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Port Gardner Bay Regional Background Sediment Characterization

Everett, WA

Final Data Evaluation and Summary Report

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Port Gardner Bay
Regional Background Sediment Characterization

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Table of Contents

Appendices (A – D, F, and G available at: www.ecy.wa.gov/biblio/1409339.html)

List of Figures and Tables

List of Figures

List of Tables

List of Acronyms

AOI	Area of Interest
ARI	Analytical Resources Inc.
Axys	Axys Analytical Ltd.
CoC	chemical of concern
CRM	certified reference material
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSL	Cleanup Screening Level
DGPS	differential global positioning system
DMMP	Dredged Material Management Program
DQO	data quality objectives
Ecology	Washington State Department of Ecology
EMPC	estimated maximum potential concentration
EPA	U.S. Environmental Protection Agency
KM	Kaplan-Meier
MCD	minimum covariance determinant
MDL	method detection limit
MLLW	mean lower low water
MTCA	Model Toxics Control Act
NAD83	1983 North American Datum
OCDF	octachlorodibenzodioxin
PCA	principal component analysis
PCB	polychlorinated biphenyl
Phase I	regional background samples collected in 2013
Phase II	regional background samples collected in 2014
PQL	practical quantitation limit
PSEP	Puget Sound Estuary Program
PSRM	Puget Sound reference material
QA/QC	Quality Assurance/Quality Control
RPD	relative percent difference
RSD	relative standard deviation
SAP	Sampling and Analysis Plan
SCO	Sediment Cleanup Objective
SCUM II	Sediment Cleanup User's Manual II
SDL	sample specific detection limit
SIM	select ion monitoring
SMS	Sediment Management Standards
SRM	standard reference material
TCDD	2,3,7,8-Tetrachlorodibenzodioxin
TEC	toxic equivalent concentration

TEF	toxic equivalent factor
TEQ	toxic equivalent quotient
TOC	total organic carbon
UCL	upper confidence limit
UTL	upper tolerance limit
WAC	Washington Administrative Code
WHO	World Health Organization

1.0 Introduction

Port Gardner Bay is one of several embayments identified for focused sediment investigation, cleanup, and source control under the Washington State Department of Ecology (Ecology) Toxics Cleanup Program's Puget Sound Initiative. In early 2013, Ecology revised its Sediment Management Standards (SMS) to establish a new framework for identification and cleanup of contaminated sediment sites (Washington Administrative Code [WAC] 173-204). A key component of this framework was the concept of regional background sediment concentrations, which could potentially serve as the Cleanup Screening Level (CSL) for sediment sites.

Initial efforts were made in 2013 to collect samples representative of regional background from Port Gardner Bay (Phase I). However, as Ecology's approach to evaluating regional background evolved due to internal review, tribal and stakeholder review, and public comment, portions of this data set were determined to be unrepresentative of regional background and not consistent with the intent of the SMS rule (WAC 173-204-505(16) and 173-204-560(5)). For example, samples collected from the Snohomish River delta were determined to be more representative of natural background (WAC 173-204-505(11)). As a result, Ecology identified new areas representative of regional background which included adding areas closer to the shoreline and removing Phase I areas influenced by the Snohomish River Delta for supplemental sampling. This supplemental sampling occurred in 2014 (Phase II). This report presents the combined sampling data from Phases I and II for calculation of regional background for Port Gardner Bay. Lessons learned during sampling and evaluation of these results will serve as one example to inform sample location placement and study design for future regional background characterization work in other areas of the state.

1.1. Regional Background Definition

For a number of bioaccumulative chemicals, risk-based values protective of human health and upper trophic levels fall below natural background concentrations, as defined in the SMS (WAC 173-204-505(11)). Sediments are a sink for chemicals from potentially hundreds of sources, including a mix of permitted and unpermitted stormwater, atmospheric deposition, and historical releases from industrial activities. In urban embayments with developed shorelines, chemical concentrations in sediment are frequently higher than natural background concentrations.

The 2013 SMS rule revisions retained the two-tiered framework used to establish sediment cleanup levels, but now incorporates natural background (as the potential Sediment Cleanup Objective (SCO)) and a new term and concept, regional background as the potential CSL. The SMS rule includes a definition for regional background (WAC 173-204-505(16)) and parameters for establishing regional background (WAC 173-204-560(5)):

> *"Regional Background" means the concentration of a contaminant within a department-defined geographic area that is primarily attributable to diffuse sources, such as atmospheric deposition or storm water, not attributable to a specific source or release.*

The SMS rule is intended to provide flexibility to establish regional background on a case-by-case basis and does not specifically prescribe how regional background should be established. The approach and methods contained in the Phase I and Phase II Port Gardner Bay Regional Background Sampling and Analysis Plans (SAP; Ecology 2013a, Ecology 2014) were developed by Ecology to establish regional background concentrations for selected analytes: arsenic, cadmium, mercury, carcinogenic polycyclic hydrocarbons (cPAHs), dioxins/furans, and polychlorinated biphenyls (PCBs) in Port Gardner Bay. This study serves as one example of how regional background concentrations can be established in a particular Ecology-defined geographic area.

Ecology's approach to establishing regional background has evolved over time through working on initial bays and after receiving comments from stakeholders and tribes, as described below.

1.2. Stakeholder Discussions

In 2013, Ecology received a number of comments from stakeholders and tribes on the Phase I Port Gardner Bay Regional Background SAP (Ecology 2013a) and the North Olympic Peninsula Regional Background SAP (Ecology 2013c), some of which were incorporated into the final SAPs. Many stakeholders requested that for future regional background characterizations, they would like to work with Ecology before SAPs were drafted and submitted for public comment. In response, Ecology engaged stakeholders earlier in the process for the initial discussions regarding establishing regional background for Elliott Bay and/or the Lower Duwamish River and Bellingham Bay.

The early involvement for Elliott Bay/Lower Duwamish River included conducting a series of interviews with key regional stakeholders in June 2013 to prepare for a September 2013 technical workshop to 1) discuss whether to establish regional background in Elliott Bay and/or the Lower Duwamish River, 2) share information and data, including stakeholder and Ecology presentations, and 3) collaboratively work on the sampling design, which included discussion of alternative sampling approaches for both areas. In addition, Ecology received a number of follow up comment letters after this technical workshop.

Subsequently, the Phase I Port Gardner Bay data package containing the data, graphs, figures, and limited data interpretation was provided to stakeholders and tribes on August 5, 2013 for review and comment. Ecology received a number of comments on the Port Gardner Bay data package, as well as concurrent discussions related to regional background sampling in the North Olympic Peninsula.

Based on all of the above comments and discussions, Ecology determined that some modifications to the Phase I Port Gardner Bay sampling design were appropriate. These changes were incorporated into the Phase II Port Gardner Bay SAP (Ecology 2014) and the revised approach will be updated in the Sediment Cleanup Users Manual II guidance (SCUM II, Ecology 2013b).

The following major modifications were incorporated into the Phase II SAP for Port Gardner Bay:

- **Rationale and Conceptual Bay Model.** A discussion of the selected analytes, existing information used to develop the sampling area of interest, and the rationale for the selected sampling method(s). These choices were based on a conceptual bay model developed for Port Gardner Bay and key features of the bay that influenced these decisions. These include known sites and sources, existing chemistry data, existing modeling information, hydrodynamic information, bathymetry, etc.
- **Sampling Area.** The area in which the Phase II sediment samples were collected was modified to be more consistent with the SMS definition of regional background (WAC 173-204-505(16)). The Phase I areas more representative of natural background were excluded, while new areas representative of regional background were added. This entailed sampling closer to the shoreline, sources, and sites, while remaining outside areas of direct influence from known or suspected sources for the regional background CoCs (WAC 173-204-560(5)(d)). A default distance from these areas was no longer used. Instead, bay-specific information was used, where available, to determine areas associated with the depositional zones of outfalls or other point sources and areas directly affected by sites. Accordingly, the Phase II SAP included collection of samples in nearshore areas that were not sampled in Phase I (Ecology 2013a, Ecology 2014). This was done in such a way that the data were able to be statistically combined with the Phase I samples collected in 2013.

This new approach and lessons learned have been applied to the SAP design for Bellingham Bay, in addition to bay-specific modifications.

1.3. Phase II Area of Interest

Regional background concentrations for Port Gardner Bay were determined based on data from samples collected within the Phase II area of interest (AOI; Figure 1). Portions of this AOI boundary were consistent with the Phase I SAP, while the northern and eastern boundaries were modified as discussed above. Based on the conceptual bay model, the Phase II AOI was defined as follows:

- The southwestern boundary was established as in Phase I and was drawn far enough west to include the depositional area around the Dredged Material Management Program (DMMP) disposal site.
- The open-water DMMP disposal site itself was excluded as recent disposal events consisted of clean sand and gravel from the Snohomish River maintenance dredging and would not be reflective of regional background.
- Many of the samples from Phase I were collected from the Snohomish River Delta. While the Snohomish River provides much of the total deposition to Port Gardner Bay, it may not be representative of regional background because it is relatively coarse-grained and low in chemical concentrations. The northern boundary was roughly defined as the southern extent of coarse-grained particulate deposition from the Snohomish River, corresponding approximately to a contour line marking 30 percent fines. All areas south of this line were retained.
- Deeper areas with elevated percent fines northwest of the Snohomish Delta were not considered representative of regional background from the urbanized shoreline and were excluded from the Phase II AOI.
- The southeast boundary was moved to -6 ft mean lower low water (MLLW) along the shoreline south of the Weyerhaeuser Mill Site as there were no apparent depositional areas from sources present in this area. This water depth was selected for logistical sampling reasons.
- East Waterway and areas outside of the mouth of East Waterway north of a line from the south end of the Weyerhaeuser Mill site extending to the western tip of the Everett Naval Station Pier were excluded to avoid the direct influence of known sites.
- The AOI was not extended east of Jetty Island, as much of this area is either intertidal or part of the navigational channel.

The Phase II AOI boundary is presented in Figure 1. The Phase I AOI boundary is included for comparison. Phase I samples that are no longer located within the Phase II AOI boundary were not included for calculation of regional background.

2.0 Sampling Methods and Analysis

Phase I sediment sampling was conducted from March 26 through March 29, 2013. Phase II sampling was conducted April 22 and 23, 2014. For both phases, sampling was conducted within the respective AOI shown in Figure 1. The target locations were mapped within each AOI such that no samples would be collected within 500 meters of each other (Ecology 2013a, Ecology 2014).

Sediment collection within the AOI consisted of two types of samples, baseline and secondary. The same volume of sediment was collected for both sample types following the same collection methodologies. The difference between the sample types was that baseline samples were submitted for analysis of the full suite of chemicals, while secondary samples were initially analyzed for mercury and total sulfides due to short holding times. Secondary samples were also analyzed for grain size to better characterize the physical characteristics of the AOI and to aid in the selection of secondary samples for potential analysis. The remainder of the sediment from the secondary samples was archived for potential future analysis. Sample counts for each phase are as follows:

- 25 baseline samples and 25 secondary samples were collected as part of Phase I. 15 of these sample locations were located within the Phase II AOI and were incorporated into the Phase II data set.
- 12 new baseline and 3 new secondary samples were collected as part of Phase II.

A total of 27 baseline samples and 3 secondary samples were integrated into the Phase II dataset. The target sampling locations were randomly placed throughout the AOI to ensure a minimum distance of 500 meters between sampling locations.

2.1. Station Positioning and Navigation

The R/V *Kittiwake* was used for the surface sediment grabs for both phases of sampling. A differential global positioning system (DGPS) was used aboard the R/V *Kittiwake* for station positioning. The baseline and secondary sampling location target coordinates were provided in advance and programmed into the R/V *Kittiwake's* navigation system. Upon sampling device deployment, the actual position was recorded once the device reached the seafloor and the winch cable was in a vertical position. Latitude and longitude station coordinates were recorded in degrees decimal minutes using the 1983 North American Datum (NAD83). Water depths were measured using the winch meter wheel and verified by the ship's fathometer. Table 1 provides the actual coordinates, water depths, and distance between the target and actual locations for the baseline and secondary sample locations, respectively. Figure 2 shows the actual locations for the baseline and secondary samples, respectively, and notes whether the samples were collected as part of Phase I or II.

There were two instances where a grab could not be collected at the target location. The first two grabs at PG-12-S were mostly washed out and contained rocks and shell hash. A successful grab was collected on the third attempt approximately 300 meters south of the target location (Table 1). Multiple efforts were made to collect a grab in the vicinity of PG-56-S. However, the grab could not close due to the presence of large woody debris and cobble. A successful grab was collected 293 meters north of the target (Table 1).

2.2. Surface Sediment Grabs

Surface sediment grabs were collected at 30 locations; 15 as part of Phase I and 15 as part of Phase II. All samples were collected using a stainless steel van Veen grab sampler deployed as either a dual or single bucket (0.1 m^2 per bucket). Sampling followed the step wise procedure outlined in the SAP (Ecology 2013a, Ecology 2014). Notes related to sampling activities are presented in Appendix A. A brief summary of field sampling methods is provided below.

Established deployment and recovery procedures for the grab sampling gear, described by the Puget Sound Estuary Program (PSEP), were followed to ensure recovery of the best possible samples and minimize risks to personnel and equipment (PSEP 1997). Once a grab sample was retrieved, the overlying water was carefully siphoned off one side of the sampler. If the sample was judged to be acceptable according to PSEP specifications, the penetration depth was measured with a decontaminated stainless steel ruler, and sample quality, color, odor, and texture were described in the sample log. Scanned copies of the surface sediment grab logbook are presented in Appendix B.

The target depth for surface sediment collection was 10 cm. Only two samples, PG-01-S and PG-53-S, with penetration depths of 9.5 cm did not meet the target depth. There was slight over penetration in PG-44-S, however very little surface sediment was disturbed and the grab was deemed acceptable.

Percent fines were determined at each location by rinsing 40 ml of sediment through a 63.5 µ sieve until the water was clear. Percent fines are equal to 40 minus the volume of remaining sediment divided by 40. The amount of sediment retained on the sieve was recorded in the surface sediment grab logbook (Appendix B).

2.3. Sample Storage, Delivery, and Chain of Custody

After filling the jars with homogenized aliquots of sediment, all samples were labeled and the lids were wrapped with electrical tape to seal the jars and prevent leakage. Each label was marked with a jar tag number for tracking purposes. Sample identification and jar tag numbers were recorded in the sample container logbook (Appendix C).

After labeling, all samples were stored in insulated coolers and preserved by cooling to a temperature of 4ºC.

Samples were picked up by or delivered to Analytical Resources Incorporated (ARI; Tukwila, WA), while samples were shipped to Axys Analytical (Sidney, BC). Archived sediment from the Phase I secondary samples were stored at the Environ biological laboratory in Port Gamble, WA and disposed of after one year. Select Phase I secondary samples were removed from archival and submitted for analysis of the full suite of chemicals (Section 2.3.1). Archived sediment from the Phase II secondary samples were submitted to ARI. All archived samples were frozen at -18°C. The Chain of Custody forms for all samples are presented in Appendix D.

2.3.1. Laboratory Analysis

Samples were submitted to laboratories subcontracted by NewFields to conduct the chemical analyses. Axys analyzed the samples for dioxin/furan and PCB congeners. ARI analyzed samples for the sediment conventionals (total organic carbon [TOC], total solids, total volatile solids [TVS], grain size, and total sulfides), arsenic, cadmium, mercury, and cPAHs. Table 2 presents a list of all samples collected as part of the Phase II effort and includes the relevant analytical methods.

Within Table 2, samples PG-27, PG-28, PG-31, and PG-34 were secondary samples collected in 2013 as part of Phase I but analyzed separately from the remainder of the Phase I and II samples. These samples were analyzed for PCB congeners in 2013 due to the need for a larger sample size (Section 5.2). Archived sediment from these locations was submitted to ARI for analysis of arsenic, cadmium, and cPAHs. Archived sediment was submitted to Axys Analytical for analysis of dioxin/furan congeners. All archived samples were submitted in March 2014 and were received by the laboratories and extracted prior to the expiration of the one year holding time.

Additional samples collected for quality assurance/quality control (QA/QC) purposes are listed in Table 2. Full duplicates and triplicates were collected at locations PG-10 and PG-65. Rinsate blanks and equipment rinsate samples for metals and cPAHs were also collected as part of field sampling for both phases. Further details relating to chemical analysis can be found in the SAPs (Ecology 2013a, Ecology 2014).

Because of expected low concentrations, the data quality objectives (DQOs) used in this study were more stringent than those required for most sediment characterizations. As a result, the target practical quantitation limits (PQLs) for analysis were lower than most standard methods could provide. The PQLs for the analytes are listed in Table 3. This table includes the PQLs for the dioxin-like PCB congeners. The PQLs for the non-listed PCB congeners were all 0.4 ng/kg. The PQLs for the conventional parameters and the full list of PCB congeners can be found in the SAP (Ecology 2013a, Ecology 2014).

All non-detect sample results for cPAHs were reported to the method detection limit (MDL) and detected results less than the target PQL were “J” qualified. All non-detect results for metals

were reported at the PQL. Metals data are not qualified below the PQL. Non-detect results for dioxin/furan and PCB congeners were reported at the sample specific detection limit (SDL). All detected congener results less than the PQL were "J" qualified.

Laboratories do not provide PQL values for toxicity equivalent (TEQ) concentrations. Instead, these values were calculated for cPAHs, dioxin/furan congeners, and PCB congeners using the toxicity equivalency factors (TEF) from SCUM II for determining TEQ values (Ecology, 2013b) and the individual compound or congener specific PQLs in Table 3. The Ecology guidance for determining TEQs uses the dioxin/furan TEF values updated by the World Health Organization (WHO) in 2005 (Van den Berg et al. 2006). The resulting PQL for cPAHs was 0.76 µg TEQ/kg. The PQLs for dioxin/furan and PCB congeners were 2.3 and 0.052 ng TEQ/kg, respectively.

Cadmium was analyzed by Environmental Protection Agency (EPA) Method 200.8, which dictates results be reported at two significant figures for concentrations under 10 mg/kg. To meet this criterion, ARI reported cadmium concentrations below 10 mg/kg to one decimal place. However, this reporting system means concentrations less than 1 mg/kg contain only one significant figure. Many of the cadmium concentrations reported for this background study were below 1 mg/kg, meaning results are listed at one significant figure in the data packages in Appendix F. ARI was able to provide the metals analysis sheets that contain additional decimal places for cadmium. Cadmium concentrations measured to two decimal places were taken from these sheets and used in the final data tables (Appendix E) and the reporting and statistical analysis discussions.

3.0 Data Validation

A QA2 (EPA Stage 3/4) chemistry data review was conducted by EcoChem, Inc. (Seattle, WA) who examined the complete analytical process from calculation of instrument and method detection limits, PQLs, final dilution volumes, sample size, and wet-to-dry ratios to quantification of calibration compounds and all analytes detected in blanks and environmental samples (PTI 1989a; PTI 1989b; USEPA 2009). The intent of the independent data validation was to ensure that the investigation data results are defensible and usable for their intended purpose. This section provides a brief summary of the data validation reports for the Phase I and II analysis. Two validation reports were completed for Phase I including one for the initial round of analysis and another for the PCB congeners analyzed from the secondary samples. The full validation reports are provided in Appendix G.

When necessary, EcoChem applied the following data qualifiers to the chemical results:

- U: The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- UJ: The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte.
- J: The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte. “J” qualifiers were assigned by the laboratories for results less than the PQL and greater than the MDL, or by EcoChem for results that failed to meet study specific QA/QC criteria.
- DNR: Do not report. A more appropriate result is reported from another analysis or dilution.

The use of the DNR qualifier was limited to selecting the appropriate results for 2,3,7,8-TCDF, as results were reported for analysis on two separate columns. The remainder of the data was usable. Reason codes for applying the “U,” “UJ,” and “J” qualifiers and the definition for these codes are given in the validation reports (Appendix G).

Several qualifiers given by Axys were reclassified by EcoChem. Axys gave a “B” qualifier to all results where the analyte was detected in the method blank. EcoChem established an action level of five times the blank concentration. If a sample result was above that, the “B” qualifier was removed. If the result was below the action level, the result was qualified as un-detected (“U”).

The laboratory assigned “K” qualifiers to dioxin/furan and PCB congener data. This qualifier implied that a peak was detected, but did not meet identification criteria. These data were considered estimated maximum possible concentrations (EMPC). All EMPC results were given a “U” qualifier by EcoChem, but remained at the reported concentration which represented an elevated PQL for that congener.

Project specific QA/QC measures were employed during sample collection and analysis to ensure the precision, accuracy, and reproducibility of the results. This included field QA/QC samples such as equipment rinsate blanks, rinsate blanks, and field duplicates and triplicates. Laboratory measures included the analysis of specific certified or standard reference materials (CRM; SRM).

The equipment rinsate blank and decontamination water rinsate blanks provided a quality control check on the potential for cross contamination by measuring the effectiveness of the sampling and processing decontamination procedures. Rinsate blank samples were collected for metals and PAH. None of these analytes were detected in the rinsate blank samples.

Field duplicates and triplicates were collected at the same time as the original samples using identical sampling techniques. Duplicate/triplicates were used to determine the precision of the sample collection process and determine the representativeness of the sample. Table 2 lists the specific duplicates and triplicates collected for this study.

The relative percent difference (RPD) was used to evaluate duplicate samples, while the relative standard deviation (RSD) was used to evaluate triplicates. In general, if the RPD or RSD was greater than 50 percent, the affected results of the duplicate/triplicate sample were "J" qualified. For the duplicate PG-10-S/D, the RPD for several of the dioxin/furan homologue groups and one PCB congener were greater than the control limit and these results were qualified. For duplicate PG-65-S/D, one dioxin homologue and seven PCB congeners were qualified for an elevated RPD.

Overall, the high precision of the field duplicates indicates that the study results were representative of the sediment they were collected from, which is important for reducing variability in the data set.

The NIST standard reference material 1944 was analyzed for dioxin/furan congeners with the Phase I baseline samples. The result for OCDF was less than the lower control limit, indicating potential low bias. OCDF was detected in all associated samples and results were qualified "J".

The recently developed Puget Sound standard reference material (PSRM) was submitted for analysis of PCB congeners in the Phase I secondary samples. The published acceptance criteria for this SRM are ±50 percent of the mean (http://www.nws.usace.army.mil/Missions/CivilWorks/Dredging/SRM.aspx). All acceptance criteria were met.

The PSRM was also submitted for analysis of dioxin/furan congeners with the Phase I secondary samples as well as dioxin/furan and PCB congeners with the Phase II samples. The results for 1,2,3,7,8,9-HxCDF were less than the lower control limit for both batches. With the exception of PCB 159, which was not detected, the reference material results fell within the control limits for PCB congeners. No results were qualified based on these outliers as the reference material is still undergoing evaluation and is not yet certified.

4.0 Data Results

A summary of the results from the laboratory analysis is provided in this section. The results are presented in terms of general usability by listing the number of undetected and qualified results for each analyte (Figure 3). The results of the conventionals analyses (grain size distribution and TOC) are presented in Figure 4. The spatial distributions of the measured analyte results throughout the AOI are presented in Figures 5 through 10. Complete data results are presented in Appendix E. Laboratory data packages are available electronically as Appendix F.

4.1. Calculation of Toxicity Equivalents

Calculation of the TEQ when many of the congener concentrations within a sample are reported below the detection limits can be problematic. A common approach is to substitute 0, ½, or 1 times the detection limit in place of a non-detected concentration. A more robust method for calculating total TEQs when non-detect values are present is the Kaplan-Meier (KM) approach, which is a statistical method for estimating a sum or mean when part of the population is censored (Helsel 2010, 2012). The methods for addressing non-detects, including KM, are discussed in greater detail in the SCUM II guidance, Chapter 6 (Ecology 2013b).

KM TEQs were calculated separately for the PCB congeners, dioxin/furan congeners, and cPAHs for each sample. The KM means reported for the TEQ data were calculated using R version 3.1.1 (R Core Team 2014) using the *cenfit* function from the NADA package (Lee 2013).The KM sum was calculated and the number and distribution of censored values was evaluated. The following rules were applied to the final KM TEQs:

- If the number of non-detect congeners within a sample exceeded 50 percent, the KM TEQ value was qualified as a less-than value (L qualified), followed by the number of censored congeners (see data tables in Appendix E). For example, if 12 of the 17 dioxin/furan congeners were undetected, the detection frequency was 29% and the KM TEQ would be calculated and qualified with L12.
- If the lowest detection limit for a non-detect was lower than all detected values, the positive bias in the KM estimate was adjusted downwards using Efron's bias correction (Klein and Moeschberger 2003). This method treats the lowest ranked value as detected even if it was reported as a non-detected data point.
- If the highest detection limit was greater than the highest detected value, the highest non-detect value provides no meaningful information and was ignored in the KM estimation of the mean. The highest toxic equivalent concentration (TEC) value is always treated as uncensored in the KM TEQ calculation, and the TEQ is qualified with an L if the original value was censored. All L-qualified TEQ values were treated as non-detects in the distributional assessments and when calculating summary statistics across samples.

Calculated KM TEQs are presented in the data tables in Appendix E along with the traditional 0, ½, and 1 detection limit substitutions. A brief comparison was made of the results from these four estimates of total TEQ.

The mean and 90th percentiles were calculated for each method. For cPAHs the mean and 90th percentiles each differed by less than 0.2 µg TEQ/kg regardless of the method used. The dioxin/furan TEQ mean differed between 2.14 and 2.32 ng TEQ/kg, while the 90th percentile ranged from 3.57 to 3.60 ng TEQ/kg.

Larger differences were noted for PCB TEQ due to the greater frequency of non-detects, but even these differences were small. PCB TEQ means ranged from 0.180 ng TEQ/kg for the 0 DL substitution to 0.226 ng TEQ/kg for the 1 DL substitution. The 90th percentiles ranged from 0.340 to 0.364 ng TEQ/kg. Given the small differences between the methods, the more statistically robust KM TEQ values are used in statistical summaries and analysis for the remainder of this report when discussing total TEQ concentrations.

4.2. Summary of Qualified Results

The DQOs for this study necessitated PQLs that were lower than those typically used in sediment investigations, as the intent of this regional background study is to obtain as few non-detects and as many unqualified results as possible. Too many non-detects could create a skewed distribution that would not meet the project requirements for precision (Section 5.2), while too many data qualified as estimated for a given analyte could result in an unreliable regional background concentration or one that is below the project-specific PQLs summarized in Table 3.

The number of qualified (both non-detect and estimated) results for each analyte are shown in Figure 3. Non-detect results are represented by dark blue and included all data given a qualifier flag of "U" or "UJ." Estimated values were given a qualifier flag of "J" and are represented by a medium blue color. A "J" qualifier indicates the result was considered an estimate either because the value was less than the PQL and greater than the MDL, or the data validation indicated QA/QC issues. The light blue color indicates sample results that were not qualified. The total sample counts in Figure 3 include the field duplicates and Phase II secondary samples for mercury. No Phase I samples analyzed solely for mercury were included in this report, as not all of these samples met the minimum distance criteria (500 m) from the new Phase II samples.

None of the arsenic results were qualified. Two results were qualified for cadmium as non-detect concentrations, with an additional 6 qualified as estimates. A total of 32 samples and 2 duplicates were analyzed for mercury. Five of these results were non-detects.

Most of the cPAH compounds were detected. Dibenz(a,h)anthracene had the most qualified results with 3 non-detects and 10 estimated results. The remainder of the cPAH compounds was detected in all samples. Benzo(a)pyrene is the most influential cPAH in terms of calculating the TEQ, as it has a TEF of 1. Benzo(a)pyrene concentrations were only qualified in 1 sample. The

total cPAH TEQ concentration was above the calculate PQL of 0.76 µg TEQ/kg in all samples (Figure 3).

Non-detects were more common with the dioxin/furan congeners. 2,3,7,8-TCDD and 1,2,3,7,8-PeCDD have the greatest impact on total TEQ (TEF of 1). These two congeners alone comprised nearly 35 percent of the total TEQ on average and were not detected in 14 and 2 samples, respectively. The hepta- and octa-chlorinated congeners were detected with the greatest frequency. These congeners had some of the highest concentrations, but also the lowest TEF values. Fourteen samples had a total TEQ less than the PQL of 2.3 ng/kg TEQ (Figure 3).

Of the dioxin-like PCBs, PCB-169 was not detected in any of the samples and PCB-81 was not detected in 16 samples. The remaining congeners were detected in at least 75 percent of samples. PCBs 77, 108, 114, 118, 156/157, and 167 were not qualified in any of the samples. The total PCB TEQ was less than the PQL of 0.052 ng/kg TEQ in only 2 samples (Figure 3).

Overall, the data quality for calculation of regional background is high as most of the analytes were detected and without qualifiers in more than 75 percent of the samples analyzed. Dioxin/furan congeners were an exception, with the total TEQ less than the target PQL in half the samples (14 samples).

4.3. Summary and Spatial Distribution of the Results

This section provides an initial evaluation of the sample results prior to the more in-depth statistical evaluation in Section 5.0. Therefore, no potential outliers have been removed from the summary statistics or spatial distribution figures. Discussion of the data is limited to simply describing the concentration range and spatial distribution of analytes measured in the bay.

Summary statistics including the minimum, median, average, and maximum concentrations for each analyte are presented in Table 4 for the combined regional background data set. Table 4 also includes the Pearson correlation coefficient (*r*-value) and its significance level (*p*-value) for correlations of each contaminant to percent fines and TOC. A more in depth evaluation of the grain size relationship is discussed in Appendix H.

Field duplicates and triplicates were averaged prior to mapping the spatial distributions and calculating the summary statistics in Table 4. Only detected concentrations were averaged for a given location. If all concentrations were non-detects, the maximum detection limit was used. Non-detect concentrations were included in the summary statistics using a PQL substitution for the metals. The TEQ values presented in this section were calculated using the KM method described in Section 4.1.

4.3.1. Conventional Parameters

Conventional parameters analyzed for this study included grain size, TOC, total solids, and TVS. Total sulfides were analyzed only in samples from Phase I and are not discussed here. All 30 samples (27 baseline and 3 secondary) were analyzed for grain size and TOC. Figure 4 presents combined results for the grain size distribution and percent TOC for the baseline locations. The segments of the pie charts represent the gravel, sand, silt, and clay fractions. The size of the pie chart is scaled to represent the percent TOC.

Percent fines primarily varied with bathymetry. Fines were higher in deeper locations representing the more depositional areas of Port Gardner Bay. Conversely, fines were lower along the steep, shallow southeastern boundary of the AOI and on the side slope of Hat Island and the Snohomish River Delta on the north side of the AOI.

Percent fines and TOC were correlated with $r = 0.753$ ($p < 0.0001$). As expected from this correlation, TOC concentrations were also highest in the deeper, more depositional portion of the AOI. Six of the 30 locations had TOC below 0.5 percent, while 2.44 percent was the highest value observed. TVS ranged between 1.15 and 7.09 percent. Concentrations were strongly correlated to percent fines ($r = 0.953$) and slightly less so to TOC ($r = 0.785$).

4.3.2. Metals

Arsenic concentrations ranged between 2.9 and 12 mg/kg, with a median of 8.5 mg/kg across the entire AOI. The three highest arsenic concentrations were at the western edge of the AOI at locations PG-04, PG-09, and PG-51 (Figure 5). Correlations of arsenic concentrations to percent fines and TOC were both significant (Table 4). The median cadmium concentration was 0.31, with statistically significant correlations to fines and TOC. The spatial distribution of cadmium is presented in Figure 6.

All 30 samples were analyzed for mercury. Concentrations ranged from non-detect up to 0.16 mg/kg at location PG-60 (Table 4). While this location did have the highest concentration, it is consistent with the elevated TOC at this site (Figure 7). The correlation of mercury to TOC had $r = 0.778$ and was statistically significant at $p < 0.0001$.

4.3.3. Organics

The measured cPAH concentrations ranged from 1.5 to 55 µg TEQ/kg, with a median of 33 µg TEQ/kg (Table 4). The spatial distribution of cPAH concentrations is shown in Figure 8.

The maximum dioxin/furan concentration was 3.9 ng TEQ/kg, measured at both locations PG-60 and PG-55 (Figure 9). The median concentration across the AOI was 2.5 ng TEQ/kg. Dioxin/furan congener TEQs had the highest correlations to percent fines ($r = 0.879$) and TOC ($r = 0.782$) of all of the analytes. Both correlations were statistically significant (Table 4).

The PCB congener TEQ is based on the toxicity of dioxin/furan congeners. However, the TEFs for PCBs are lower than those of dioxin/furan congeners, resulting in lower TEQs. PCB

congener TEQs had a median concentration of 0.22 ng TEQ/kg and a maximum concentration of 0.38 ng TEQ/kg (Table 4) at PG-21 (Figure 10). Like the other analytes, PCB congener TEQ values were correlated to both TOC and percent fines.

4.3.4. Chemical Distribution Summary

Overall, the physical and chemical distributions shown on Figures 4 through 10 indicate the following patterns and similarities:

- Lower concentrations in the Snohomish River delta and along the southwestern shoreline in coarse-grained areas.
- Somewhat higher concentrations in deeper areas with higher fines and TOC.
- Strong or moderate correlations of all chemicals to percent fines and TOC.
- Randomly distributed elevated concentrations in the deeper areas consistent with a regional background distribution. In other words, the data did not show trends away from source areas or geographic features.

These chemical distributions suggest that the AOI did not contain areas directly affected by sites or sources and variations in the data were primarily correlated with geologic characteristics of the sediments. These features confirm the overall data set as appropriate for calculation of regional background concentrations, subject to individual outlier analysis as presented in Section 5.3.

5.0 Data Analysis

This section describes the approach used to evaluate the combined Phase I and Phase II results for Port Gardner Bay with the objective of calculating regional background sediment concentrations.

5.1. Natural Background for Port Gardner Bay

This section describes the natural background data set defined by SCUM II (Ecology, 2013b) for use in Puget Sound. Comparison to this natural background data set was important for determining the need to analyze secondary samples, determining which analytes are elevated above natural background, and evaluating potential outliers.

Ecology has determined that data from the OSV Bold Survey (DMMP 2009) plus select data sets from reference areas (Bold Plus) are appropriate for use as natural background for sites throughout Puget Sound. Bold Plus consists of the 70 samples collected as part of the OSV Bold Survey and analyzed for the full suite of analytes plus additional samples from reference areas. The "plus" samples do not include all analytes as the OSV Bold survey, limiting their utility in multivariate analysis (Appendix H). The Bold Plus data set was used for comparison with the Port Gardner Bay data set (Section 5.3 and Appendix H) to identify which analytes were present at concentrations above natural background. Information on the full suite of Bold Plus data can be found in SCUM II (Ecology, 2013b).

5.2. Potential Analysis of Secondary Samples

In both phases, sediment sampling was divided into baseline and secondary locations. Sediment from the secondary locations was archived after sample collection. Analysis of these samples would be conducted if a larger sample size was needed to supplement the baseline results. The flow chart in Figure 11 outlines the process followed for determining whether or not to analyze the secondary samples.

The first step in ensuring that the data set was sufficient to calculate regional background values was to evaluate the precision of the mean expressed as the width of the 95 percent upper confidence limit (95 UCL) of the mean, divided by the mean:

$$\text{Precision} = \frac{t_{0.05(1),df} S/\sqrt{n}}{\bar{X}}$$

where:

$\bar{X}$ = the arithmetic mean of the *n* baseline samples

$t_{0.05(1),df}$ = the 1-tailed critical value from the *t*-distribution, for *df* degrees of freedom and α = 0.05.

df = the degrees of freedom associated with the sample standard deviation (S). This is *n* -1, where *n* is the number of observations used to estimate the variance.

S = standard deviation of the sample = $\sqrt{\frac{\sum_{i=1}^{n}(X_i-\bar{X})^2}{(n-1)}}$

The precision of the mean expressed in this way is a common frame of reference for quantifying uncertainty in the population estimates necessary for calculation of the background threshold value.

A precision value of 25 percent was selected as a guideline. If this target was met, no additional analysis was needed. The precision for PCB congener TEQ samples from Phase I exceeded this target. Following the flow chart (Figure 11), the distribution of PCB congener TEQ was compared to the natural background and then compared to the PQL. The Phase I PCB TEQ concentrations exceeded natural background (step 2) and the PQL (step 3), respectively. It was determined that analysis of 10 additional samples would improve confidence in the upper tail of the data (step 4). Four of these 10 Phase I secondary samples fell within the Phase II AOI. These samples were PG-27, PG-28, PG-31, and PG-34. Prior to Phase II sampling, archived sediment from these four samples was submitted to the laboratories for analysis of the remaining analytes.

Only 3 secondary samples were collected with the Phase II data. The same process (Figure 11) was used to evaluate the potential analysis of these samples. Precision was acceptable for the baseline data (Table 5), and it was determined that no secondary samples needed to be analyzed for the Phase II data set.

5.3. Outlier Analysis

Ecology used a weight of evidence approach to identify and evaluate potential outliers and determine whether they should be excluded from the calculation of regional background as follows:

- A statistical analysis was conducted to identify potential outliers. This analysis included a variety of techniques, including Q-Q plots, box plots, univariate outlier tests appropriate to the distribution, and the bivariate and multivariate exploratory analyses described in Appendix H.
- The bay-specific distribution was compared to the Bold Plus natural background distribution, both visually for the entire distribution and with respect to their calculated 90/90 UTLs. For future work, this comparison may be conducted as the first step, since any analytes that fall entirely within natural background need not be considered further for the purposes of calculating regional background.

- If the distribution for an analyte was within the natural background distribution, the analyte and any potential outliers associated with it are not evaluated further. Alternatively, if the bay-specific distribution for an analyte appears to exceed natural background, any potential outliers within that distribution are evaluated further.
- If a station is elevated for any analyte and determined to be directly influenced by a current or historical source, the analyte(s) from that station that may be associated with the source may be excluded from the calculation of regional background.
- If a station is elevated for any analyte, but not directly impacted by a current or historical source, other factors that may explain the elevated value(s) are considered. This may include gradients or patterns in the data set for that analyte (or lack thereof), correlations with natural geologic factors (grain size, TOC), sediment transport processes, etc.
- The 90/90 UTL of the data set was calculated with and without any elevated values and/or statistically identified outliers. If the resulting 90/90 UTL calculated values are within the range of analytical variability or are not analytically different from one another, Ecology may decide to retain the analytes in the calculation of regional background.
- Ecology may also choose to analyze supplemental samples (if available) to fill data gaps in the upper tail of the distribution.

