) with trace gravel	Abundant roots from 0 to 1 inch, residence is elevated approximately 10 feet above ROW with a rock retaining wall, grass in ROW, grass at residence surrounded by small shrubs.
CH-3-A	4/5/2011	11 x 41.6	(Loose), damp, dark brown sandy SILT (ML) to (soft) silty SAND (SM)	Trace debris (i.e. cigarette butts, broken glass) observed in area of the ROW, debris was excluded from sub-samples, abundant roots from 0 to 1 inch, fence surrounds residence that has grass lawn surrounded by shrubs and mature trees, grass in ROW.
CH-3-B	4/6/2011	9 x 47	(Soft), damp, dark brown, sandy SILT (ML)	Abundant fine root material and scattered worms.

Table A-4 - Surface Soil Sample Descriptions - Capitol Hill

Sample Number	Sample Date	Median Strip Dimensions in Feet	Visual Soil Description	Comments
CH-3-C	4/6/2011	8 x 35	(Loose), damp, dark brown, sandy SILT (SM), one sub-sample was a (medium dense), red-brown, sandy silty GRAVEL (GM)	Occasional worms and ROW on a steep slope.
CH-3-D	4/6/2011	10 x 34	(Loose), damp, dark brown, clayey SILT (ML) with trace large gravel	Abundant root material and scattered worms.
CH-3-E	4/6/2011	14.5 x 40	(Loose), damp, dark brown, clayey SILT (ML)	Abundant roots, ROW covered with abundant moss, no worms present in soil.
CH-4-A	4/6/2011	10 x 39	(Loose), damp, dark brown, sandy SILT (ML)	Grass, moss, and roots from 0 to 2 inches, scattered worms, ROW on a slope.
CH-4-B	4/6/2011	10 x 22	(Loose), damp, dark brown, sandy SILT (ML) with trace gravel, one sub-sample was a sandy silty GRAVEL (GM)	Scattered worms, narrow ROW, sub-sample locations were placed closer together.
CH-4-C	4/6/2011	3.2 x 40	(Soft), damp, brown, CLAY (CL) to SILT (ML) with trace large and small gravel	Scattered worms, no roots present, and narrow ROW.
CH-4-D	4/6/2011	4.8 x 39	(Soft), damp, dark brown, CLAY (CL)	Few worms present, abundant roots, residence on a street corner, sampled the ROW without trees. The ROW was not rectangular in shape, one end was wider than other.
CH-4-E	4/6/2011	8 x 56	(Soft), damp, dark brown, CLAY (CL)	Abundant worms, fine root material from 0 to 2 inches, long grass on ROW.

20 Total CH Samples

ROW = right-of-way

NA - Not Available

Table A-5 - Surface Soil Sample Descriptions - Ballard

Sample Number	Sample Date	Median Strip Dimensions in Feet	Visual Soil Description	Comments
Ballard (BA)				
BA-1-A	3/30/2011	>3 x 52.5	(Medium stiff), damp to moist, dark brown, sandy SILT (ML) with trace gravel	Abundant fine roots, scattered worms in upper 1 to 2 inches, ROW covered in grass, ROW matches the residence.
BA-1-B	3/30/2011	11 x 50	(Soft), damp, dark brown, sandy SILT (ML) to (loose), silty SAND (SM)	Abundant fine roots, scattered worms, ROW covered in grass, ROW matches the residence, residence yard is elevated approximately 2 to 3 feet above the ROW.
BA-1-C	3/30/2011	10 x 40	(Soft), damp, dark brown, sandy SILT (ML) to (lose), silty SAND (SM)	Abundant fine roots, worms, ROW covered in grass, ROW matches the residence.
BA-1-D	3/30/2011	10 x 45	(Loose to medium dense), damp, gray to brown, fine to course grained SAND (SW) with trace silt to (soft to stiff), dark brown, sandy SILT (ML)	Abundant roots from 0 to 4 inches, ROW and residence both had trees of approximately the same age.
BA-1-E	3/30/2011	11 x 44	(Loose), damp, dark brown, sandy SILT (ML)	Abundant roots, scattered worms, ROW covered in grass, ROW matches the residence, with the exception of a small fruit tree on the residence yard.
BA-2-A	3/30/2011	13 x 36	(Soft), moist to damp, dark brown, sandy SILT (ML) to (loose), silty SAND (SM)	Abundant roots, scattered worms, young trees in ROW which match the residence landscaping.
BA-2-B	3/30/2011	12 x 52	(Soft), moist, dark brown, sandy SILT (ML) to (loose), silty SAND (SM)	Abundant roots from 0 to 1 inch, site on a corner of an intersection, ROW matches residence, one young tree occurs in the ROW. A nearby resident indicated that historically standing water is present in a parking area adjacent to the sampled ROW. During sampling a standing puddle was present in the adjacent parking area with a sheen, but was at a lower elevation and not influencing the sampled ROW.
BA-2-C	3/30/2011	>3 x 40	(Loose), damp to moist, dark brown, silty SAND (SM) with trace gravel	Abundant roots from 0 to 2 inches, residential yard is elevated approximately 2 feet, ROW covered in grass, a few bushes are present on the residence yard.
BA-2-D	3/31/2011	12 x 25	(Loose), damp, dark, silty SAND (SM)	Scattered worms, abundant fine roots, tree stump with flowers within ROW.
BA-2-E	3/31/2011	7 x 27	(Loose), damp, dark brown, silty fine grained SAND (SM)	Abundant roots, worms, grass, weeds, and leaf litter within ROW.
BA-3-A	3/31/2011	9 x 42	(Soft), damp, dark brown, sandy SILT (ML)	Abundant roots, occasional worms, ROW is covered in grass with minor amounts of moss, next door neighbors stated that the site owners had re-sodden within past 3 years.
BA-3-B	3/31/2011	9 x 40	(Soft), damp, brown, sandy SILT (ML)	Abundant roots, occasional worms, ROW is covered with a mixture of grass, clover and weeds.
BA-3-C	3/31/2011	>3 x 50	(Loose), damp, dark brown silty, fine to medium SAND (SM)	Abundant fine roots, scattered worms, residence yard is steeply sloped, small tree with recently planted daffodils at one end of ROW.
BA-3-D	3/31/2011	9 x 49.5	(Soft), damp, brown, clayey SILT (ML)	Abundant roots, occasional worms, ROW is covered with a mixture of grass, weeds, and moss and one old small tree.