The following discussion presents the results of this approach for the Port Gardner Bay Phase II data set. Three different approaches were used to identify unusual data points in the Port Gardner Bay data set: univariate, bivariate, and multivariate. The univariate investigations were used to evaluate the distribution of each analyte independently. The bivariate investigations were used to evaluate whether a given result was elevated relative to the percent fines or TOC content. The multivariate investigations were used to evaluate the collective distributions of all analytes within the Port Gardner Bay data set to identify samples that had unusual chemical patterns. Of these three approaches, only the univariate analysis summarized in this section was used to identify potential outliers for possible exclusion from the calculation of the regional background values. The bivariate and multivariate analyses are summarized in Appendix H and were strictly exploratory in nature.

Each analyte was evaluated to describe the best-fit distribution of the data and identify values that may be unduly influential or represent outliers. Data for each analyte from the Port Gardner Bay data set were also evaluated alongside the range of concentrations present in the Bold Plus natural background data set. A summary of results for each analyte is presented in Tables 4 and 5. A full description of these investigations is presented in Appendix H, with the key findings presented below:

- Sample PG-60 was identified as a potential outlier for cadmium by the univariate outlier test. The cadmium concentration for this sample (0.61 mg/kg) was elevated for the Port Gardner Bay data set. However, this value was still within the Bold Plus natural background distribution (i.e., the natural background 90/90 UTL is 0.79 mg/kg).

- Arsenic and mercury from Port Gardner Bay presented no potential outliers and all concentrations were within the range of natural background.
- cPAH, dioxin/furan, and PCB TEQs presented no potential outliers. The concentration ranges for all three of these analytes from Port Gardner Bay overlapped with natural background, but the Port Gardner Bay samples showed a tendency for higher concentrations (especially for cPAH and PCB TEQs).

The only identified potential outlier was for the cadmium concentration of 0.61 mg/kg (sample PG-60). However, this concentration, along with the rest of the cadmium data, was less than the natural background 90/90 UTL of 0.79 mg/kg (Table 6). Therefore, this data point was not removed from the calculation of regional background.

5.4. Calculation of Port Gardner Bay Regional Background Values

Ecology uses the 90/90 UTL as the statistical metric to calculate regional and natural background values. Table 6 presents the calculated 90/90 UTLs for the Port Gardner Bay data set alongside the Bold Plus natural background values. All values were calculated in ProUCL 5.0 (USEPA 2013).

The Port Gardner Bay 90/90 UTLs for the metals were consistent with those of natural background. The Port Gardner Bay 90/90 UTL for arsenic was 12 mg/kg, compared to 11 mg/kg for the Bold Plus natural background. The Port Gardner Bay 90/90 UTLs for cadmium and mercury (0.52 and 0.14 mg/kg, respectively), were less than those of natural background (Table 6).

The Port Gardner Bay 90/90 UTL for dioxin/furan TEQ was slightly greater than natural background, but both were approximately 4 ng TEQ/kg, within analytical variability. The Port Gardner Bay PCB congener and cPAH TEQs had the highest 90/90 UTL concentrations relative to natural background. The Port Gardner Bay PCB 90/90 UTL of 0.38 ng TEQ/kg was almost two times the natural background of 0.20 ng TEQ/kg. The Port Gardner Bay cPAH 90/90 UTL of 56 µg TEQ/kg was more than three times higher than natural background.

The following conclusions regarding regional background values for Port Gardner Bay can be drawn from these results:

- The Port Gardner Bay 90/90 UTLs for arsenic, mercury, and dioxins/furans are consistent with natural background values, within the natural background data distribution, and within the range of analytical variability. Particularly for dioxins/furans, both analytical variability and the number of non-detects influence the ability to quantify and distinguish between similar values. Therefore, regional background values cannot be calculated for these analytes and natural background will be used in developing cleanup levels.

- The Port Gardner Bay 90/90 UTL for cadmium is lower than natural background despite the statistical outlier in the data set. This may reflect the smaller size of the Port Gardner Bay data set relative to the natural background data set. Smaller data sets are likely to have concentration gaps (fewer data points in the upper and lower tails of the distribution) that may appear to be outliers. Therefore, a regional background value cannot be calculated and natural background will be used in developing cleanup levels.

- The Port Gardner Bay 90/90 UTL for PCB TEQ is above natural background by approximately a factor of 2. Therefore, a regional background value of 0.38 ng TEQ/kg has been calculated.

- The Port Gardner Bay 90/90 UTL for cPAH TEQ is above natural background by approximately a factor of 3.5. Therefore, a regional background value of 56 µg TEQ/kg has been calculated.

6.0 References

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Tables

Table 1. Location depths, actual coordinates, distance from target, and percent fines for Port Gardner Bay Regional Background sampling.

StationID	Mudline Depth (m) (MLLW)	Easting (SPN NAD83)	Northing (SPN NAD83)	Latitude (NAD83)	Longitude (NAD83)	Distance from Target (m)
Phase I Sampling Locations						
PG-01	-2.9	1294561.2	366183.3	47.995173	-122.245975	1.0
PG-04	-141.6	1282895.2	359942.2	47.977470	-122.293130	0.0
PG-05	-134.0	1289501.7	361395.9	47.981795	-122.266272	1.0
PG-08	-134.4	1286128.8	358205.9	47.972878	-122.279797	1.0
PG-09	-138.6	1282984.9	363226.5	47.986477	-122.293018	1.0
PG-10	-1.9	1296197.8	366133.2	47.995118	-122.239288	1.0
PG-12	-128.6	1286221.6	365441.3	47.992715	-122.279973	299.0
PG-15	-137.7	1287724.7	356515.3	47.968327	-122.273153	3.0
PG-17	-154.6	1284397.0	354975.6	47.963935	-122.286617	0.0
PG-21	-112.9	1291055.8	358064.6	47.972743	-122.259675	3.0
PG-23	-83.8	1294535.2	361342.7	47.998350	-122.246168	1.0
PG-27*	-105.7	1291189.6	362990.5	47.986252	-122.259502	1.0
PG-28*	-0.3	1297799.3	364447.7	47.990578	-122.232623	1.0
PG-31*	-119.7	1289640.0	366322.9	47.995307	-122.266082	1.0
PG-34*	-145.7	1282846.2	358308.6	47.972990	-122.293203	2.0
Phase II Sampling Locations						
PG-51	-131.8	1281594.9	365390.9	47 59.5402	122 17.9317	13.2
PG-54	-93.8	1293078.0	360514.2	47 58.7736	122 15.0963	1.1
PG-55	-136.5	1284892.3	363805.7	47 59.2898	122 17.1165	5.5
PG-56	-85.4	1289809.4	354912.5	47 57.8424	122 15.8714	293.2
PG-57	-86.5	1294722.9	355593.4	47 57.9693	122 14.6713	0.6
PG-59	-33.2	1293081.2	353950.8	47 57.6942	122 15.0659	0.2
PG-60	-107.7	1294722.7	357232.1	47 58.2388	122 14.6787	0.2
PG-61	-137.6	1287750.5	363387.8	47 59.2299	122 16.4144	1.3
PG-62	-95.4	1296779.5	358460.5	47 58.4470	122 14.1805	2.2
PG-63	-125.1	1289396.0	358461.5	47 58.4248	122 15.9888	1.6
PG-64	-29.3	1285289.3	352719.9	47 57.4679	122 16.9681	0.4
PG-65	-69.2	1291849.1	365034.2	47 59.5132	122 15.4178	3.2
Phase II Secondary Locations						
PG-53	-8.0	1294722.7	363793.7	47 59.3179	122 14.7082	0.2
PG-52	-7.2	1291442.4	367076.9	47 59.8479	122 15.5267	0.8
PG-58	-28.2	1296366.3	362152.8	47 59.0530	122 14.2982	1.1

Notes:
*sample was initially collected as a secondary sample and later analyzed for the full suite of chemicals of potential concern (Section 5.2)

Table 2. Collected sediment samples, target analytes, and analytical methods.

Sampling Location	Sediment Conventionals[1]	Arsenic, Cadmium	Mercury	cPAH	Dioxin/Furan Congeners	PCB Congeners	Archive
Method	**PSEP**	**EPA 200.8**	**EPA 7471A**	**LL SIM 8270**	**EPA 1613B**	**EPA 1668A**	
PG-01	X[2]	X	X	X	X	X	A
PG-04	X[2]	X	X	X	X	X	A
PG-05	X[2]	X	X	X	X	X	A
PG-08	X[2]	X	X	X	X	X	A
PG-09	X[2]	X	X	X	X	X	A
PG-10	X[2]	X	X	X	X	X	A
PG-10-D	X[2]	X	X	X	X	X	-
PG-10-T	X[2]	-	-	-	-	-	-
PG-12	X[2]	X	X	X	X	X	A
PG-15	X[2]	X	X	X	X	X	A
PG-17	X[2]	X	X	X	X	X	A
PG-21	X[2]	X	X	X	X	X	A
PG-23	X[2]	X	X	X	X	X	A
PG-27*	X[2]	X	X	X	X	X	A
PG-28*	X[2]	X	X	X	X	X	A
PG-31*	X[2]	X	X	X	X	X	A
PG-34*	X[2]	X	X	X	X	X	A
PG-51	X	X	X	X	X	X	A
PG-54	X	X	X	X	X	X	A
PG-55	X	X	X	X	X	X	A
PG-56	X	X	X	X	X	X	A
PG-57	X	X	X	X	X	X	A
PG-59	X	X	X	X	X	X	A
PG-60	X	X	X	X	X	X	A
PG-61	X	X	X	X	X	X	A
PG-62	X	X	X	X	X	X	A
PG-63	X	X	X	X	X	X	A
PG-64	X	X	X	X	X	X	A
PG-65	X	X	X	X	X	X	A
PG-65-D	X	X	X	X	X	X	-
PG-65-T	X	-	-	-	-	-	-
PG-53	X[3]	A	X	A	A	A	A
PG-52	X[3]	A	X	A	A	A	A
PG-58	X[3]	A	X	A	A	A	A

Notes

A – archive **cPAH**-carcinogenic polycyclic aromatic hydrocarbons **PCB**-polychlorinated biphenyl **D**-duplicate **T**-triplicate

*sample was initially collected as a secondary sample and later analyzed for the full suite of chemicals of potential concern (Section 5.2)

1-sediment conventionals include total organic carbon (TOC), total volatile solids (TVS), total solids, and grain size distribution

2-sediment conventionals analysis also included total sulfides

3-only grain size was analyzed from the secondary locations, remaining sediment was archived

Table 3. Target analytes, methods, and practical quantitation limits.

Analyte	Preparation Method	Analytical Method	PQL
Metals (mg/kg DW)			
Arsenic	EPA 3050B/3051	EPA 200.8	0.5[a]
Cadmium	EPA 3050B/3051	EPA 200.8	0.1
Mercury	EPA 7471A	EPA 7471A	0.025
carcinogenic PAH (µg/kg DW)			
Benzo(a)pyrene	EPA 3546	EPA 8270 SIM LL	0.5
Benz(a)anthracene	EPA 3546	EPA 8270 SIM LL	0.5
Benzo(b)fluoranthene	EPA 3546	EPA 8270 SIM LL	0.5
Benzo(k)fluoranthene	EPA 3546	EPA 8270 SIM LL	0.5
Chrysene	EPA 3546	EPA 8270 SIM LL	0.5
Indeno(1,2,3-cd)pyrene	EPA 3546	EPA 8270 SIM LL	0.5
Dibenz(a,h)anthracene	EPA 3546	EPA 8270 SIM LL	0.5
cPAH TEQ[b]	--	--	0.76
PCB Congeners (ng/kg DW)			
PCB 77	EPA 1668A	EPA 1668	0.4
PCB 81	EPA 1668A	EPA 1668	0.4
PCB 105	EPA 1668A	EPA 1668	0.4
PCB 114	EPA 1668A	EPA 1668	0.4
PCB 118	EPA 1668A	EPA 1668	0.4
PCB 123	EPA 1668A	EPA 1668	0.4
PCB 126	EPA 1668A	EPA 1668	0.4
PCB 156	EPA 1668A	EPA 1668	0.8
PCB 157	EPA 1668A	EPA 1668	
PCB 167	EPA 1668A	EPA 1668	0.4
PCB 169	EPA 1668A	EPA 1668	0.4
PCB 189	EPA 1668A	EPA 1668	0.4
PCB Congener TEQ[b]	--	--	0.052
Dioxin/Furan Congeners (ng/kg DW)			
2,3,7,8-TCDD	EPA 1613B/3540C	EPA 1613B	0.2
1,2,3,7,8-PeCDD	EPA 1613B/3540C	EPA 1613B	1
1,2,3,4,7,8-HxCDD	EPA 1613B/3540C	EPA 1613B	1
1,2,3,6,7,8-HxCDD	EPA 1613B/3540C	EPA 1613B	1
1,2,3,7,8,9-HxCDD	EPA 1613B/3540C	EPA 1613B	1
1,2,3,4,6,7,8-HpCDD	EPA 1613B/3540C	EPA 1613B	1
OCDD	EPA 1613B/3540C	EPA 1613B	2
2,3,7,8-TCDF	EPA 1613B/3540C	EPA 1613B	0.2
1,2,3,7,8-PeCDF	EPA 1613B/3540C	EPA 1613B	1
2,3,4,7,8-PeCDF	EPA 1613B/3540C	EPA 1613B	1
1,2,3,4,7,8-HxCDF	EPA 1613B/3540C	EPA 1613B	1

Analyte	Preparation Method	Analytical Method	PQL
1,2,3,6,7,8-HxCDF	EPA 1613B/3540C	EPA 1613B	1
1,2,3,7,8,9-HxCDF	EPA 1613B/3540C	EPA 1613B	1
2,3,4,6,7,8-HxCDF	EPA 1613B/3540C	EPA 1613B	1
1,2,3,4,6,7,8-HpCDF	EPA 1613B/3540C	EPA 1613B	1
1,2,3,4,7,8,9-HpCDF	EPA 1613B/3540C	EPA 1613B	1
OCDF	EPA 1613B/3540C	EPA 1613B	2
Dioxin/Furan TEQ[b]	--	--	2.3

DW - dry weight TEQ - toxicity equivalent PQL - practical quantitation limit

Rose highlighting indicates the project specific PQL

a. Two possible ions are used for the quantification of arsenic, both with separate PQLs (0.2 and 0.5 mg/kg). The ion is dependent upon matrix and interferences. The higher PQL is listed.

b. TEQ values were calculate by multiplying the PQL by the appropriate TEF.

Table 4. Summary statistics and correlation to percent fines and total organic carbon (TOC) for target contaminants.

Location ID	Arsenic	Cadmium	Mercury	cPAH TEQ[1]	Dx/F TEQ[1]	PCB TEQ[1]
Units	**mg/kg**	**mg/kg**	**mg/kg**	**µg TEQ/kg**	**ng TEQ/kg**	**ng TEQ/kg**
Port Gardner Bay Phase II Data Set						
Sample Size[2]	27	27	30	27	27	27
Minimum	2.9	0.13	0.03	1.5	0.23	0.035
Average	7.8	0.31	0.081	30	2.2	0.21
Median	8.5	0.31	0.090	33	2.5	0.22
Maximum	12	0.61	0.16	55	3.9	0.38
Pearson's Linear Correlation to TOC						
r-value	0.635	0.526	0.778	0.712	0.782	0.749
p-value	0.0004	0.0048	<0.0001	<0.0001	<0.0001	<0.0001
Pearson's Linear Correlation to Percent Fines						
r-value	0.800	0.639	0.871	0.831	0.879	0.764
p-value	<0.0001	0.0003	<0.0001	<0.0001	<0.0001	<0.0001

Notes:

cPAH – carcinogenic polycyclic aromatic hydrocarbons **Dx/F** – dioxin/furan congeners **PCB** – polychlorinated biphenyl

1 - toxicity equivalency – calculated as described in Section 4.1

Table 5. Statistical summary of Port Gardner Bay Phase II data set.

Parameter	Units	N	% Detected	CV	Precision[1]	Potential Outlier[2]	Distribution[3]
Arsenic	mg/kg	27	100%	0.3	10%	--	Normal
Cadmium	mg/kg	27	93%	0.35	12%	PG-60[4]	Normal or Gamma
Mercury	mg/kg	30	83%	0.49	15%	--	Normal
cPAH	µg TEQ/kg	27	100%	0.5	16%	--	Normal
Dioxin/Furan	ng TEQ/kg	27	93%	0.57	19%	--	None[5]
PCB congener	ng TEQ/kg	27	81%	0.6	19%	--	Normal

Notes:
cPAH – carcinogenic polycyclic aromatic hydrocarbons **PCB** – polychlorinated biphenyl **N** – sample size **CV** - coefficient of variance

1 - The precision column shows the half-width of the 95% UCL on the mean relative to the mean (e.g., for a normal distribution, t × std.dev./sqrt(n)/mean); the target was to keep precision below 25%.

2 - Outlier tests included Rosner's (for normal distributions, $n \geq 25$), or Tukey's rule of 2 × IQR from median (non-parametric). Multivariate outliers were not used in this assessment of outliers.

3 - The distribution column shows the best fit distribution as determined by the goodness-of-fit tests in ProUCL and the highest correlation coefficient for the probability plots (detected concentrations only).

4 - PG-60 was a potential statistical outlier assuming a normal distribution for cadmium; a gamma distribution fit the full data set, including PG-60. Equations for the gamma distribution with KM estimates of the mean and variance were used to estimate the 95 UCL on the mean from which the precision was calculated.

5 - The normal distribution was rejected for the detected dioxin/furan TEQ values (Shapiro-Wilk's p-value = 0.03), due to some bimodality in the data. The normal distribution had the highest correlation coefficient for the probability plots (0.961) and the distribution was symmetric, so normal equations and KM estimates of the mean and variance were used to estimate the 95 UCL on the mean from which the precision was calculated.

Table 6. Calculated 90/90 upper tolerance limits (UTL) for Port Gardner Bay Phase II and Bold Plus natural background data sets.

Chemical of Concern	Units	Port Gardner Bay		Bold Plus
		N	90/90 UTL[1]	90/90 UTL[1]
Arsenic	mg/kg	27	12	11
Cadmium	mg/kg	27	0.52	0.79
Mercury	mg/kg	30	0.14	0.17
cPAH TEQ	µg TEQ/kg	27	56	16
PCB TEQ	ng TEQ/kg	27	0.38	0.20
Dioxins/Furans TEQ	ng TEQ/kg	27	3.9	3.6

Notes:
cPAH – carcinogenic polycyclic aromatic hydrocarbons **PCB** – polychlorinated biphenyl **TEQ** – toxic equivalent quotient **N** – sample size
1 – all values rounded to two significant figures

Figures

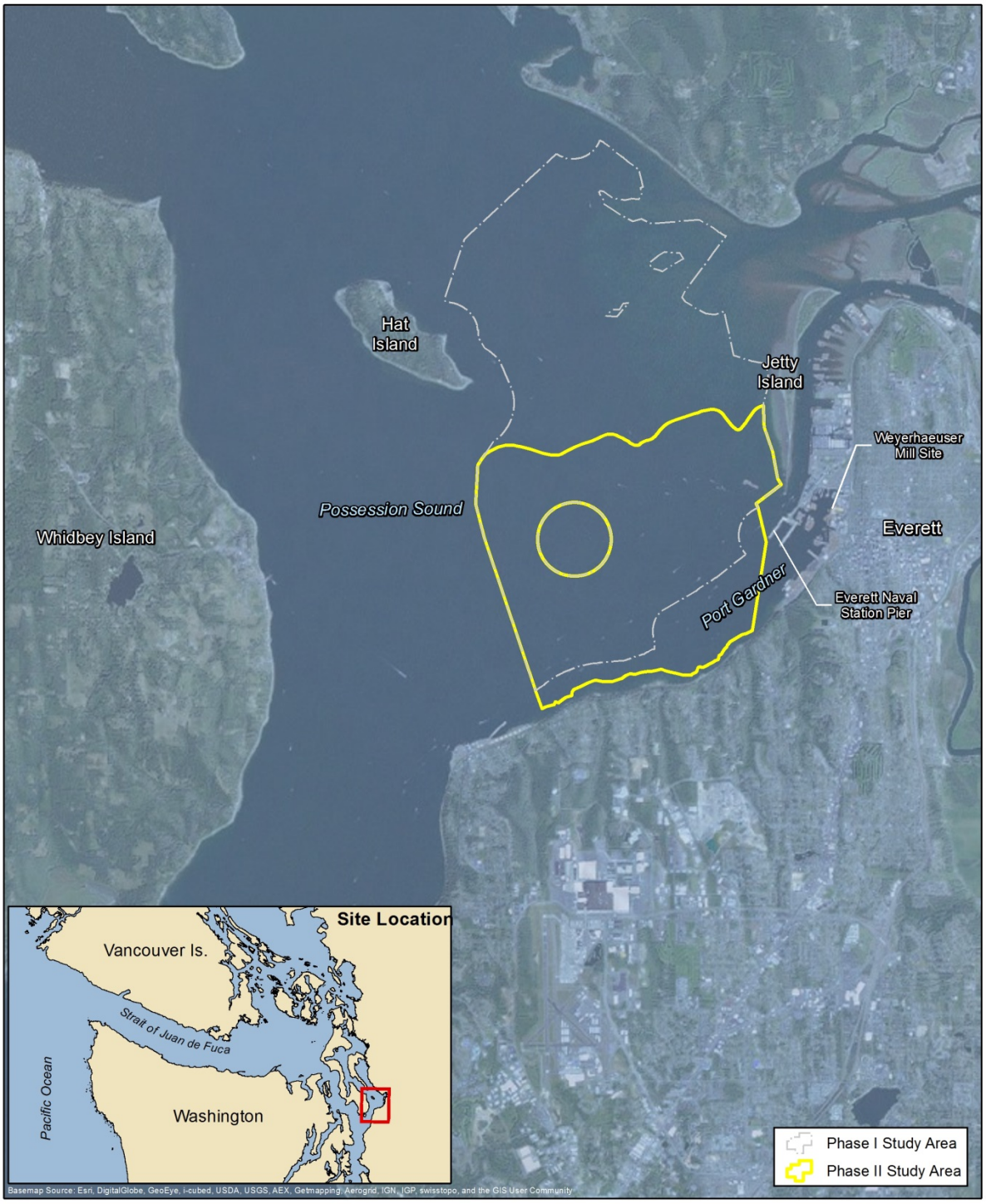


Figure 1. Phase I and Phase II Study Areas in Port Gardner Bay

D:\GIS_Working\Ecology\Background\PortGardner_Site.mxd

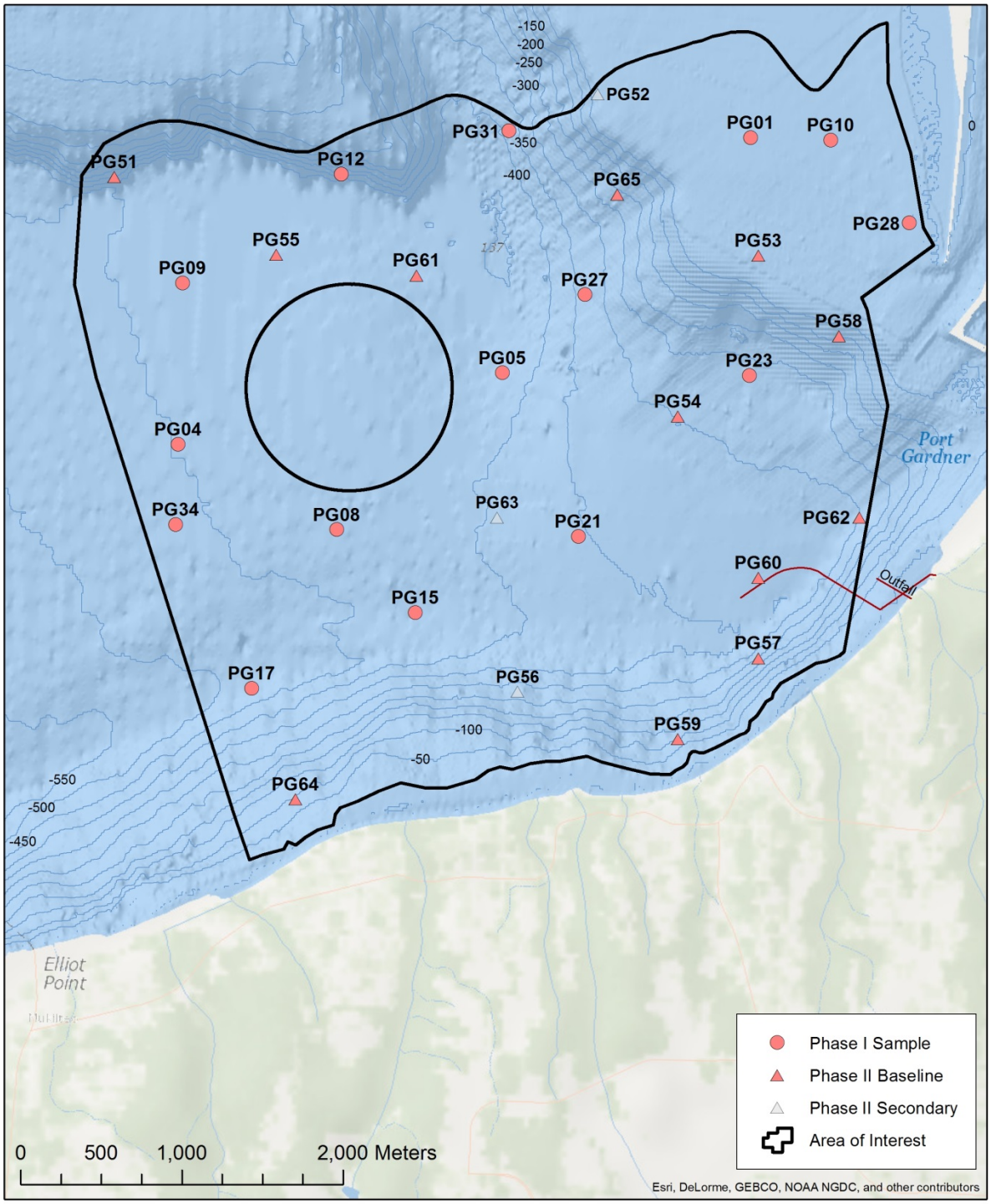


Figure 2. Sample Locations Included in the Phase II Area of Interest.

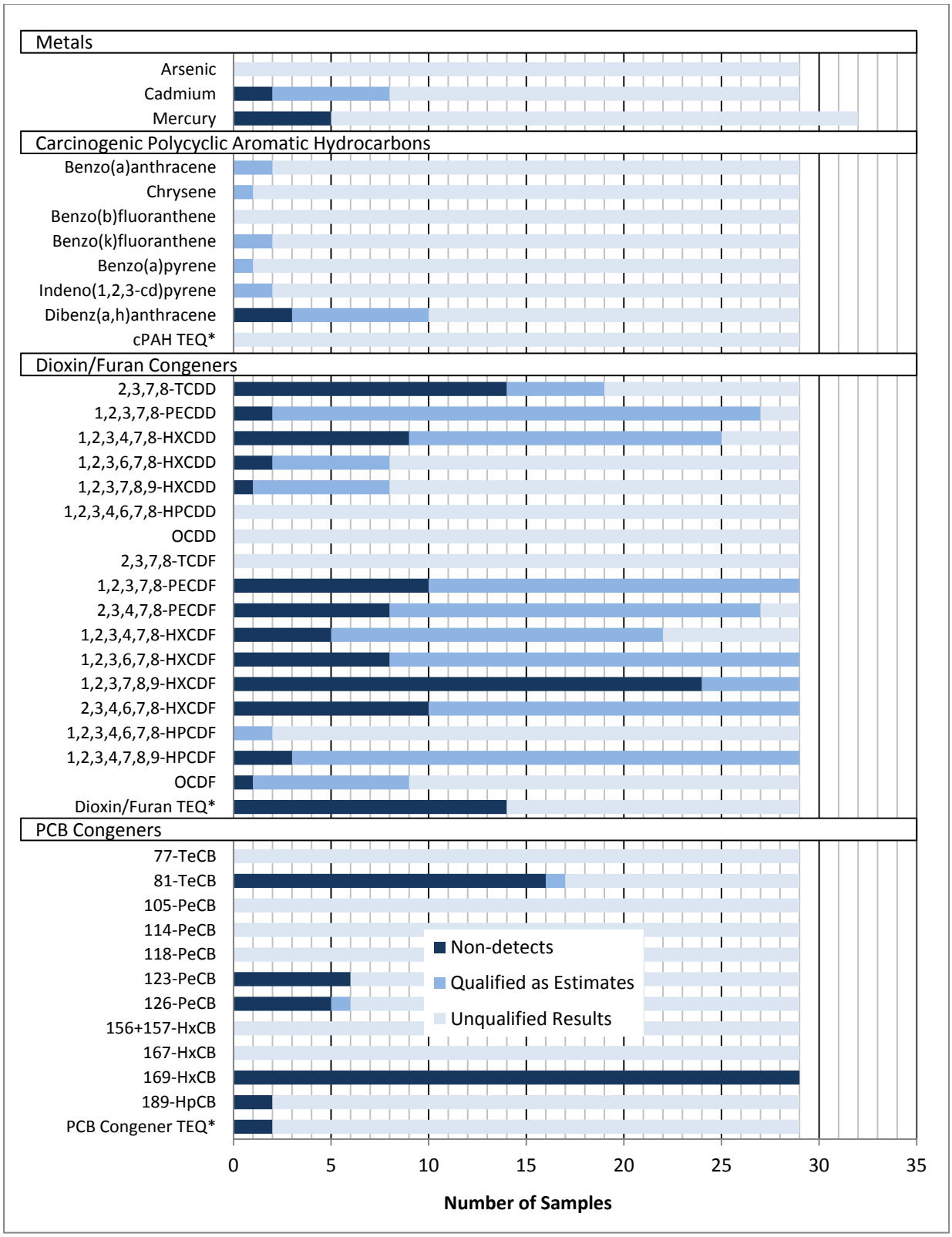


Figure 3. Summary of Undetected and Qualified Results.

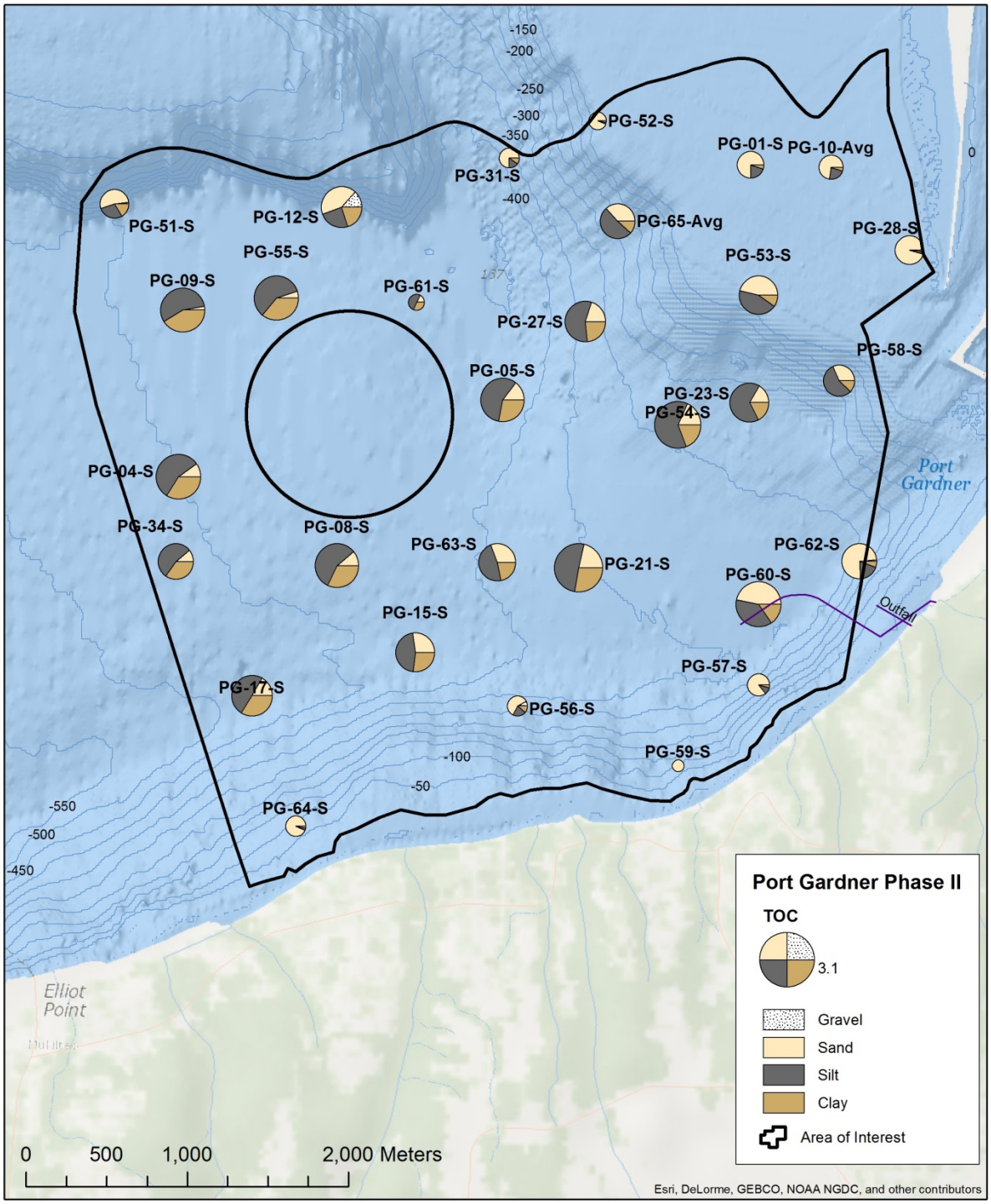


Figure 4. Percent Total Organic Carbon and Grain Size Distributions Throughout the Port Gardner Area of Interest.

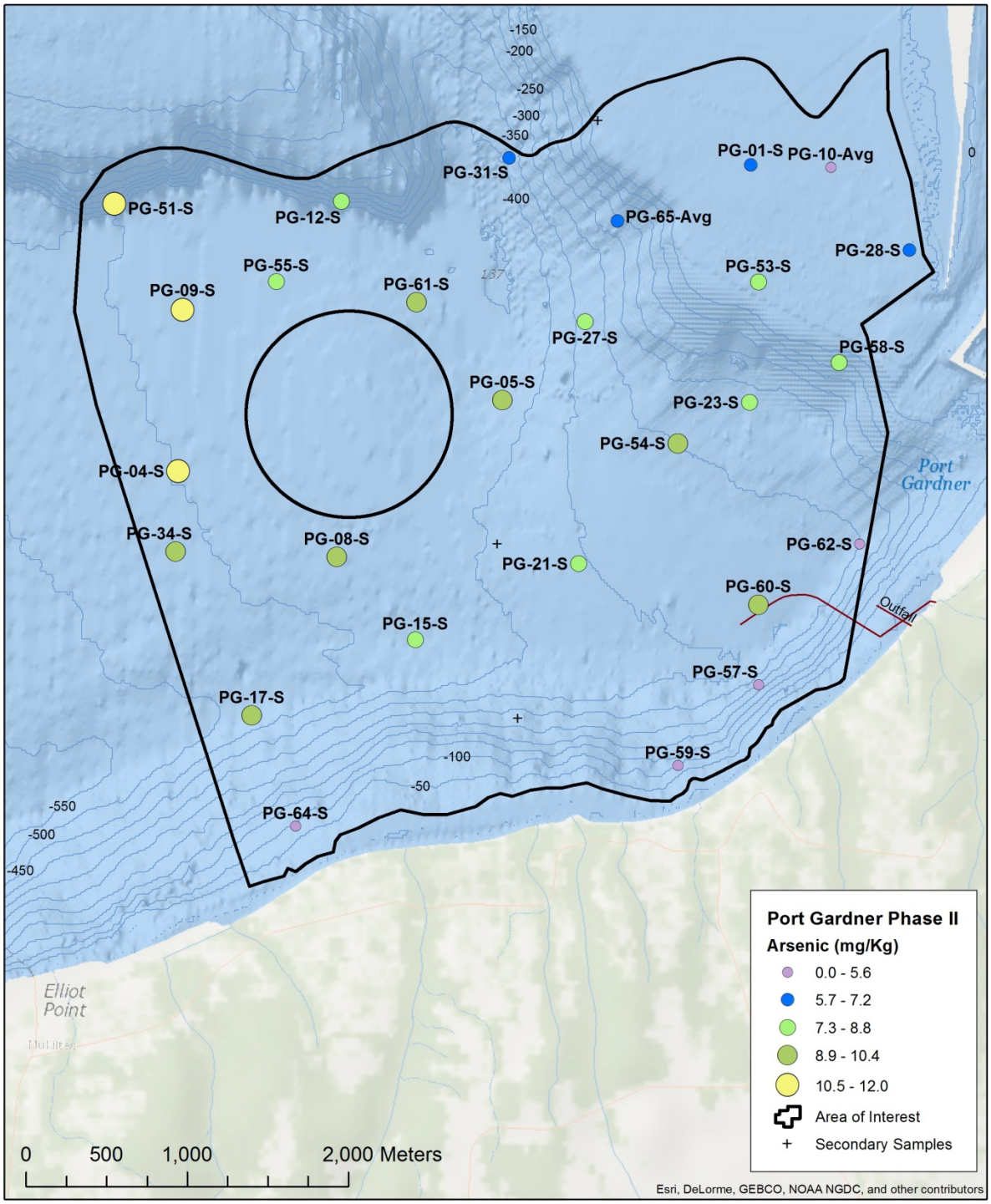
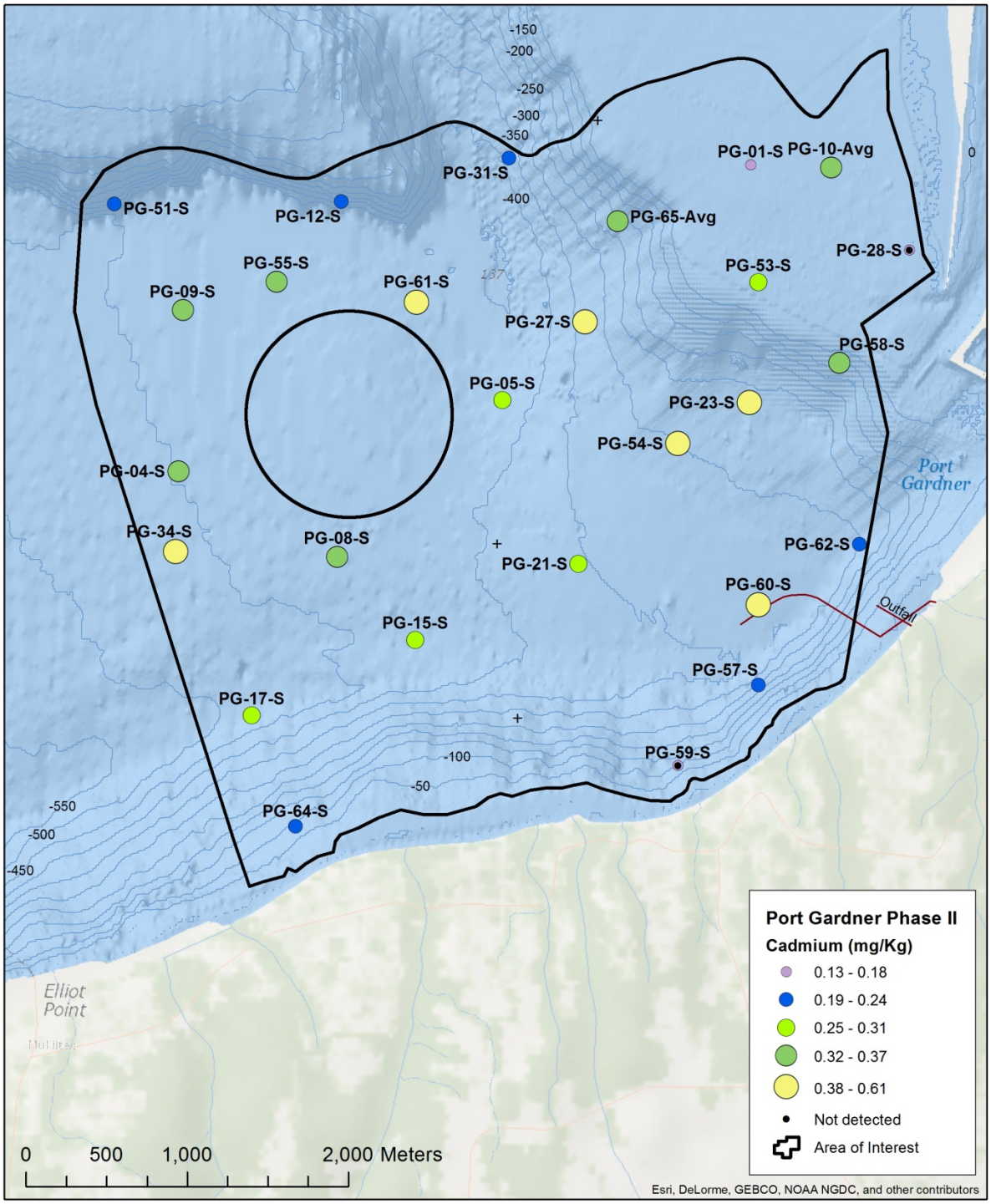


Figure 5. Arsenic Concentrations Throughout the Port Gardner Area of Interest.