Table A-5 - Surface Soil Sample Descriptions - Ballard

Sample Number	Sample Date	Median Strip Dimensions in Feet	Visual Soil Description	Comments
BA-3-E	3/31/2011	12 x 39	(Loose), damp, dark brown, silty SAND (SM)	Abundant fine roots and scattered worms. Surface soil sample was not shipped to CAS.
BA-3-F	3/31/2011	4 x 32	(Loose), moist, dark brown, SAND (SM)	Abundant fine roots. Surface soil sample BA-3-F replaces BA-3-E.
BA-4-A	3/31/2011	>3 x 49	(Loose), moist, dark brown, silty SAND (SM) with trace gravel	Occasional roots, wood fragments (excluded from sub-samples), residence yard is steeply sloped, ROW is covered with a mixture of grass, weeds, and leaf litter.
BA-4-B	3/31/2011	3.6 x 45	(Loose), damp, dark brown, silty, fine to medium SAND (SM)	Abundant fine roots, scattered worms, site on a busy road, patches of grass with compacted soil from foot traffic, sub-samples were collected from areas away from foot traffic disturbances.
BA-4-C	3/31/2011	3.5 x 32	(Loose), damp, dark brown, sandy SILT (ML)	Abundant fine roots, residence yard is steeply sloped, altered sampling area to avoid a guy wire from telephone pole, plastic mesh fragment in one sub-sample location, plastic was excluded from the surface soil sample.
BA-4-D	4/1/2011	4.8 x 41	(Loose), damp, dark brown, very silty, fine to medium SAND (SM)	Abundant fine roots, occasional worms, ROW is not rectangle in shape, the ROW tapers towards the south.
BA-4-E	4/1/2011	10.6 x 23	(Loose), damp, dark brown, CLAY (CL)	Fine root material, occasional worms, trash cans and compost placed on ROW for pick up, avoided sampling from the immediate area.

21 Total BA Samples

ROW = right-of-way

NA - Not Available

Table A-6 - Surface Soil Sample Descriptions - Ravenna

Sample Number	Sample Date	Median Strip Dimensions in Feet	Visual Soil Description	Comments
Ravenna (RA)				
RA-1-A	4/1/2011	9 x 38	(Loose), damp, dark brown CLAY (CL)	Abundant worms, occasional fine root material, ROW and yard match with comparable tree cover.
RA-1-B	4/1/2011	9 x 42	(Stiff to very stiff), damp, dark brown, CLAY (CL)	Abundant worms and grubs, ROW and yard match with comparable tree cover, sub-samples collected away from trees and sidewalk.
RA-1-C	4/1/2011	9 x 30	(Soft), damp, dark brown, CLAY (CL)	Occasional fine root material, ROW covered with a combination of moss and grass, no worms present in sub-locations.
RA-1-D	4/1/2011	9 x 44	(Soft), damp, dark brown to red-brown, clayey SILT (ML)	Occasional worms.
RA-1-E	4/1/2011	9 x 35	(Loose), damp, dark brown, silty SAND (SM) with trace gravel	Occasional worms, residence yard is steeply sloped.
RA-2-A	4/1/2011	5.3 x 44	(Loose), damp, dark brown, silty SAND (SM) with trace gravel	ROW and residence property are both flat.
RA-2-B	4/1/2011	11 x 36	(Soft), moist to wet, brown, clayey SILT (ML) with trace large gravels	Abundant worms, site next to a busy street.
RA-2-C	4/1/2011	5 x 42	(Loose), damp, dark brown, gravelly, silty SAND (SM)	Occasional worms, found a marble in one sub-location, marble was excluded from surface soil sample.
RA-2-D	4/1/2011	10 x 45	(Loose), damp, gravelly, clayey SILT (ML)	Occasional worms.
RA-2-E	4/1/2011	9.5 x 28	(Loose), damp, dark red-brown, clayey SAND (SC) with trace gravel	Occasional worms.
RA-3-A	4/4/2011	7.2 x 47	(Loose), damp, dark brown sandy SILT (ML)	Occasional fine root material, very few worms, fire hydrant and stop sign present at end of ROW.
RA-3-B	4/4/2011	8 x 52	(Loose), damp to moist, dark brown, silty SAND, a sandy GRAVEL (GP) to gravelly SAND (SP) layer was encountered at the bottom of three sub-locations	Abundant roots, scattered worms, large shrub present on ROW. Residence yard is approximately 8 feet above ROW grade with mature conifers and numerous mature shrubs.
RA-3-C	4/4/2011	5 x 42	(Loose), damp to moist, dark brown, silty SAND (SM) over silty gravelly SAND (SP) over silty sandy GRAVEL (GP)	Abundant roots, ROW is covered with grass, scattered debris (i.e. bottle cap, glass) observed in one sub-location, debris was excluded from the surface soil sample, ROW matches residence yard.
RA-3-D	4/4/2011	7.2 x 42	(Loose), damp to moist, gray brown to dark brown, silty fine SAND (SM)	Abundant roots from 0 to 2 inches, residence yard is elevated approximately 6 feet above the ROW with a 4 foot concrete retaining wall and large hedge above the retaining wall.
RA-3-E	4/4/2011	5 x 41	(Loose), damp, dark brown, silty SAND (SM) with trace gravel	Abundant roots from 0 to 2 inches, ROW is covered with grass, residence yard has young trees and a raised bed.
RA-4-A	4/4/2011	7 x 41	(Loose), damp, dark brown, silty SAND (SM)	Site located on the corner of two streets, a telephone pole is present at one end of the ROW.