N

Figure 6. Cadmium Concentrations Throughout the Port Gardner Area of Interest.

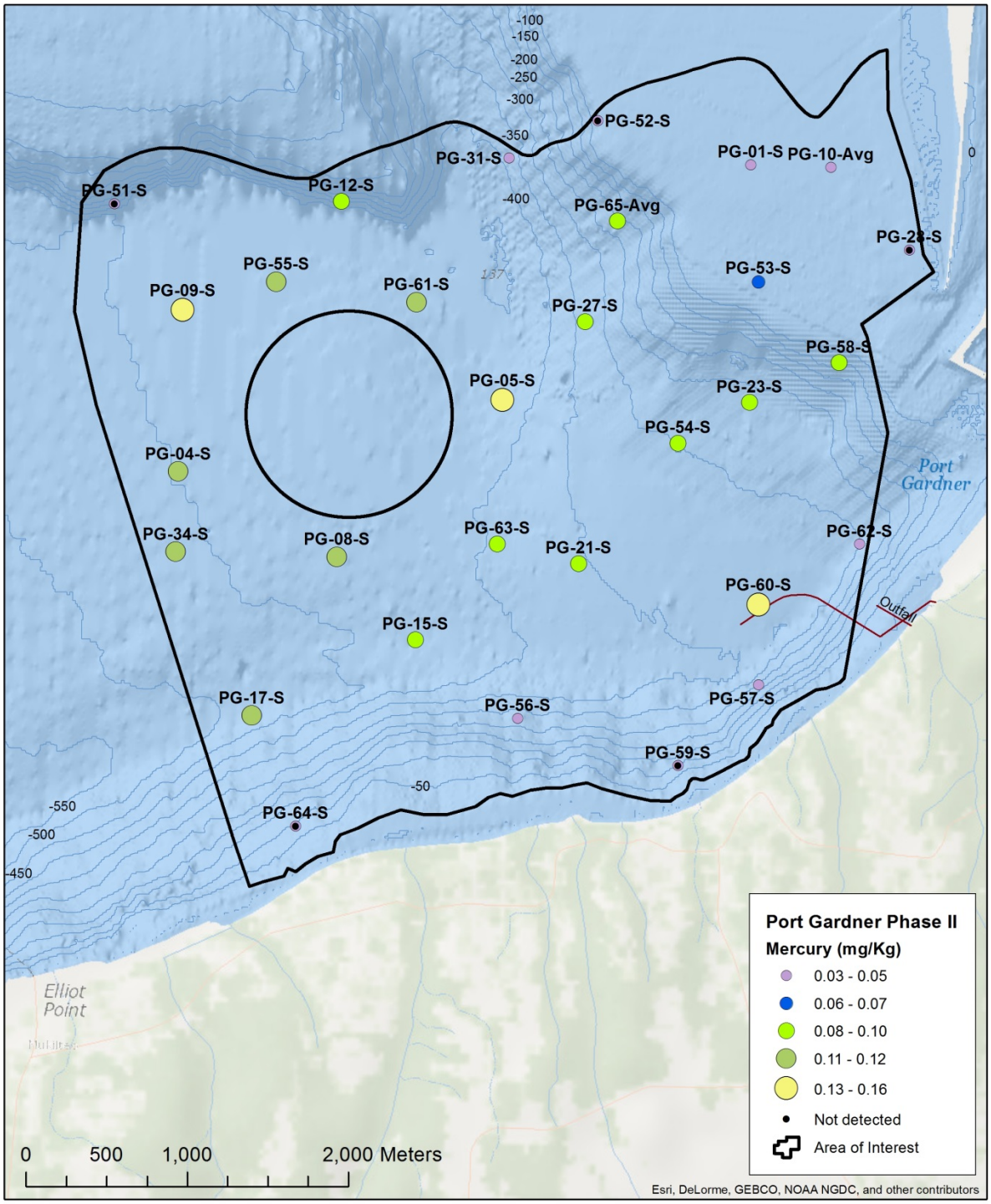
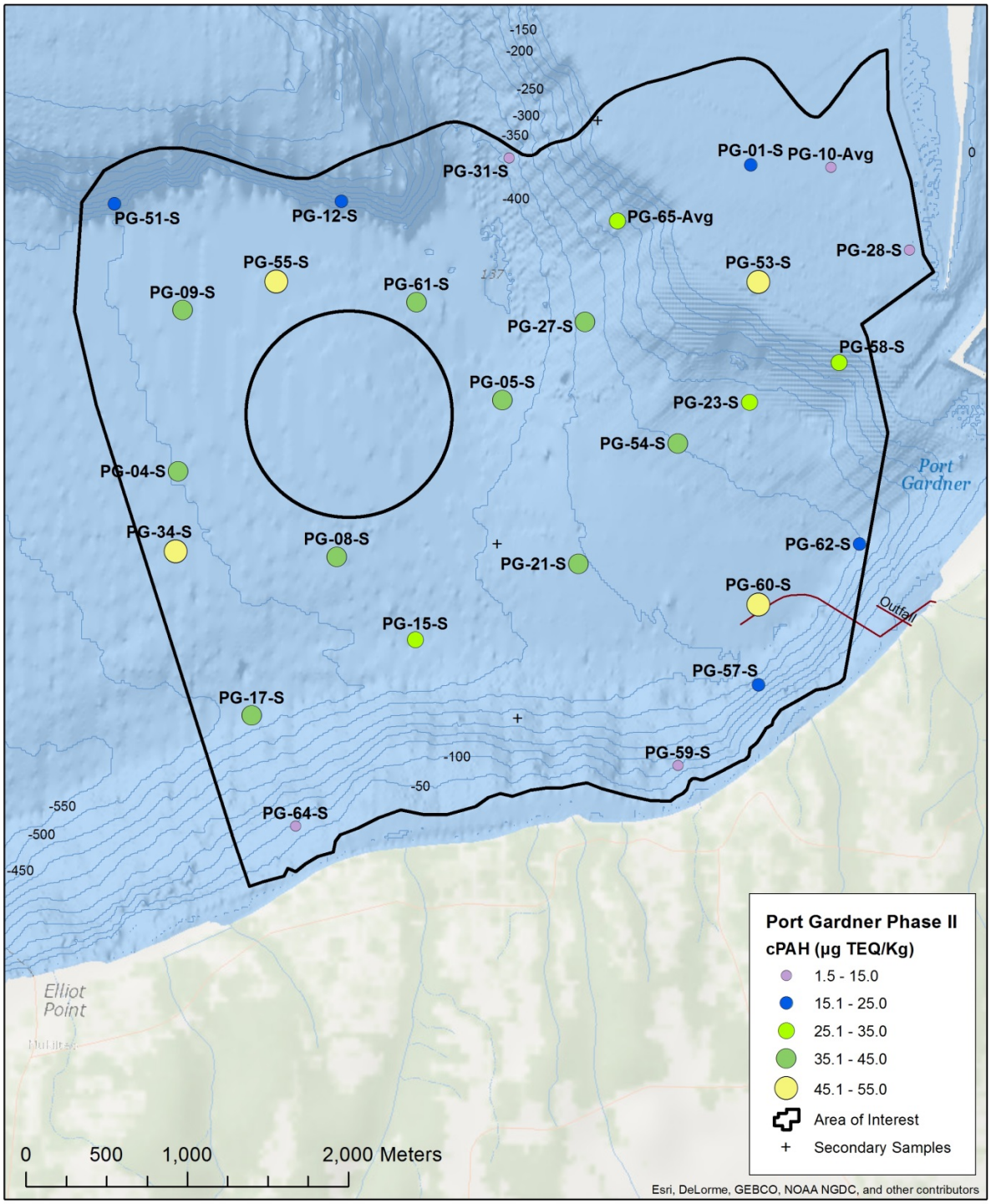


Figure 7. Mercury Concentrations Throughout the Port Gardner Area of Interest.



N

Figure 8. Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAH) TEQ Concentrations (KM) Throughout the Port Gardner Area of Interest.

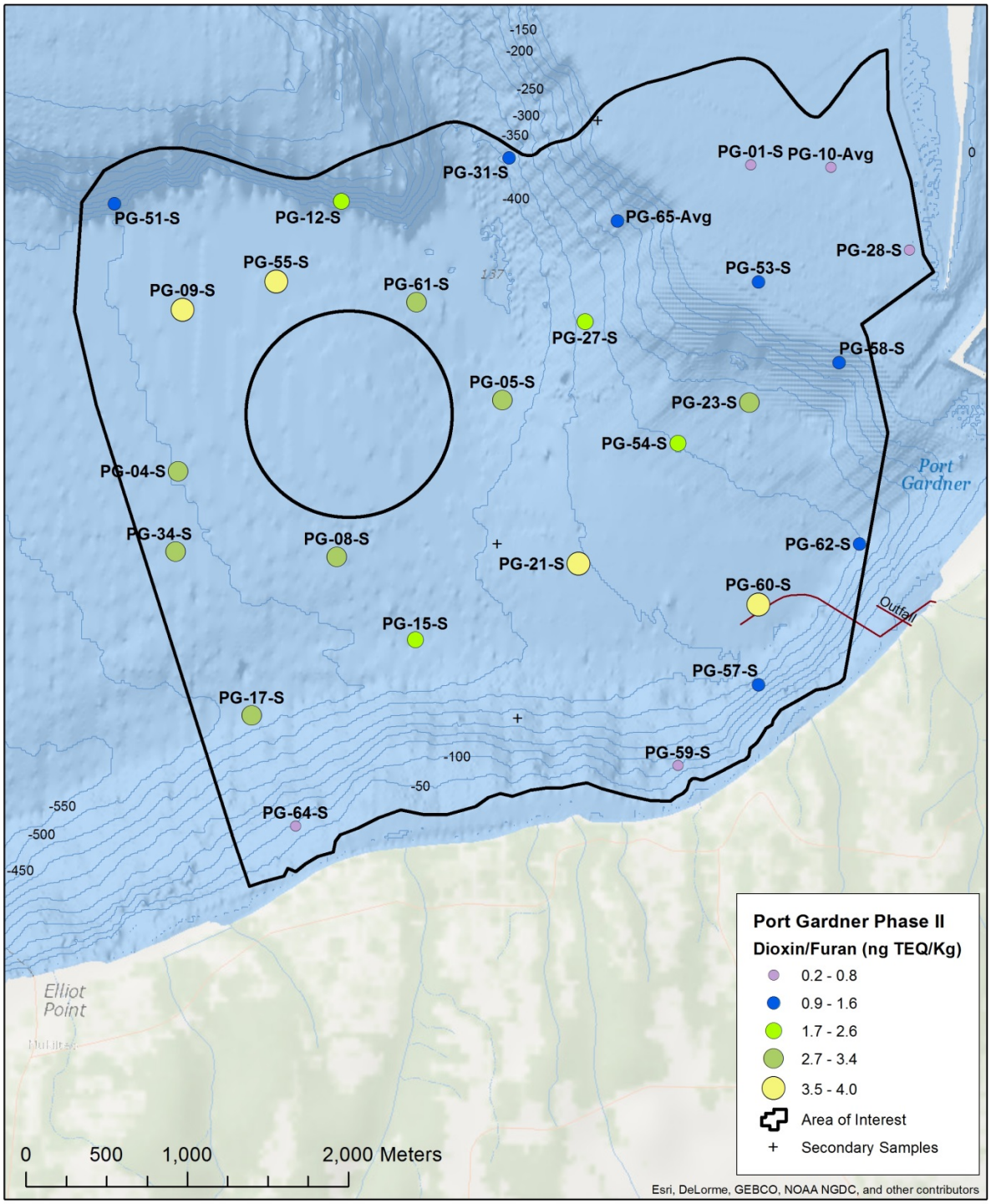


Figure 9. Dioxin/Furan Congener TEQ Concentrations (KM) Throughout the Port Gardner Area of Interest.

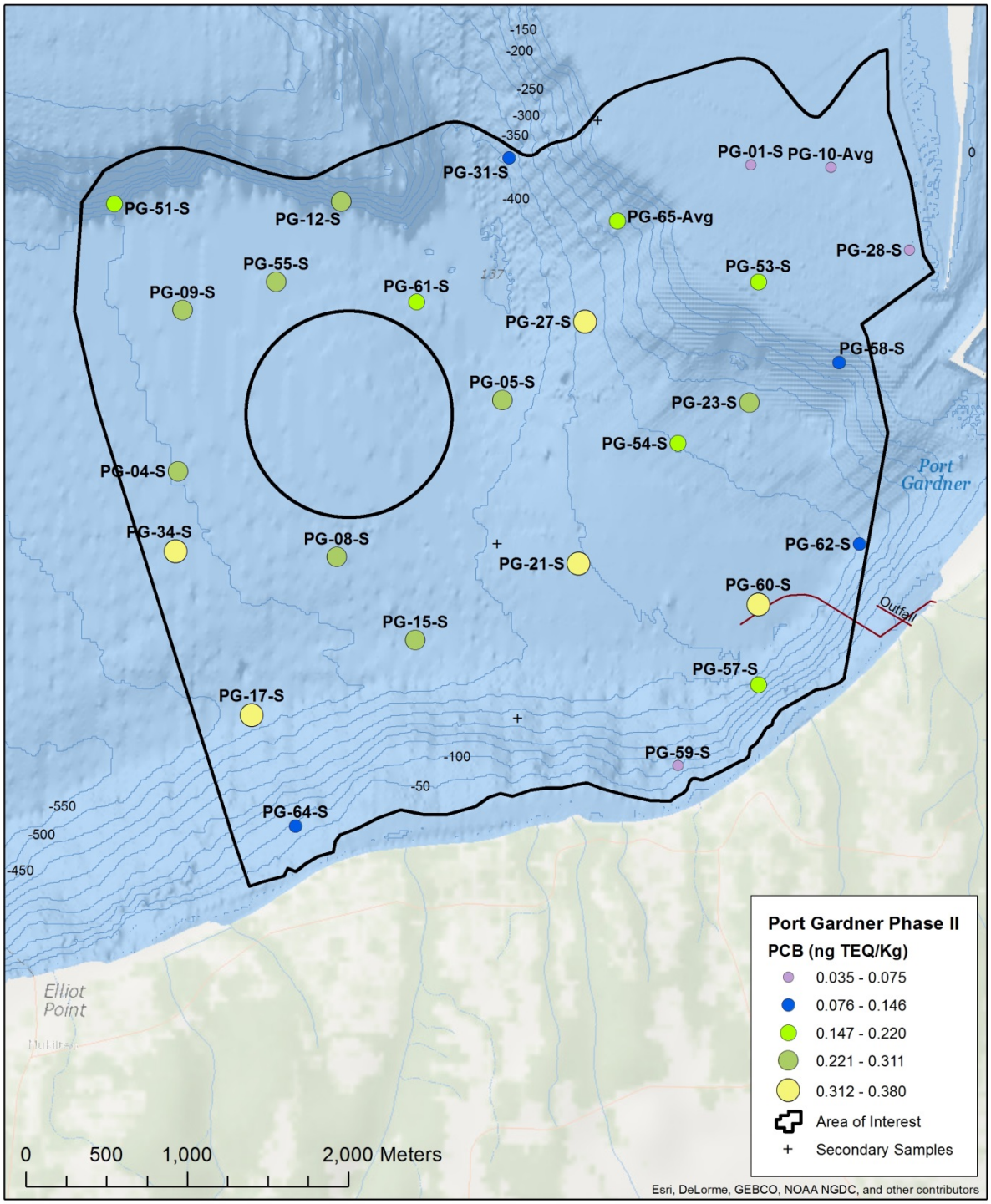


Figure 10. Polychlorinated Biphenyl (PCB) TEQ Concentrations (KM) Throughout the Port Gardner Area of Interest.

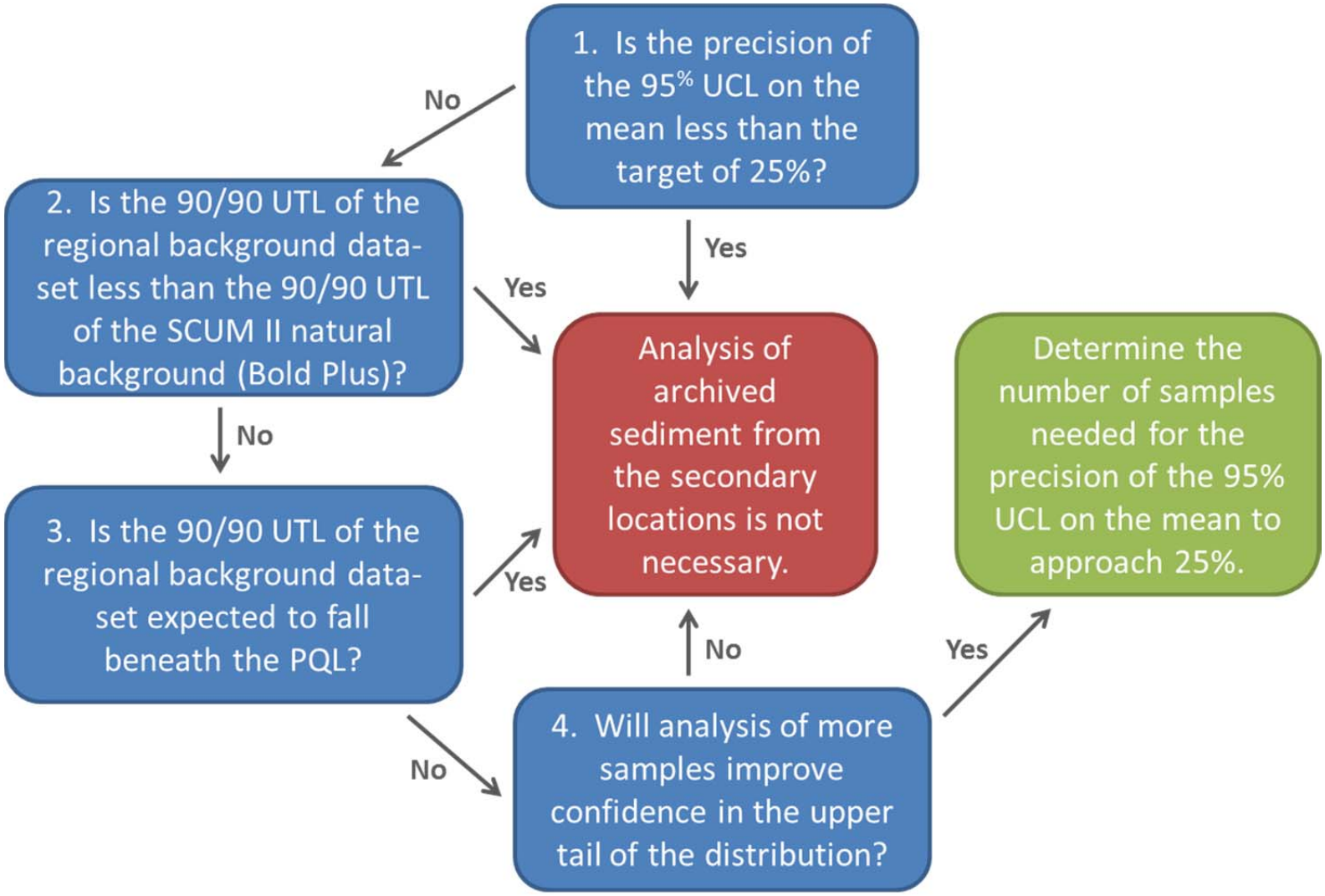


Figure 11. Decision Process for the Evaluation of Secondary Samples.

Appendices A-D, F, and G. Available at: www.ecy.wa.gov/biblio/1409339.html)

Appendix E. Data Tables

Port Gardner Regional Background

Phase II Data Tables

Table E-1. Summary of Phase II Sediment Conventionals, Metals, and Carcinogenic Polycyclic Aromatic Hydrocarbons.

Location ID	PG-01-S	Q	PG-04-S	Q	PG-05-S	Q	PG-08-S	Q	PG-09-S	Q	PG-10-S	Q	PG-10-D	Q
Date/Time	**3/28/2013 15:48**		**3/26/2013 11:21**		**3/28/2013 13:18**		**3/26/2013 9:17**		**3/26/2013 11:42**		**3/28/2013 16:24**		**3/28/2013 16:24**	
Conventionals														
Total Organic Carbon	0.738		2.09		1.98		2.01		2.03		0.524		0.58	
Total Solids	69.38		40.44		44.18		43.9		38.38		70.39		69.53	
Total Volatile Solids	2.45		6.49		5.95		6.08		7.09		2.23		2.22	
Preserved Total Solids	61.75		37.2		41.58		40.04		34.83		64.61		62.98	
Sulfide	1.61	UJ	55.9	J	74.7	J	13.9	J	33.9	J	4.94	J	3.02	J
Particle/Grain Size, Phi Scale <-1	0.1	U	0.1		0.1	U	0.2		0.1	U	0.1	U	0.1	U
Particle/Grain Size, Phi Scale -1 to 0	0.1		0.7		0.1		0.4		0.1		0.1		0.1	
Particle/Grain Size, Phi Scale 0 to 1	0.5		1		0.6		0.4		0.3		0.5		0.5	
Particle/Grain Size, Phi Scale 1 to 2	2		0.8		1.1		0.9		0.4		1.3		1.4	
Particle/Grain Size, Phi Scale 2 to 3	24.2		1.5		2.1		1.4		0.3		11.7		11.3	
Particle/Grain Size, Phi Scale 3 to 4	48.1		6		10.8		8		1.7		59.3		59.7	
Particle/Grain Size, Phi Scale 4 to 5	10.8		12.8		18.5		16.1		7.7		13.9		14.2	
Particle/Grain Size, Phi Scale 5 to 6	4.3		17.7		16.9		16		15.9		4		3.8	
Particle/Grain Size, Phi Scale 6 to 7	2.9		14.1		12.9		13.9		17.3		2.5		2.4	
Particle/Grain Size, Phi Scale 7 to 8	1.7		11.5		9		10.5		15		1.6		1.5	
Particle/Grain Size, Phi Scale 8 to 9	1.2		9.6		8		8.5		11.6		1.1		1.1	
Particle/Grain Size, Phi Scale 9 to 10	1.1		8.3		6.7		8		10.1		1		1	
Particle/Grain Size, Phi Scale >10	3		16		13.3		15.7		19.7		3.1		3	
Particle/Grain Size, Fines (Silt/Clay)	25		90		85.3		88.7		97.2		27.1		27	
Metals (mg/kg DW)														
Arsenic	6		10.5		9.3		10.1		10.5		5.4		5.6	
Cadmium	0.18		0.35	J	0.26		0.32	J	0.33	J	0.3		0.42	
Mercury	0.04		0.12		0.13		0.12		0.13		0.04		0.05	
carcinogenic PAH (ug/kg DW)														
Benzo(a)anthracene	19.9		32.1		27.7		31.8		26.5		2.97		3.81	
Chrysene	21.9		40		47.9		46.9		34.6		4.19		7.06	
Benzo(b)fluoranthene	10.2		34.9		27.8		29.4		32.2		3.33		3.44	
Benzo(k)fluoranthene	6.31		15.6		14.6		18.1		13.4		1.67	J	1.85	J
Total Benzofluoranthenes	23.4		66.5		56.2		62.5		59.4		6.65		7.15	
Benzo(a)pyrene	19.2		32.5		26.1		29.7		28.7		2.69		3.05	
Indeno(1,2,3-cd)pyrene	7.69		20		16.5		18		18.4		1.6	J	1.8	J
Dibenz(a,h)anthracene	2.9		4.74	J	4.1		4.32	J	4.02	J	0.868	U	0.799	U
cPAH TEQ (0 DL)	24.1		43.6		35.6		40.3		38.5		3.69		4.21	
cPAH TEQ (1/2 DL)	24.1		43.6		35.6		40.3		38.5		3.73		4.25	
cPAH TEQ (1 DL)	24.1		43.6		35.6		40.3		38.5		3.78		4.29	
cPAH TEQ (KM)	24		44		36		40		38		4	AVG	--	

* Insufficient fines were present for the full determination of silt and clay fractions. Only total fines are reported.

U-the analytie was analyzed for, but was not detected above the reported sample quantitation limit

J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.

L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detects

KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-1. Summary of Phase II Sediment Conventionals, Metals, and Carcinogenic Polycyclic Aromatic Hydrocarbons (continued).

Location ID	PG-10-T	Q	PG-12-S	Q	PG-15-S	Q	PG-17-S	Q	PG-21-S	Q	PG-23-S	Q	PG-27-S	Q
Date/Time	3/28/2013 16:24		3/27/2013 12:09		3/26/2013 9:45		3/26/2013 10:10		3/28/2013 12:59		3/29/2013 13:32		3/28/2013 14:50	
Conventionals														
Total Organic Carbon	0.733		1.74		1.59		1.73		2.44		1.59		1.72	
Total Solids	69.01		57.76		48.31		43.21		47.92		51.75		51.2	
Total Volatile Solids	2.19		4.01		5.26		5.88		5.79		5.63		5.78	
Preserved Total Solids	62.63		48.02		44.08		38.86		44.83		49		48.71	
Sulfide	2.23	J	5.01	J	2.31	UJ	6.42	J	135	J	28.6		32.8	J
Particle/Grain Size, Phi Scale <-1	0.3		13.4		0.1	U	0.1		0.5		0.5		0.1	
Particle/Grain Size, Phi Scale -1 to 0	0.1		5.8		0.3		0.4		0.3		0.1		0.1	
Particle/Grain Size, Phi Scale 0 to 1	0.4		7		1		0.8		1.4		0.5		0.5	
Particle/Grain Size, Phi Scale 1 to 2	1.4		10.6		7.8		1.1		2.9		0.7		1.1	
Particle/Grain Size, Phi Scale 2 to 3	12.1		10.7		7.5		1.5		6.9		1.9		2.3	
Particle/Grain Size, Phi Scale 3 to 4	59		8.1		10.5		12.8		10		13.3		16	
Particle/Grain Size, Phi Scale 4 to 5	14.5		5.2		15.5		16		14.4		30.7		22.4	
Particle/Grain Size, Phi Scale 5 to 6	3.4		4.9		11.9		12.3		14.6		19		16.9	
Particle/Grain Size, Phi Scale 6 to 7	2.4		7		9.6		11.9		11.7		9.9		10.1	
Particle/Grain Size, Phi Scale 7 to 8	1.5		7.1		9.1		9.4		9.7		6.2		6.9	
Particle/Grain Size, Phi Scale 8 to 9	1.1		5.9		6.9		8.9		7.9		4.4		5.8	
Particle/Grain Size, Phi Scale 9 to 10	1		4.8		6.3		8.7		6.7		4.3		5.5	
Particle/Grain Size, Phi Scale >10	2.9		9.5		13.6		16.1		12.9		8.6		12.2	
Particle/Grain Size, Fines (Silt/Clay)	26.7		44.4		72.9		83.2		78		83		79.9	
Metals (mg/kg DW)														
Arsenic	--		7.7		7.7		9		8.3		8.8		8.5	
Cadmium	--		0.22	J	0.29	J	0.31	J	0.27		0.43		0.38	
Mercury	--		0.09		0.1		0.11		0.1		0.1		0.1	
carcinogenic PAH (ug/kg DW)														
Benzo(a)anthracene	--		17.5		23.8		26.3		32		26.8		29.6	
Chrysene	--		22.7		33		35.9		44.8		34.8		41.7	
Benzo(b)fluoranthene	--		21.4		25.4		29.3		28.5		22.3		32	
Benzo(k)fluoranthene	--		9.08		14.4		16.9		15.5		14.5		12.9	
Total Benzofluoranthenes	--		40		52.1		60.1		58.9		47.8		57.5	
Benzo(a)pyrene	--		18.2		24.5		29		31.4		22.4		26.7	
Indeno(1,2,3-cd)pyrene	--		12.4		15.2		19.3		18.9		11.7		16.9	
Dibenz(a,h)anthracene	--		2.27	J	3.67	J	4.57	J	4.57		3.47		3.81	
cPAH TEQ (0 DL)	--		24.7		33.1		39		41.8		30.6		36.6	
cPAH TEQ (1/2 DL)	--		24.7		33.1		39		41.8		30.6		36.6	
cPAH TEQ (1 DL)	--		24.7		33.1		39		41.8		30.6		36.6	
cPAH TEQ (KM)	--		25		33		39		42		31		37	

* Insufficient fines were present for the full determination of silt and clay fractions. Only total fines are reported.

U-the analytie was analyzed for, but was not detected above the reported sample quantitation limit

J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.

L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detects

KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-1. Summary of Phase II Sediment Conventionals, Metals, and Carcinogenic Polycyclic Aromatic Hydrocarbons (continued).

Location ID	PG-28-S	Q	PG-31-S	Q	PG-34-S	Q	PG-51-S	Q	PG-52-S	Q	PG-53-S	Q	PG-54-S	Q
Date/Time	3/28/2013	19:36	3/27/2013	14:15	3/26/2013	10:39	4/22/2014	15:21	4/22/2014	10:24	4/22/2014	9:58	4/22/2014	14:10
Conventionals														
Total Organic Carbon	0.861		0.416		1.32		0.866	J	0.315	J	1.54	J	2.26	J
Total Solids	69.26		67.19		41.15		50.5		68.26		64.03		51.05	
Total Volatile Solids	1.8		2.67		6.82		4.4		1.99		5.42		5.93	
Preserved Total Solids	69.31		63.24		39.35		--		--		--		--	
Sulfide	2.16	J	3.08	J	2.5	UJ	--		--		--		--	
Particle/Grain Size, Phi Scale <-1	0.1	U	0.1	U	0.1	U	1.9		0.1	U	0.4		0.6	
Particle/Grain Size, Phi Scale -1 to 0	0.1		0.1		0.1		5.8		0.1		0.7		1.1	
Particle/Grain Size, Phi Scale 0 to 1	0.7		0.7		0.7		7.5		0.5		3.8		1.6	
Particle/Grain Size, Phi Scale 1 to 2	11.7		9.9		1.5		13		2.7		6.6		3	
Particle/Grain Size, Phi Scale 2 to 3	72.8		41.3		2.2		14.7		52.1		11.3		2.4	
Particle/Grain Size, Phi Scale 3 to 4	9.9		23		6.6		12.5		38.3		23.7		10.1	
Particle/Grain Size, Phi Scale 4 to 5	2.1		5.9		11.8		7.8		2		23.4		26.9	
Particle/Grain Size, Phi Scale 5 to 6	0.5		3.7		15.6		7.8		0.5		11.2		18.9	
Particle/Grain Size, Phi Scale 6 to 7	0.3		3		15.4		6.9		0.7		5.8		9.9	
Particle/Grain Size, Phi Scale 7 to 8	0.2		2.7		11		5.8		0.6		3.5		6.4	
Particle/Grain Size, Phi Scale 8 to 9	0.3		2.3		9.8		5.1		0.4		2.2		4.5	
Particle/Grain Size, Phi Scale 9 to 10	0.3		2.2		8.7		4		0.4		2.2		4.5	
Particle/Grain Size, Phi Scale >10	1.1		5.1		16.5		7.3		1.6		5.3		9.9	
Particle/Grain Size, Fines (Silt/Clay)	4.8		24.8		88.8		44.7		6.2		53.5		81.1	
Metals (mg/kg DW)														
Arsenic	6.6		5.9		9.9		11.6		--		7.8		9.1	
Cadmium	0.14	U	0.19		0.42		0.24		--		0.29		0.51	
Mercury	0.03	U	0.05		0.12		0.04	U	0.03	U	0.07		0.09	
carcinogenic PAH (ug/kg DW)														
Benzo(a)anthracene	1.55		5.97		40.6		12.5		--		44.1		32.4	
Chrysene	1.97		8.15		51.7		16.4		--		48.9		41.6	
Benzo(b)fluoranthene	1.5		8.62		49.1		16.4		--		29.8		31.3	
Benzo(k)fluoranthene	0.53		3.23		23		5.83		--		14.1		15	
Total Benzofluoranthenes	2.58		15.1		92.4		28.1		--		57.8		59.6	
Benzo(a)pyrene	1.07		6.23		40.2		13		--		38.8		28.3	
Indeno(1,2,3-cd)pyrene	0.68		4.42		28.4		10.6		--		21.5		20.3	
Dibenz(a,h)anthracene	0.17	U	0.98		5.77		2.43		--		5.55		4.96	
cPAH TEQ (0 DL)	1.52		8.63		55.4		17.9		--		50.8		39.1	
cPAH TEQ (1/2 DL)	1.52		8.63		55.4		17.9		--		50.8		39.1	
cPAH TEQ (1 DL)	1.53		8.63		55.4		17.9		--		50.8		39.1	
cPAH TEQ (KM)	1.5		8.6		55		18		--		51		39	

* Insufficient fines were present for the full determination of silt and clay fractions. Only total fines are reported.

U-the analytie was analyzed for, but was not detected above the reported sample quantitation limit

J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.

L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detects

KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-1. Summary of Phase II Sediment Conventionals, Metals, and Carcinogenic Polycyclic Aromatic Hydrocarbons (continued).