Table A-6 - Surface Soil Sample Descriptions - Ravenna

Sample Number	Sample Date	Median Strip Dimensions in Feet	Visual Soil Description	Comments
RA-4-B	4/4/2011	9 x >46	(Loose), damp to moist, dark brown, silty SAND (SM) to (soft) sandy SILT (ML) over silty sandy GRAVEL at 4 inches in one sub-location	Abundant roots from o to 3 inches, residence yard is raised approximately 4 feet above the ROW, the ROW and residence yard are both covered with grass.
RA-4-C	4/4/2011	NA	(Loose), damp to moist, dark brown, silty SAND (SM) with trace gravel	Abundant roots from 0 to 2 inches, ROW is covered with grass, residence yard is covered with shrubs and small to medium size trees (~20' tall).
RA-4-D	4/4/2011	9.5 x 29	(Loose), damp to moist, dark brown, gravelly silty SAND (SM) to silty SAND (SM)	ROW is covered with grass, scattered garbage, and animal waste, garbage and animal waste was excluded from sub-locations. Residence yard has one small tree.
RA-4-E	4/5/2011	9 x 40	(Loose), damp, brown with orange brown zones, silty SAND (SM) to (soft) sandy SILT (ML)	Abundant roots from 0 to 1 inches, ROW is similar to the residence yard, the residence yard is approximately 4 feet above the ROW with a rock retaining wall, and small shrubs in yard.

20 Total RA Samples

ROW = right-of-way

NA - Not Available

Appendix B. Representative Photographs

Photo 1: Set up of five subsample locations for one surface soil sample at a randomly selected site. Note the telephone/power line pole in the background and the utility box in the foreground. Subsample locations were collected away from disturbances.

Photo 2: Randomly selected site (same as Photo 1) once surface soil sampling was completed.

Photo 3: Set up of five subsample locations for one surface soil sample at a randomly selected site. Note grass and mature trees in the right-of-way (ROW); at this particular site, both the residence yard and ROW had grass and trees.

Photo 4: Randomly selected site (same as Photo 3) once surface soil sampling was completed.

Photo 5: Example of a subsample location exploration, approximately 2 inches of grass sod over a root zone from approximately 2 to 4 inches with abundant worms present. Soil sample was collected by scraping along the sides of the exploration to collect an adequate undisturbed soil sample.

Photo 6: Example of a disturbance, note the color difference of the grass in the foreground due to high amount of fertilizer.

Appendix C. Chemical Data Quality Review and Laboratory Reports

Appendix C. Chemical Data Quality Review and Laboratory Reports

Chemical data quality review for soil samples

123 soil samples were collected from urban Seattle, Washington locations between March 30, 2011 and April 6, 2011. The samples were submitted to Columbia Analytical Services, Inc. (CAS), in Kelso, Washington, for chemical analysis. The samples were reported in CAS Service Request Nos. K1102825, K1102826, K1102923, and K1103078. On May 19, 2011, the laboratory was asked to perform additional analyses on the archived samples. The additional results were reported in Service Request Nos. K1104576, K1104577, K1104578, K1104579, K1104580, and K1104585.

The samples for chemical analysis were air dried, sieved with a Number 10 (2 mm) sieve, than processed via a Multi-Increment Sampling (MIS) procedure. The soil samples were analyzed for the following:

- Total organic carbon (TOC) by EPA Method 9060 Modified;
- Total solids by EPA Method 160.3 modified; and
- Grain size by ASTM D422 modified.

An aliquot from each of the samples was submitted to CAS in Houston, Texas, for analysis of dioxins/furans by EPA Method 1613B. Additional aliquots were prepared for potential analysis for Polycyclic Aromatic Hydrocarbons. The additional aliquots and remaining air dried and sieved sample volumes were archived at -20oC.

Additional analyses on the archived samples were requested on May 19, 2011. The soil samples were analyzed for the following:

- Polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270C - SIM.

Quality assurance/quality control (QA/QC) reviews of laboratory procedures are performed on an ongoing basis by the laboratory. Hart Crowser performed the data review, using laboratory quality control results summary sheets and raw data, as required, to ensure they met data quality objectives for the project. Data review generally followed the format outlined in the National Functional Guidelines for Organic Data Review (EPA 2008), and the National Functional Guidelines for Chlorinated Dibenzo-p-Dioxin (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review (EPA 2005) modified to include specific criteria of the individual analytical methods. The following criteria were evaluated in the standard data quality review process, where applicable:

- Holding times;

- Method blanks;
- Surrogate recoveries;
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCS/LCSD) recoveries;
- Matrix spike/matrix spike duplicate (MS/MSD) recoveries;
- Laboratory duplicate relative percent differences (RPDs) and laboratory replicate relative standard deviations (RSDs);
- Labeled compound recoveries;
- Ongoing precision and recovery sample (OPR) recoveries;
- Standard reference material (SRM) recoveries;
- Calibration criteria; and
- Reporting limits (RL).

The data were determined to be acceptable for use, as qualified. Full laboratory results are presented at the end of this appendix. Results of the data reviews, organized by analysis class, follow.

Sample receiving exceedances

The coolers were received at CAS in Kelso, Washington, at temperatures below 2° to 6°C. One temperature blank was received frozen. No sample jars were damaged. As the samples were soils that were frozen and archived, no sample results were qualified.

The coolers shipped from CAS in Kelso, Washington, to CAS in Houston, Texas, containing the samples were received at the Houston laboratory at a temperature of 23oC. Because the samples were air dried, sieved, and processed by MIS prior to shipping, the temperature exceedance resulted in no sample qualification.