Location ID	PG-55-S	Q	PG-56-S	Q	PG-57-S	Q	PG-58-S	Q	PG-59-S	Q	PG-60-S	Q	PG-61-S	Q
Date/Time	**4/23/2014 12:40**		**4/23/2014 10:32**		**4/22/2014 13:23**		**4/22/2014 10:46**		**4/22/2014 11:17**		**4/23/2014 9:11**		**4/23/2014 13:13**	
Conventionals														
Total Organic Carbon	2.05	J	0.424	J	0.504	J	1.02	J	0.15	J	2.11	J	0.268	J
Total Solids	38.08		67.84		72.32		58.15		75.76		55.21		41.18	
Total Volatile Solids	6.94		2.45		2.46		5.39		1.15		6.73		6.18	
Preserved Total Solids	--		--		--		--		--		--		--	
Sulfide	--		--		--		--		--		--		--	
Particle/Grain Size, Phi Scale <-1	0.1	U	7.6		0.5		0.1	U	0.7		0.4		0.1	U
Particle/Grain Size, Phi Scale -1 to 0	0.2		3.7		1.1		0.4		3.6		1.7		1	
Particle/Grain Size, Phi Scale 0 to 1	0.6		4.4		12.1		0.6		15.3		4.6		1.4	
Particle/Grain Size, Phi Scale 1 to 2	0.8		15.3		33.2		1.2		31.7		13.2		1.2	
Particle/Grain Size, Phi Scale 2 to 3	0.5		22.9		15.1		6.3		27		15.7		3.7	
Particle/Grain Size, Phi Scale 3 to 4	3		13		23.8		23.1		18		11.5		9.6	
Particle/Grain Size, Phi Scale 4 to 5	10.2		8.3		5.6		28		--		13.6		12.1	
Particle/Grain Size, Phi Scale 5 to 6	16.8		5.1		2.1		15		--		12.1		15.8	
Particle/Grain Size, Phi Scale 6 to 7	17.3		4.4		1.2		8		--		7		13.1	
Particle/Grain Size, Phi Scale 7 to 8	14.5		3.8		1.1		5.2		--		4.9		10.9	
Particle/Grain Size, Phi Scale 8 to 9	9.9		2.8		1		2.7		--		3.7		9.4	
Particle/Grain Size, Phi Scale 9 to 10	10.6		2.9		1		3.1		--		3.8		7.8	
Particle/Grain Size, Phi Scale >10	15.4		5.7		2.3		6.4		--		7.9		13.9	
Particle/Grain Size, Fines (Silt/Clay)	94.8		33.1		14.3		68.4		3.7	*	53		83	
Metals (mg/kg DW)														
Arsenic	8.5		--		4.5		8.6		2.9		10.1		8.9	
Cadmium	0.36		--		0.19		0.36		0.13	U	0.61		0.39	
Mercury	0.11		0.03		0.03		0.08		0.03	U	0.16		0.11	
carcinogenic PAH (ug/kg DW)														
Benzo(a)anthracene	34.9		--		21.4	J	31.2		2.24	J	50.3		28	
Chrysene	47.4		--		23.2		44.5		3.06	J	135		35.5	
Benzo(b)fluoranthene	40.4		--		16.1		27.7		2.64		32.6		31.8	
Benzo(k)fluoranthene	17.4		--		7.05		12.3		1.18		18.6		14.6	
Total Benzofluoranthenes	73.9		--		30.3		50.9		4.86		64.7		59.5	
Benzo(a)pyrene	34.9		--		16.9		22.3		2.09	J	32.6		28.3	
Indeno(1,2,3-cd)pyrene	26.3		--		9.61		13.7		1.5		21.6		21.2	
Dibenz(a,h)anthracene	5.79		--		2.43		3.65		0.39	J	5.56		4.89	
cPAH TEQ (0 DL)	47.9		--		22.8		31.6		2.92		46.8		38.7	
cPAH TEQ (1/2 DL)	47.9		--		22.8		31.6		2.92		46.8		38.7	
cPAH TEQ (1 DL)	47.9		--		22.8		31.6		2.92		46.8		38.7	
cPAH TEQ (KM)	48		--		23		32		2.9		47		39	

* Insufficient fines were present for the full determination of silt and clay fractions. Only total fines are reported.

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L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detects

KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-1. Summary of Phase II Sediment Conventionals, Metals, and Carcinogenic Polycyclic Aromatic Hydrocarbons (continued).

Location ID	PG-62-S	Q	PG-63-S	Q	PG-64-S	Q	PG-65-S	Q	PG-65-D	Q	PG-65-T	Q
Date/Time	**4/22/2014 13:46**		**4/23/2014 13:42**		**4/22/2014 12:03**		**4/23/2014 11:08**		**4/23/2014 11:08**		**4/23/2014 11:08**	
Conventionals												
Total Organic Carbon	1.28	J	1.45	J	0.431	J	1.26	J	1.4	J	1.13	J
Total Solids	68.31		48.95		73.23		61.52		61.02		61.79	
Total Volatile Solids	2.64		5.25		1.46		4.82		4.08		4.13	
Preserved Total Solids	--		--		--		--		--		--	
Sulfide	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale <-1	1.5		0.1	U	0.1		0.1	U	0.1	U	0.1	U
Particle/Grain Size, Phi Scale -1 to 0	0.7		0.3		0.2		0.4		0.4		0.3	
Particle/Grain Size, Phi Scale 0 to 1	1.9		0.8		1.2		0.6		0.6		0.7	
Particle/Grain Size, Phi Scale 1 to 2	28.8		3.5		10		1.3		1.5		1.5	
Particle/Grain Size, Phi Scale 2 to 3	35		13.1		52.4		6.4		8.1		7.5	
Particle/Grain Size, Phi Scale 3 to 4	7.9		13.1		29.5		28.3		25.9		26.8	
Particle/Grain Size, Phi Scale 4 to 5	8.3		15.2		1.8		29.8		29.9		31	
Particle/Grain Size, Phi Scale 5 to 6	4.8		13.9		0.6		12.1		12.6		11.5	
Particle/Grain Size, Phi Scale 6 to 7	3.2		10.9		0.7		5.5		5.7		5.5	
Particle/Grain Size, Phi Scale 7 to 8	2.1		7.6		0.6		3.8		3.6		3.6	
Particle/Grain Size, Phi Scale 8 to 9	1.6		5.3		0.7		2.6		2.6		3.5	
Particle/Grain Size, Phi Scale 9 to 10	1.6		5.9		0.7		2.8		2.7		2.1	
Particle/Grain Size, Phi Scale >10	2.7		10.5		1.6		6.3		6.6		6.1	
Particle/Grain Size, Fines (Silt/Clay)	24.2		69.2		6.6		63		63.6		63.3	
Metals (mg/kg DW)												
Arsenic	3.7		--		3.3		6.6		6.1		--	
Cadmium	0.24		--		0.17		0.35		0.3		--	
Mercury	0.04		0.09		0.03	U	0.06		0.14		--	
carcinogenic PAH (ug/kg DW)												
Benzo(a)anthracene	18.1		--		10.1		21.9		20.5		--	
Chrysene	24.1		--		17.2		26.9		26.2		--	
Benzo(b)fluoranthene	16.5		--		8.19		22.2		21.1		--	
Benzo(k)fluoranthene	6.79		--		4.28		9.49		8.86		--	
Total Benzofluoranthenes	29.9		--		16.3		40.8		38.4		--	
Benzo(a)pyrene	15.3		--		7.8		21.6		20.1		--	
Indeno(1,2,3-cd)pyrene	9.33		--		4.59		14.4		13		--	
Dibenz(a,h)anthracene	2.13		--		1.09		3.15		3.02		--	
cPAH TEQ (0 DL)	20.8		--		10.8		29		27		--	
cPAH TEQ (1/2 DL)	20.8		--		10.8		29		27		--	
cPAH TEQ (1 DL)	20.8		--		10.8		29		27		--	
cPAH TEQ (KM)	21		--		11		28	AVG	--		--	

* Insufficient fines were present for the full determination of silt and clay fractions. Only total fines are reported.

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KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-2. Summary of Phase II Dioxin/Furan Congener Data.

Location ID	PG-01-S	Q	PG-04-S	Q	PG-05-S	Q	PG-08-S	Q	PG-09-S	Q	PG-10-S	Q	PG-10-D	Q	PG-12-S	Q
Date/Time	3/28/2013	15:48	3/26/2013	11:21	3/28/2013	13:18	3/26/2013	9:17	3/26/2013	11:42	3/28/2013	16:24	3/28/2013	16:24	3/27/2013	12:09
Dioxin/Furan Congeners (ng/kg DW)																
2,3,7,8-TCDD	0.102	J	0.29		0.348	U	0.347		0.325		0.1	U	0.142	U	0.235	
1,2,3,7,8-PECDD	0.129	U	0.787	J	0.858	J	0.851	J	0.822	J	0.188	J	0.216	J	0.631	J
1,2,3,4,7,8-HXCDD	0.187	J	0.881	J	0.861	J	0.868	J	0.844	J	0.179	UJ	0.272	J	0.638	J
1,2,3,6,7,8-HXCDD	0.652	J	3.62		3.4		3.65		3.66		0.83	J	0.862	J	2.9	
1,2,3,7,8,9-HXCDD	0.566	J	2.76		2.8		2.97		2.97		0.69	J	0.859	J	2.26	
1,2,3,4,6,7,8-HPCDD	8.76		50.4		50.3		47.2		57.4		10.4		11.5		33.9	
OCDD	75.4		400		415		380		535		92.8		97.4		260	
2,3,7,8-TCDF	0.53		2.2		2.59		2.41		2.44		0.663		0.58		1.74	
1,2,3,7,8-PECDF	0.11	U	0.505	J	0.54	J	0.606	J	0.545	J	0.099	U	0.101	J	0.412	J
2,3,4,7,8-PECDF	0.155	J	0.978		0.883	J	0.927	J	0.969	J	0.175	J	0.177	U	0.713	J
1,2,3,4,7,8-HXCDF	0.134	J	1.03		1.09		1.07		1.2		0.205	J	0.237	J	0.821	J
1,2,3,6,7,8-HXCDF	0.103	J	0.647	J	0.642	J	0.617	J	0.664	J	0.111	U	0.159	J	0.445	J
1,2,3,7,8,9-HXCDF	0.0475	U	0.061	U	0.062	U	0.071	U	0.066	U	0.0512	UJ	0.053	J	0.049	J
2,3,4,6,7,8-HXCDF	0.107	U	0.622	J	0.64	J	0.603	J	0.651	J	0.057	J	0.153	U	0.478	J
1,2,3,4,6,7,8-HPCDF	1.36		10.6		9.93		8.82		12.2		1.97		1.83		7.34	
1,2,3,4,7,8,9-HPCDF	0.087	J	0.519	J	0.628	J	0.516	J	0.592	J	0.113	J	0.18	J	0.502	J
OCDF	3.04		20.9	J	25.2		18.4	J	39.5	J	5.29		4.59		13.7	J
Dx/F TEQ (0 DL)	0.491		3.3		3.08		3.4		3.57		0.639		0.687		2.52	
Dx/F TEQ (1/2 DL)	0.565		3.31		3.26		3.4		3.57		0.708		0.792		2.52	
Dx/F TEQ (1 DL)	0.639		3.31		3.44		3.41		3.58		0.776		0.897		2.52	
Dx/F TEQ (KM)	0.62	L	3.3		3.2		3.4		3.6		0.71	AVG	--		2.5	

*total PCBs represents the sum of all detected congeners

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UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.

L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detects

KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-2. Summary of Phase II Dioxin/Furan Congener Data (continued).

Location ID	PG-15-S	Q	PG-17-S	Q	PG-21-S	Q	PG-23-S	Q	PG-27-S	Q	PG-28-S	Q	PG-31-S	Q	PG-34-S	Q	PG-51-S	Q
Date/Time	3/26/2013 9:45		3/26/2013 10:10		3/28/2013 12:59		3/29/2013 13:32		3/28/2013 14:50		3/28/2013 19:36		3/27/2013 14:15		3/26/2013 10:39		4/22/2014 15:21	
Dioxin/Furan Congeners (ng/kg DW)																		
2,3,7,8-TCDD	0.278	U	0.284		0.478		0.367	U	0.266		0.065	U	0.129	J	0.322		0.169	U
1,2,3,7,8-PECDD	0.706	J	0.859	J	0.936	J	0.909	J	0.619	J	0.082	J	0.265	J	0.801	J	0.421	J
1,2,3,4,7,8-HXCDD	0.807	J	0.877	J	1.01		1.09		0.722	J	0.071	U	0.283	J	0.914	J	0.652	U
1,2,3,6,7,8-HXCDD	3.12		3.59		3.39		2.94		2.63		0.317	U	1.02		4.17		1.63	J
1,2,3,7,8,9-HXCDD	2.49		3.17		2.57		2.84		2.23		0.271	J	1.02		3.16		1.55	J
1,2,3,4,6,7,8-HPCDD	40.9		51.2		44.4		50.4		35		3.37		14.4		49.2		24.2	
OCDD	306		400		324		415		291		22.5		108		387		162	
2,3,7,8-TCDF	1.85		2		2.99		4.15		2.25		0.297		0.754		2.19		1.35	
1,2,3,7,8-PECDF	0.461	J	0.535	J	0.613	J	0.689	J	0.504	J	0.0506	U	0.196	J	0.584	J	0.288	U
2,3,4,7,8-PECDF	0.784	J	0.939	J	0.891	J	0.942	J	0.746	J	0.103	J	0.318	J	0.931	J	0.339	U
1,2,3,4,7,8-HXCDF	0.823	J	1.03	J	1.05		0.887	J	0.692	J	0.078	J	0.328	J	1.04		0.597	U
1,2,3,6,7,8-HXCDF	0.519	J	0.609	J	0.696	J	0.631	J	0.447	J	0.0506	U	0.17	J	0.581	J	0.387	U
1,2,3,7,8,9-HXCDF	0.072	J	0.067	U	0.086	J	0.103	J	0.05	U	0.0506	U	0.0496	U	0.0654	U	0.219	U
2,3,4,6,7,8-HXCDF	0.52	J	0.623	J	0.629	J	0.612	J	0.443	J	0.0506	U	0.175	J	0.666	J	0.336	U
1,2,3,4,6,7,8-HPCDF	6.97		9.71		8.62		8.22		6.35		0.63	J	2.67		10.4		5.26	
1,2,3,4,7,8,9-HPCDF	0.495	J	0.569	J	0.612	J	0.619	J	0.455	J	0.061	J	0.187	J	0.675	J	0.262	J
OCDF	13.8	J	17.4	J	20.7		20.3		14.3		1.1	J	6.5		22.3		8.64	
Dx/F TEQ (0 DL)	2.55		3.37		3.58		3.26		2.57		0.225		1.08		3.42		1.22	
Dx/F TEQ (1/2 DL)	2.69		3.37		3.58		3.44		2.58		0.285		1.08		3.42		1.47	
Dx/F TEQ (1 DL)	2.83		3.38		3.58		3.63		2.58		0.346		1.08		3.42		1.72	
Dx/F TEQ (KM)	2.6		3.4		3.6		3.4		2.6		0.25		1.1		3.4		1.3	

*total PCBs represents the sum of all detected congeners

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KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-2. Summary of Phase II Dioxin/Furan Congener Data (continued).

Location ID	PG-53-S	Q	PG-54-S	Q	PG-55-S	Q	PG-57-S	Q	PG-58-S	Q	PG-59-S	Q	PG-60-S	Q	PG-61-S	Q
Date/Time	4/22/2014 9:58		4/22/2014 14:10		4/23/2014 12:40		4/22/2014 13:23		4/22/2014 10:46		4/22/2014 11:17		4/23/2014 9:11		4/23/2014 13:13	
Dioxin/Furan Congeners (ng/kg DW)																
2,3,7,8-TCDD	0.161	J	0.135	U	0.313		0.092	U	0.193	J	0.0496	U	0.482		0.246	U
1,2,3,7,8-PECDD	0.287	J	0.67	J	1.04		0.332	J	0.423	J	0.056	U	1.14		0.829	J
1,2,3,4,7,8-HXCDD	0.377	J	0.86	U	0.992	U	0.313	U	0.517	J	0.0803	U	1.09		1.18	
1,2,3,6,7,8-HXCDD	1.16		2.3		4.43		0.981		1.53		0.214	J	3.17		3.44	
1,2,3,7,8,9-HXCDD	1.13		2.1		3.93		0.972	J	1.64		0.242	J	2.93		3.08	
1,2,3,4,6,7,8-HPCDD	18.8		34.2		60.4		11		28.4		3.57		33.8		44	
OCDD	156		268		453		72.4		227		28.6		222		337	
2,3,7,8-TCDF	1.47		2.7		3.3		1.42		1.41		0.311		4.13		2.37	
1,2,3,7,8-PECDF	0.122	J	0.44	J	0.703	J	0.234	J	0.228	U	0.05	U	0.876	J	0.482	J
2,3,4,7,8-PECDF	0.278	U	0.683	J	1.23	U	0.362	U	0.342	U	0.076	J	1.38		0.615	J
1,2,3,4,7,8-HXCDF	0.44	J	0.606	J	1.27		0.325	J	0.433	U	0.0687	U	1.07	U	0.866	J
1,2,3,6,7,8-HXCDF	0.22	U	0.54	J	0.789	J	0.26	U	0.312	J	0.0687	U	0.921	J	0.512	J
1,2,3,7,8,9-HXCDF	0.0523	U	0.0842	U	0.0903	U	0.0777	U	0.0726	U	0.0687	U	0.099	U	0.0938	U
2,3,4,6,7,8-HXCDF	0.283	U	0.439	U	0.807	J	0.192	U	0.338	U	0.075	U	0.792	J	0.594	U
1,2,3,4,6,7,8-HPCDF	3.64		6.88		12.5		2.44		4.9		0.585	J	6.87		8.25	
1,2,3,4,7,8,9-HPCDF	0.299	J	0.59	J	0.957	J	0.21	U	0.499	J	0.064	J	0.541	J	0.705	J
OCDF	6.85		14.7		24		3.82		11.3		1.17	J	11.7		18.5	
Dx/F TEQ (0 DL)	1.19		2.21		3.71		0.866		1.57		0.151		3.85		2.81	
Dx/F TEQ (1/2 DL)	1.26		2.35		3.95		1.01		1.66		0.222		3.91		2.97	
Dx/F TEQ (1 DL)	1.32		2.49		4.19		1.15		1.76		0.294		3.96		3.12	
Dx/F TEQ (KM)	1.2		2.3		3.9		0.93		1.6		0.23	L	3.9		2.9	

*total PCBs represents the sum of all detected congeners

U-the analytie was analyzed for, but was not detected above the reported sample quantitation limit

J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.

L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detects

KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-2. Summary of Phase II Dioxin/Furan Congener Data (continued).

Location ID	PG-62-S	Q	PG-64-S	Q	PG-65-S	Q	PG-65-D	Q
Date/Time	4/22/2014 13:46		4/22/2014 12:03		4/23/2014 11:08		4/23/2014 11:08	
Dioxin/Furan Congeners (ng/kg DW)								
2,3,7,8-TCDD	0.198	U	0.076	U	0.214	J	0.195	U
1,2,3,7,8-PECDD	0.41	J	0.18	J	0.472	J	0.354	J
1,2,3,4,7,8-HXCDD	0.422	U	0.145	J	0.459	J	0.448	U
1,2,3,6,7,8-HXCDD	1.32	U	0.463	J	1.62		1.19	
1,2,3,7,8,9-HXCDD	1.27		0.49	U	1.56		1.15	
1,2,3,4,6,7,8-HPCDD	16.1		7.04		22		18.4	
OCDD	129		53.8		161		135	
2,3,7,8-TCDF	2.35		0.423		2		1.52	
1,2,3,7,8-PECDF	0.275	U	0.128	U	0.357	U	0.255	U
2,3,4,7,8-PECDF	0.466	J	0.169	J	0.46	U	0.368	U
1,2,3,4,7,8-HXCDF	0.407	J	0.161	J	0.401	U	0.387	J
1,2,3,6,7,8-HXCDF	0.332	J	0.208	U	0.33	U	0.26	J
1,2,3,7,8,9-HXCDF	0.0665	U	0.096	U	0.103	U	0.0754	U
2,3,4,6,7,8-HXCDF	0.333	J	0.169	J	0.404	J	0.186	J
1,2,3,4,6,7,8-HPCDF	3.48		1.39		4.26		3.99	
1,2,3,4,7,8,9-HPCDF	0.253	U	0.107	J	0.287	J	0.229	U
OCDF	6.52		2.68	U	7.71		10.1	
Dx/F TEQ (0 DL)	1.26		0.468		1.61		1.09	
Dx/F TEQ (1/2 DL)	1.45		0.548		1.72		1.27	
Dx/F TEQ (1 DL)	1.65		0.628		1.84		1.46	
Dx/F TEQ (KM)	1.4		0.52		1.4	AVG	--	

*total PCBs represents the sum of all detected congeners

U-the analytie was analyzed for, but was not detected above the reported sample quantitation limit

J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.

L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detects

KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-3. Summary of Phase II Polychlorinated Biphenyl (PCB) Congener Data.

Location ID	PG-01-S	Q	PG-04-S	Q	PG-05-S	Q	PG-08-S	Q	PG-09-S	Q	PG-10-S	Q
Date/Time	3/28/2013 15:48		3/26/2013 11:21		3/28/2013 13:18		3/26/2013 9:17		3/26/2013 11:42		3/28/2013 16:24	
PCB Congeners (ng/kg DW)												
PCB-001	2.84		17		21.1		15.3		22		4.55	
PCB-002	7.41		16.8		24.4		20.1		19.4		7.69	
PCB-003	4.4		11.4		17.5		13.1		13.2		5.95	
PCB-004	3.27		21.5		25.5		29.6		23.3		6.12	
PCB-005	0.209	J	0.725		1.02		1.07	U	0.893	U	0.349	J
PCB-006	2.11		9.99		10.9		13.1		9.24		3.9	
PCB-007	0.874		4.9	U	4.49		4.45		3.9		1.59	
PCB-008	13.7		76.4		76.5		80.4		69.3		23.3	
PCB-009	0.561		2.51		2.65		3.24		2	U	0.939	
PCB-010	0.154	U	1.04		1.06		1.09	U	0.862		0.32	U
PCB-011	14.4		35.3		38.8		30.4		41.7		17.7	
PCB-012/013	5.02	CUJ	9.43	C	9.24	CUJ	9.22	C	15.7	CU	3.95	CUJ
PCB-014	0.442	U	0.736	U	1.04	U	0.693	U	0.624	U	0.447	U
PCB-015	20.5		69.5		81.3		76.3		73.7		24.4	
PCB-016	6.55		22		28.9		35.2		18.8		13.4	
PCB-017	7.99		39.4		43.6		51.7		32.5		16.2	
PCB-018/030	15.3	C	49.2	C	61.7	C	83.6	C	40.8	C	28.3	C
PCB-019	1.3		6.31		7.39		9.42		6.14		2.53	
PCB-020/028	64.7	C	206	C	233	C	227	C	187	C	103	C
PCB-021/033	19.4	C	54.6	C	66.8	C	72.3	C	48	C	36.1	C
PCB-022	15.3		45		54.9		56		38.6		26.5	
PCB-023	0.0879	U	0.161	U	0.176	J	0.238	U	0.12	U	0.093	U
PCB-024	0.16	J	0.712		0.676		1.37	U	0.515	U	0.397	U
PCB-025	3.68		13.5		14.5		14.7		12.3		5.79	
PCB-026/029	6.59	C	23.4	C	27.9	C	27.4	C	20.5	C	11.4	C
PCB-027	1.1	J	6.49		6.32	J	8.29		6.35		2.09	J
PCB-031	39.4		121		140		144		102		68	
PCB-032	6.54		38		42.7		47.5		33.1		12.5	
PCB-034	0.289	U	0.902		1.13		0.951		0.112	U	0.47	
PCB-035	1.74		6.39		6.96		6.32		6.04		2.32	
PCB-036	0.442		1.51		1.83		1.42		1.43		0.532	
PCB-037	19.7		78.1		86.5		88.2		77.4		28.2	
PCB-038	0.211	U	0.619		0.682		0.541		0.569	U	0.255	J
PCB-039	0.479		1.51		1.72		1.7		1.34		0.655	
PCB-040/041/071	22.9	C	101	C	100	C	112	C	96	C	42	C
PCB-042	12.3		55.1		53.2		58.9		52.9		22.4	
PCB-043	1.24		5.39		5.43		7.75		5.7	U	2.29	
PCB-044/047/065	44.5	C	188	C	198	C	227	C	185	C	78.3	C
PCB-045/051	5.39	C	25.1	C	25.6	C	29.7	C	23.6	C	9.43	C
PCB-046	1.95		8.52		8.62		10.1		8.49		3.19	
PCB-048	7.98		30.6		31.8		35.8		27.7		14.2	
PCB-049/069	30	C	140	C	144	C	158	C	133	C	53.9	C
PCB-050/053	4.51	C	22.2	C	22	C	25.4	C	21.2	C	7.61	C
PCB-052	54.5		203		223		294		210		93.1	
PCB-054	0.375	U	0.449		0.425		0.449	U	0.421	U	0.401	U
PCB-055	0.838	U	2.9		2.4		0.335	U	2.34		0.974	
PCB-056	28.5		86.3		102		103		87		46.9	
PCB-057	0.818	U	0.88	U	1.09		0.88		0.894	U	0.813	U
PCB-058	0.833	U	0.915		1.19		0.889		0.913	U	0.827	U
PCB-059/062/075	3.95	C	18.2	C	18.5	C	19.2	C	17.1	C	7.11	C
PCB-060	14.7		47		55.3		55.8		45.1		23.7	
PCB-061/070/074/076	107	C	359	C	411	C	439	C	337	C	176	C
PCB-063	2.55		9.43		9.23		9.32		8.49		4.22	U
PCB-064	19.2		76.8		81.4		92		73.4		35.4	
PCB-066	55.4		224		235		243		210		90.3	
PCB-067	2.02		6.94		7.67		7.1		6.31	U	3.03	
PCB-068	0.791	U	2.62		2.69		2.35	U	2.31		0.912	
PCB-072	1.03	U	3.77		3.77		3.29		3.43		1.52	
PCB-073	0.415	U	0.412	U	0.624		0.0689	U	0.399	U	0.463	U

Location ID	PG-01-S	Q	PG-04-S	Q	PG-05-S	Q	PG-08-S	Q	PG-09-S	Q	PG-10-S	Q
Date/Time	3/28/2013 15:48		3/26/2013 11:21		3/28/2013 13:18		3/26/2013 9:17		3/26/2013 11:42		3/28/2013 16:24	
PCB-077	8.73		37		40		39.3		37.6		12.7	
PCB-078	0.799	U	0.766	U	0.277	U	0.306	U	0.868	U	0.793	U
PCB-079	1.01	U	5.56		4.57		6.64		4.87		1.5	
PCB-080	0.758	U	0.727	U	0.263	U	0.291	U	0.824	U	0.753	U
PCB-081	0.866	U	1.49		1.48	U	1.71	U	1.35	U	0.85	U
PCB-082	7.52		37.3		39.2		57.5		37.8		11.1	J
PCB-083/099	48.3	C	273	C	251	C	319	C	274	C	73.7	C
PCB-084	14		81.2		79.8		114		91.4		23.3	
PCB-085/116/117	14.6	C	73.4	C	72.9	C	92.2	C	80	C	22.9	C
PCB-087/097/108/119/125	48.5	C	238	C	244	C	323	C	256	C	75.5	C
PCB-088/091	8.78	C	52.8	C	50.6	C	66.1	C	54.7	C	14.5	C
PCB-089	0.688	U	4.47		4.1		5.48		4.96		1.19	
PCB-090/101/113	72	C	393	C	382	C	504	C	402	C	119	C
PCB-092	14.1		69.5		69.6		94.8		71.1		23	
PCB-093/095/098/100/102	50.6	C	263	C	268	C	367	C	287	C	79	C
PCB-094	0.437		2.15		2.01		2.24		2.06	U	0.563	
PCB-096	0.331	J	2.15		1.95		2.72		2.59		0.598	
PCB-103	0.944		6.49		5.67		5.97		6.09		1.49	
PCB-104	0.0568	U	0.12	J	0.117	U	0.093	U	0.086	J	0.0463	U
PCB-105	34.4		164		178		209		169		48.7	
PCB-106	0.189	U	0.295	U	0.225	U	0.689	U	0.479	U	0.225	U
PCB-107/124	2.77	C	13.8	C	14.8	C	18.1	C	13.9	C	4.02	C
PCB-109	6.02		31.1		33.7		37.4		32.2		8.76	
PCB-110/115	81.1	C	400	C	412	C	544	C	432	C	127	C
PCB-111	0.114	J	0.579		0.526		0.521		0.132	U	0.208	J
PCB-112	0.0671	U	0.135	U	0.117	U	0.0719	U	0.129	U	0.0596	U
PCB-114	1.76		7.34		8.05		10.1		7.2		2.45	
PCB-118	78.8		392		425		497		395		116	
PCB-120	0.601	U	3.27		2.77		2.73		3.05		0.908	
PCB-121	0.0675	U	0.205	U	0.209	J	0.226	U	0.181	U	0.0599	U
PCB-122	0.94		4.71		4.56		6.2		4.52		1.32	
PCB-123	1.41	U	7.73		7.84	U	8.97		7.2		2.1	U
PCB-126	0.32	J	2.59	U	2.55		2.58		2.58		0.509	
PCB-127	0.181	U	0.274	U	0.216	U	0.64	U	0.445	U	0.637	
PCB-128/166	13.1	C	85.3	C	83.2	C	106	C	86.9	C	19.6	C
PCB-129/138/160/163	87.1	C	566	C	549	C	635	C	571	C	137	C
PCB-130	5.19		37.9		35.1		40.3		37.8		8.15	
PCB-131	0.774	U	5.74		5.16		7.31		5.6		1.37	U
PCB-132	23.6		168		155		197		181		39.3	
PCB-133	1.61		10		9.06		9.91		9.69		2.59	
PCB-134/143	3.56	C	25.8	C	22.8	C	29	C	27	C	101	CJ
PCB-135/151/154	27.2	C	184	C	158	C	200	C	189	C	45.1	C
PCB-136	8.48		61.9		52.5		65.6		60.8		14.3	
PCB-137	2.63		15.5		14.4		18		14.9		4.51	
PCB-139/140	1.51	C	11	C	9.54	C	11.8	C	11.1	C	2.33	C
PCB-141	11		48.6		53.3		63.6		47.2		19.2	
PCB-142	0.27	U	0.665	U	0.461	U	0.464	U	0.56	U	0.251	U
PCB-144	3.15		20.4		18.8		23.6		21.7		5.28	
PCB-145	0.0848	U	0.196	U	0.239	U	0.235	U	0.245	J	0.0681	U
PCB-146	15.6		95.8		90.1		117		80.5		23.6	
PCB-147/149	55	C	391	C	373	C	447	C	408	C	91.2	C
PCB-148	0.212	U	2.08		1.6		1.84		0.98		0.339	J
PCB-150	0.249	U	2.04		1.6		1.68		1.94		0.45	
PCB-152	0.095	J	0.51	U	0.323	J	0.503	U	0.46	U	0.167	U
PCB-153/168	76.9	C	506	C	491	C	535	C	483	C	126	C
PCB-155	0.0596	U	0.231	J	0.161	J	0.198	U	0.159	J	0.047	J
PCB-156/157	8.64	C	48.1	C	51.5	C	64.9	C	49.4	C	13.4	C
PCB-158	7.98		45.5		44.6		55.4		46.1		12.3	
PCB-159	0.964	U	5.67		5.07		5.53		5.18		1.3	
PCB-161	0.183	U	0.432	U	0.314	U	0.302	U	0.364	U	0.171	U
PCB-162	0.298	U	1.66		1.83		2.11		1.66		0.383	

Location ID	PG-01-S	Q	PG-04-S	Q	PG-05-S	Q	PG-08-S	Q	PG-09-S	Q	PG-10-S	Q
Date/Time	3/28/2013 15:48		3/26/2013 11:21		3/28/2013 13:18		3/26/2013 9:17		3/26/2013 11:42		3/28/2013 16:24	
PCB-164	5.94		34.3		35.4		41.6		34.6		9.34	
PCB-165	0.211	U	0.935		0.932		0.877		0.862		0.197	U
PCB-167	3.09		20.1		20.3		24		19.3		4.61	
PCB-169	0.187	U	0.715	U	0.54	U	0.604	U	0.644	U	0.181	U
PCB-170	17.7		94		99.5		104		89.4		28.5	
PCB-171/173	6.01	C	43.7	C	38.9	C	44.9	C	40.9	C	9.41	C
PCB-172	3.29		17.3		17		19.6		16.2		4.86	
PCB-174	16.3		117		101		117		109		26.2	
PCB-175	0.884		7.16		5.73		6.61		6.33		1.37	
PCB-176	2.42		19.9		15.9		18.6		18.2		3.8	
PCB-177	12.1		99.3		83.5		95.3		96		18.3	
PCB-178	4.88		43.6		33.7		38.4		38.2		7.52	
PCB-179	8.34		67.1		55.7		63.6		62.6		13.1	
PCB-180/193	38.9	C	181	C	202	C	209	C	169	C	62.8	C
PCB-181	0.158	U	1.38		1.21		1.64		1.38		0.234	J
PCB-182	0.212	U	1.19		1		1.25	U	1.02		0.289	U
PCB-183/185	13.8	C	104	C	84.5	C	97.4	C	93.4	C	21.3	C
PCB-184	0.118	U	0.425		0.415		0.437		0.347	J	0.0674	U
PCB-186	0.127	U	0.216	U	0.107	U	0.113	U	0.252	U	0.0729	U
PCB-187	29.9		236		196		218		222		44.3	
PCB-188	0.116	U	0.729	U	0.598		0.697	U	0.774	U	0.2	J
PCB-189	0.863	U	3.89		4.36		4.51		3.82		1.29	
PCB-190	3.38		17.2		19.8		22.9		18		5.21	
PCB-191	0.801		4.54		4.43		5		4.02		1.13	U
PCB-192	0.135	U	0.231	U	0.102	U	0.121	U	0.27	U	0.0774	U
PCB-194	9.09		41.9		55.1		54.1		44.6		13.7	
PCB-195	3.39		20.8		25.3		24.7		21.6		5.17	
PCB-196	5.31		31.5		36		39.1		31.2		8.13	
PCB-197/199	1.63	C	12.4	C	11.6	C	13.9	CJ	15.7	C	2.2	C
PCB-198/201	13.5	C	94.8	C	97.7	C	106	C	98.3	C	17.7	C
PCB-200	1.54		14.7		12.2		14		14		2.22	
PCB-202	3.19		25.3		24.1		25.8		24.7		3.92	
PCB-203	7.01		47.4		51.1		55.6		45.6		9.2	
PCB-204	0.125	U	0.119	U	0.146	U	0.24	J	0.198	J	0.0698	U
PCB-205	0.514	U	3.14		3.4	U	3.67		2.86		0.76	
PCB-206	6.89		79.8		51.8		60.7		54.1		7.81	
PCB-207	0.933		9.04		7.35		8.28		7.52		1.14	
PCB-208	2.46		33.1		21.1		24.8		21.6		2.75	
PCB-209	4.71		97.4		54.2		50.6		53.3		5.31	
Total PCBs*	1770		9130		9170		10700		8950		2950	
PCB TEQ (0 DL)	0.0367		0.0234		0.28		0.286		0.281		0.0578	
PCB TEQ (1/2 DL)	0.0396		0.164		0.288		0.296		0.291		0.0606	
PCB TEQ (1 DL)	0.0426		0.304		0.296		0.305		0.301		0.0635	
PCB TEQ (KM)	0.037		0.29	L	0.28		0.29		0.28		0.063	AVG

*total PCBs represents the sum of all detected congeners
U-the analytie was analyzed for, but was not detected above the reported sample quantitation limi
J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sampl
UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate
L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detect
KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicate
C-see list for co-eluting congeners

Table E-3. Summary of Phase II Polychlorinated Biphenyl (PCB) Congener Data (continued).

Location ID	PG-10-D	Q	PG-12-S	Q	PG-15-S	Q	PG-17-S	Q	PG-21-S	Q	PG-23-S	Q
Date/Time	3/28/2013	16:24	3/27/2013	12:09	3/26/2013	9:45	3/26/2013	10:10	3/28/2013	12:59	3/29/2013	13:32
PCB Congeners (ng/kg DW)												
PCB-001	4.53		13.9		14.5		18.3		23.8		36.1	
PCB-002	7.38		13.8		17.6		24.4		24.1		22	
PCB-003	5.65		10.8		11.6		12.8		21.3		27.9	
PCB-004	5.63		28.2		24		32.4		40.2		25	
PCB-005	0.411		0.492	U	0.68	U	0.735	U	1.14		1.71	J
PCB-006	3.23		6.58		7.61		9.71		13.8		14.5	
PCB-007	1.37		3.46		3.51		4.49		5.54		4.05	
PCB-008	23.4		54.1		56.9		66.3		96.8		65.2	
PCB-009	0.862		1.48		1.57		2		3.49		4.06	
PCB-010	0.255	U	1.11		0.955		1.33	U	1.62	U	1.26	J
PCB-011	17.7		22.8		28.2		34.2		37.8		43.6	
PCB-012/013	2.96	CJ	6.98	C	7.43	C	10.7	CU	9.65	CU	18.2	CUJ
PCB-014	1.55	UJ	0.653		0.782	U	1.82	U	1.28	U	1.19	U
PCB-015	26.9		60.2		60		79.6		89.2		91.9	
PCB-016	12.5		20		22.2		25.6		50.6		36	
PCB-017	16.1		36.9		37.5		43.7		69.1		42.2	
PCB-018/030	23.2	C	43.4	C	52.6	C	52.8	CJ	112	C	82.4	C
PCB-019	2.38		8.3		7.61		9.55		14.9		7.52	
PCB-020/028	106	C	178	C	181	C	217	C	276	C	267	C
PCB-021/033	36.5	C	42.3	C	47.8	C	55.5	C	81.7	C	92.3	C
PCB-022	28.5		34.9		39.9		45.8		67.8		72.5	
PCB-023	0.091	U	0.11	U	0.12	U	0.347	J	0.238	J	0.197	U
PCB-024	0.289	J	0.523		0.689		0.992		1.39		0.826	
PCB-025	5.95		10.9		11.3		13.9		16.5		17.7	
PCB-026/029	11.3	C	18.5	C	20.2	C	23.9	C	32.9	C	35.7	C
PCB-027	2.45	J	6.73		6.72		8.67		11.2		7.45	J
PCB-031	68.8		99.1		107		124		179		204	
PCB-032	12.1		48.7		40.4		58		64.1		42.1	
PCB-034	0.431		0.814		0.862		0.839		1.1		1.09	
PCB-035	2.48		5.43		5.41		7.05		7.59		7.55	
PCB-036	0.56		1.34		1.47		1.77		1.96		1.68	
PCB-037	30		68.5		66.9		88.1		99.5		94.9	
PCB-038	0.211	U	0.535	U	0.551		0.751		0.813		0.688	
PCB-039	0.665		1.33		1.53		1.58		2.05		1.89	
PCB-040/041/071	41.4	C	86.5	C	95	C	111	C	153	C	117	C
PCB-042	22.1		46.7		50.7		55.3		80.3		61.2	
PCB-043	2.39		4.77		5.73	U	6.22		8.81		6.1	
PCB-044/047/065	79.2	C	164	C	177	C	203	C	317	C	243	C
PCB-045/051	8.66	C	24.8	C	24.5	C	30.6	C	42.7	C	28.4	C
PCB-046	2.98		7.75		8.21		9.66		14.9		10.2	
PCB-048	14.5		24.8		28.2		33.2		47.8		38.5	
PCB-049/069	55.4	C	119	C	127	C	151	C	217	C	173	C
PCB-050/053	7.61	C	20.9	C	20.8	C	24.1	C	37.5	C	26.6	C
PCB-052	95.9		172		199		220		389		324	
PCB-054	0.137	U	0.366		0.345	U	0.667	U	0.614	U	0.416	U
PCB-055	1.24		1.85		2.52		4.93	U	4.25		3.34	
PCB-056	48.8		84.4		80.8		105		136		124	
PCB-057	0.455	U	0.92		0.796		1.21	U	1.15	U	1.16	
PCB-058	0.373	J	0.982		0.942		1.28	U	1.24		1.06	U
PCB-059/062/075	6.96	C	15.9	C	16.6	C	20.8	C	26.8	C	21.6	C
PCB-060	25		43.2		45.1		55.7		73.6		65.2	
PCB-061/070/074/076	194	C	315	C	322	C	413	C	571	C	529	C
PCB-063	3.93		8.26		7.97		9.93		13		10.9	
PCB-064	36.2		66.2		73.8		79.1		125		101	
PCB-066	95.8		195		193		251		316		277	
PCB-067	3.05		6.38		6.11		7.21		9.64		8.53	
PCB-068	0.974		2.13		2.01		2.83	J	2.84		2.84	
PCB-072	1.38		3.19		2.92		4.11	J	4.42		4.25	
PCB-073	0.143	J	0.0523	U	0.0721	U	0.562	U	5.29		0.468	U

Location ID	PG-10-D	Q	PG-12-S	Q	PG-15-S	Q	PG-17-S	Q	PG-21-S	Q	PG-23-S	Q
Date/Time	3/28/2013 16:24		3/27/2013 12:09		3/26/2013 9:45		3/26/2013 10:10		3/28/2013 12:59		3/29/2013 13:32	
PCB-077	12.4		35.8		33.1		44.4		45		42	
PCB-078	0.175	U	0.193	U	0.21	U	1.29	U	0.492	U	0.808	U
PCB-079	1.23		4.74	U	4.74		6.55	U	6.97	U	5.55	
PCB-080	0.166	U	0.182	U	0.2	U	1.17	U	0.483	U	2.53	
PCB-081	0.379	U	1.5	U	1.25	U	2.34	U	1.62	U	1.69	U
PCB-082	11.5	J	44.8		40.1		37.4	J	64.9		48.7	
PCB-083/099	74.8	C	232	C	240	C	298	C	385	C	234	C
PCB-084	23.1		73.3		76.8		96.9		145		90.2	
PCB-085/116/117	22.8	C	68.3	C	69.7	C	88.9	C	113	C	79.5	C
PCB-087/097/108/119/125	75.5	C	222	C	228	C	274	C	394	C	301	C
PCB-088/091	14.6	C	47	C	47.6	C	61.8	C	83.2	C	55.1	C
PCB-089	1.21		4.38		3.93		5.13		6.73		3.09	
PCB-090/101/113	117	C	342	C	347	C	461	C	600	C	439	C
PCB-092	22.6		62.1		64.3		80.4		112		81.9	
PCB-093/095/098/100/102	81.6	C	243	C	248	C	317	C	459	C	291	C
PCB-094	0.611		1.85	U	1.71		2.5		2.98		1.87	
PCB-096	0.573		1.83		1.89		2.7		3.13		2.32	
PCB-103	1.55		6.04		5.23		7.74		7.76		5.73	
PCB-104	0.0512	U	0.103	U	0.063	J	0.24	J	0.129	U	0.091	U
PCB-105	53		154		151		196		253		205	
PCB-106	0.206	U	0.465	U	0.319	U	0.439	U	0.617	U	0.411	U
PCB-107/124	4.3	C	12.4	C	12.9	C	16.1	C	22.3	C	18.7	C
PCB-109	9.47		30.9		28.7		38		45.8		36.4	
PCB-110/115	129	C	377	C	387	C	491	C	653	C	521	C
PCB-111	0.164	U	0.558		0.506		0.0881	U	0.444	U	0.531	
PCB-112	0.065	U	0.0777	U	0.0962	U	0.086	U	0.262	U	0.109	U
PCB-114	2.34		6.89		6.87		8.48		11.2		9.92	
PCB-118	125		373		361		466		593		500	
PCB-120	0.77		2.62		2.6		0.0822	U	2.86		2.9	
PCB-121	0.0654	U	0.199	U	0.185	J	0.26	J	0.274	U	0.195	U
PCB-122	1.36	U	4.2		4.18		5.37		6.24		5.29	
PCB-123	2.37	U	5.78		7.08		8.3		10.7	U	8.5	U
PCB-126	0.587		2.32		2.57		3.35		3.41		2.34	
PCB-127	0.198	U	0.494	U	0.297	U	0.408	U	0.665	U	0.928	U
PCB-128/166	18.7	C	76.2	C	71.9	C	95.1	C	117	C	87.8	C
PCB-129/138/160/163	133	C	504	C	470	C	600	C	618	C	598	C
PCB-130	8.06		31.9		30.4		41.1		39.3		37.3	
PCB-131	1.15		4.71		4.61		6.06		6.49		6.15	
PCB-132	36		139		137		184		180		180	
PCB-133	2.33		8.33		7.69		10.8		10.4		10.3	
PCB-134/143	5.55	CJ	21.8	C	21	C	28.2	C	26.3	C	24.9	C
PCB-135/151/154	41.5	C	146	C	146	C	207	C	179	C	183	C
PCB-136	13		43.3		45.1		56.1		62.3		50.9	
PCB-137	3.89		14.5		13.8		14.8		19.8		20.2	
PCB-139/140	2.38	C	8.66	C	8.38	C	11.8	C	11.6	C	10.6	C
PCB-141	17.6		44		43.3		59.4		75.6		84.6	
PCB-142	0.267	U	0.513	U	0.278	U	0.349	U	0.475	U	0.483	U
PCB-144	4.81		17		17.4		22.9		24.6		22.5	
PCB-145	0.0676	U	0.0593	U	0.122	U	0.153	U	0.173	U	0.174	U
PCB-146	23.7		102		82.5		91		101		87	
PCB-147/149	73.7	C	354	C	325	C	415	C	429	C	366	C
PCB-148	0.332	U	1.35	J	1.46		1.25		1.71		1.47	
PCB-150	0.313	J	1.63	U	1.44		2.42		1.82		1.33	
PCB-152	0.153	J	0.357	J	0.332	U	0.438		0.339	J	0.418	U
PCB-153/168	119	C	456	C	410	C	541	C	529	C	526	C
PCB-155	0.0494	U	0.147	U	0.188	U	0.31	J	0.213	U	0.254	J
PCB-156/157	13.2	C	44.2	C	44	C	57.2	C	71	C	61.5	C
PCB-158	11.9		40.3		39.1		51.5		60		57.1	
PCB-159	1.32		4.85		4.08		6.01		6.56		6.2	
PCB-161	0.182	U	0.358	U	0.181	U	0.227	U	0.339	U	0.329	U
PCB-162	0.326	U	1.79		1.49		2.28		3.06		2.13	U

Location ID	PG-10-D	Q	PG-12-S	Q	PG-15-S	Q	PG-17-S	Q	PG-21-S	Q	PG-23-S	Q
Date/Time	3/28/2013 16:24		3/27/2013 12:09		3/26/2013 9:45		3/26/2013 10:10		3/28/2013 12:59		3/29/2013 13:32	
PCB-164	9.29		28.9		27.9		39.5		39		42.1	
PCB-165	0.209	U	1.07		0.79		1.11		0.994		0.625	
PCB-167	4.73		17.9		17.3		23.2		26.8		21.7	
PCB-169	0.186	U	0.531	U	0.419	U	0.798	U	0.57	U	0.6	U
PCB-170	27.2		88.1		79.1		110		127		116	
PCB-171/173	8.95	C	32.6	C	36.1	C	49.3	C	46.2	C	37.7	C
PCB-172	4.52		13.5		15.7		21		23.8		19.5	
PCB-174	23.9		84.8		91.7		128		143		116	
PCB-175	1.37		5.02		5.87		7.68		7.75		5.98	
PCB-176	3.55		13.8		14.5		21		16.1		16.6	
PCB-177	17.7		71.5		78		111		103		80.9	
PCB-178	6.78		29.5		32.9		45.6		40.2		33.1	
PCB-179	12.2		48.4		51.7		69		61.1		57.2	
PCB-180/193	61.5	C	174	C	158	C	216	C	262	C	249	C
PCB-181	0.2	J	1		1.16	U	1.75		1.37		1.03	U
PCB-182	0.264	J	0.881		0.99		1.2	U	1.32	U	1.01	
PCB-183/185	19.8	C	73.5	C	81.7	C	109	C	108	C	92.2	C
PCB-184	0.083	J	0.264	U	0.252	J	0.437		0.434	U	0.434	
PCB-186	0.0778	U	0.105	U	0.154	U	0.175	U	0.196	U	0.0989	U
PCB-187	40.2		171		184		247		245		190	
PCB-188	0.201	U	0.814		0.568		1.03		0.76		0.518	
PCB-189	1.36		3.77		3.38		5		5.63		5.16	
PCB-190	4.99		15.6		17.6		22.5		27.3		22.7	
PCB-191	1.21		3.58		3.85		5.52		5.87		5.02	
PCB-192	0.0827	U	0.115	U	0.166	U	0.187	U	0.208	U	0.105	U
PCB-194	13.9		51.7		39.9		54.9		74.7		60.8	
PCB-195	5.25		24.7		17.6		25.2		30.3		23.6	
PCB-196	7.66		30.7		31.4		43.1		37.1		37.5	
PCB-197/199	2.19	C	13.6	CJ	10	CJ	17	C	12.5	C	9.57	CJ
PCB-198/201	16.8	C	85.1	C	88.1	C	128	C	104	C	99.3	C
PCB-200	2.13	U	11.4		11.7		17.2		11.6		10.3	
PCB-202	4.39		23.8		19.9		28.2		26.8		21.6	
PCB-203	8.82		44.1		43.5		58.5		54.8		49.6	
PCB-204	0.0834	U	0.136	U	0.207	U	0.183	U	0.151	U	0.155	U
PCB-205	0.676	U	3.11		2.68		3.98		3.97		3.31	
PCB-206	8.07		50.8		43.7		76.4		57.9		60.2	
PCB-207	1.07		7.02		6.53		10.8		7.84		6.69	
PCB-208	3		20.6		17.3		32.4		24.4		24.9	
PCB-209	5.08		46.2		41.5		178		49.6		61.6	
Total PCBs*	2850		7970		7950		10300		12400		10500	
PCB TEQ (0 DL)	0.0659		0.254		0.278		0.362		0.374		0.262	
PCB TEQ (1/2 DL)	0.0688		0.262		0.285		0.375		0.383		0.272	
PCB TEQ (1 DL)	0.0717		0.27		0.291		0.387		0.392		0.281	
PCB TEQ (KM)	--		0.26		0.28		0.37		0.38		0.27	

*total PCBs represents the sum of all detected congeners
U-the analytie was analyzed for, but was not detected above the reported sample quantitation limi
J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sampl
UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate
L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detect
KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates
C-see list for co-eluting congeners

Table E-3. Summary of Phase II Polychlorinated Biphenyl (PCB) Congener Data (continued).

Location ID	PG-27-S	Q	PG-28-S	Q	PG-31-S	Q	PG-34-S	Q	PG-51-S	Q	PG-53-S	Q
Date/Time	3/28/2013	14:50	3/28/2013	19:36	3/27/2013	14:15	3/26/2013	10:39	4/22/2014	15:21	4/22/2014	9:58
PCB Congeners (ng/kg DW)												
PCB-001	16.3		1.48		6.42		21.2		7.75	J	12.7	
PCB-002	18.8		13.2		10.9		22.7		12.9		9.67	
PCB-003	17.1		2.29		5.38		13.9		4.86	J	22.6	
PCB-004	25.1		2.17		8.28		26.7		13.8		18.7	
PCB-005	0.954		0.212	U	0.259	J	0.829		2.3	U	1.74	
PCB-006	10.4		1.33		2.5		10.4		3.74	J	12.1	
PCB-007	4.01		0.25	J	1.36		4.67		2.18	U	3.53	
PCB-008	71.4		7.55		18.3		74.1		32.8		63.9	
PCB-009	2.66		0.367	J	0.666		2.54		2	U	3.23	
PCB-010	1.18		0.19	U	0.355	J	1.06		1.89	U	1.07	
PCB-011	32.1		13.3		11.2		36		21.3		26.2	
PCB-012/013	11.4	C	2.99	C	8.22	CU	10.3	C	10.9	CU	9.33	C
PCB-014	0.986	U	0.188	U	0.405	U	0.91	U	2.2	U	0.617	
PCB-015	72.9		13		20.6		81.1		36.3		54.4	
PCB-016	29		4.75		5.13		24.5		11.7		48.4	
PCB-017	47.7		5.8		9.38		42.1		18		59.1	
PCB-018/030	72.2	C	9.95	C	11.4	C	52.4	C	25.6	C	130	C
PCB-019	8.02		1.36		2.95		7.57		3.71		9.46	
PCB-020/028	234	C	41.6	C	57.9	C	245	C	117	C	294	C
PCB-021/033	68.9	C	14.1	C	15.3	C	67.2	C	28.4	C	118	C
PCB-022	56.5		11.8		12.3		53.5		24		91.8	
PCB-023	0.397	U	0.141	U	0.938		0.224	U	0.113	U	0.24	J
PCB-024	0.794		0.134	U	0.159	J	0.831		0.6	U	1.5	
PCB-025	14.4		2.13		3.57		15.5		7.02		16.4	
PCB-026/029	26.5	C	4.39	C	6.55	C	28.3	C	13.8	C	36.3	C
PCB-027	7.84		0.961	J	2.13		6.88		4.92	J	10.2	
PCB-031	149		28.7		34		142		66.4		236	
PCB-032	43.8		4.43		10.6		41.5		26.8		49.1	
PCB-034	0.981		0.208	U	1.01		1.15		0.452		0.971	
PCB-035	6.36		1.31		1.97		7.19		4.26		5.38	
PCB-036	1.21		0.344	J	0.523		1.9		0.912		0.753	
PCB-037	86.7		16.2		22.5		93.4		44.7		69.2	
PCB-038	0.609		0.133	U	0.352	U	0.672		0.377	J	0.552	
PCB-039	1.55		0.26	J	0.434		1.63		0.905		2.66	
PCB-040/041/071	102	C	15.9	C	25.1	C	109	C	54.2	C	157	C
PCB-042	56.8		9.1		13.9		57.9		28.1		74.5	
PCB-043	5.45		1.22		1.41		6.74		2.81		10.7	
PCB-044/047/065	215	C	32.3	C	50.8	C	202	C	104	C	305	C
PCB-045/051	25.9	C	3.64	C	6.64	C	27.9	C	12.9	C	37.3	C
PCB-046	8.04		1.29	U	2.18		9.14		4.45		12.5	
PCB-048	33		5.5		7.58		33.6		14		55.4	
PCB-049/069	155	C	21.8	C	38.3	C	150	C	72.2	C	193	C
PCB-050/053	24.2	C	3.08	C	5.56	C	23.3	C	11.5	C	30.4	C
PCB-052	256		33.3		52.5		208		104		449	
PCB-054	0.307	J	0.121	U	0.64		0.444		0.207	J	0.337	J
PCB-055	4.13		0.549		0.749		3.33		1.74		4.9	
PCB-056	113		22.5		27.1		104		57.3		168	
PCB-057	1.14		0.211	U	0.342	J	1.22		0.484		0.415	U
PCB-058	1.35		0.219	U	0.279	U	1.34		0.546		0.443	U
PCB-059/062/075	18.5	C	2.79	C	4.57	C	20.2	C	10.1	C	24	C
PCB-060	60.9		10.6		14.5		55.5		31		95.7	
PCB-061/070/074/076	479	C	85.6	C	110	C	429	C	218	C	665	C
PCB-063	11.1		1.74		2.69		10.9		5.12		12.6	
PCB-064	92.4		14.4		20.8		85		41.3		144	
PCB-066	270		53.8		70.3		265		137		307	
PCB-067	8		1.33		2.22		9.23		3.96		9.23	
PCB-068	2.22		0.444		0.783		2.92		1.46		1.65	
PCB-072	3.56		0.553		1.09		4.27		2.25		3.02	
PCB-073	0.715	U	0.115	J	0.192	U	1.05		0.0506	U	0.0979	U

Location ID	PG-27-S	LQ	PG-28-S	LQ	PG-31-S	LQ	PG-34-S	LQ	PG-51-S	Q	PG-53-S	Q
Date/Time	3/28/2013	14:50	3/28/2013	19:36	3/27/2013	14:15	3/26/2013	10:39	4/22/2014	15:21	4/22/2014	9:58
PCB-077	39.1		6.59		11.4		43		24.9		27.8	
PCB-078	0.575	U	0.212	U	0.27	U	0.247	U	0.0981	U	0.458	U
PCB-079	6.04		0.707		1.51		5.82		3.17		15.8	
PCB-080	0.534	U	0.196	U	0.249	U	0.234	U	0.0899	U	0.421	U
PCB-081	1.62	U	0.21	U	0.537	U	1.55	U	0.87		1.16	
PCB-082	47.6		6.92		8.59	J	39.4		35.3		59.2	
PCB-083/099	286	C	34.2	C	68.1	C	283	C	166	C	290	C
PCB-084	92.2		9.47		19.5		81.7		43.6		132	
PCB-085/116/117	84.9	C	9.86	C	19.4	C	79.8	C	46.5	C	75.5	C
PCB-087/097/108/119/125	284	C	31.8	C	60.4	C	257	C	145	C	409	C
PCB-088/091	57.6	C	5.98	C	14	C	54.6	C	29.4	C	60.7	C
PCB-089	4.23		0.385	J	1.19		4.75		2.68		5.65	
PCB-090/101/113	453	C	49	C	101	C	396	C	204	C	1400	C
PCB-092	80.8		9.41		18.9		71.4		40.7		196	
PCB-093/095/098/100/102	319	C	34.9	C	68.3	C	270	C	141	C	1250	C
PCB-094	1.8		0.207	U	0.549		2.06		0.923		1.87	
PCB-096	2.09		0.269	U	0.628		2.22		1.16		2.2	
PCB-103	5.62		0.838		1.84		6.31		3.34		6.56	
PCB-104	0.259	U	0.118	U	0.268	U	0.145	U	0.064	J	0.0776	U
PCB-105	202		23.9		48.7		196		111		181	
PCB-106	1.08	U	0.279	U	0.348	U	0.449	U	0.302	U	0.75	U
PCB-107/124	17.1	C	1.64	C	3.88	C	16.2	C	9.23	C	16.6	C
PCB-109	35.6		4.5		9.41		39.4		22.6		33	
PCB-110/115	502	C	58.2	C	115	C	449	C	248	C	884	C
PCB-111	0.535	U	0.141	U	0.175	U	0.598		0.356	U	0.388	U
PCB-112	0.433	U	0.14	U	0.129	U	0.182	U	0.0744	U	0.162	U
PCB-114	9.19		1.05		2.21		8.47		4.65		10	
PCB-118	480		58.8		117		467		270		508	
PCB-120	2.76		0.388	J	0.842		3.19		1.88		2.04	U
PCB-121	0.424	U	0.141	U	0.13	U	0.262	U	0.105	U	0.161	U
PCB-122	5.1		0.498		1.07		5.44		3.35		5.59	
PCB-123	10.2		0.97		2.67		7.87		5.2		7.34	
PCB-126	2.98		0.31	U	1.01		2.85		1.44		1.27	U
PCB-127	1.1	U	0.271	U	0.393	U	0.974	U	0.312	U	0.763	U
PCB-128/166	91.7	C	7.18	C	24.9	C	101	C	69.3	C	186	C
PCB-129/138/160/163	584	C	60.7	C	156	C	637	C	440	C	2150	C
PCB-130	36.6		3.23		9.6		40.6		24.5		73.7	
PCB-131	6.5		0.497		1.41		5.65	U	4.05		13.5	
PCB-132	173		15.8		41.5		173		110		728	
PCB-133	9.58		1.03		2.87		11		6.21		23.4	
PCB-134/143	26.3	C	2.17	CU	6.14	C	26.4	C	15.7	C	86	C
PCB-135/151/154	168	C	19.7	C	43.2	C	181	C	102	C	1070	C
PCB-136	50		5.78		12.8		55.9		30.8		405	
PCB-137	19		1.65	U	4.5		17.2		12.4		13.4	
PCB-139/140	10.2	C	0.92	C	2.74	C	11	C	7.36	C	7.8	C
PCB-141	69.4		8.81		13.9		58.9		35.1		569	
PCB-142	1.01	U	0.299	U	0.332	U	0.794	U	0.494	U	1.73	U
PCB-144	19.8		2.37		5.27		21.7		13.5		161	
PCB-145	0.349	U	0.169	U	0.142	U	0.171	J	0.12	J	0.0977	U
PCB-146	94.1		11.7		26.6		107		67.5		302	
PCB-147/149	403	C	43.3	C	104	C	426	C	291	C	2330	C
PCB-148	1.74		0.211	U	0.34	J	1.52		1.34	U	1.32	
PCB-150	1.61		0.168	U	0.59		1.83		0.878		0.955	
PCB-152	0.316	J	0.153	U	0.128	U	0.474		0.198	J	0.357	J
PCB-153/168	506	C	53.9	C	141	C	574	C	352	C	2030	C
PCB-155	0.255	U	0.126	U	0.323	U	0.247	J	0.093	J	0.0716	U
PCB-156/157	58.1	C	5.85	C	14.4	C	59.7	C	35.4	C	120	C
PCB-158	51.9		5.04		12.8		53		31.1		176	
PCB-159	4.37	U	0.477		1.25		5.5		0.328	U	1.22	U
PCB-161	0.73	U	0.204	U	0.226	U	0.535	U	0.337	U	1.24	U
PCB-162	0.728	U	0.213	U	0.463	U	2.14		0.332	U	1.27	U

Location ID	PG-27-S	LQ	PG-28-S	LQ	PG-31-S	LQ	PG-34-S	LQ	PG-51-S	Q	PG-53-S	Q
Date/Time	3/28/2013	14:50	3/28/2013	19:36	3/27/2013	14:15	3/26/2013	10:39	4/22/2014	15:21	4/22/2014	9:58
PCB-164	36.7		3.92		8.99		38.6		22.3		168	
PCB-165	0.811	U	0.235	U	0.343	U	1.47	U	0.588	U	1.4	U
PCB-167	21.6		2.13		5.8		23.5		14		44	
PCB-169	0.74	U	0.207	U	0.233	U	0.634	U	0.31	U	3.17	U
PCB-170	109		12		28.7		122		57.8		623	
PCB-171/173	42.8	C	4.06	C	12.2	C	49.3	C	23.1	C	222	C
PCB-172	21.2		2.15		5.45		21.8		10.2		123	
PCB-174	117		12.6		34.1		136		66.9		873	
PCB-175	6.09		0.585	U	1.96		7.76		3.46		31.5	
PCB-176	16.8		1.81		4.75		20.9		10.1		103	
PCB-177	83.1		8.76		27.2		110		53.9		465	
PCB-178	33.4		2.93		11.1		44.2		20.8		154	
PCB-179	55.6		5.37		17.3		71.3		36		346	
PCB-180/193	222	C	26.9	C	60.7	C	236	C	112	C	1400	C
PCB-181	0.983		0.191	U	0.281	U	1.6		0.872		2.07	
PCB-182	1.05		0.181	U	0.436	U	1.41		0.583		0.231	U
PCB-183/185	92.3	C	8.86	C	26.7	C	110	C	48.2	C	507	C
PCB-184	0.417	U	0.134	U	0.164	U	0.423		0.246	U	0.175	U
PCB-186	0.454	U	0.147	U	0.179	U	0.195	U	0.182	U	0.187	U
PCB-187	200		18.1		64.2		255		153		1030	
PCB-188	0.802		0.13	U	0.267	J	0.964		0.434		0.229	U
PCB-189	5.3		0.518		1.5		5.5		2.32		19.1	
PCB-190	21.8		2.49		5.96		25.2		10.8		129	
PCB-191	5.12		0.426		1.48		5.54		2.12		29.2	
PCB-192	0.492	U	0.167	U	0.204	U	0.213	U	0.189	U	0.201	U
PCB-194	58.9		5.17		17.8		63.7		29.2		239	
PCB-195	23.4		2.13	U	6.85		31.4		13.7		105	
PCB-196	33.3		2.78		11.1		46.3		18		137	
PCB-197/199	12	C	0.988	C	3.64	C	16.9	C	8.41	C	43.9	CJ
PCB-198/201	96.5	C	6.67	C	31.3	C	133	C	45.2	C	266	C
PCB-200	12.1		0.829		4.17		16.7		7.65		34	
PCB-202	21.8		1.36		7.38		30		14.2		46.3	
PCB-203	51.4		3.77		15.7		66.6		30.6		164	
PCB-204	0.31	U	0.155	U	0.147	U	0.226	J	0.14	U	0.147	U
PCB-205	2.76		0.375	J	1.08		3.94		1.66		11.3	
PCB-206	47.7		2.35		17		67.4		30.4		44.8	
PCB-207	6.47		0.354	J	2.16		9.2		4.24		7.07	
PCB-208	19.2		0.828		6.62		27.9		12.8		12.4	
PCB-209	37.7		1.55		16.1		67.6		28.8		10.7	
Total PCBs*	10000		1260		2530		10200		5550		27600	
PCB TEQ (0 DL)	0.326		0.00346		0.108		0.312		0.16		0.0298	
PCB TEQ (1/2 DL)	0.337		0.0221		0.111		0.322		0.162		0.141	
PCB TEQ (1 DL)	0.348		0.0407		0.115		0.332		0.167		0.252	
PCB TEQ (KM)	0.33		0.035	L	0.11		0.32		0.16		0.16	L

*total PCBs represents the sum of all detected congeners
U-the analytie was analyzed for, but was not detected above the reported sample quantitation limi
J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sampl
UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate
L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detect
KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates
C-see list for co-eluting congeners

Table E-3. Summary of Phase II Polychlorinated Biphenyl (PCB) Congener Data (continued).

Location ID	PG-54-S	Q	PG-55-S	Q	PG-57-S	Q	PG-58-S	Q	PG-59-S	Q	PG-60-S	Q
Date/Time	4/22/2014	14:10	4/23/2014	12:40	4/22/2014	13:23	4/22/2014	10:46	4/22/2014	11:17	4/23/2014	9:11
PCB Congeners (ng/kg DW)												
PCB-001	12.1		19.4		9.49		9.48		1.77	J	20.8	
PCB-002	21.2		24.8		12.4		11.7		2.57	J	24.1	
PCB-003	16.1		14.7		15		11.4		1.33	J	25.1	
PCB-004	14.4		25.2		17.9		10		3.51		34.2	
PCB-005	0.975		0.84		0.784		0.834		0.217	U	1.82	
PCB-006	9.51		11.1		5.5		8.03		1.04		15.2	
PCB-007	2.65		5.31		3.42		2		0.667		4.98	
PCB-008	52		86.7		34.6		43.9		8.79		95.6	
PCB-009	2.31		2.73		2.36		2.09		0.302	J	4.09	
PCB-010	0.623		1.08		0.757		0.495		0.186	U	1.56	
PCB-011	29.7		46.7		20		20.4		4.37	U	47.8	
PCB-012/013	10	C	14.5	C	7.28	C	7.07	C	2.05	CU	15.8	C
PCB-014	0.62		0.933		0.804		0.399		0.203	U	1.28	
PCB-015	57.7		88.9		37.7		40.4		7.7		97.2	
PCB-016	22.9		28.8		33.3		25.2		3.2		58.1	
PCB-017	30.9		46.7		42.5		31.3		5.71		76.9	
PCB-018/030	56.3	C	70.2	C	71.7	C	51	CJ	8.94	C	147	C
PCB-019	5.35		7.41		9.33		4.52		1.57		14.4	
PCB-020/028	186	C	266	C	155	C	180	C	26.2	C	372	C
PCB-021/033	66.7	C	76.1	C	54.1	C	78.1	C	6.82	C	126	C
PCB-022	50.5		59.9		43.7		55.1		5.91		96.2	
PCB-023	0.134	J	0.247	U	0.322	J	0.14	J	0.0496	U	0.337	J
PCB-024	0.724		0.914		1.72		0.716		0.094	J	1.7	
PCB-025	11.7		16.9		9.26		16		1.91		21.7	
PCB-026/029	24.8	C	32	C	20.8	C	34.4	C	2.93	C	45.9	C
PCB-027	5.44		9.15		6.43		5.04		0.964	J	12.8	
PCB-031	136		156		105		135		14.5		258	
PCB-032	30		52.5		33.3		24.9		6.7		76.6	
PCB-034	0.813		1.11		0.441		0.91		0.13	J	1.64	
PCB-035	5.98		9.79		4.64		3.51		0.864		11.9	
PCB-036	1.12		1.77		0.848	U	0.52		0.145	J	2.04	
PCB-037	61.2		98		46.3		54.4		8.22		109	
PCB-038	0.532		0.71		0.372	U	0.418		0.088	J	1.13	
PCB-039	1.48		2.12		1.31	U	1.18		0.198	J	2.98	
PCB-040/041/071	89	C	121	C	96.8	C	69	C	12.1	C	173	C
PCB-042	46.1		61.6		46.1		39		6.44		89.2	
PCB-043	5.61		6.78		6.19		5.08		0.607	U	11.1	
PCB-044/047/065	201	C	239	C	163	C	164	C	22.5	C	371	C
PCB-045/051	19.6	C	28.7	C	25.8	C	17.2	C	3.01	C	44.1	C
PCB-046	6.88		9.93		9.86		5.89		1.35		15.7	
PCB-048	27.6		35.9		29.3		25.2		3.7		55.4	
PCB-049/069	133	C	171	C	102	C	117	C	16.5	C	261	C
PCB-050/053	18	C	25.5	C	20.6	C	14.8	C	3.82	C	41.9	C
PCB-052	265		278		185		194		28		487	
PCB-054	0.333	J	0.425		0.418		0.251	J	0.112	J	0.683	
PCB-055	3.1		3.81		3.67		3.65		0.506		4.72	
PCB-056	102		127		84.5		81.6		12.2		174	
PCB-057	0.792		1.02		0.774		1.87		0.116	J	1.44	
PCB-058	0.793		1.15		0.628		0.859		0.149	U	1.52	
PCB-059/062/075	16.1	C	21.1	C	16.2	C	14.7	C	2.23	C	31.3	C
PCB-060	54.5		69.9		48.2		38.5		6.21		94.1	
PCB-061/070/074/076	451	C	534	C	329	C	357	C	54.6	C	762	C
PCB-063	8.93		11.8		7.44		7.68		1.2		15.7	
PCB-064	85.6		94.8		71.8		65.2		9.55		159	
PCB-066	228		306		171		186		30.1		397	
PCB-067	6.77		9.15		5.88		9.67		0.998		10.7	
PCB-068	1.87		3.16		1.05		2.43		0.295	J	3.61	
PCB-072	3.08		4.77		1.68		4.04		0.469		5.83	
PCB-073	0.0573	U	4.54		0.0518	U	0.0497	U	0.0496	U	7.41	

Location ID	PG-54-S	Q	PG-55-S	Q	PG-57-S	Q	PG-58-S	Q	PG-59-S	Q	PG-60-S	Q
Date/Time	4/22/2014	14:10	4/23/2014	12:40	4/22/2014	13:23	4/22/2014	10:46	4/22/2014	11:17	4/23/2014	9:11
PCB-077	29		48.4		24.6		19		5.53		48.3	
PCB-078	0.258	U	0.407	U	0.145	U	0.146	U	0.0632	U	0.466	U
PCB-079	5.81		10.9		4.12		4.29		1.17		10.1	
PCB-080	0.234	U	0.373	U	0.132	U	0.132	U	0.0573	U	0.427	U
PCB-081	1.2		1.85		1.08		0.71		0.188	J	2.08	
PCB-082	51.9	J	78.2		49		29.2	J	6.94		94.7	
PCB-083/099	266	C	375	C	164	C	173	C	37.8	C	437	C
PCB-084	94.5		124		64.9		57.4		12.3		149	
PCB-085/116/117	76.3	C	108	C	55.6	C	43.2	C	9.53	C	128	C
PCB-087/097/108/119/125	294	C	375	C	197	C	167	C	35.1	C	449	C
PCB-088/091	55.8	C	76.5	C	35.4	C	36.3	C	7.23	C	85.3	C
PCB-089	4.2		7.01		3.93		2.82		0.565		6.58	
PCB-090/101/113	432	C	568	C	253	C	242	C	50.2	C	704	C
PCB-092	82.3		103		44.1		54.6		9.75		136	
PCB-093/095/098/100/102	315	C	415	C	195	C	180	C	41.8	C	514	C
PCB-094	1.75		1.79	J	1.19	J	1.14		0.246	U	2.72	J
PCB-096	1.9		2.85	J	1.52	J	1.34		0.235	J	2.99	J
PCB-103	4.14		7.35		2.24	J	3.16		0.768		8.39	
PCB-104	0.0609	U	0.131	J	0.0507	U	0.0497	U	0.0496	U	0.12	U
PCB-105	181		249		124		100		22.5		262	
PCB-106	0.467	U	1.08	U	0.644	U	0.364	U	0.0909	U	1.02	U
PCB-107/124	16.6	C	22.6	C	11.1	C	8.17	C	2.1	C	25.6	C
PCB-109	32.6		51.1		22.6		20.2		4.45		58	
PCB-110/115	480	C	642	C	341	C	291	C	60.4	C	802	C
PCB-111	0.293	J	0.607	U	0.314	U	0.316	U	0.097	U	0.927	J
PCB-112	0.117	U	0.606	U	0.299	U	0.113	U	0.0496	U	0.57	U
PCB-114	8.28		11.3		6.15		5.11		0.937		13.6	
PCB-118	440		632		283		262		58.9		712	
PCB-120	1.48		3.53	J	0.683	U	1.18		0.334	U	3.67	J
PCB-121	0.121	U	0.606	U	0.297	U	0.116	U	0.0496	U	0.566	U
PCB-122	5.5		7.26		3.59	J	2.87		0.708		8.27	
PCB-123	8.15		10.1		5.48		3.6		1.13		12.4	
PCB-126	1.4		2.46		1.43	U	0.838		0.495		3.2	
PCB-127	0.479	U	1.14	U	0.693	U	0.373	U	0.0933	U	1.09	U
PCB-128/166	108	C	156	C	64.2	C	59.2	C	12.8	C	173	C
PCB-129/138/160/163	708	C	911	C	443	C	400	C	80	C	1040	C
PCB-130	38.8		56.4		27.2		21.2		4.43		60.5	
PCB-131	7.71		9.47		3.93		3.87		0.894		11.3	
PCB-132	203		249		117		118		19.8		325	
PCB-133	7.6		12.7		3.53	J	4.78		1.03	U	15.4	
PCB-134/143	27.9	C	38.9	C	18.2	C	16.3	C	2.93	C	48.8	C
PCB-135/151/154	178	C	217	C	99.9	C	109	C	17.3	C	286	C
PCB-136	61.5		75.1		30.1		36.2		5.99		92.8	
PCB-137	28		30.1		18.7		15.6		3.13		44.1	
PCB-139/140	10.2	C	15.3	C	6.05	C	6.78	C	1.31	C	17.8	C
PCB-141	83		84.3		50.9		49.2		7.76		133	
PCB-142	0.421	U	0.588	U	0.941	U	0.562	U	0.212	U	1.18	U
PCB-144	27		30.1		13.6		14.1		2.28		42.3	
PCB-145	0.167	J	0.376	J	0.411	U	0.0873	U	0.0576	U	0.371	J
PCB-146	83.3		133		38.1		49.6		10.7		160	
PCB-147/149	534	C	595	C	296	C	332	C	53	C	783	C
PCB-148	1.27	J	2.43		0.522	U	0.883		0.138	J	2.29	
PCB-150	1.16		1.83		0.639	J	1.01		0.126	J	1.96	
PCB-152	0.446		0.511	U	0.365	U	0.353	J	0.0513	U	0.737	
PCB-153/168	464	C	740	C	235	C	241	C	55.9	C	856	C
PCB-155	0.175	J	0.212	J	0.108	U	0.109	U	0.0496	U	0.174	J
PCB-156/157	59.4	C	86.6	C	26.5	C	30.2	C	6.56	C	102	C
PCB-158	56.9		74.4		38		31.4		5.91		91.5	
PCB-159	0.29	U	0.391	U	2.03	J	0.387	U	0.146	U	0.785	U
PCB-161	0.293	U	0.401	U	0.656	U	0.392	U	0.148	U	0.805	U
PCB-162	0.296	U	0.396	U	0.684	U	0.395	U	0.149	U	0.795	U

Location ID	PG-54-S	Q	PG-55-S	Q	PG-57-S	Q	PG-58-S	Q	PG-59-S	Q	PG-60-S	Q
Date/Time	4/22/2014	14:10	4/23/2014	12:40	4/22/2014	13:23	4/22/2014	10:46	4/22/2014	11:17	4/23/2014	9:11
PCB-164	38		51.5		24.9		21.7		3.97		60.6	
PCB-165	0.429		1.23		0.732	U	0.449	U	0.169	U	0.93	U
PCB-167	20.2		32.1		10.1		10.4		2.92		35.6	
PCB-169	0.484	U	1.12	U	0.464	U	0.325	U	0.133	U	1.07	U
PCB-170	103		134		45.2		61.9		9.98		169	
PCB-171/173	40.9	C	58.1	C	17.7	C	25.4	C	3.17	C	62.5	C
PCB-172	18.2		24.9		6.42		11.1		1.69		30.9	
PCB-174	125		153		57.4		86.3		8.88		183	
PCB-175	4.93		8.6		2.06	J	2.68		0.504		9.05	
PCB-176	17.1		23.1		7.05		11.3		1.21		25	
PCB-177	85.1		132		46.7		59.4		6.47		125	
PCB-178	27.9		49.5		11.6		16.3		2.39		48.4	
PCB-179	58.9		80.3		25.4		40.1		4.11		87.4	
PCB-180/193	211	C	247	C	101	C	139	C	20	C	345	C
PCB-181	1.33		2.13		0.595	U	0.659		0.119	J	2.04	
PCB-182	0.813		1.17		0.554	U	0.611		0.123	J	1.48	
PCB-183/185	85.5	C	122	C	34.4	C	0.157	CU	7.07	C	135	C
PCB-184	0.237	J	0.4		0.402	U	0.154	J	0.0709	U	0.498	
PCB-186	0.14	U	0.349	U	0.451	U	0.128	U	0.0746	U	0.274	U
PCB-187	208		335		78.8		134		18.8		340	
PCB-188	0.407		1.01		0.177	J	0.352	J	0.0657	U	0.653	
PCB-189	4.12		5.46		1.64		2.47		0.404	U	6.59	
PCB-190	22.9		26.9		10.4		13.9		1.63		30.7	
PCB-191	4.68		5.95		1.61	U	2.8		0.449		7.34	
PCB-192	0.149	U	0.364	U	0.508	U	0.137	U	0.0798	U	0.285	U
PCB-194	53.9		68		21.1		35.1		4.84		78	
PCB-195	23.1		34.7		10.2		14		1.73		32.4	
PCB-196	30.1		44		12.8		16.6		2.38		45.6	
PCB-197/199	11	CJ	19.6	C	3.75	CJ	5.53	CJ	1.26	CJ	20	C
PCB-198/201	81.2	C	119	C	29.7	C	41	C	5.9	C	110	C
PCB-200	8.43		20.4		3.03	J	4.87		0.796		17	
PCB-202	17.2		32.3		7.1		10.2		1.6		28.7	
PCB-203	44.7		71.1		18.2		25.7		3.57		70.3	
PCB-204	0.125	U	0.214	U	0.494	U	0.0806	U	0.0659	U	0.182	U
PCB-205	2.53		4.25		0.929		1.59		0.193	J	3.88	
PCB-206	33.9		67.9		16.2		22.4		3.65		53.6	
PCB-207	4.4		9.52		1.9		2.62		0.575		7.63	
PCB-208	14.4		30.6		6.26		8.02		1.42		22	
PCB-209	32.9		87.8		11.7		17		3.18		40.8	
Total PCBs*	9720		13000		6280		6390		1130		16200	
PCB TEQ (0 DL)	0.165		0.282		0.0165		0.0983		0.0529		0.36	
PCB TEQ (1/2 DL)	0.172		0.299		0.095		0.103		0.0549		0.376	
PCB TEQ (1 DL)	0.179		0.316		0.173		0.108		0.0569		0.392	
PCB TEQ (KM)	0.17		0.29		0.16	L	0.1		0.053		0.36	

*total PCBs represents the sum of all detected congeners
U-the analytie was analyzed for, but was not detected above the reported sample quantitation limi
J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sampl
UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate
L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detect
KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates
C-see list for co-eluting congeners

Table E-3. Summary of Phase II Polychlorinated Biphenyl (PCB) Congener Data (continued).