Additional analyses for PAHs on the archived samples were requested on May 19, 2011. As all samples had been archived at -20oC, holding times were extended to six months, and no sample results were qualified. Previously prepared aliquots of air dried, sieved, and MIS processed samples were removed from archive for analysis. Some samples had not had additional aliquots of MIS processed soils prepared during the initial sample extraction, but air dried and sieved soils had been archived. These samples (BA-1-D, WS-2-D, WS-3-A, WS-3-B, WS-4-B, and WS-4-C) were removed from archive and underwent the MIS procedure prior to extraction and analysis for PAHs.

Physical/chemical parameters

Analytical methods

Total organic carbon was prepared and analyzed by modified EPA Method 9060. Total solids were determined by modified EPA Method 160.3. Grain size was determined by modified ASTM D422.

Sample holding times

The samples met holding time limits for total solids, total organic carbon, and grain size.

Laboratory detection limits

Reported detection limits and analytical results for TOC were adjusted for moisture content and any required dilution factors. Reported detection limits were acceptable.

Blank contamination

Laboratory blanks for TOC were non-detect.

Laboratory control sample recovery

LCS recoveries for TOC fell within control limits.

Matrix spike recovery

MS recoveries for TOC fell within control limits with the following exception:

- RA-1-E: The RPD for the matrix spike/matrix spike duplicate exceeded the control limits. As the recoveries were within control, sample results were not qualified.

Laboratory duplicate RPDs and laboratory replicate RSDs

The laboratory duplicate RPDs for total solids fell within control limits.

The laboratory replicate RSDs for TOC fell within control limits with the following exception:

- WS-3-A: The RSD for TOC exceeded the control limit. Results for TOC in WS-3-A were qualified as estimated (J).

The laboratory duplicate RPDs for grain size fell within control limits with the following exceptions:

- WS-4-C: The RPD for fine gravel exceeded control limits of 35 percent. Results for fine gravel in WS-4-C were qualified as estimated (J).
- WS-4-E: The RPD for medium gravel and fine gravel exceeded control limits of 35 percent. Results for medium gravel and fine gravel in WS-4-E were qualified as estimated (J).
- GT-2-B: The RPD for medium gravel, fine gravel, and coarse sand exceeded control limits of 35 percent. Results for medium gravel, fine gravel, and coarse sand in GT-2-B were qualified as estimated (J).

- 1412: The RPD for medium gravel exceeded control limits of 35 percent. Results for medium gravel in 1412 were qualified as estimated (J).
- CH-1-C: The RPD for medium gravel and fine gravel exceeded control limits of 35 percent. Results for medium gravel and fine gravel in CH-1-C were qualified as estimated (J).
- SP-8-B: The RPD for medium gravel and clay exceeded control limits of 35 percent. Results for medium gravel and clay in SP-8-B were qualified as estimated (J).
- BA-4-C: The RPD for medium gravel, coarse sand, very fine sand, and clay exceeded control limits of 35 percent. Results for medium gravel, coarse sand, very fine sand, and clay in BA-4-C were qualified as estimated (J).

Continuing calibration verification checks (CCVs)

The CCVs for TOC fell within acceptance criteria.

PAHs by EPA 8270-SIM

Analytical methods

PAHs were prepared by EPA Method 3541 and analyzed following EPA Method 8270C with Selected Ion Monitoring (SIM).

Sample holding times

The samples met holding time limits of six months for frozen soils.

Laboratory detection limits

Reported detection limits and analytical results were adjusted for moisture content and any required dilution factors. Detections that fell between the reporting limit (RL) and the method detection limit (MDL) were qualified by the laboratory as "J." The laboratory "J" qualifier was changed to "T" to be consistent with Ecology's EIM database.

Multiple samples were analyzed at dilutions due to high levels of target analytes. The laboratory qualified the diluted analytes with "D". The laboratory "D" qualifier was removed.

MB KWG1104924-6: The MDL for benzo(a)pyrene was elevated due to matrix interferences. The reporting limit was unchanged. The laboratory qualified the analyte as "Ui."

Blank contamination

The method blanks had detections for multiple analytes between the MDL and the RL. The detections in the associated samples were evaluated and results modified as follows:

- MB KWG1104705-6: The method blank had detections for phenanthrene between the MDL and the RL.
    - Results for phenanthrene in associated samples were above the RL and greater than five times the amount in the method blank and were not qualified.

- MB KWG1104706-6: The method blank had detections for naphthalene, phenanthrene, fluoranthene, pyrene, benz(a)anthracene, and chrysene between the MDL and the RL.
    - Results for those analytes in associated samples with detections above the RL and greater than five times the amount in the method blank were not qualified.
    - Results for those analytes in associated samples that fell between the MDL and the RL were raised to the RL and qualified as non-detect (U):
    - WS-1-A: Naphthalene
    - Results for those analytes in associated samples with detections above the RL but less than five times the amount in the method blank were qualified as non-detect (U):
    - WS-1-E: Naphthalene
    - WS-3-C: Naphthalene
- MB KWG1104924-6: The method blank had detections for naphthalene, phenanthrene, fluorene, fluoranthene, pyrene, benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(123-cd)pyrene, dibenz(ah)anthracene, and benzo(ghi)perylene between the MDL and the RL.
    - Results for those analytes in associated samples with detections above the RL and greater than five times the amount in the method blank were not qualified.
    - Results for those analytes in associated samples that fell between the MDL and the RL were raised to the RL and qualified as non-detect (U):
    - SP-8-B: Fluorene
- MB KWG1105068-3: The method blank had detections for naphthalene and phenanthrene between the MDL and the RL. Results for those analytes in associated samples were above the RL and greater than five times the amount in the method blank and were not qualified.
- MB KWG1104777-6: The method blank had detections for naphthalene and phenanthrene between the MDL and the RL. Results for those analytes in associated samples were above the RL and greater than five times the amount in the method blank and were not qualified.
- MB KWG1104810-6: The method blank had detections for naphthalene, phenanthrene, pyrene, benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(123-cd)pyrene, and benzo(ghi)perylene between the MDL and the RL. Results for those analytes in associated samples were above the RL and greater than five times the amount in the method blank and were not qualified.
- MB KWG1104859-6: The method blank had detections for naphthalene and phenanthrene between the MDL and the RL. Results for those analytes in associated samples were above the RL and greater than five times the amount in the method blank and were not qualified.