Location ID	PG-61-S	Q	PG-62-S	Q	PG-64-S	Q	PG-65-S	Q	PG-65-D	Q	PT-03-S	Q
Date/Time	4/23/2014	13:13	4/22/2014	13:46	4/22/2014	12:03	4/23/2014	11:08	4/23/2014	11:08	5/10/2013	13:07
PCB Congeners (ng/kg DW)												
PCB-001	13.7		6.4		4.4		13.8		7.44		6.3	
PCB-002	21.7		11.1		4.37		17.3		9.64		25.1	
PCB-003	10.1		9.7		3.65	J	16.9		10.1		6.69	
PCB-004	17.9		8.83		10.7		46.6	J	10.8	J	8.55	
PCB-005	0.69		0.564		0.246	J	1.05		0.68		0.324	J
PCB-006	8.93		4.98		2.61		10.2	J	6.06	J	4.16	
PCB-007	3.62		1.63		1.76		3.72		2.56		1.66	
PCB-008	62.4		28.4		22.6		63.1	J	37.6	J	28.9	
PCB-009	2.24		1.35		0.763		2.67		1.57		1.11	
PCB-010	0.849		0.398		0.616		1.38		0.597		0.441	
PCB-011	30.7		19.5		8.14		30.9		19.6		57.2	
PCB-012/013	8.22	C	6.07	C	3.46	CUJ	11	CUJ	5.9	CJ	6.04	C
PCB-014	0.64		0.844	U	0.255	J	0.843		0.493		0.699	
PCB-015	53.2		33.1		16		51.1		34.9		37.9	
PCB-016	19.7		16.5		9.14		33.3		20.7		7.69	
PCB-017	31.9		19.5		17.7		46.1		31		11.2	
PCB-018/030	47.1	C	38.4	C	24.5	C	90.7	CJ	51.7	CJ	15.8	C
PCB-019	5.09		3.62		5.67		10.3	J	4.64	J	1.85	
PCB-020/028	172	C	116	C	57.9	C	211	C	144	C	87.9	C
PCB-021/033	52.6	C	42.1	C	16.3	C	72	C	49.7	C	27.5	C
PCB-022	39.3		32.5		13.5		55.7		38.1		19.7	
PCB-023	0.171	U	0.122	U	0.071	U	0.24	U	0.127	U	0.152	U
PCB-024	0.671		0.474		0.335	J	1.08		0.575		0.221	J
PCB-025	10.9		7.35		4.48		12.6		8.52		6.03	
PCB-026/029	20.7	C	15.8	C	7.21	C	26.7	C	17.5	C	9.93	C
PCB-027	5.11		3.44		3.2	J	8.49		4.64		2.01	
PCB-031	105		88.4		35.1		149		101		50	
PCB-032	34.1		18.7		23.4		38.1		25.5		11.8	
PCB-034	0.848		0.497		0.233	J	0.913		0.623		0.304	J
PCB-035	5.48		3.97		1.81		5.78		3.48		4.13	
PCB-036	1		0.768		0.267	U	0.82		0.5		2.47	
PCB-037	55.2		36.4		16.7		59		38.9		32.4	
PCB-038	0.467		0.335	J	0.192	J	0.581		0.361	J	0.335	J
PCB-039	1.37		0.979		0.567		1.83		1.17		0.693	
PCB-040/041/071	73.3	C	54.8	C	42.5	C	96.8	C	64.4	C	32.3	C
PCB-042	37.5		28.4		21.1		50.2		33.6		14.8	
PCB-043	4.67		3.52		2.35		6.08		4.27		1.41	
PCB-044/047/065	166	C	121	C	77.7	C	194	C	129	C	56	C
PCB-045/051	17.3	C	12.2	C	11.9	C	23.7	C	16	C	5.79	C
PCB-046	5.8		4.37		5.09		8.03		5.39		2.23	
PCB-048	22.1		17.7		11.9		31.9		22		8.3	
PCB-049/069	111	C	81.8	C	53.8	C	139	C	91.8	C	37.6	C
PCB-050/053	16.2	C	11.7	C	14.3	C	21.1	C	14.2	C	5.86	C
PCB-052	228		154		91.8		227		150		57.9	
PCB-054	0.287	J	0.196	J	0.484		0.407	J	0.216	J	0.13	J
PCB-055	1.96		2.34		1.03		3.08	J	1.83	J	1.02	
PCB-056	82.2		64.1		32		104		76.5		35.8	
PCB-057	0.502		0.548		0.321	J	0.93		0.489		0.374	J
PCB-058	0.736		0.564		0.345	J	1.01		0.595		0.272	J
PCB-059/062/075	12.9	C	10	C	8.02	C	17.3	C	11.3	C	5.02	C
PCB-060	42.6		36		16.6		54.6		39.6		20.3	
PCB-061/070/074/076	371	C	295	C	141	C	430	C	285	C	137	C
PCB-063	7.13		5.82		3.11		8.8		6.15		3.2	
PCB-064	64.7		51.9		30.8		83.6		56.7		21.8	
PCB-066	195		147		77.4		230		162		83.1	
PCB-067	5.3		4.19		2.89		6.71		4.26		2.69	
PCB-068	1.79		1.18		0.768		1.99		1.32		0.942	
PCB-072	2.87		1.99		1.31		3.27	J	1.91	J	1.21	
PCB-073	0.0573	U	0.0645	U	0.0484	U	0.124	U	0.0738	U	0.0801	U

Location ID	PG-61-S	Q	PG-62-S	Q	PG-64-S	Q	PG-65-S	Q	PG-65-D	Q	PT-03-S	Q
Date/Time	4/23/2014 13:13		4/22/2014 13:46		4/22/2014 12:03		4/23/2014 11:08		4/23/2014 11:08		5/10/2013 13:07	
PCB-077	26.1		19.2		13.5		25.7		17.5		15.3	
PCB-078	0.178	U	0.2	U	0.107	U	0.315	U	0.479	U	0.142	U
PCB-079	5.71		3.21		2.88		4.31		2.92		1.82	
PCB-080	0.163	U	0.181	U	0.0974	U	0.289	U	0.439	U	0.133	U
PCB-081	0.931		0.702		0.463		0.998	U	0.542		0.562	
PCB-082	61.1		36.7		32		46.4		32.8		11.8	
PCB-083/099	257	C	148	C	132	C	216	C	155	C	76.6	C
PCB-084	96.2		47.2		47		67.1		49.9		21.4	
PCB-085/116/117	74.9	C	40.9	C	35.6	C	57.6	C	41.2	C	24.8	C
PCB-087/097/108/119/125	281	C	158	C	128	C	203	C	145	C	73.9	C
PCB-088/091	53.3	C	29.5	C	26.9	C	44.9	C	32.2	C	13.6	C
PCB-089	4.16		2.32		2.24		3.21	J	2.65		1.18	
PCB-090/101/113	407	C	230	C	186	C	321	C	247	C	105	C
PCB-092	71.8		43.4		34.6		59.3		46		18.3	
PCB-093/095/098/100/102	303	C	166	C	160	C	232	C	166	C	70	C
PCB-094	1.69	J	0.941		1.12		1.52	J	0.98		0.527	
PCB-096	2.1	J	0.893		1.24		1.52	J	1.12		0.572	U
PCB-103	4.9		2.3		2.7		4.2	J	3.27		1.34	
PCB-104	0.077	U	0.0544	U	0.0473	U	0.115	U	0.0658	U	0.0676	U
PCB-105	167		103		66.9		130		90.5		60	
PCB-106	1.37	U	0.381	U	0.376	U	0.798	U	0.338	U	0.125	U
PCB-107/124	15	C	9.12	C	7.3	C	11.9	C	8.18	C	4.62	C
PCB-109	31.8		18.6		13.6		26		18		11.5	
PCB-110/115	455	C	259	C	211	C	358	C	247	C	116	C
PCB-111	0.48	U	0.232	U	0.229	J	0.76	U	0.375	J	0.213	U
PCB-112	0.479	U	0.0734	U	0.0857	U	0.759	U	0.0809	U	0.0766	U
PCB-114	8.6		4.91		2.84		6.31		4.27		2.38	
PCB-118	427		246		176		346		216		131	
PCB-120	2.23	J	1.13		0.945		1.56	J	1.35		0.863	U
PCB-121	0.479	U	0.0755	U	0.0881	U	0.759	U	0.123	J	0.0804	U
PCB-122	4.47		3		2.28		4.91	J	2.93	J	1.51	
PCB-123	6.47		4.1		3.7		6.36		4.11		2.28	
PCB-126	1.91	U	1.11		1.27		1.72		1.16		1.14	
PCB-127	1.45	U	0.391	U	0.386	U	0.839	U	0.349	U	0.13	U
PCB-128/166	101	C	51.3	C	40	C	70.4	C	48.1	C	28.7	C
PCB-129/138/160/163	592	C	321	C	240	C	453	C	323	C	170	C
PCB-130	34.6		17.1		15		24.1		18.7		11.3	
PCB-131	6.89		3.33		2.81		4.64		3.5		1.54	
PCB-132	169		85.8		68.2		117		92.7		41.9	
PCB-133	8.22		4.22		3.04		6.81		5.31		2.72	
PCB-134/143	25.4	C	12.4	C	10.7	C	17	C	13.4	C	6.31	C
PCB-135/151/154	142	C	83	C	60.8	C	125	C	98.1	C	39.3	C
PCB-136	50		26		21.8		40.1		32.2		12.4	
PCB-137	22.3		11.6		10.2		15.8		10.8		4.95	
PCB-139/140	10.4	C	4.69	C	4.04	C	6.87	C	5.67	C	2.67	C
PCB-141	60.1		41.7		25		55.7		40.1		13.1	
PCB-142	0.46	U	0.352	U	0.241	U	0.743	U	0.467	U	0.175	U
PCB-144	20.3		13		8.08		17		13.6		4.76	
PCB-145	0.181	J	0.081	U	0.0587	U	0.14	U	0.0959	U	0.0963	U
PCB-146	85.8		47.7		32.6		71.5		55.5		23.3	
PCB-147/149	414	C	234	C	178	C	348	C	264	C	102	C
PCB-148	1.99	J	0.874	J	0.61	J	1.9	J	1		0.388	
PCB-150	1.09		0.659		0.471		1.13		1.05	U	0.31	U
PCB-152	0.443		0.184	J	0.121	J	0.23	J	0.322	J	0.11	U
PCB-153/168	456	C	247	C	175	C	365	C	275	C	140	C
PCB-155	0.147	U	0.118	J	0.0473	U	0.146	U	0.088	J	0.0656	U
PCB-156/157	62.7	C	31	C	20.8	C	42.7	C	28	C	14	C
PCB-158	50		27.9		18.9		37.9		27		12.3	
PCB-159	0.306	U	0.242	U	0.166	U	0.495	U	0.311	U	1.33	
PCB-161	0.314	U	0.246	U	0.168	U	0.507	U	0.319	U	0.119	U
PCB-162	0.31	U	0.248	U	0.169	U	0.501	U	0.315	U	0.605	U

Location ID	PG-61-S	Q	PG-62-S	Q	PG-64-S	Q	PG-65-S	Q	PG-65-D	Q	PT-03-S	Q
Date/Time	4/23/2014	13:13	4/22/2014	13:46	4/22/2014	12:03	4/23/2014	11:08	4/23/2014	11:08	5/10/2013	13:07
PCB-164	32.4		18.1		13.5		26.6		19.6		8.7	
PCB-165	0.61	U	0.296	J	0.192	U	0.586	U	0.368	U	0.276	J
PCB-167	21.2		11.3		8.77		15.6		9.72		5.85	
PCB-169	0.279	U	0.367	U	0.139	U	0.593	U	0.429	U	0.195	U
PCB-170	87.1		74.6		29.7		75.5		52.3		24.5	
PCB-171/173	37	C	24	C	9.76	C	27.8	CJ	14.9	CJ	10	C
PCB-172	15.7		13.6		5.28		15.3	J	8.62	J	3.97	
PCB-174	93.1		82.3		30.3		84.5	J	47.1	J	24.5	
PCB-175	4.84		3.68		1.53		4.06		2.48		1.68	
PCB-176	13.3		9.64		3.89		10.8		6.93		3.82	
PCB-177	77.3		50.9		23.5		54.7	J	32.8	J	23	
PCB-178	27.2		18.8		8.79		21		13.2		10.2	
PCB-179	46.1		33.9		14		37.4		25.4		13.8	
PCB-180/193	156	C	171	C	61.5	C	163	C	116	C	48.7	C
PCB-181	1.37		0.735		0.32	J	0.755		0.466	U	0.231	J
PCB-182	0.912		0.641	U	0.341	J	0.705		0.45		0.343	J
PCB-183/185	71.6	C	59.2	C	23	C	63.4	CJ	35.7	CJ	21.4	C
PCB-184	0.278	J	0.24	J	0.0908	U	0.226	U	0.122	J	0.102	U
PCB-186	0.131	U	0.113	U	0.0956	U	0.218	U	0.123	U	0.103	U
PCB-187	196		141		59.3		167	J	92.3	J	54	
PCB-188	0.507	U	0.283	J	0.162	J	0.335	U	0.265	U	0.194	J
PCB-189	3.69		2.82		1.14		2.99		2.09		1.06	
PCB-190	17.9		15.5		4.99		14.4	J	7.26	J	4.43	
PCB-191	4.11		3.13		1.17		3.12	J	1.71	J	0.871	
PCB-192	0.137	U	0.121	U	0.102	U	0.227	U	0.128	U	0.114	U
PCB-194	38.2		65.7		14.5		43.3		31.2		13	
PCB-195	20.5		23.1		4.66		15.4		12.2		5.55	
PCB-196	25.6		32.9		9.02		20.2		14.1		7.8	
PCB-197/199	11.5	C	12.9	C	2.66	C	8.22	CJ	5.74	C	2.39	CJ
PCB-198/201	70.6	C	84.2	C	21.1	C	58.8	CJ	30.9	CJ	24.2	C
PCB-200	10.6		9.26		2.51		8.48	J	4.66	J	3.56	
PCB-202	17.9		16.3		5.04		13.3		9.05		6.98	
PCB-203	39.2		47.3		10.8		32.8		21.5		10.8	
PCB-204	0.111	U	0.082	U	0.077	U	0.208	U	0.114	U	0.0999	U
PCB-205	2.32		2.65		0.633		1.98		1.2		0.8	
PCB-206	40.8		30.8		10.7		31.5		21.1		16.6	
PCB-207	5.46		4.81		1.44		4.05		2.78		2.53	
PCB-208	17		10.4		4.05		12.4		8.17		6.79	
PCB-209	43		15.9		7.88		24.2		15.9		20.5	
Total PCBs*	8650		5620		3590		7890		5430		2790	
PCB TEQ (0 DL)	0.0238		0.125		0.137		0.191		0.129		0.122	
PCB TEQ (1/2 DL)	0.123		0.131		0.139		0.2		0.135		0.125	
PCB TEQ (1 DL)	0.223		0.136		0.141		0.209		0.141		0.128	
PCB TEQ (KM)	0.22	L	0.13		0.14		0.16	AVG	--		0.123	

*total PCBs represents the sum of all detected congeners
U-the analytie was analyzed for, but was not detected above the reported sample quantitation limi
J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sampl
UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate
L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detect
KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates
C-see list for co-eluting congeners

Table E-4. Co-eluting PCB Congeners.

Congener	PCB #	Co-elutes With PCB #
3,4'-DICB	13	C12
2,4,4'-TRICB	28	C20
2,4,5-TRICB	29	C26
2,4,6-TRICB	30	C18
2',3,4-TRICB	33	C21
2,2',3,4-TECB	41	C40
2,2',4,4'-TECB	47	C44
2,2',4,6'-TECB	51	C45
2,2',5,6'-TECB	53	C50
2,3,4,6-TECB	62	C59
2,3,5,6-TECB	65	C44
2,3',4,6-TECB	69	C49
2,3',4',5-TECB	70	C61
2,3',4',6-TECB	71	C40
2,4,4',5-TECB	74	C61
2,4,4',6-TECB	75	C59
2',3,4,5-TECB	76	C61
2,2',3,4,5'-PECB	87	C86
2,2',3,4',6-PECB	91	C88
2,2',3,5',6-PECB	95	C93
2,2',3',4,5-PECB	97	C86
2,2',3',4,6-PECB	98	C93
2,2',4,4',5-PECB	99	C83
2,2',4,4',6-PECB	100	C93
2,2',4,5,5'-PECB	101	C90
2,2',4,5,6'-PECB	102	C93
2,3,3',4,5'-PECB	108	C86
2,3,3',5',6-PECB	113	C90
2,3,4,4',6-PECB	115	C110
2,3,4,5,6-PECB	116	C85
2,3,4',5,6-PECB	117	C85
2,3',4,4',6-PECB	119	C86
2',3,4,5,5'-PECB	124	C107
2',3,4,5,6'-PECB	125	C86
2,2',3,4,4',5'-HXCB	138	C129
2,2',3,4,4',6'-HXCB	140	C139
2,2',3,4,5,6'-HXCB	143	C134
2,2',3,4',5',6-HXCB	149	C147
2,2',3,5,5',6-HXCB	151	C135
2,2',4,4',5,6'-HXCB	154	C135
2,3,3',4,4',5'-HXCB	157	C156
2,3,3',4,5,6-HXCB	160	C129
2,3,3',4',5,6-HXCB	163	C129
2,3,4,4',5,6-HXCB	166	C128
2,3',4,4',5',6-HXCB	168	C153
2,2',3,3',4,5,6-HPCB	173	C171
2,2',3,4,5,5',6-HPCB	185	C183
2,3,3',4',5,5',6-HPCB	193	C180
2,2',3,3',4,5,6,6'-OCCB	199	C197
2,2',3,3',4,5,5',6'-OCCB	201	C198

Port Gardner Regional Background

Phase I Data Tables

Table E-5. Summary of Phase I Sediment Conventionals, Metals, and Carcinogenic Polycyclic Aromatic Hydrocarbons.

Location ID	PG-02-S	Q	PG-02-D	Q	PG-02-T	Q	PG-03-S	Q	PG-06-S	Q	PG-07-S	Q	PG-11-S	Q
Date/Time	3/26/2013	14:09	3/26/2013	14:09	3/26/2013	14:09	3/27/2013	10:35	3/27/2013	15:40	3/28/2013	17:35	3/27/2013	10:10
Conventionals														
Total Organic Carbon	1.4		1.49		0.975		0.347		1.08		0.541		0.973	
Total Solids	51.72		51.88		82.11		73.76		67.87		72.3		69.69	
Total Volatile Solids	5.35		5.34		5.36		1.08		3.22		2.53		2.22	
Preserved Total Solids	48.27		47.63		46.64		74.57		63.54		74.02		60.41	
Sulfide	2.15	UJ	2.01	UJ	6.81	J	1.3	UJ	1.56	UJ	1.35	UJ	1.64	UJ
Particle/Grain Size, Phi Scale <-1	0.3		0.3		0.3		0.1	U	0.1	U	0.1	U	0.1	
Particle/Grain Size, Phi Scale -1 to 0	0.4		0.4		0.4		0.1		0.4		1		0.4	
Particle/Grain Size, Phi Scale 0 to 1	0.2		0.3		0.3		2		1.4		18.9		2.4	
Particle/Grain Size, Phi Scale 1 to 2	0.3		0.3		0.3		37.6		16.1		53.2		17.7	
Particle/Grain Size, Phi Scale 2 to 3	2.9		3		3		50.4		46.6		21.4		31.5	
Particle/Grain Size, Phi Scale 3 to 4	19.2		19.3		19.2		6.6		11.6		2.4		22.5	
Particle/Grain Size, Phi Scale 4 to 5	23.6		25.5		25.9		--		6.6		--		7.8	
Particle/Grain Size, Phi Scale 5 to 6	13.9		12.5		11.7		--		5.1		--		3.2	
Particle/Grain Size, Phi Scale 6 to 7	9.8		9.4		9.6		--		4.5		--		2.5	
Particle/Grain Size, Phi Scale 7 to 8	6.6		6.8		6.7		--		2.5		--		2.4	
Particle/Grain Size, Phi Scale 8 to 9	5.9		5.7		5.8		--		1.4		--		2.5	
Particle/Grain Size, Phi Scale 9 to 10	5.4		5.1		5.3		--		1.2		--		2.2	
Particle/Grain Size, Phi Scale >10	11.5		11.3		11.6		--		2.4		--		4.7	
Particle/Grain Size, Fines (Silt/Clay)	76.7		76.4		76.7		3.3	*	23.9		3.1	*	25.4	
Metals (mg/kg DW)														
Arsenic	8.2		8.1		--		4		9		9.8		6.9	
Cadmium	0.28	J	0.28	J	--		0.13	U	0.15	U	0.12	U	0.14	U
Mercury	0.11		0.12		--		0.03	U	0.04		0.02	U	0.05	
carcinogenic PAH (ug/kg DW)														
Benzo(a)anthracene	20.6		18.7		--		0.6		2.23		0.27	J	5.53	
Chrysene	30.9		28.5		--		1.04		4.57		0.47		7.96	
Benzo(b)fluoranthene	16.6		18.9		--		0.76		3.16		0.35	J	26.9	
Benzo(k)fluoranthene	9.74		11		--		0.39	J	1.08		0.16	J	4.3	J
Total Benzofluoranthenes	34.3		38.9		--		1.53		5.32		0.932	U	34.7	
Benzo(a)pyrene	15		18.1		--		0.53		1.8		0.19	J	5.75	
Indeno(1,2,3-cd)pyrene	9.28		11.4		--		0.36	J	1.3		0.15	J	3.8	J
Dibenz(a,h)anthracene	2.22	J	2.74	J	--		0.168	U	0.37	J	0.166	U	1.71	U
cPAH TEQ (0 DL)	21.2		24.7		--		0.751		2.66		0.288		9.88	
cPAH TEQ (1/2 DL)	21.2		24.7		--		0.76		2.66		0.296		9.97	
cPAH TEQ (1 DL)	21.2		24.7		--		0.768		2.66		0.304		10.1	
cPAH TEQ (KM)	23	AVG	--		--		0.8		2.7		0.3		10	

* Insufficient fines were present for the full determination of silt and clay fractions. Only total fines are reported.

U-the analytie was analyzed for, but was not detected above the reported sample quantitation limit

J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.

L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detects

KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-5. Summary of Phase I Sediment Conventionals, Metals, and Carcinogenic Polycyclic Aromatic Hydrocarbons (continued).

Location ID	PG-13-S	Q	PG-14-S	Q	PG-16-S	Q	PG-18-S	Q	PG-19-S	Q	PG-20-S	Q	PG-22-S	Q
Date/Time	3/27/2013	15:25	3/27/2013	14:51	3/26/2013	13:21	3/28/2013	18:39	3/27/2013	16:23	3/27/2013	14:32	3/27/2013	11:29
Conventionals														
Total Organic Carbon	0.338		0.817		2.53		0.541		0.46		1.56		0.699	
Total Solids	75.15		66.85		39.74		75.17		70.89		66.96		75.64	
Total Volatile Solids	1.19		3.37		6.68		3.21		1.55		2.95		1.2	
Preserved Total Solids	77.23		63.05		35.21		74.6		71.75		61		74.44	
Sulfide	1.28	UJ	1.57	UJ	20	J	1.31	UJ	1.39	UJ	2.83	J	1.31	UJ
Particle/Grain Size, Phi Scale <-1	0.1	U	0.1		0.1		0.1	U	0.1	U	0.1		0.1	
Particle/Grain Size, Phi Scale -1 to 0	1.5		0.2		0.2		1.5		1		0.3		0.4	
Particle/Grain Size, Phi Scale 0 to 1	22.6		0.5		0.5		20.4		8.8		1.5		7.3	
Particle/Grain Size, Phi Scale 1 to 2	57.5		1.4		0.6		23.7		33.4		8.6		34.8	
Particle/Grain Size, Phi Scale 2 to 3	14.4		17.6		0.3		13.4		51.4		46.8		39.7	
Particle/Grain Size, Phi Scale 3 to 4	1.7		47.9		3.1		3.1		3.9		22.1		13.2	
Particle/Grain Size, Phi Scale 4 to 5	--		16.5		10.7		2.1		--		3.4		1	
Particle/Grain Size, Phi Scale 5 to 6	--		4.4		14.7		1.5		--		2.7		0.2	
Particle/Grain Size, Phi Scale 6 to 7	--		3		14.3		1.2		--		2.8		0.4	
Particle/Grain Size, Phi Scale 7 to 8	--		1.9		13.5		0.9		--		2.7		0.4	
Particle/Grain Size, Phi Scale 8 to 9	--		1.5		12.1		0.6		--		2.3		0.5	
Particle/Grain Size, Phi Scale 9 to 10	--		1.7		10		0.4		--		2.3		0.5	
Particle/Grain Size, Phi Scale >10	--		3.4		19.8		1		--		4.4		1.4	
Particle/Grain Size, Fines (Silt/Clay)	2.2	*	32.4		95.1		7.9		1.4	*	20.6		4.4	
Metals (mg/kg DW)														
Arsenic	7.5		6.2		9.7		9.6		7.2		6.7		4	
Cadmium	0.12	U	0.18	J	0.28	J	0.13	U	0.13	U	0.15	U	0.13	U
Mercury	0.03	U	0.15		0.13		0.03	U	0.03	U	0.05		0.02	U
carcinogenic PAH (ug/kg DW)														
Benzo(a)anthracene	5		7.2		29.9		0.7		0.38	J	9.5		1.77	
Chrysene	9.65	J	10.1		42.9		1.15		0.66		12.3		3.56	
Benzo(b)fluoranthene	2.28		7.83		31		0.85		0.47	J	10.6		1.59	
Benzo(k)fluoranthene	1.51		3.5	J	17.7		0.43	J	0.17	J	4.68	J	1.06	
Total Benzofluoranthenes	4.92		15.1		63.1		1.7		0.951	U	20.1		3.48	
Benzo(a)pyrene	1.66		7.02		28.7		0.6		0.27	J	8.37		1.15	
Indeno(1,2,3-cd)pyrene	0.78		3.96	J	18.7		0.43	J	0.19	J	4.68	J	0.72	
Dibenz(a,h)anthracene	0.2	J	1.76	U	4.28	J	0.164	U	0.169	U	1.67	U	0.2	J
cPAH TEQ (0 DL)	2.73		9.37		39.3		0.853		0.398		11.4		1.72	
cPAH TEQ (1/2 DL)	2.73		9.46		39.3		0.861		0.406		11.5		1.72	
cPAH TEQ (1 DL)	2.73		9.55		39.3		0.869		0.415		11.6		1.72	
cPAH TEQ (KM)	2.7		9.5		39		0.9		0.4		12		1.7	

* Insufficient fines were present for the full determination of silt and clay fractions. Only total fines are reported.

U-the analytie was analyzed for, but was not detected above the reported sample quantitation limit

J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.

L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detects

KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-5. Summary of Phase I Sediment Conventionals, Metals, and Carcinogenic Polycyclic Aromatic Hydrocarbons (continued).

Location ID	PG-24-S	Q	PG-25-S	Q	PG-26-S	Q	PG-29-S	Q	PG-30-S	Q	PG-30-D	Q	PG-30-T	Q
Date/Time	3/26/2013 15:21		3/28/2013 18:55		3/26/2013 16:53		3/26/2013 15:43		3/27/2013 16:04		3/27/2013 16:04		3/27/2013 16:04	
Conventionals														
Total Organic Carbon	2.19		0.484		2.36		2.01		0.28		--		--	
Total Solids	44.12		71.86		50.97		44.51		77.17		--		--	
Total Volatile Solids	6.54		0.73		6.25		6.72		1.02		--		--	
Preserved Total Solids	39.66		70.09		45.49		40.78		74.15		74.39		75.66	
Sulfide	74.7	J	1.45	J	20.5	J	16.4	J	3.92	J	1.32	UJ	1.32	UJ
Particle/Grain Size, Phi Scale <-1	0.4		0.1	U	0.1		0.1	U	0.1		--		--	
Particle/Grain Size, Phi Scale -1 to 0	0.6		0.1		0.1		0.1		1.6		--		--	
Particle/Grain Size, Phi Scale 0 to 1	0.5		2.3		0.2		0.3		17.9		--		--	
Particle/Grain Size, Phi Scale 1 to 2	0.3		18		0.3		0.5		69		--		--	
Particle/Grain Size, Phi Scale 2 to 3	0.4		54.6		1		0.8		8.9		--		--	
Particle/Grain Size, Phi Scale 3 to 4	5.4		20.8		11.8		7.9		0.2		--		--	
Particle/Grain Size, Phi Scale 4 to 5	17.5		--		20.6		17.5		--		--		--	
Particle/Grain Size, Phi Scale 5 to 6	17		--		21.8		21.2		--		--		--	
Particle/Grain Size, Phi Scale 6 to 7	14.8		--		14.6		15.2		--		--		--	
Particle/Grain Size, Phi Scale 7 to 8	11.2		--		6.8		11.3		--		--		--	
Particle/Grain Size, Phi Scale 8 to 9	8.9		--		5.7		6.2		--		--		--	
Particle/Grain Size, Phi Scale 9 to 10	7.7		--		5.2		6.6		--		--		--	
Particle/Grain Size, Phi Scale >10	15.2		--		11.9		12.5		--		--		--	
Particle/Grain Size, Fines (Silt/Clay)	92.4		4.2	*	86.6		90.4		2.3	*	--		--	
Metals (mg/kg DW)														
Arsenic	9.6		12		--		--		--		--		--	
Cadmium	0.3	J	0.13	U	--		--		--		--		--	
Mercury	0.13		0.03	U	0.09		0.1		0.03	U	0.03	U	--	
carcinogenic PAH (ug/kg DW)														
Benzo(a)anthracene	21.7		0.7		--		--		--		--		--	
Chrysene	29.4		1.25		--		--		--		--		--	
Benzo(b)fluoranthene	27.9		0.65		--		--		--		--		--	
Benzo(k)fluoranthene	11		0.33	J	--		--		--		--		--	
Total Benzofluoranthenes	50		1.29		--		--		--		--		--	
Benzo(a)pyrene	20.6		0.4	J	--		--		--		--		--	
Indeno(1,2,3-cd)pyrene	13.8		0.28	J	--		--		--		--		--	
Dibenz(a,h)anthracene	3.41	J	0.165	U	--		--		--		--		--	
cPAH TEQ (0 DL)	28.7		0.609		--		--		--		--		--	
cPAH TEQ (1/2 DL)	28.7		0.617		--		--		--		--		--	
cPAH TEQ (1 DL)	28.7		0.625		--		--		--		--		--	
cPAH TEQ (KM)	29		0.6		--		--		--		--		--	

* Insufficient fines were present for the full determination of silt and clay fractions. Only total fines are reported.

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J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

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L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detects

KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-5. Summary of Phase I Sediment Conventionals, Metals, and Carcinogenic Polycyclic Aromatic Hydrocarbons (continued).

Location ID	PG-32-S	Q	PG-33-S	Q	PG-35-S	Q	PG-36-S	Q	PG-37-S	Q	PG-38-S	Q	PG-39-S	Q
Date/Time	3/26/2013 13:46		3/28/2013 17:22		3/27/2013 10:53		3/28/2013 17:50		3/28/2013 18:13		3/28/2013 13:40		3/28/2013 15:11	
Conventionals														
Total Organic Carbon	1.69		0.467		0.481		--		--		--		--	
Total Solids	48.25		73.32		74.1		--		--		--		--	
Total Volatile Solids	5.68		1.32		0.9		--		--		--		--	
Preserved Total Solids	45.28		74.39		72.86		73.14		73.31		43.71		47.83	
Sulfide	2.3	UJ	1.32	UJ	1.36	UJ	1.36	UJ	1.36	UJ	9.3	J	5.79	J
Particle/Grain Size, Phi Scale <-1	0.1	U	0.1		0.1	U	--		--		--		--	
Particle/Grain Size, Phi Scale -1 to 0	0.1		1.3		0.2		--		--		--		--	
Particle/Grain Size, Phi Scale 0 to 1	0.2		14.6		10		--		--		--		--	
Particle/Grain Size, Phi Scale 1 to 2	1.6		50.8		65.2		--		--		--		--	
Particle/Grain Size, Phi Scale 2 to 3	1.5		29.4		22.1		--		--		--		--	
Particle/Grain Size, Phi Scale 3 to 4	16.1		3		0.4		--		--		--		--	
Particle/Grain Size, Phi Scale 4 to 5	19.9		--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 5 to 6	13.9		--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 6 to 7	10.6		--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 7 to 8	8.9		--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 8 to 9	7.1		--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 9 to 10	6.7		--		--		--		--		--		--	
Particle/Grain Size, Phi Scale >10	13.5		--		--		--		--		--		--	
Particle/Grain Size, Fines (Silt/Clay)	80.5		0.8	*	2.2	*	--		--		--		--	
Metals (mg/kg DW)														
Arsenic	--		--		--		--		--		--		--	
Cadmium	--		--		--		--		--		--		--	
Mercury	0.11		0.03	U	0.03	U	0.03	U	0.02	U	0.11		0.11	
carcinogenic PAH (ug/kg DW)														
Benzo(a)anthracene	--		--		--		--		--		--		--	
Chrysene	--		--		--		--		--		--		--	
Benzo(b)fluoranthene	--		--		--		--		--		--		--	
Benzo(k)fluoranthene	--		--		--		--		--		--		--	
Total Benzofluoranthenes	--		--		--		--		--		--		--	
Benzo(a)pyrene	--		--		--		--		--		--		--	
Indeno(1,2,3-cd)pyrene	--		--		--		--		--		--		--	
Dibenz(a,h)anthracene	--		--		--		--		--		--		--	
cPAH TEQ (0 DL)	--		--		--		--		--		--		--	
cPAH TEQ (1/2 DL)	--		--		--		--		--		--		--	
cPAH TEQ (1 DL)	--		--		--		--		--		--		--	
cPAH TEQ (KM)	--		--		--		--		--		--		--	

* Insufficient fines were present for the full determination of silt and clay fractions. Only total fines are reported.

U-the analytie was analyzed for, but was not detected above the reported sample quantitation limit

J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

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L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detects

KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-5. Summary of Phase I Sediment Conventionals, Metals, and Carcinogenic Polycyclic Aromatic Hydrocarbons (continued).