Surrogate recovery

Surrogate recoveries fell within laboratory control limits with the following exception:

- SP-10-A: The recovery for the surrogate Terphenyl-d14 fell below the control limits. The remaining surrogates were within control, and sample results were not qualified.

Laboratory control sample recovery

LCS recoveries fell within laboratory control limits.

Matrix spike recovery

MS recoveries fell within laboratory control limits with the following exceptions:

- BA-4-C MS/MSD: The recoveries for phenanthrene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, and benz(a)anthracene exceeded the control limits in the MS, but fell within the control limits in the MSD. The recoveries for fluoranthene and pyrene exceeded the control limits in the MS, and fell below the control limits in the MSD. The RPD results for acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(123-cd)pyrene, and benzo(ghi)perylene exceeded the control limits. As the LCS and LCSD were within control limits, the RPD failures and recovery failures are indicative of heterogeneity in the source sample. Results for the source sample BA-4-C were qualified as estimated (J).
- GT-3-A MS/MSD: The recoveries for phenanthrene, benzo(a)pyrene, indeno(123-cd)pyrene, benzo(ghi)perylene, and benzo(b)fluoranthene fell below the control limits in the MS; the recoveries of fluoranthene, benz(a)anthracene, chrysene, and pyrene fell below the control limits in the MS and MSD. The spiking amount was less than the target analytes present in the source sample, and no results were qualified.
- SP-8-A MS/MSD: The RPDs for phenanthrene and pyrene exceeded the control limits. As the recoveries for those analytes were within control, no sample results were qualified.

Internal standards recovery

Internal standards were within acceptance criteria.

Standard reference material recovery

The SRM recoveries fell within acceptance criteria with the following exceptions:

- SRM 1941b, extracted on May 25, 2011: The recoveries for naphthalene, fluorene, and fluoranthene fell below the laboratory advisory limits. Sample results were not qualified due to SRM failures.
- SRM 1941b, extracted on May 25, 2011. The recoveries for naphthalene and fluorene fell below the laboratory advisory limits. Sample results were not qualified due to SRM failures.
- SRM 1941b, extracted on May 26, 2011. The recoveries for naphthalene and fluorene fell below the laboratory advisory limits. Sample results were not qualified due to SRM failures.
- SRM 1941b, extracted on May 27, 2011: The recoveries for naphthalene, fluorene, anthracene, and benzo(a)pyrene fell below the laboratory advisory limits. Sample results were not qualified due to SRM failures.
- SRM 1941b, extracted on May 31, 2011: The recovery for naphthalene fell below the laboratory advisory limits. Sample results were not qualified due to SRM failures
- SRM 1941b, extracted on June 1, 2011. The recoveries for naphthalene and fluorene fell below the laboratory advisory limits. Sample results were not qualified due to SRM failures.

Initial calibration curves and continuing calibration verification checks (CCVs)

The initial calibration curves were within acceptance criteria.

The CCVs were within control limits with the following exceptions:

- CCV 05/28/11 at 14:44: The recoveries for Benzo(b)fluoranthene and indeno(123-cd)pyrene failed high. Those analytes in the associated samples (BA-1-A, BA-1-B, BA-1-C, BA-1-D, BA-2-A, BA-2-B, BA-2-E, BA-3-A, BA-3-D, and BA-4-A) were not reported from that sequence. The samples were reanalyzed and benzo(b)fluoranthene and indeno(123-cd)pyrene were reported from the reanalysis. No sample results were qualified.

Dioxins/furans by EPA 1613B

Analytical methods

Dioxins/furans were prepared and analyzed by EPA Method 1613B.

Sample holding times

The samples were prepared and analyzed within holding time limits.

Laboratory detection limits

Reported detection limits and analytical results were adjusted for moisture content and any required dilution factors. Detections that fell between the RL and the Estimated Detection Limit (EDL) were qualified by the laboratory as estimated (J). J qualifiers were changed to T to be consistent with Ecology's Environmental Information Management (EIM) database.

Blank contamination

The method blanks had detections for multiple analytes between the EDL and the RL. The laboratory qualified congener results in the associated samples with B. Method blank results that did not meet ion ratio criteria (EMPC results qualified as K) were treated as non-detected. The detections in the associated samples were evaluated and results modified as follows:

- MB-EQ1100174-01: The method blank had the following detections, which met ion identification criteria, between the EDL and RL.
  - 1,2,3,4,6,7,8-HpCDD – 0.132 ng/kg
  - OCDD – 0.961 ng/kg
  - OCDF – 0.0889 ng/kg
  - Total HpCDD – 0.132 ng/kg

Results for those analytes in the associated samples that fell between the EDL and the RL were qualified as non-detected at the value reported by the laboratory.

- WS-1-A: OCDF
- WS-3-B: OCDF

- WS-3-D: OCDF

Results for those analytes in the associated samples with detections above the RL and greater than five times the amount in the method blank (ten times for OCDD and OCDF) had the B qualifier removed:

- WS-1-A: 1,2,3,4,6,7,8-HpCDD and OCDD
- WS-1-B: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- WS-1-C: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- WS-1-D: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- WS-1-E: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- WS-2-A: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- WS-2-B: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- WS-2-C: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- WS-2-D: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- WS-2-E: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- WS-3-A: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- WS-3-B: 1,2,3,4,6,7,8-HpCDD and OCDD
- WS-3-D: 1,2,3,4,6,7,8-HpCDD and OCDD
- WS-3-E: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- WS-4-A: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- WS-4-B: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF

- MB-EQ1100184-01: The method blank had the following detections, which met ion identification criteria, between the EDL and RL.
  - 1,2,3,4,6,7,8-HpCDD – 0.299 ng/kg
  - OCDF – 0.257 ng/kg
  - Total HpCDD – 0.299 ng/kg

Detections for OCDD did not meet the ion identification criteria in the method blank. Results for OCDD in the associated samples were also qualified with B, and the B qualifier was removed in samples WS-3-C, WS-4-C, WS-4-D, BA-1-A, BA-1-B, BA-1-C, BA-1-D, BA-1-E, BA-2-A, BA-2-B, BA-2-C, BA-2-D, BA-2-E, BA-3-A, BA-3-B, BA-3-C, BA-3-D, BA-3-F, BA-4-A, and BA-4-B.

Results for those analytes in associated samples that fell between the EDL and the RL were qualified as non-detected at the value reported by the laboratory.

- WS-4-C: OCDF

Results for those analytes in the associated samples with detections above the RL and greater than five times the amount in the method blank (ten times for OCDD and OCDF) had the B qualifier removed:

- WS-3-C: 1,2,3,4,6,7,8-HpCDD and OCDF
- WS-4-C: 1,2,3,4,6,7,8-HpCDD and OCDF
- WS-4-D: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-1-A: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-1-B: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-1-C: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-1-D: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-1-E: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-2-A: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-2-B: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-2-C: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-2-D: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-2-E: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-3-A: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-3-B: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-3-C: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-3-D: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-3-F: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-4-A: 1,2,3,4,6,7,8-HpCDD and OCDF
- BA-4-B: 1,2,3,4,6,7,8-HpCDD and OCDF

- MB-EQ110185-01: The method blank had the following detections, which met ion identification criteria, between the EDL and RL:
  - 1,2,3,4,6,7,8-HpCDD – 0.774 ng/kg
  - OCDD – 4.66 ng/kg
  - OCDF – 0.551 ng/kg
  - Total HpCDD – 1.28 ng/kg

Results for those analytes in associated samples with detections above the RL and greater than five times the amount in the method blank (ten times for OCDD and OCDF) had the B qualifier removed:

- BA-4-C: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- BA-4-D: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- BA-4-E: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- CH-1-A: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- CH-1-B: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- GT-1-A: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- GT-1-B: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- GT-1-C: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- GT-1-D: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- GT-1-E: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- GT-2-A: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- GT-2-B: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- GT-2-C: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF
- GT-2-D: 1,2,3,4,6,7,8-HpCDD; OCDD; and OCDF

- MB-EQ110194-01: The method blank had the following detections, which met ion identification criteria, between the EDL and RL.
  - 1,2,3,4,6,7,8-HpCDD – 0.402 ng/kg
  - OCDD – 1.42 ng/kg
  - Total HpCDD – 0.763 ng/kg

Detections for OCDF did not meet the ion identification criteria in the method blank. Results for OCDF in the associated samples were also qualified with B, and the B qualifier was removed in samples GT-2-E, GT-3-A, GT-3-B, GT-3-C, GT-3-D, GT-3-E, GT-4-A, GT-4-B, GT-4-C, GT-4-D, GT-4-E, RA-1-A, RA-1-B, RA-1-C, RA-1-D, RA-1-E, RA-2-A, RA-2-B, and RA-2-C.

Results for those analytes in associated samples with detections above the RL and greater than five times the amount in the method blank (ten times for OCDD and OCDF) had the B qualifier removed:

- GT-2-E: 1,2,3,4,6,7,8-HpCDD and OCDD
- GT-3-A: 1,2,3,4,6,7,8-HpCDD and OCDD
- GT-3-B: 1,2,3,4,6,7,8-HpCDD and OCDD
- GT-3-C: 1,2,3,4,6,7,8-HpCDD and OCDD
- GT-3-D: 1,2,3,4,6,7,8-HpCDD and OCDD
- GT-3-E: 1,2,3,4,6,7,8-HpCDD and OCDD

- GT-4-A: 1,2,3,4,6,7,8-HpCDD and OCDD
- GT-4-B: 1,2,3,4,6,7,8-HpCDD and OCDD
- GT-4-C: 1,2,3,4,6,7,8-HpCDD and OCDD
- GT-4-D: 1,2,3,4,6,7,8-HpCDD and OCDD
- GT-4-E: 1,2,3,4,6,7,8-HpCDD and OCDD
- RA-1-A: 1,2,3,4,6,7,8-HpCDD and OCDD
- RA-1-B: 1,2,3,4,6,7,8-HpCDD and OCDD
- RA-1-C: 1,2,3,4,6,7,8-HpCDD and OCDD
- RA-1-D: 1,2,3,4,6,7,8-HpCDD and OCDD
- RA-1-E: 1,2,3,4,6,7,8-HpCDD and OCDD
- RA-2-A: 1,2,3,4,6,7,8-HpCDD and OCDD
- RA-2-B: 1,2,3,4,6,7,8-HpCDD and OCDD
- RA-2-C: 1,2,3,4,6,7,8-HpCDD and OCDD

- MB-EQ110196-01: The method blank had the following detections, which met ion identification criteria, between the EDL and the RL.
  - OCDD – 21.4 ng/kg
  - 1,2,3,4,6,7,8-HpCDF – 0.602 ng/kg
  - OCDF – 4.98 ng/kg
  - Total HpCDD – 1.13 ng/kg
  - Total HpCDF – 7.05 ng/kg

Detections for 1,2,3,4,6,7,8-HpCDD and 1,2,3,4,7,8,9-HpCDF did not meet the ion identification criteria in the method blank. Results for those congeners in the associated samples were also qualified with B, and the B qualifier was removed in samples SP-1-A, SP-1-B, SP-2-A, SP-2-B, SP-3-A, RA-2-D, RA-2-E, RA-3-A, RA-3-B, RA-3-C, RA-3-D, RA-3-E, RA-4-A, RA-4-B, RA-4-C, RA-4-D, WS-4-E.