Location ID	PG-40-S	Q	PG-41-S	Q	PG-42-S	Q	PG-43-S	Q	PG-44-S	Q	PG-45-S	Q
Date/Time	3/27/2013 12:50		3/27/2013 9:50		3/28/2013 12:40		3/28/2013 16:59		3/26/2013 12:17		3/28/2013 19:14	
Conventionals												
Total Organic Carbon	--		--		--		--		--		--	
Total Solids	--		--		--		--		--		--	
Total Volatile Solids	--		--		--		--		--		--	
Preserved Total Solids	61.89		43.95		42.93		74.92		32.7		68.87	
Sulfide	1.59	UJ	5	J	35.8	J	2.49	J	8.76	J	25	J
Particle/Grain Size, Phi Scale <-1	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale -1 to 0	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 0 to 1	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 1 to 2	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 2 to 3	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 3 to 4	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 4 to 5	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 5 to 6	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 6 to 7	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 7 to 8	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 8 to 9	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale 9 to 10	--		--		--		--		--		--	
Particle/Grain Size, Phi Scale >10	--		--		--		--		--		--	
Particle/Grain Size, Fines (Silt/Clay)	--		--		--		--		--		--	
Metals (mg/kg DW)												
Arsenic	--		--		--		--		--		--	
Cadmium	--		--		--		--		--		--	
Mercury	0.05		0.13		0.13		0.02	U	0.13		0.04	
carcinogenic PAH (ug/kg DW)												
Benzo(a)anthracene	--		--		--		--		--		--	
Chrysene	--		--		--		--		--		--	
Benzo(b)fluoranthene	--		--		--		--		--		--	
Benzo(k)fluoranthene	--		--		--		--		--		--	
Total Benzofluoranthenes	--		--		--		--		--		--	
Benzo(a)pyrene	--		--		--		--		--		--	
Indeno(1,2,3-cd)pyrene	--		--		--		--		--		--	
Dibenz(a,h)anthracene	--		--		--		--		--		--	
cPAH TEQ (0 DL)	--		--		--		--		--		--	
cPAH TEQ (1/2 DL)	--		--		--		--		--		--	
cPAH TEQ (1 DL)	--		--		--		--		--		--	
cPAH TEQ (KM)	--		--		--		--		--		--	

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KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-5. Summary of Phase I Sediment Conventionals, Metals, and Carcinogenic Polycyclic Aromatic Hydrocarbons (continued).

Location ID	PG-46-S	Q	PG-47-S	Q	PG-48-S	Q	PG-49-S	Q	PG-50-S	Q
Date/Time	**3/29/2013 11:10**		**3/29/2013 11:59**		**3/29/2013 13:08**		**3/29/2013 10:52**		**3/29/2013 11:35**	
Conventionals										
Total Organic Carbon	--		--		--		--		--	
Total Solids	--		--		--		--		--	
Total Volatile Solids	--		--		--		--		--	
Preserved Total Solids	39.09		34.97		50.01		47.77		40.16	
Sulfide	3.6		5.35		2.46		74.7		5.41	
Particle/Grain Size, Phi Scale <-1	--		--		--		--		--	
Particle/Grain Size, Phi Scale -1 to 0	--		--		--		--		--	
Particle/Grain Size, Phi Scale 0 to 1	--		--		--		--		--	
Particle/Grain Size, Phi Scale 1 to 2	--		--		--		--		--	
Particle/Grain Size, Phi Scale 2 to 3	--		--		--		--		--	
Particle/Grain Size, Phi Scale 3 to 4	--		--		--		--		--	
Particle/Grain Size, Phi Scale 4 to 5	--		--		--		--		--	
Particle/Grain Size, Phi Scale 5 to 6	--		--		--		--		--	
Particle/Grain Size, Phi Scale 6 to 7	--		--		--		--		--	
Particle/Grain Size, Phi Scale 7 to 8	--		--		--		--		--	
Particle/Grain Size, Phi Scale 8 to 9	--		--		--		--		--	
Particle/Grain Size, Phi Scale 9 to 10	--		--		--		--		--	
Particle/Grain Size, Phi Scale >10	--		--		--		--		--	
Particle/Grain Size, Fines (Silt/Clay)	--		--		--		--		--	
Metals (mg/kg DW)										
Arsenic	--		--		--		--		--	
Cadmium	--		--		--		--		--	
Mercury	0.11		0.13		0.09		0.11		0.12	
carcinogenic PAH (ug/kg DW)										
Benzo(a)anthracene	--		--		--		--		--	
Chrysene	--		--		--		--		--	
Benzo(b)fluoranthene	--		--		--		--		--	
Benzo(k)fluoranthene	--		--		--		--		--	
Total Benzofluoranthenes	--		--		--		--		--	
Benzo(a)pyrene	--		--		--		--		--	
Indeno(1,2,3-cd)pyrene	--		--		--		--		--	
Dibenz(a,h)anthracene	--		--		--		--		--	
cPAH TEQ (0 DL)	--		--		--		--		--	
cPAH TEQ (1/2 DL)	--		--		--		--		--	
cPAH TEQ (1 DL)	--		--		--		--		--	
cPAH TEQ (KM)	--		--		--		--		--	

* Insufficient fines were present for the full determination of silt and clay fractions. Only total fines are reported.

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KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-6. Summary of Phase I Dioxin/Furan Congener Data.

Location ID	PG-02-S	Q	PG-02-D	Q	PG-03-S	Q	PG-06-S	Q	PG-07-S	Q	PG-11-S	Q	PG-13-S	Q	PG-14-S	Q
Date/Time	3/26/2013	14:09	3/26/2013	14:09	3/27/2013	10:35	3/27/2013	15:40	3/28/2013	17:35	3/27/2013	10:10	3/27/2013	15:25	3/27/2013	14:51
Dioxin/Furan Congeners (ng/kg DW)																
2,3,7,8-TCDD	0.244	U	0.233	U	0.0485	U	0.099	U	0.061	U	0.101	U	0.0482	U	0.139	J
1,2,3,7,8-PECDD	0.64	J	0.576	J	0.063	U	0.137	J	0.05	U	0.19	J	0.0482	U	0.26	J
1,2,3,4,7,8-HXCDD	0.832	J	0.769	J	0.078	J	0.215	J	0.051	J	0.225	J	0.0482	U	0.267	J
1,2,3,6,7,8-HXCDD	3.84	J	2.14	J	0.194	J	0.617	J	0.171	U	0.737	J	0.125	U	0.87	J
1,2,3,7,8,9-HXCDD	2.94		1.95		0.169	U	0.851	J	0.147	J	0.785	J	0.114	J	0.788	J
1,2,3,4,6,7,8-HPCDD	33.3		25.4		2.13		9.53		1.61		9.76		1.09		12.1	
OCDD	255		211		14.2		99.6		14.2		77.5		7.65		99.3	
2,3,7,8-TCDF	1.77		1.7		0.121	U	0.38		0.23		0.549		0.172	J	1.3	
1,2,3,7,8-PECDF	0.375	J	0.407	U	0.0485	U	0.095	J	0.0451	U	0.136	U	0.0482	U	0.23	J
2,3,4,7,8-PECDF	0.629	J	0.563	J	0.053	U	0.148	U	0.066	J	0.23	J	0.069	U	0.282	J
1,2,3,4,7,8-HXCDF	0.534	J	0.604	J	0.068	U	0.131	J	0.047	J	0.245	J	0.0482	U	0.251	J
1,2,3,6,7,8-HXCDF	0.406	J	0.358	J	0.0485	U	0.076	J	0.0451	U	0.14	J	0.0482	U	0.181	J
1,2,3,7,8,9-HXCDF	0.056	U	0.0487	U	0.0485	U	0.0485	U	0.0451	U	0.0473	U	0.0482	U	0.0486	U
2,3,4,6,7,8-HXCDF	0.393	J	0.37	J	0.057	U	0.101	J	0.0451	U	0.172	J	0.0482	U	0.193	J
1,2,3,4,6,7,8-HPCDF	5.56		5.02		0.431	J	1.27		0.23	J	2.1		0.183	J	2.03	
1,2,3,4,7,8,9-HPCDF	0.341	J	0.315	J	0.082	U	0.114	J	0.0451	U	0.137	U	0.0482	U	0.169	J
OCDF	11.4	J	8.84	J	0.502	J	2.97		0.432	J	3.08	J	0.273	J	4.9	
Dx/F TEQ (0 DL)	2.38		1.91		0.0572		0.517		0.0901		0.687		0.0437		1.05	
Dx/F TEQ (1/2 DL)	2.51		2.03		0.148		0.591		0.162		0.743		0.122		1.05	
Dx/F TEQ (1 DL)	2.63		2.16		0.238		0.665		0.234		0.798		0.199		1.05	
Dx/F TEQ (KM)	2.2	AVG	--		0.14	L11	0.56		0.17	L	0.72		0.15	L11	1.1	

*total PCBs represents the sum of all detected congeners

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KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-6. Summary of Phase I Dioxin/Furan Congener Data (continued).

Location ID	PG-16-S	Q	PG-18-S	Q	PG-19-S	Q	PG-20-S	Q	PG-22-S	Q	PG-24-S	Q	PG-25-S	Q
Date/Time	3/26/2013	13:21	3/28/2013	18:39	3/27/2013	16:23	3/27/2013	14:32	3/27/2013	11:29	3/26/2013	15:21	3/28/2013	18:55
Dioxin/Furan Congeners (ng/kg DW)														
2,3,7,8-TCDD	0.324	U	0.069	U	0.067	U	0.121	J	0.0342	U	0.277		0.083	U
1,2,3,7,8-PECDD	0.934	J	0.087	J	0.05	J	0.258	J	0.0342	U	0.687	J	0.101	J
1,2,3,4,7,8-HXCDD	1.09		0.099	J	0.0491	U	0.271	J	0.05	J	0.82	J	0.071	UJ
1,2,3,6,7,8-HXCDD	4.34		0.285	J	0.186	J	1.17		0.156	U	2.97		0.341	J
1,2,3,7,8,9-HXCDD	3.28		0.254	J	0.173	J	0.998		0.154	J	2.58		0.278	J
1,2,3,4,6,7,8-HPCDD	52.8		3.85		1.63		13.4		1.91		39.9		3.93	
OCDD	418		33.6		12.9		104		13.7		338		30.2	
2,3,7,8-TCDF	2.73		0.27		0.273		0.859		0.108	J	2.23		0.522	
1,2,3,7,8-PECDF	0.705	J	0.048	U	0.0491	U	0.244	J	0.035	J	0.478	J	0.068	U
2,3,4,7,8-PECDF	1.03		0.092	J	0.071	U	0.292	J	0.045	U	0.698	J	0.099	J
1,2,3,4,7,8-HXCDF	1.17		0.08	U	0.0491	U	0.342	J	0.044	J	0.805	J	0.074	U
1,2,3,6,7,8-HXCDF	0.697	J	0.059	J	0.0491	U	0.209	J	0.0342	U	0.542	J	0.051	J
1,2,3,7,8,9-HXCDF	0.094	J	0.048	U	0.0491	U	0.0484	U	0.0342	U	0.067	J	0.0475	U
2,3,4,6,7,8-HXCDF	0.708	J	0.075	U	0.0491	U	0.198	J	0.0342	U	0.459	J	0.054	J
1,2,3,4,6,7,8-HPCDF	10.8		0.599	J	0.316	J	2.94		0.36	J	7.7		0.727	J
1,2,3,4,7,8,9-HPCDF	0.634	J	0.09	U	0.0491	U	0.174	U	0.0342	U	0.434	J	0.066	U
OCDF	21.2	J	1.27	J	0.44	J	4.83	J	0.542	J	17	J	1.43	J
Dx/F TEQ (0 DL)	3.45		0.266		0.137		1.07		0.0636		2.82		0.311	
Dx/F TEQ (1/2 DL)	3.61		0.312		0.194		1.08		0.118		2.82		0.364	
Dx/F TEQ (1 DL)	3.77		0.358		0.251		1.08		0.172		2.82		0.416	
Dx/F TEQ (KM)	3.6		0.28		0.22	L9	1.1		0.14	L	2.8		0.33	

*total PCBs represents the sum of all detected congeners

U-the analytie was analyzed for, but was not detected above the reported sample quantitation limit

J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample

UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.

L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detects

KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates

Table E-7. Summary of Phase I Polychlorinated Biphenyl (PCB) Congener Data.

Location ID	PG-02-S	Q	PG-02-D	Q	PG-03-S	Q	PG-06-S	Q	PG-07-S	Q	PG-11-S	Q
Date/Time	3/26/2013	14:09	3/26/2013	14:09	3/27/2013	10:35	3/27/2013	15:40	3/28/2013	17:35	3/27/2013	10:10
PCB Congeners (ng/kg DW)												
PCB-001	12.8		14		0.851	U	2.29	UJ	2.33	U	4.18	
PCB-002	17.8		14.6		1.59	J	6.65	J	2.88	J	10	
PCB-003	12.3		13		1.4	U	2.84	J	2.66	U	3.87	
PCB-004	22.4		22.3		1.92	U	3.22		8.94	U	8.98	
PCB-005	0.732		0.827		1.12	U	0.254	U	5.9	U	0.224	U
PCB-006	8.01		8.29		0.994	U	1.2		5.06	U	2.14	
PCB-007	3.77		3.48		1.01	U	0.321	J	5.17	U	0.985	U
PCB-008	61.2		61.3		2.55	U	6.88		4.57	U	15.7	
PCB-009	2.02		2.11		1	U	0.273	J	5.26	U	0.438	
PCB-010	1.04		1.02		1.02	U	0.232	U	5.36	U	0.319	J
PCB-011	31.4		30.1		4.14	U	12.3		8.57	U	9.01	
PCB-012/013	10.5	CUJ	9.43	CU	1.07	CU	2.87	CUJ	5.18	CU	3.45	CU
PCB-014	1.22	U	0.742	U	1.03	U	0.473	U	5.25	U	0.788	U
PCB-015	62.9		69.5		4.66		15.8		6.07	U	16.8	
PCB-016	32.6		27.9		1.07	J	4.8		0.641	J	6.52	
PCB-017	43.7		42.2		2.42	U	5.29		0.678	U	12	
PCB-018/030	66.4	C	63.8	C	3.44	CJ	11.1	C	1.81	CJ	15.8	C
PCB-019	7.66		7.56		0.66	U	1.53	U	0.684	U	2.34	
PCB-020/028	222	C	209	C	12.7	C	35.9	C	9.96	C	51.2	C
PCB-021/033	67.3	C	62.6	C	2.28	CJ	10.9	C	1.8	CU	13.2	C
PCB-022	53.7		50.4		2.77	J	9.34		1.85	J	11.1	
PCB-023	0.151	U	0.131	J	0.811	U	0.134	U	0.532	U	0.11	U
PCB-024	1.07		0.729		0.605	U	0.539	U	0.466	UJ	0.2	J
PCB-025	12.9		12		0.698	J	2.06		0.446	U	3.14	
PCB-026/029	26.2	C	24.2	C	1.31	CU	3.95	C	1.07	CJ	5.78	C
PCB-027	6.61	J	6.66		0.564	U	0.855	J	0.426	UJ	1.89	
PCB-031	145		135		6.79		24.7		4.95		30.5	
PCB-032	42.1		38.1		3.21	J	4.08		0.815	J	14.1	
PCB-034	0.768		0.853		0.815	U	0.139	J	0.594	U	0.212	J
PCB-035	5.37		5.85		0.789	U	1.14		0.598	U	1.51	
PCB-036	1.29		1.3		0.718	U	0.304	J	0.537	U	0.4	
PCB-037	72.3		73.8		5.81		13.7		5.05		19.8	
PCB-038	0.7		0.64		0.729	U	0.164	U	0.522	U	0.256	J
PCB-039	1.57		1.56		0.73	U	0.171	U	0.511	U	0.398	
PCB-040/041/071	107	C	99.1	C	6.4	C	13.1	C	3.21	C	26.2	C
PCB-042	55.7		51.2		2.75	U	7.81		1.54	J	13.7	
PCB-043	6.31		5.94		1.12	U	0.698	U	0.859	U	1.45	
PCB-044/047/065	203	C	189	C	11.9	C	28.2	C	6.31	C	51.7	C
PCB-045/051	27	C	24	C	1.94	CJ	3.83	C	0.82	CU	8.13	C
PCB-046	9.05		8.27		1.16	U	1.02		0.881	U	2.62	
PCB-048	34.7		31		1.92	U	4.23		0.955	U	7.57	
PCB-049/069	137	C	129	C	7.87	CU	20.4	C	4.32	C	37	C
PCB-050/053	23.4	C	21.4	C	1.62	CU	4.34	C	0.874	CU	6.92	C
PCB-052	223		213		11.8		32		7.27		54.1	
PCB-054	0.294	J	0.283	J	0.0763	U	0.371	U	0.516	U	0.112	U
PCB-055	2.78		2.97		0.965	U	0.931	U	0.773	U	0.782	
PCB-056	98.8		96.9		6.03		15.8		4.76		24.3	
PCB-057	0.979	U	0.859		0.903	U	0.859	U	0.738	U	0.3	U
PCB-058	0.745		0.886		0.954	U	0.904	U	0.774	U	0.31	U
PCB-059/062/075	18.9	C	17.5	C	0.75	CU	2.27	C	0.601	CU	4.9	C
PCB-060	51.4		51.5		3.13	J	8.03		2.61	J	13	
PCB-061/070/074/076	375	C	377	C	22.3	C	59.7	C	18	C	94.2	C
PCB-063	9.16		8.84		0.893	U	1.44		0.723	U	2.4	
PCB-064	86		81.2		0.708	U	11.7		2.75	J	20.4	
PCB-066	220		221		14		38		11.7		56.2	
PCB-067	6.97		6.77		0.825	U	1.06		0.646	U	1.72	
PCB-068	2		1.82		0.879	U	0.841	U	0.73	U	0.529	
PCB-072	2.85		2.91		0.907	U	0.848	U	0.734	U	0.889	
PCB-073	0.0809	U	0.0812	U	0.762	U	0.419	U	0.618	U	0.117	U

Location ID	PG-02-S	Q	PG-02-D	Q	PG-03-S	Q	PG-06-S	Q	PG-07-S	Q	PG-11-S	Q
Date/Time	3/26/2013	14:09	3/26/2013	14:09	3/27/2013	10:35	3/27/2013	15:40	3/28/2013	17:35	3/27/2013	10:10
PCB-077	30.5		31.6		3.09	J	4.73		2.53	J	10.1	
PCB-078	0.369	U	0.252	U	0.966	U	0.847	U	0.799	U	0.296	U
PCB-079	3.73		4.18		0.775	U	0.727	U	0.642	U	1.23	U
PCB-080	0.348	U	0.237	U	0.876	U	0.832	U	0.736	U	0.279	U
PCB-081	1.11	U	1.21	U	0.271	U	0.764	U	0.858	U	0.322	U
PCB-082	33.4		37.6		2.12	UJ	3.11	J	1.11	J	12.2	
PCB-083/099	210	C	218	C	14.9	C	26.7	C	7.69	C	67.5	C
PCB-084	71.3		74.7		5.02		7.82		2.25		21.7	
PCB-085/116/117	64.2	C	67.2	C	4.25	C	8.62	C	2.56	C	20.3	C
PCB-087/097/108/119/125	210	C	224	C	14.7	C	27	C	8.65	C	63.9	C
PCB-088/091	43.4	C	45	C	2.89	C	5.06	C	1.43	C	14.5	C
PCB-089	3.34		3.84		0.291	J	0.45		0.109	U	1.3	
PCB-090/101/113	324	C	336	C	22	C	37.7	C	11.3	C	99.2	C
PCB-092	57.1		61		3.86		7.74		2.07		18.3	
PCB-093/095/098/100/102	235	C	246	C	16.1	C	28.2	C	8.05	C	74.3	C
PCB-094	1.65		1.53	U	0.0937	U	0.184	J	0.118	U	0.523	
PCB-096	1.63		1.69		0.144	U	0.196	U	0.0796	U	0.566	
PCB-103	4.28		4.25		0.325	J	0.71		0.106	J	1.86	
PCB-104	0.065	U	0.05	U	0.055	U	0.0662	U	0.075	U	0.067	U
PCB-105	135		144		10.8		17.2		6.88		43.1	
PCB-106	0.364	U	0.292	U	0.109	U	0.183	U	0.133	U	0.168	U
PCB-107/124	11.4	C	12.5	C	0.85	C	1.7	C	0.552	C	3.34	C
PCB-109	25		26.7		1.76		3.31		1.13		8.23	
PCB-110/115	365	C	383	C	23.4	C	44.8	C	14.3	C	109	C
PCB-111	0.403		0.399		0.0648	U	0.0811	U	0.0788	U	0.192	U
PCB-112	0.104	U	0.114	U	0.0651	U	0.0808	U	0.08	U	0.0849	U
PCB-114	6.68		7.17		0.545		0.899	U	0.339	J	2.01	
PCB-118	318		335		24.7		40.3		15.1		101	
PCB-120	1.86		2.05		0.0586	U	0.372	J	0.074	U	0.715	
PCB-121	0.193	U	0.187	J	0.065	U	0.0846	U	0.0805	U	0.0847	U
PCB-122	3.96		4.05		0.252	U	0.465	U	0.197	J	1.28	U
PCB-123	5.61		6.4		0.513		1.02	U	0.308	U	2.08	U
PCB-126	2.06		1.86		0.247	U	0.403	U	0.183	U	0.744	
PCB-127	0.387	U	0.31	U	0.116	U	0.184	U	0.128	U	0.178	U
PCB-128/166	60.9	C	70.9	C	4.16	C	7.45	C	2.24	C	21.5	C
PCB-129/138/160/163	401	C	440	C	25.9	C	50.8	C	12	C	135	C
PCB-130	26.1		29.6		1.75		3.28		0.962		8.75	
PCB-131	4.04		4.82		0.235	U	0.368	J	0.148	U	1.4	U
PCB-132	114		130		6.91		12.7		3.21		36	
PCB-133	6.28		7.47		0.461		0.898		0.283	J	2.49	
PCB-134/143	17.2	C	19.9	C	1.1	C	2.06	C	0.398	C	5.77	C
PCB-135/151/154	116	C	124	C	9.1	C	14.6	C	3.44	C	39.8	C
PCB-136	37		40.4		2.14		4.12	U	0.85		12	
PCB-137	12.7		14		0.952		1.92		0.614		3.73	
PCB-139/140	6.72	C	7.6	C	0.408	CU	0.973	C	0.174	CU	2.37	C
PCB-141	39.5		47.5		2.76		6.63		1.52		11.9	
PCB-142	0.388	U	0.495	U	0.129	U	0.247	U	0.127	U	0.287	U
PCB-144	14.3		15.1		0.786		1.58		0.282	U	4.53	
PCB-145	0.129	U	0.204	U	0.065	U	0.112	U	0.0857	U	0.0721	U
PCB-146	65.7		74.6	J	4.45		8.09		1.99		23	
PCB-147/149	282	C	306	C	15	C	31.4	C	5.6	C	96.4	C
PCB-148	1.09		1.02		0.0799	U	0.137	U	0.106	U	0.457	
PCB-150	1.01		0.959	U	0.0639	U	0.107	U	0.083	U	0.555	U
PCB-152	0.268	U	0.302	J	0.0607	U	0.104	U	0.0801	U	0.107	U
PCB-153/168	356	C	382	C	23.7	C	42.3	C	10.9	C	125	C
PCB-155	0.093	U	0.11	U	0.0536	U	0.0733	U	0.068	U	0.066	J
PCB-156/157	35.2	C	40.7	C	2.65	C	4.51	C	1.4	C	11.6	C
PCB-158	33.8		38		2.07		4.15		1.3	U	10.9	
PCB-159	3.82		3.91		0.22	U	0.417	U	0.096	U	1.36	
PCB-161	0.271	U	0.346	U	0.0899	U	0.176	U	0.0862	U	0.2	U
PCB-162	1.2		1.37		0.108	J	0.253	J	0.0876	U	0.486	U

Location ID	PG-02-S	Q	PG-02-D	Q	PG-03-S	Q	PG-06-S	Q	PG-07-S	Q	PG-11-S	Q
Date/Time	3/26/2013	14:09	3/26/2013	14:09	3/27/2013	10:35	3/27/2013	15:40	3/28/2013	17:35	3/27/2013	10:10
PCB-164	24.1		27.8		1.75		3.26		0.924		7.73	
PCB-165	0.571	U	0.588		0.102	U	0.193	U	0.0993	U	0.227	U
PCB-167	14		15.5		0.93		1.77		0.6		4.82	
PCB-169	0.414	U	0.361	U	0.09	U	0.213	U	0.0806	U	0.206	U
PCB-170	67.3		71.3		4.59		7.77		2.16		23.7	
PCB-171/173	23.9	C	27	C	1.33	C	2.72	C	0.726	C	9.09	C
PCB-172	10.7		12.1		0.758	U	1.5	U	0.403		4.01	
PCB-174	66.9		74.6		3.88		8.45		1.66		23.6	
PCB-175	3.77		4.21		0.233	U	0.365	U	0.115	J	1.47	U
PCB-176	10		11.2		0.574	U	1.05		0.316	U	3.71	
PCB-177	52.5		55.8		3.06		5.46		1.26	U	19.5	
PCB-178	22.5		23		1.26		2.83		0.669	U	8.41	
PCB-179	36.4		37.6		1.98		4.16		0.98		14	
PCB-180/193	134	C	141	C	9.55	C	19.2	C	4.49	C	47.3	C
PCB-181	0.795	U	0.85		0.0974	U	0.119	U	0.108	U	0.25	U
PCB-182	0.61	U	0.709		0.0915	U	0.116	U	0.104	U	0.352	J
PCB-183/185	56.9	C	61	C	3.07	C	6.56	C	1.56	C	20.7	C
PCB-184	0.374	U	0.19	U	0.0694	U	0.0878	U	0.0801	U	0.0949	U
PCB-186	0.0767	U	0.113	U	0.0749	U	0.0956	U	0.0866	U	0.103	U
PCB-187	127		141		7.78		16.6		3.69		49	
PCB-188	0.415	U	0.399		0.0693	U	0.071	U	0.0738	U	0.266	U
PCB-189	3.04		3.33	U	0.183	U	0.404	U	0.178	U	1.25	U
PCB-190	12.7		14.3		0.681	U	1.41		0.539		4.23	
PCB-191	3.02		3.11		0.135	J	0.304	J	0.113	U	1.06	
PCB-192	0.084	U	0.124	U	0.082	U	0.101	U	0.092	U	0.112	U
PCB-194	37.4		37.7		2.48	U	4.83		1.18	U	14.2	
PCB-195	17.7		17.1		0.913		1.61		0.309	J	5.72	U
PCB-196	23.4		23.6		1.3	U	2.39		0.547		8.07	
PCB-197/199	7.66	CJ	7.77	CJ	0.542	C	1.03	CU	0.283	CU	2.51	C
PCB-198/201	64.7	C	65.4	C	3.44	C	8.37	C	1.69	CU	22.2	C
PCB-200	7.2		8.11		0.523	U	0.941		0.237	U	2.89	
PCB-202	17.2		16.9		1.02		2.35		0.432		6.15	
PCB-203	32.7		34.3		2.01		4.82		0.878		11.6	
PCB-204	0.078	U	0.114	U	0.0741	U	0.119	U	0.0729	U	0.0856	U
PCB-205	2.3		2.36		0.18	U	0.371	J	0.0996	U	0.79	
PCB-206	37.3		36.6		2.17		6.83		1.04		14.2	
PCB-207	5.1		4.98		0.242	U	0.904		0.256	U	1.99	
PCB-208	15.3		14.3		0.816		2.44		0.408		5.22	
PCB-209	35.4		32.8		1.86		5.32		0.94		12.7	
Total PCBs*	7520		7750		429		1010		246		2260	
PCB TEQ (0 DL)	0.225		0.206		0.00151		0.00239		0.000983		0.0803	
PCB TEQ (1/2 DL)	0.231		0.211		0.0153		0.0259		0.0115		0.0835	
PCB TEQ (1 DL)	0.237		0.217		0.029		0.0494		0.022		0.0867	
PCB TEQ (KM)	0.22	AVG			0.026	L	0.043	L6	0.019	L	0.081	

*total PCBs represents the sum of all detected congeners
U-the analytie was analyzed for, but was not detected above the reported sample quantitation limi
J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sampl
UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate
L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detect
KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicate
C-see list for co-eluting congeners

Table E-7. Summary of Phase I Polychlorinated Biphenyl (PCB) Congener Data (continued).

Location ID	PG-13-S	Q	PG-14-S	Q	PG-16-S	Q	PG-18-S	Q	PG-19-S	Q	PG-20-S	Q
Date/Time	3/27/2013	15:25	3/27/2013	14:51	3/26/2013	13:21	3/28/2013	18:39	3/27/2013	16:23	3/27/2013	14:32
PCB Congeners (ng/kg DW)												
PCB-001	4.05	U	10.4		20.9		1.2	J	1.59	UJ	6.05	
PCB-002	3.25	J	14		20.9		3.22	U	2.92	J	8.11	
PCB-003	3.01	U	12.9		14.2		1.6	U	1.2	J	3.84	
PCB-004	8.03	U	15.2		37.5		1.86	U	2.29	U	13.3	
PCB-005	4.61	U	0.495		0.77		1.1	U	1.35	U	0.167	U
PCB-006	3.96	U	5.19		13.1		0.933	U	1.14	U	3.15	
PCB-007	4.04	U	2.38		5.6		0.954	U	1.17	U	1.42	
PCB-008	3.57	U	38.3		108		3.34		2.32	U	24	
PCB-009	4.11	U	1.54		2.79		0.986	U	1.2	U	0.696	
PCB-010	4.2	U	0.775		1.54		0.992	U	1.21	U	0.413	
PCB-011	9.69	U	25.3		29.2		9.19	U	7.7	U	10.8	
PCB-012/013	4.05	CU	5.72	CUJ	9.55	CU	1	CUJ	1.22	CUJ	3.71	CU
PCB-014	4.11	U	1.04	U	0.301	U	0.989	U	1.21	U	0.491	U
PCB-015	9.33	U	39.5		101		6.99		12.5		23.6	
PCB-016	0.666	U	24.2		33.2		1.84	J	1.07	U	9.27	
PCB-017	0.769	U	29.8		63		3.09	U	1.51		16.7	
PCB-018/030	2.1	CJ	54.6	C	78.4	C	5.54	C	3.14	C	21.5	C
PCB-019	0.805	U	6.73		11		0.756	U	0.213	U	3.87	
PCB-020/028	12.7	C	147	C	287	C	21.8	C	21.1	C	74.4	C
PCB-021/033	1.71	CJ	44.8	C	76.2	C	5.87	C	4.36	C	25.9	C
PCB-022	2.36	J	37.1		68.4		5.22		4.61		15.2	
PCB-023	0.55	U	0.126	U	0.148	U	0.633	U	0.126	U	0.0819	U
PCB-024	0.516	UJ	0.681	U	1.43	U	0.493	U	0.129	U	0.267	U
PCB-025	0.424	U	8.48		18.6		0.984	U	0.765		5	
PCB-026/029	1.36	CU	18	C	31.7	C	2.31	CJ	1.84	C	8.16	C
PCB-027	0.471	UJ	4.37	J	8.89		0.45	UJ	0.263	U	2.79	
PCB-031	7.72		101		168		13.6		14.6		44.9	
PCB-032	0.932	U	24.9		70.9		2.32	J	1.43		19	
PCB-034	0.614	U	0.565		1.12		0.707	U	0.122	U	0.311	J
PCB-035	0.618	U	3.48		7.98		0.787	J	0.657		2.38	
PCB-036	0.555	U	0.991		1.46		0.639	U	0.154	U	0.535	
PCB-037	6.65		42.4		120		7.7		11.5		29.1	
PCB-038	0.539	U	0.638		0.842		0.621	U	0.114	U	0.273	J
PCB-039	0.529	U	1.2		1.96		0.609	U	0.113	U	0.663	U
PCB-040/041/071	2.82	C	85.3	C	143	C	8.3	C	4.57	C	49.9	C
PCB-042	2.24		44		81.5		4.74		3.85		27.9	
PCB-043	0.283	U	5.26		8.54	U	0.449		1.56	U	2.71	
PCB-044/047/065	8.38	C	161	C	279	C	17.2	C	11.7	C	160	C
PCB-045/051	0.829	C	20.9	C	41	C	1.94	C	1.29	CU	11.3	C
PCB-046	0.267	U	8.3		13.4		0.585		1.48	U	4.49	
PCB-048	0.841	U	28		44.7		2.7		1.77		13.9	
PCB-049/069	5.22	C	106	C	198	C	11.5	C	8.55	C	119	C
PCB-050/053	0.565	C	21	C	35.5	C	1.72	C	1.24	CU	15.1	C
PCB-052	7.2		179		285		18.8		12.9		313	
PCB-054	0.0948	U	0.593	U	0.436	U	0.0776	U	0.781	U	0.283	J
PCB-055	0.229	U	2.31		3.76		0.252	J	1.93	U	0.309	U
PCB-056	5.17		75.7		123		10.4		9.86		54.7	
PCB-057	0.211	U	0.591		0.996	U	0.169	U	1.78	U	0.343	J
PCB-058	0.222	U	0.659		1.27		0.172	U	1.87	U	0.617	
PCB-059/062/075	0.637	C	14.8	C	27.3	C	1.48	C	0.946	CU	8.23	C
PCB-060	2.91		40.7		67.6		5.13		6.22	U	23.9	
PCB-061/070/074/076	21	C	290	C	471	C	39.3	C	39.1	C	391	C
PCB-063	0.405		6.51		12.3		0.858		1.77	U	5.94	
PCB-064	3.92		69.9		111		7.14		5.94		55.9	
PCB-066	14.3		154		294		23		25.4		149	
PCB-067	0.253	J	5.05		9.51		0.844		1.6	U	3.04	
PCB-068	0.382	J	1.21		2.86	U	0.204	J	1.74	U	1.24	U
PCB-072	0.208	U	2.19		4.3		0.335	J	1.76	U	2.16	
PCB-073	0.17	U	0.45	U	0.341	U	0.109	U	0.94	U	0.061	U

Location ID	PG-13-S	Q	PG-14-S	Q	PG-16-S	Q	PG-18-S	Q	PG-19-S	Q	PG-20-S	Q
Date/Time	3/27/2013	15:25	3/27/2013	14:51	3/26/2013	13:21	3/28/2013	18:39	3/27/2013	16:23	3/27/2013	14:32
PCB-077	2.28		16.7		54.9		3.24		4.94	U	16.4	
PCB-078	0.208	U	0.527	U	0.655	U	0.165	U	1.76	U	0.279	U
PCB-079	0.179	U	2.87		7.18		0.451		1.51	U	5.75	
PCB-080	0.205	U	0.518	U	0.622	U	0.157	U	1.72	U	0.263	U
PCB-081	0.173	U	0.868	U	2.04	U	0.175	U	1.82	U	0.884	U
PCB-082	0.946	UJ	21.1	J	58.6		2.19	J	1.84		46.7	J
PCB-083/099	6.9	C	126	C	358	C	16.1	C	11.6	C	282	C
PCB-084	1.51		44.9		117		5.01		2.36		161	
PCB-085/116/117	2.15	C	38.3	C	106	C	5.11	C	4.16	CU	88.9	C
PCB-087/097/108/119/125	8.39	C	129	C	316	C	16.2	C	12.6	C	365	C
PCB-088/091	0.979	C	26.5	C	71.1	C	3.17	C	1.81	CU	73.3	C
PCB-089	0.113	U	2.11		7.44		0.253	U	0.229	U	4.38	
PCB-090/101/113	9.16	C	203	C	521	C	23.6	C	15.9	C	535	C
PCB-092	1.7		36.1		93.1		4.97		2.78		94.4	
PCB-093/095/098/100/102	5.59	C	147	C	365	C	17.7	C	8.93	CU	485	C
PCB-094	0.116	U	1.1	U	3.01		0.096	U	0.235	U	2.1	
PCB-096	0.0678	U	1.32		3.21		0.138	J	0.115	U	2.73	
PCB-103	0.0946	U	2.51		8.16		0.352	J	0.192	U	4.29	
PCB-104	0.068	U	0.058	J	0.134	U	0.0517	U	0.105	U	0.0592	U
PCB-105	6.13		81.6		220		11.2		11		173	
PCB-106	0.102	U	0.266	U	0.452	U	0.106	U	0.177	U	0.397	U
PCB-107/124	0.466	C	7.02	C	18.5	C	0.914	C	0.757	CU	15.2	C
PCB-109	0.919		14.8		41.4		2.01		1.54		28	
PCB-110/115	12.5	C	225	C	555	C	27.7	C	19.7	C	624	C
PCB-111	0.676	U	0.26	J	0.687		0.0641	U	0.158	U	0.163	U
PCB-112	0.0774	U	0.121	U	0.112	U	0.0651	U	0.157	U	0.123	U
PCB-114	0.294	U	4.49		9.87		0.516		0.537	U	7.23	
PCB-118	13.5		188		520		25.7		23.6		415	
PCB-120	0.0718	U	1.32		3.52		0.135	J	0.146	U	1.16	U
PCB-121	0.081	U	0.126	U	0.301	U	0.0655	U	0.164	U	0.123	J
PCB-122	0.134	U	2.19		6.42		0.263	U	0.259	U	4.43	
PCB-123	0.272	U	3.96	U	9.98		0.604	U	0.508	U	6.49	U
PCB-126	0.113	U	0.984		3.32	U	0.225	J	0.211	U	1.06	
PCB-127	0.103	U	0.472		0.42	U	0.101	U	0.178	U	0.422	U
PCB-128/166	1.61	C	29	C	116	C	4.22	C	2.62	C	60.1	C
PCB-129/138/160/163	8.56	C	196	C	727	C	27.6	C	15.9	C	350	C
PCB-130	0.584		12.7		48.9		1.75		0.856	U	23.1	
PCB-131	0.1	U	2		6.99		0.2	J	0.332	U	4.86	
PCB-132	2.08		55.3		219		7.61		3.75		131	
PCB-133	0.177	U	3.4		12.5		0.531		0.314	U	5	
PCB-134/143	0.223	CU	8.37	C	34.2	C	1.04	C	0.489	CU	20.1	C
PCB-135/151/154	1.99	C	61.5	C	239	C	7.81	C	3.8	C	95.8	C
PCB-136	0.56	U	17.4		77		2.43		0.768		41.7	
PCB-137	0.344	U	7.22		17.2		0.933		0.746	U	15.6	
PCB-139/140	0.099	CU	3.36	C	13.3	C	0.431	C	0.3	CU	6.62	C
PCB-141	1.09		27.3		60		3.6		1.87		37	
PCB-142	0.098	U	0.245	U	0.88	U	0.173	U	0.324	U	0.368	U
PCB-144	0.171	J	7.77		27.3		0.822		0.418	U	12.4	
PCB-145	0.062	U	0.0715	U	0.249	U	0.062	U	0.179	U	0.16	U
PCB-146	1.39		30.3		105		4.94		2.29		46.9	
PCB-147/149	3.68	C	137	C	519	C	15	C	8.4	C	253	C
PCB-148	0.0758	U	0.328	J	1.62		0.0766	U	0.218	U	0.385	U
PCB-150	0.0593	U	0.481	U	2.13		0.0601	U	0.171	U	0.765	
PCB-152	0.0577	U	0.152	J	0.657		0.058	U	0.166	U	0.384	J
PCB-153/168	7.46	C	173	C	644	C	24.6	C	12.7	C	265	C
PCB-155	0.0517	U	0.123	J	0.227	U	0.048	U	0.129	U	0.095	U
PCB-156/157	1.19	C	18.7	C	61.6	C	2.84	C	2.03	C	31.3	C
PCB-158	0.839		17.6		58.1		2.53		1.49		32	
PCB-159	0.0667	U	1.67		6.53		0.207	U	0.22	U	2.22	
PCB-161	0.07	U	0.175	U	0.572	U	0.118	U	0.231	U	0.257	U
PCB-162	0.0726	U	0.608		2.44		0.12	U	0.24	U	1.1	