Results for those analytes in associated samples that fell between the EDL and the RL or were less than five times the amount in the method blank (ten times for OCDD and OCDF) were qualified as non-detected at the value reported by the laboratory:

- RA-4-B: OCDF
- RA-4-C: OCDF
- RA-3-D: OCDF
- WS-4-E: OCDF

Results for those analytes in the associated samples with detections above the RL and greater

than five times the amount in the method blank (ten times for OCDD and OCDF) had the B qualifier removed:

- RA-2-D: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF
- RA-2-E: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF
- RA-3-A: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF
- RA-3-B: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF
- RA-3-C: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF
- RA-3-D: OCDD and 1,2,3,4,6,7,8-HpCDF
- RA-3-E: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF
- RA-4-A: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF
- RA-4-B: OCDD and 1,2,3,4,6,7,8-HpCDF
- RA-4-C: OCDD and 1,2,3,4,6,7,8-HpCDF
- RA-4-D: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF
- WS-4-E: OCDD and 1,2,3,4,6,7,8-HpCDF
- SP-1-A: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF
- SP-1-B: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF
- SP-2-A: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF
- SP-2-B: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF
- SP-3-A: OCDD; 1,2,3,4,6,7,8-HpCDF and OCDF

- MB-EQ110198-01: The method blank had the following detections, which met ion identification criteria, between the EDL and the RL.
  - 1,2,3,4,6,7,8-HpCDD – 0.127 ng/kg
  - OCDD – 0.342 ng/kg
  - Total HpCDD – 0.127 ng/kg

Results for those analytes in the associated samples with detections above the RL and greater than five times the amount in the method blank (ten times for OCDD and OCDF) had the B qualifier removed:

- SP-3-B: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-4-A: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-4-B: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-5-A: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-5-B: OCDD and 1,2,3,4,6,7,8-HpCDD

- SP-6-A: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-6-B: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-7-A: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-7-B: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-8-A: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-8-B: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-9-A: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-9-B: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-10-A: OCDD and 1,2,3,4,6,7,8-HpCDD
- SP-10-B: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-1-C: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-1-D: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-1-E: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-2-A: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-2-B: OCDD and 1,2,3,4,6,7,8-HpCDD

- MB-EQ110201-01: The method blank had the following detections, which met ion identification criteria, between the EDL and the RL.
  - 1,2,3,4,6,7,8-HpCDD – 0.0998 ng/kg
  - OCDD – 0.536 ng/kg
  - Total HpCDD – 0.0998 ng/kg

Results for those analytes in the associated samples with detections above the RL and greater than five times the amount in the method blank (ten times for OCDD and OCDF) had the B qualifier removed:

- CH-2-C: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-2-D: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-2-E: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-3-A: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-3-B: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-3-C: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-3-D: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-3-E: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-4-A: OCDD and 1,2,3,4,6,7,8-HpCDD

- CH-4-B: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-4-C: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-4-D: OCDD and 1,2,3,4,6,7,8-HpCDD
- CH-4-E: OCDD and 1,2,3,4,6,7,8-HpCDD
- RA-4-E: OCDD and 1,2,3,4,6,7,8-HpCDD
- 1420-24: OCDD and 1,2,3,4,6,7,8-HpCDD
- 1410: OCDD and 1,2,3,4,6,7,8-HpCDD
- 1412: OCDD and 1,2,3,4,6,7,8-HpCDD

Labeled compound recoveries

The labeled compound recoveries were within control limits.

Ongoing precision and recovery

OPR recoveries were within QC limits.

Laboratory control sample and LCS duplicate analysis

LCS and LCSD recoveries were within control limits with the following exceptions:

- LCS/LCSD-EQ110174-02/03: The recoveries for 1,2,3,7,8-PeCDF fell below the control limits. Results for 1,2,3,7,8-PeCDF in the associated samples (WS-1-A, WS-1-B, WS-1-C, WS-1-D, WS-1-E, WS-2-A, WS-2-B, WS-2-C, WS-2-D, WS-2-E, WS-3-A, WS-3-B, WS-3-D, WS-3-E, WS-4-A, and WS-4-B) were qualified as estimated (J).
- LCS/LCSD-EQ110184-02/03: The recoveries for 1,2,3,7,8-PeCDF fell below the control limits. Results for 1,2,3,7,8-PeCDF in the associated samples (WS-3-C, WS-4-C, and WS-4-D) were qualified as estimated (J).
- LCSD-EQ110184-03: The recovery for 1,2,3,7,8-PeCDF fell slightly below the control limits. The recovery for that analyte in the LCS fell within the control limits. As the LCS passed, no associated sample results were qualified.
- LCS/LCSD-EQ110194-02/03: The recovery for 1,2,3,7,8- PeCDF was slightly below laboratory control limits in the LCSD, but within control limits in the LCS. The recovery for 1,2,3,4,6,7,8-HpCDF exceeded laboratory control limits in the LCS, but fell within control limits in the LCSD. As recoveries were within control for one of the batch QC samples, associated sample results were not qualified.

Standard reference material (SRM) recovery

The recoveries of the SRM NIST-1944 fell within acceptance criteria with the following exceptions:

- 1,2,3,7,8,9-HxCDF: RPDs were not reported for this congener. No certified value for this congener is available, as NIST recently decertified the value.

- Batch EQ1100185: Due to a spiking error, no SRM results were reported for this batch. The associated LCS and LCSD recoveries were within control limits.

Initial calibration curves and continuing calibration verification checks (CCVs)

The initial calibration curves and CCVs were within acceptance criteria.

Sample qualifiers

Multiple compounds in the samples were qualified by the laboratory when ion abundance ratios fell outside quality control limits. The K qualifiers were reported as non-detect (U) for individual analytes and results qualified as UK.

When 2,3,7,8-TCDF was detected on the DB-5 column, confirmation analyses were performed on a second column (DB-225). The results from both the DB-5 column and the DB-225 column were included in the data package, and the results from the DB-5 column were qualified as "C." The results from the DB-225 analyses were reported for 2,3,7,8-TCDF in the samples, and the "C" qualifier was removed.

When OCDD and/or OCDF results exceeded the calibration range at the instrument, the laboratory did not reanalyze the sample at dilution, but qualified the results as estimated (E). The E qualifier was changed to J in the following samples:

- CH-1-C: OCDD
- BA-1-E: OCDD
- BA-4-B: OCDD
- GT-3-D: OCDD
- GT-4-D: OCDD

Multiple compounds were qualified by the laboratory with P due to interferences from chlorodiphenyl ethers. The P qualifiers were changed to J (estimated) in the following samples:

- BA-1-A: 1,2,3,7,8-PeCDF and 2,3,4,6,7,8-HxCDF
- BA-1-B: 1,2,3,7,8-PeCDF and 1,2,3,6,7,8-HxCDF
- BA-1-C: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- BA-1-D: 1,2,3,7,8-PeCDF
- BA-1-E: 1,2,3,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; and 2,3,4,6,7,8-HxCDF
- BA-2-A: 1,2,3,7,8-PeCDF and 2,3,4,6,7,8-HxCDF
- BA-2-B: 1,2,3,7,8-PeCDF
- BA-2-C: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- BA-2-D: 1,2,3,7,8-PeCDF
- BA-2-E: 1,2,3,7,8-PeCDF and 1,2,3,6,7,8-HxCDF

- BA-3-A: 1,2,3,7,8-PeCDF and 1,2,3,6,7,8-HxCDF
- BA-3-B: 1,2,3,7,8-PeCDF and 1,2,3,6,7,8-HxCDF
- BA-3-C: 1,2,3,7,8-PeCDF and 2,3,4,7,8-PeCDF
- BA-3-D: 1,2,3,7,8-PeCDF and 2,3,4,6,7,8-HxCDF
- BA-3-F: 1,2,3,7,8-PeCDF
- BA-4-A: 1,2,3,7,8-PeCDF
- BA-4-B: 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,6,7,8-HxCDF; and 2,3,4,6,7,8-HxCDF
- BA-4-D: 1,2,3,7,8-PeCDF
- GT-1-A: 1,2,3,7,8-PeCDF
- GT-1-B: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- GT-1-C: 1,2,3,7,8-PeCDF
- GT-1-D: 1,2,3,7,8-PeCDF
- GT-1-E: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- GT-2-A: 1,2,3,7,8-PeCDF
- RA-1-A: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- RA-1-B: 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; and 1,2,3,4,7,8-HxCDF
- RA-1-C: 1,2,3,7,8-PeCDF
- RA-1-D: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- RA-1-E: 1,2,3,7,8-PeCDF
- RA-2-A: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- RA-2-B: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- RA-2-C: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- CH-1-A: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- GT-3-A: 1,2,3,7,8-PeCDF; 1,2,3,6,7,8-HxCDF; and 2,3,4,6,7,8-HxCDF
- GT-3-B: 1,2,3,7,8-PeCDF
- GT-3-D: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- GT-3-E: 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; and 1,2,3,4,7,8-HxCDF
- GT-4-A: 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; and 2,3,4,6,7,8-HxCDF
- GT-4-B: 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; and 1,2,3,4,7,8-HxCDF
- GT-4-C: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF

- GT-4-D: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- GT-4-E: 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; and 2,3,4,6,7,8-HxCDF
- RA-3-A: 1,2,3,7,8-PeCDF
- RA-3-B: 1,2,3,7,8-PeCDF
- RA-3-C: 1,2,3,7,8-PeCDF
- RA-3-D: 1,2,3,7,8-PeCDF and 2,3,4,6,7,8-HxCDF
- RA-3-E: 1,2,3,4,7,8-HxCDF
- RA-4-A: 1,2,3,7,8-PeCDF
- RA-4-C: 1,2,3,7,8-PeCDF
- SP-1-A: 1,2,3,7,8-PeCDF and 2,3,4,7,8-PeCDF
- SP-2-A: 1,2,3,7,8-PeCDF
- SP-2-B: 1,2,3,7,8-PeCDF
- SP-3-A: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- SP-10-A: 1,2,3,7,8-PeCDF
- SP-10-B: 1,2,3,7,8-PeCDF and 2,3,4,6,7,8-HxCDF
- CH-1-C: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- CH-1-D: 1,2,3,4,7,8-HxCDF
- CH-2-A: 1,2,3,7,8-PeCDF; 1,2,3,6,7,8-HxCDF; and 2,3,4,6,7,8-HxCDF
- CH-2-B: 1,2,3,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; and 2,3,4,6,7,8-HxCDF
- CH-2-C: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- CH-2-D: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- CH-2-E: 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF
- CH-3-A: 1,2,3,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; and 2,3,4,6,7,8-HxCDF
- CH-3-B: 1,2,3,7,8-PeCDF
- CH-3-E: 1,2,3,7,8-PeCDF
- CH-4-A: 1,2,3,7,8-PeCDF
- CH-4-C: 1,2,3,7,8-PeCDF
- CH-4-D: 1,2,3,7,8-PeCDF