Location ID	PG-13-S	Q	PG-14-S	Q	PG-16-S	Q	PG-18-S	Q	PG-19-S	Q	PG-20-S	Q
Date/Time	3/27/2013	15:25	3/27/2013	14:51	3/26/2013	13:21	3/28/2013	18:39	3/27/2013	16:23	3/27/2013	14:32
PCB-164	0.491		12.2		46.9		1.84		0.873	U	21.7	
PCB-165	0.0766	U	0.301	U	1.23	U	0.135	U	0.253	U	0.36	J
PCB-167	0.425		7.08		24.9		1.13		0.663	U	11.5	
PCB-169	0.0668	U	0.176	U	0.622	U	0.121	U	0.224	U	0.258	U
PCB-170	1.41		32.2		115		5.86		2.1		43	
PCB-171/173	0.533	C	10.4	C	55.8	C	1.86	C	0.525	C	14.6	C
PCB-172	0.285	J	5.94		21.9		1.05		0.536		6.83	
PCB-174	1.15		32.8		144		5.22		1.96	U	39	
PCB-175	0.0804	U	1.68		8.49		0.205	U	0.19	U	2.18	
PCB-176	0.157	J	4.41		23.7		0.606		0.198	U	5.81	
PCB-177	0.837		22.2		124		3.78		1.2		30.2	
PCB-178	0.378	J	9.94		53.5		1.59		0.534	U	12.3	
PCB-179	0.478		14.9		87.5		2.1		0.923		20.3	
PCB-180/193	3.03	C	73.9	C	223	C	12.7	C	4.75	C	82.5	C
PCB-181	0.0834	U	0.313	U	1.72		0.0937	U	0.197	U	0.512	
PCB-182	0.0809	U	0.335	U	1.42		0.0906	U	0.191	U	0.463	
PCB-183/185	0.97	C	26	C	124	C	4.07	C	1.72	C	31.4	C
PCB-184	0.0613	U	0.185	J	0.433	U	0.0698	U	0.145	U	0.113	U
PCB-186	0.0668	U	0.0751	U	0.184	U	0.0755	U	0.158	U	0.116	U
PCB-187	2.3		55.8		300		9.09		3.6		69.4	
PCB-188	0.0581	U	0.191	U	0.927		0.071	J	0.138	U	0.275	U
PCB-189	0.128	U	1.31	U	4.51		0.273	U	0.28	U	1.82	U
PCB-190	0.304	J	5.93		25.3		1.07		0.479	U	7.16	
PCB-191	0.0643	U	1.29		5.33		0.217	J	0.152	U	1.73	
PCB-192	0.0708	U	0.0795	U	0.197	U	0.0802	U	0.167	U	0.126	U
PCB-194	0.669		16.5		54.5		3.2		1.21		22.9	
PCB-195	0.247	J	6.15		27.7		1.22		0.391	J	9.07	
PCB-196	0.306	J	9.44		43.5		1.76	U	0.577		12.6	
PCB-197/199	0.139	CU	2.97	C	16.9	C	0.564	C	0.268	CU	5.13	C
PCB-198/201	0.99	CU	24.5	C	132	C	4.79	C	1.56	CU	34.9	C
PCB-200	0.081	U	3.09		17.1		0.525		0.197	J	3.88	
PCB-202	0.282	J	5.81		32.6		1.13		0.438	U	9	
PCB-203	0.591	U	13.4		61.2		2.58		1.01	U	17.5	
PCB-204	0.0551	U	0.0664	U	0.145	U	0.0719	U	0.154	U	0.105	U
PCB-205	0.0944	U	0.823		4.3		0.186	U	0.258	U	1.16	
PCB-206	0.547		15.9		63.7		2.62		0.925	U	20.2	
PCB-207	0.208	U	2.17		9.46		0.415	U	0.619	U	2.56	
PCB-208	0.23	U	6.49		29.1		0.871	U	0.647	U	8.08	
PCB-209	0.533		25.1		67.5		2.11		1.19	U	18.5	
Total PCBs*	231		4620		12100		582		382		7220	
PCB TEQ (0 DL)	0.000865		0.109		0.031		0.0241		0.0011		0.127	
PCB TEQ (1/2 DL)	0.00755		0.112		0.207		0.0259		0.0156		0.131	
PCB TEQ (1 DL)	0.0142		0.115		0.382		0.0278		0.03		0.135	
PCB TEQ (KM)	0.012	L6	0.11		0.37	L	0.024		0.023	L8	0.13	

*total PCBs represents the sum of all detected congeners
U-the analytie was analyzed for, but was not detected above the reported sample quantitation limi
J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sampl
UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate
L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detect
KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates
C-see list for co-eluting congeners

Table E-7. Summary of Phase I Polychlorinated Biphenyl (PCB) Congener Data (continued).

Location ID	PG-22-S	Q	PG-24-S	Q	PG-25-S	Q	PG-26-S	Q	PG-29-S	Q	PG-30-S	Q
Date/Time	3/27/2013	11:29	3/26/2013	15:21	3/28/2013	18:55	3/26/2013	16:53	3/26/2013	15:43	3/27/2013	16:04
PCB Congeners (ng/kg DW)												
PCB-001	0.876		11.2		1.19	U	6.24		5.21		2.24	U
PCB-002	1.95		18		3.43		17.6		11.8		2.56	U
PCB-003	0.985	U	10.5		1.87	U	7.27		6.45		1.73	U
PCB-004	2.57		17.6		1.31		7.43		7.81		3.64	U
PCB-005	0.213	U	0.585		0.183	U	0.394	J	0.397	J	2.18	U
PCB-006	0.549	U	6.21		0.754		4.04		3.8		1.89	U
PCB-007	0.294	U	3.06		0.25	U	1.36		1.35		1.96	U
PCB-008	3.58		49.1		4.86		22		24.8		4.47	
PCB-009	0.19	U	1.66		0.223	U	1.05		0.962		1.88	U
PCB-010	0.199	U	0.724		0.173	U	0.338	U	0.327	J	1.89	U
PCB-011	2.45	U	27.3		11.4		33.3		22.7		6.28	
PCB-012/013	5.22	CU	9.48	CUJ	5.2	CUJ	6.65	CU	6.34	CU	13.1	CU
PCB-014	0.191	U	0.586	U	0.239	U	0.508	U	0.418	U	1.96	U
PCB-015	3.27		58.9		14.5		32.9		35		15.1	
PCB-016	1.71		18.9		2.1	U	10.2		9.18		2.22	U
PCB-017	2.94		30.9		2.22		14.3		15		2.3	U
PCB-018/030	4.25	C	42.2	C	4.95	C	23.2	C	24.3	C	3.14	C
PCB-019	0.811		5.08		0.519		2.72		2.61		2.02	U
PCB-020/028	9.98	C	165	C	28.8	C	89.4	C	91.8	C	25.1	C
PCB-021/033	2.65	C	46.4	C	8.77	C	29.2	C	29	C	7.21	C
PCB-022	2.23		37.1		8.44		23.6		23.4		7.48	
PCB-023	0.0845	U	0.1	U	0.0687	U	0.338	U	0.196	U	1.61	U
PCB-024	0.0661	U	0.511		0.759	U	0.312	J	0.296	J	1.28	U
PCB-025	0.672		9.62		1.57		5.67		5.51		1.36	U
PCB-026/029	1.16	C	17.8	C	3.11	C	11	C	11	C	2.23	C
PCB-027	0.518	J	4.48	J	0.757	UJ	2.45		2.72		1.26	U
PCB-031	5.88		99.1		18.8		58.8		59		13.9	
PCB-032	3.82		30.5		2.49		10.4		12.6		1.45	U
PCB-034	0.0803	U	0.748		0.076	U	0.361	J	0.497		1.52	U
PCB-035	0.272	J	5.04		1.2		2.98		3		1.61	U
PCB-036	0.111	U	1.13		0.31	J	0.818		0.839		1.44	U
PCB-037	3.75		65.1		13.5		32.2		35.9		13.2	
PCB-038	0.0732	U	0.476		0.132	U	0.317	U	0.351	J	1.51	U
PCB-039	0.092	J	1.15		0.114	U	0.751	U	0.634		1.5	U
PCB-040/041/071	5.97	C	75.5	C	10	C	33.7	C	40.8	C	4.83	C
PCB-042	3.17		41.8		6.15		19.9		22.8		2.7	
PCB-043	0.297	U	4.54		0.385	U	1.73		2.58		0.251	U
PCB-044/047/065	11.2	C	149	C	20.6	C	69.3	C	83.4	C	8.82	C
PCB-045/051	1.97	C	19.7	C	2.29	C	8.25	C	9.91	C	0.998	C
PCB-046	0.749		6.4		0.774		2.76		3.28		0.341	J
PCB-048	1.77		23.8		2.54		10.5		13		1.18	
PCB-049/069	7.71	C	106	C	13.3	C	51.7	C	60.2	C	5.58	C
PCB-050/053	1.93	C	16.6	C	1.96	C	7.26	C	9.09	C	0.87	C
PCB-052	12.6		164		22.2		80.2		94.6		7.67	
PCB-054	0.0635	U	0.307	U	0.263	U	0.334	J	0.163	J	0.132	U
PCB-055	0.114	U	2.67		0.579	U	1.43		1.47		0.207	U
PCB-056	4.84		78.7		14.5		42.7		45.3		8.49	
PCB-057	0.105	U	0.731	U	0.565	U	0.481	U	0.431		0.196	U
PCB-058	0.108	U	0.742	U	0.575	U	0.573		0.505		0.203	U
PCB-059/062/075	1.11	C	13.9	C	2.08	C	5.97	C	7.22	C	0.98	C
PCB-060	2.45		40.3		7.67		21.4		22.7		4.51	
PCB-061/070/074/076	18.5	C	305	C	55	C	170	C	181	C	26.1	C
PCB-063	0.466		7.62		1.08		3.76		4.27		0.403	J
PCB-064	4.43		61.1		8.34		29.9		34.5		4.32	
PCB-066	10.7		185		33.8		102		110		18.6	
PCB-067	0.376		5.62		0.982		3.16		3.52		0.457	
PCB-068	0.126	J	1.59		0.546	U	1.12		1.12		0.19	U
PCB-072	0.133	U	2.7		0.567	U	1.52		1.63		0.188	J
PCB-073	0.0644	U	0.0731	U	0.269	U	0.365	U	0.362	J	0.137	U

Location ID	PG-22-S	Q	PG-24-S	Q	PG-25-S	Q	PG-26-S	Q	PG-29-S	Q	PG-30-S	Q
Date/Time	3/27/2013	11:29	3/26/2013	15:21	3/28/2013	18:55	3/26/2013	16:53	3/26/2013	15:43	3/27/2013	16:04
PCB-077	2.09		29.3		5.46		13		15.3		2.39	
PCB-078	0.103	U	0.304	U	0.551	U	0.507	U	0.24	U	0.196	U
PCB-079	0.197	J	4.06		0.63		1.94		2.3		0.359	U
PCB-080	0.0971	U	0.287	U	0.523	U	0.472	U	0.222	U	0.181	U
PCB-081	0.112	U	1.07	U	0.59	U	0.566	U	0.555	U	0.189	U
PCB-082	2.24		34		4.5		14.8		20.8		1.22	J
PCB-083/099	15.5	C	198	C	21.5	C	90.6	C	111	C	6.52	C
PCB-084	4.65		65.9		6.26		26.3		35.9		2.05	
PCB-085/116/117	4.39	C	60.5	C	7.06	C	27.4	C	35	C	2.4	C
PCB-087/097/108/119/125	13.8	C	190	C	22.9	C	84.7	C	106	C	7.1	C
PCB-088/091	3.03	C	41.2	C	3.76	C	17.7	C	23.6	C	1.26	C
PCB-089	0.293	U	3.92		0.278	J	1.15		1.73		0.222	U
PCB-090/101/113	21.1	C	293	C	32.2	C	133	C	164	C	8.36	C
PCB-092	3.75		54.4		6.07		26.4		32		1.57	
PCB-093/095/098/100/102	17	C	218	C	24.2	C	93.4	C	123	C	5.71	C
PCB-094	0.15	U	1.63		0.146	U	0.752		0.795		0.232	U
PCB-096	0.171	U	1.61		0.126	U	0.599		0.95		0.129	U
PCB-103	0.363		4.41		0.411		2.07		2.54		0.186	U
PCB-104	0.0616	U	0.065	U	0.0493	U	0.233	U	0.106	U	0.119	U
PCB-105	8.42		128		18.5		61.2		73.9		6.32	
PCB-106	0.112	U	0.22	U	0.118	U	0.626	U	0.308	U	0.261	U
PCB-107/124	0.758	CU	10.5	C	1.6	C	5.25	C	6.21	C	0.505	C
PCB-109	1.64		24.5		2.99		11.7		14		0.911	
PCB-110/115	22.2	C	331	C	38.8	C	145	C	192	C	12	C
PCB-111	0.104	U	0.438		0.0569	U	0.312	U	0.217	U	0.159	U
PCB-112	0.104	U	0.116	U	0.0578	U	0.315	U	0.199	U	0.157	U
PCB-114	0.314		6.23		0.873		3.07		3.5		0.388	J
PCB-118	20.1		301		42.1		144		176		13.5	
PCB-120	0.133	J	1.98		0.25	J	1.14		1.24		0.147	U
PCB-121	0.104	U	0.204	U	0.0581	U	0.309	U	0.201	U	0.159	U
PCB-122	0.239	U	3.77		0.514		1.72		1.98		0.271	U
PCB-123	0.381		5.91		0.952	U	2.69		3.47		0.305	U
PCB-126	0.136	U	1.82		0.253	J	0.939	U	1.09		0.298	U
PCB-127	0.119	U	0.234	U	0.113	U	0.634	U	0.299	U	0.253	U
PCB-128/166	3.98	C	66.3	C	6.09	C	30.4	C	39.3	C	1.59	C
PCB-129/138/160/163	26.3	C	412	C	37.3	C	194	C	237	C	9	C
PCB-130	1.8		27.7		2.36		12.3		15.2		0.54	
PCB-131	0.242	U	4.27		0.298	J	2.14		2.42		0.262	U
PCB-132	7.07		123		9.52		52.5		69.4		2.12	
PCB-133	0.478		7.05		0.759		3.85		4.17		0.246	U
PCB-134/143	1.08	CU	18.8	C	1.35	C	6.98	C	10.3	C	0.256	CU
PCB-135/151/154	7.7	C	123	C	10.3	C	56.5	C	69.4	C	1.89	C
PCB-136	2.53		39.7		2.73		16.2		22.1		0.481	
PCB-137	0.904		10.8		1.38		7.76		7.23		0.444	U
PCB-139/140	0.461	CU	7.3	C	0.632	C	3.3	C	4.35	C	0.234	CU
PCB-141	2.72		34.4		4.93		22.9		22.4		1.06	
PCB-142	0.155	U	0.245	U	0.113	U	0.702	U	0.305	U	0.259	U
PCB-144	0.788	U	14.2		1.05	U	6.11		7.57		0.328	J
PCB-145	0.0868	U	0.103	J	0.0632	U	0.318	U	0.201	U	0.15	U
PCB-146	4.38		68.7	J	6.17		34.1		37.9		1.36	
PCB-147/149	18.9	C	296	C	17.3	C	131	C	163	C	4.29	C
PCB-148	0.107	U	1.05		0.086	J	0.879	U	1.11	U	0.188	U
PCB-150	0.086	U	1.02		0.067	U	0.554	U	0.608		0.149	U
PCB-152	0.081	U	0.325	U	0.0591	U	0.288	U	0.234	J	0.136	U
PCB-153/168	24.3	C	361	C	32.5	C	170	C	204	C	6.61	C
PCB-155	0.07	U	0.133	U	0.0475	U	0.225	U	0.147	U	0.113	U
PCB-156/157	2.17	C	35.6	C	3.87	C	17.6	C	21.2	C	1.19	CU
PCB-158	1.91		33.8		3.45		15.2		19		0.976	
PCB-159	0.239	U	4.03		0.344	J	1.71		1.89		0.18	U
PCB-161	0.109	U	0.171	U	0.0767	U	0.507	U	0.207	U	0.176	U
PCB-162	0.109	U	1.77		0.143	J	1	U	0.217	U	0.184	U

Location ID	PG-22-S	Q	PG-24-S	Q	PG-25-S	Q	PG-26-S	Q	PG-29-S	Q	PG-30-S	Q
Date/Time	3/27/2013	11:29	3/26/2013	15:21	3/28/2013	18:55	3/26/2013	16:53	3/26/2013	15:43	3/27/2013	16:04
PCB-164	1.64		25.1		2.35		10.9		14.2		0.502	U
PCB-165	0.123	U	0.591	U	0.0883	U	0.564	U	0.33	J	0.203	U
PCB-167	0.973		13.8		1.46		6.72		8.21		0.344	J
PCB-169	0.11	U	0.375	U	0.0833	U	0.478	U	0.207	U	0.176	U
PCB-170	4.5		62.8		6.68		35.4		38.8		1.34	
PCB-171/173	1.51	C	26	C	2.11	C	12.8	C	16.8	C	0.439	C
PCB-172	0.848		9.69		1.21		6.48		7.06		0.264	J
PCB-174	4.31		66.5		5.62		37		44.7		1.1	
PCB-175	0.283	U	4.12		0.38		1.86	U	2.6		0.203	U
PCB-176	0.611		11.3		0.824		5.25		6.43		0.162	U
PCB-177	3.34		57		4.36		27.6		35.9		0.852	
PCB-178	1.26		24.1		1.69		11.8		14.2		0.322	U
PCB-179	2.23		40.6		2.62		18.8		23.8		0.381	J
PCB-180/193	9.9	C	118	C	13.9	C	0.374	CU	77.6	C	2.55	C
PCB-181	0.0866	U	0.796		0.0729	U	0.457	U	0.497		0.215	U
PCB-182	0.0813	U	0.691		0.075	U	0.44	U	0.54	U	0.204	U
PCB-183/185	3.35	C	59.9	C	4.79	C	28	C	35.9	C	0.751	CU
PCB-184	0.0616	U	0.219	U	0.0543	U	0.327	U	0.19	J	0.15	U
PCB-186	0.0666	U	0.118	U	0.0587	U	0.356	U	0.186	U	0.165	U
PCB-187	8.31		146		10.7		64.6		82.8		1.89	
PCB-188	0.0628	U	0.403		0.0484	U	0.293	U	0.26	J	0.144	U
PCB-189	0.205	U	2.8		0.291	J	2.05		1.68		0.21	U
PCB-190	0.779		13.4		1.35	U	7.69		8.78		0.313	J
PCB-191	0.191	J	2.8		0.209	U	1.35	U	1.85		0.168	U
PCB-192	0.0729	U	0.129	U	0.0624	U	0.386	U	0.211	U	0.187	U
PCB-194	3.06	U	32.9		3.27		21.2		20.7		0.671	
PCB-195	1.15	U	16.3		1.3		7.6		9.72		0.248	J
PCB-196	1.31	U	22.4		1.93		11.2		14.3		0.305	U
PCB-197/199	0.563	C	8.36	CJ	0.549	C	4.23	C	5.96	C	0.159	CU
PCB-198/201	3.95	C	65.1	C	5.19	C	33.8	C	42.8	C	0.695	C
PCB-200	0.488		8.29		0.674	U	3.9		5.11		0.157	U
PCB-202	1.1		17.3		1.24		9.09		10.3		0.171	U
PCB-203	2		33.7		2.91		18.5		21.2		0.499	U
PCB-204	0.0766	U	0.123	U	0.0705	U	0.309	U	0.14	U	0.16	U
PCB-205	0.107	U	2.14		0.274	U	1.03		1.45		0.18	U
PCB-206	2.45		35.8		2.74		21.2		22.5		0.54	U
PCB-207	0.253	U	4.95		0.423		2.88		3		0.199	U
PCB-208	0.838		14.8		0.97		8.08		9.03		0.208	U
PCB-209	2.08		33.6		1.95		18.8		22.7		0.433	
Total PCBs*	447		6790		798		3250		3920		309	
PCB TEQ (0 DL)	0.00118		0.2		0.0279		0.00842		0.119		0.000856	
PCB TEQ (1/2 DL)	0.00965		0.206		0.0292		0.0626		0.122		0.0184	
PCB TEQ (1 DL)	0.0181		0.211		0.0306		0.117		0.126		0.036	
PCB TEQ (KM)	0.015	L	0.2		0.028		0.1	L	0.12		0.031	L

*total PCBs represents the sum of all detected congeners
U-the analytie was analyzed for, but was not detected above the reported sample quantitation limi
J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sampl
UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate
L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detect
KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates
C-see list for co-eluting congeners

Table E-7. Summary of Phase I Polychlorinated Biphenyl (PCB) Congener Data (continued).

Location ID	PG-32-S	Q	PG-33-S	Q	PG-35-S	Q	PG-58-S	Q
Date/Time	3/26/2013	13:46	3/28/2013	17:22	3/27/2013	10:53	4/22/2014	10:46
PCB Congeners (ng/kg DW)								
PCB-001	11.9		1.23	U	1.94	U	9.48	
PCB-002	15.9		3.26		2.79	J	11.7	
PCB-003	11.2		1.45	J	1.27	U	11.4	
PCB-004	20.8		13	U	14.4	U	10	
PCB-005	0.507		7.31	U	9.95	U	0.834	
PCB-006	6.24		6.35	U	8.64	U	8.03	
PCB-007	2.97		6.51	U	8.86	U	2	
PCB-008	49.1		6	U	8.16	U	43.9	
PCB-009	1.5		6.21	U	8.46	U	2.09	
PCB-010	0.815		6.08	U	8.27	U	0.495	
PCB-011	24.8		7.99	U	9.29	U	20.4	
PCB-012/013	8.39	CU	7.26	CU	9.88	CU	7.07	C
PCB-014	0.744		6.64	U	9.03	U	0.399	
PCB-015	57		8.33	U	10.8	U	40.4	
PCB-016	16.9		4.57	UJ	2.15	U	25.2	
PCB-017	31.6		1.59	UJ	1.93	U	31.3	
PCB-018/030	44.2	C	2.57	CJ	3.19	C	51	CJ
PCB-019	6.11		1.39	U	1.78	U	4.52	
PCB-020/028	164	C	13.2	CJ	7.17	C	180	C
PCB-021/033	44	C	2.53	CJ	2.26	CJ	78.1	C
PCB-022	36.9		3.09	J	1.61	U	55.1	
PCB-023	0.177	U	1.31	UJ	1.56	U	0.14	J
PCB-024	0.548	U	1.2	UJ	1.46	U	0.716	
PCB-025	10.1		1.1	UJ	1.31	U	16	
PCB-026/029	18.4	C	1.38	CJ	1.52	CU	34.4	C
PCB-027	6.32		1.07	UJ	1.31	U	5.04	
PCB-031	98.8		24.4	J	4.18		135	
PCB-032	31.3		3.07	UJ	1.95	U	24.9	
PCB-034	0.722		1.25	UJ	1.49	U	0.91	
PCB-035	4.85		1.32	UJ	1.57	U	3.51	
PCB-036	1.08		1.22	UJ	1.46	U	0.52	
PCB-037	65.1		6.48	J	3.14		54.4	
PCB-038	0.526	U	1.26	UJ	1.51	U	0.418	
PCB-039	1.13		1.25	UJ	1.49	U	1.18	
PCB-040/041/071	76	C	3.1	C	4.34	C	69	C
PCB-042	41.6		2.67		2.22		39	
PCB-043	4.94		0.298	U	0.782	U	5.08	
PCB-044/047/065	151	C	8.06	C	7.46	C	164	C
PCB-045/051	19.4	C	0.842	C	1.6	C	17.2	C
PCB-046	6.21		0.263	U	0.813	U	5.89	
PCB-048	23		0.974		1.11		25.2	
PCB-049/069	107	C	5.92	C	5.69	C	117	C
PCB-050/053	17.6	C	0.756	C	1.27	C	14.8	C
PCB-052	160		9.65		8.57		194	
PCB-054	0.328	J	0.135	U	0.367	U	0.251	J
PCB-055	2.13		0.199	U	0.647	U	3.65	
PCB-056	77.7		5.89		3.07		81.6	
PCB-057	0.966		0.189	U	0.569	U	1.87	
PCB-058	0.917	U	0.196	U	0.621	U	0.859	
PCB-059/062/075	14	C	0.581	C	0.797	CU	14.7	C
PCB-060	42.3		3.16		1.54	U	38.5	
PCB-061/070/074/076	304	C	24.7	C	11.9	C	357	C
PCB-063	7.69		0.487		0.579	U	7.68	
PCB-064	64.4		4.23		3.07		65.2	
PCB-066	192		16.7		7.56		186	
PCB-067	6.06		0.304	J	0.53	U	9.67	
PCB-068	1.99		0.183	U	0.554	U	2.43	
PCB-072	2.75		0.189	U	0.552	U	4.04	
PCB-073	0.42		0.163	U	0.559	U	0.0497	U

Location ID	PG-32-S	Q	PG-33-S	Q	PG-35-S	Q	PG-58-S	Q
Date/Time	3/26/2013	13:46	3/28/2013	17:22	3/27/2013	10:53	4/22/2014	10:46
PCB-077	30		2.36		1.51		19	
PCB-078	0.368	U	0.189	U	0.6	U	0.146	U
PCB-079	3.86		0.173	J	0.51	U	4.29	
PCB-080	0.34	U	0.175	U	0.558	U	0.132	U
PCB-081	1.05	U	0.175	U	0.528	U	0.71	
PCB-082	27.9		0.959	UJ	1.65	U	29.2	J
PCB-083/099	197	C	7.21	C	9.74	C	173	C
PCB-084	60.1		1.66		3.72		57.4	
PCB-085/116/117	60.5	C	3.05	C	2.15	C	43.2	C
PCB-087/097/108/119/125	186	C	8.15	C	10.4	C	167	C
PCB-088/091	38.1	C	1.26	C	2.32	C	36.3	C
PCB-089	3.51		0.257	U	0.667	U	2.82	
PCB-090/101/113	284	C	10.6	C	14.7	C	242	C
PCB-092	53.4		1.99		2.7		54.6	
PCB-093/095/098/100/102	199	C	7.34	C	13.2	C	180	C
PCB-094	1.42		0.268	U	0.699	U	1.14	
PCB-096	1.43		0.15	U	0.386	U	1.34	
PCB-103	4.16		0.215	U	0.568	U	3.16	
PCB-104	0.116	U	0.12	U	0.362	U	0.0497	U
PCB-105	138		7.69		5.9		100	
PCB-106	0.458	U	0.254	U	0.605	U	0.364	U
PCB-107/124	11.4	C	0.599	C	0.638	CU	8.17	C
PCB-109	26.3		1.31	U	0.567	U	20.2	
PCB-110/115	339	C	13.9	C	16.1	C	291	C
PCB-111	0.357	J	0.183	U	0.497	U	0.316	U
PCB-112	0.155	U	0.182	U	0.502	U	0.113	U
PCB-114	6.08		0.448		0.663	U	5.11	
PCB-118	325		16.5		15.2		262	
PCB-120	2.16		0.169	U	0.453	U	1.18	
PCB-121	0.156	U	0.183	U	0.491	U	0.116	U
PCB-122	3.61		0.264	U	0.669	U	2.87	
PCB-123	6.59		0.313	J	0.671	U	3.6	
PCB-126	1.79		0.284	U	0.719	U	0.838	
PCB-127	0.444	U	0.246	U	0.613	U	0.373	U
PCB-128/166	66.2	C	1.8	C	2.7	C	59.2	C
PCB-129/138/160/163	407	C	11.7	C	16.2	C	400	C
PCB-130	26.4		0.768		1.01	U	21.2	
PCB-131	3.61		0.274	U	0.799	U	3.87	
PCB-132	111		2.51		4.55	U	118	
PCB-133	7.12		0.257	U	0.738	U	4.78	
PCB-134/143	16.7	C	0.357	CU	0.773	CU	16.3	C
PCB-135/151/154	115	C	2.62	C	5.81	C	109	C
PCB-136	35.2		0.616		1.46		36.2	
PCB-137	11.7		0.46		0.785	U	15.6	
PCB-139/140	6.85	C	0.245	CU	0.705	CU	6.78	C
PCB-141	36.4		1.47		1.67		49.2	
PCB-142	0.538	U	0.27	U	0.767	U	0.562	U
PCB-144	13.6		0.33	J	0.743	U	14.1	
PCB-145	0.151	U	0.161	U	0.473	U	0.0873	U
PCB-146	65.8		1.71		2.86		49.6	
PCB-147/149	274	C	5.8	C	11.9	C	332	C
PCB-148	0.904		0.201	U	0.576	U	0.883	
PCB-150	1.11		0.16	U	0.45	U	1.01	
PCB-152	0.204	J	0.145	U	0.428	U	0.353	J
PCB-153/168	359	C	8.87	C	15.3	C	241	C
PCB-155	0.118	U	0.117	U	0.328	U	0.109	U
PCB-156/157	37.2	C	1.39	C	0.748	CU	30.2	C
PCB-158	33.9		1.06		1.25		31.4	
PCB-159	3.24		0.188	U	0.537	U	0.387	U
PCB-161	0.367	U	0.184	U	0.554	U	0.392	U
PCB-162	1.31		0.193	U	0.552	U	0.395	U

Location ID	PG-32-S	Q	PG-33-S	Q	PG-35-S	Q	PG-58-S	Q
Date/Time	3/26/2013	13:46	3/28/2013	17:22	3/27/2013	10:53	4/22/2014	10:46
PCB-164	24		0.69		1.25	U	21.7	
PCB-165	0.69	U	0.212	U	0.616	U	0.449	U
PCB-167	14.7		0.445		0.733		10.4	
PCB-169	0.359	U	0.181	U	0.526	U	0.325	U
PCB-170	67.9		2.01		2.16		61.9	
PCB-171/173	29.4	C	0.737	C	0.857	CU	25.4	C
PCB-172	12.2		0.415		0.658	U	11.1	
PCB-174	75.4		1.62		2.11		86.3	
PCB-175	4.6		0.233	U	0.608	U	2.68	
PCB-176	10.9		0.199	J	0.476	U	11.3	
PCB-177	65		1.07		1.94		59.4	
PCB-178	26.4		0.525		1.04	U	16.3	
PCB-179	42.4		0.73		1.37	U	40.1	
PCB-180/193	135	C	4.21	C	4.12	C	139	C
PCB-181	0.981		0.246	U	0.64	U	0.659	
PCB-182	0.693		0.233	U	0.616	U	0.611	
PCB-183/185	64.6	C	1.09	C	1.93	C	0.157	CU
PCB-184	0.209	J	0.173	U	0.458	U	0.154	J
PCB-186	0.181	U	0.189	U	0.498	U	0.128	U
PCB-187	153		2.84		4.63		134	
PCB-188	0.543		0.17	U	0.423	U	0.352	J
PCB-189	2.94		0.257	U	0.686	U	2.47	
PCB-190	15.3		0.543	U	0.499	U	13.9	
PCB-191	3.34		0.192	U	0.488	U	2.8	
PCB-192	0.206	U	0.215	U	0.54	U	0.137	U
PCB-194	37.9		0.957		1.03	U	35.1	
PCB-195	17		0.403	J	0.693	U	14	
PCB-196	26.6		0.601	U	0.557		16.6	
PCB-197/199	10.8	C	0.19	CU	0.41	CU	5.53	CJ
PCB-198/201	75.8	C	1.52	C	1.38	C	41	C
PCB-200	8.82		0.189	J	0.396	U	4.87	
PCB-202	18		0.381	J	0.524	U	10.2	
PCB-203	38.1		0.95	U	0.59	U	25.7	
PCB-204	0.162	U	0.19	U	0.411	U	0.0806	U
PCB-205	2.38		0.201	U	0.563	U	1.59	
PCB-206	39.6		0.898	U	0.847	U	22.4	
PCB-207	5.49		0.262	U	0.671	U	2.62	
PCB-208	16.2		0.414		0.71	U	8.02	
PCB-209	37.6		0.961		0.749		17	
Total PCBs*	6840		292		258		6390	
PCB TEQ (0 DL)	0.198		0.00104		0.000806		0.0983	
PCB TEQ (1/2 DL)	0.203		0.018		0.0448		0.103	
PCB TEQ (1 DL)	0.209		0.0349		0.0887		0.108	
PCB TEQ (KM)	0.2		0.03	L	0.073	L6	0.1	

*total PCBs represents the sum of all detected congeners
U-the analytie was analyzed for, but was not detected above the reported sample quantitation limi
J-the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sampl
UJ-the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate
L-the detection frequency of compounds within a sample was <50%, the numeric value indicates the number of non-detect
KM-Kaplan-Meier DW-dry weight Q-qualifier TEQ-toxicity equivalent DL-detection limit Avg-average of field duplicates
C-see list for co-eluting congeners

Appendix H. Univariate and Multivariate Investigations of the Port Gardner Bay Data Set

Appendix H: Univariate and Multivariate Investigations of the Port Gardner Bay Data Set

Various statistical methods were used to evaluate the data from Port Gardner Bay. This appendix represents a record of the analyses performed. The analyses in Section H1.0 were conducted to determine the most appropriate distribution for each analyte. All data were evaluated in Section H2.0 to identify if any statistical outliers existed for any of the individual analytes. The bivariate and multivariate exploratory analyses of Sections H3.0 and H4.0 were conducted to further explore patterns in the data and identify any unusual results not obvious from the univariate analysis. Any samples flagged by the analyses of Sections H3.0 and H4.0 were not considered outliers for the purpose of calculating the 90/90 upper tolerance limits (90/90 UTLs).

H.1 Distributional Analysis

The distributions for each analyte were evaluated individually in R (R Core Team 2014) to generate normal-probability plots and in ProUCL 5.0 (USEPA 2013) for formal goodness of fit (GOF) tests against the standard distributions (i.e., normal and gamma). The normal probability plots are shown in Figures H-1 and H-2 for each of the analytes. These plots were used in part to evaluate the shape of the data distribution. The results of the goodness of fit tests ($\alpha = 0.05$) based on the detected data only, are shown in Table H-1.

Most of the chemical distributions did not deviate significantly from a normal distribution. For cadmium, the distribution could be considered normal with elevated concentrations present, or a skewed gamma distribution provided a good fit to all of the observations. All of the data sets were best described by a normal distribution, except the following:

- Dioxin/Furan TEQ – the normal distribution was rejected (Shapiro-Wilks's test $p < 0.03$ for detected data), mainly because both tails were shorter than expected for normality (fewer values far out in the tails than expected). The distribution had symmetry like a normal distribution, and no extreme values. Because of the lack of any skewness in these data, the normal distribution was still the best-fitting distribution.
- Cadmium – for the detected data, a gamma distribution was the best fit to all of the observations, while a normal distribution was a good fit if location PG-60 was excluded.

H.2 Univariate Investigation of Extreme Values for each Analyte

The term extreme value is used to define a result that deviates from the population mean but may still be representative of background (SCUM II; Ecology 2013). Extreme values are common in data sets that lack sufficient sample sizes to capture the full range of values. Essentially, it is unknown whether an extreme value is an outlier unless more samples are available. The individual analytes were screened for extreme values using a variety of approaches:

- Single extreme values were identified using Rosner's formal outlier test (for $n \geq 25$, conducted in ProUCL; $\alpha = 0.05$) for data that fit a normal distribution (see Table H-1).
- Extreme values were also identified when the single highest concentration sample was the difference between a normal and a non-normal distribution (i.e., if the high concentration sample were excluded, the distribution would be normal).
- High values were flagged as extreme based on the boxplots for metals in Figure H-3 and the organic analytes in Figure H-4, using Tukey's rule of thumb[1].

Screening for extreme values was done to determine whether specific samples may be skewing the distribution for an individual analyte. A summary of the extreme values for each CoC in the Port Gardner Bay data set follows:

- Arsenic and mercury presented no extreme values (Figures H-1 and H-3).
- Cadmium presented one extreme value (PG-60) for the formal outlier test (Rosner's $p <$ 0.05). Tukey's rule of thumb also identified this sample as extreme (Figure H-3), with a concentration of 0.61 ppm, outside the "whiskers" of the box-and-whisker plot.
- cPAH, dioxin/furan, and PCB TEQs presented no extreme values (Figures H-2 and H-4).

Several of the analyte distributions, including the values identified as extreme, were entirely within the range of natural background. If a sample result was identified as extreme, but not outside the range of natural background, there was no need to exclude it from the data set.

H.3 Correlation Between Analyte Concentrations and Conventional Parameters

The following bivariate investigations evaluated the distribution of each analyte in relation to percent fines and percent TOC. Anthropogenic contamination tends to be associated with these conventional parameters, so in urban embayments there is typically a positive correlation with

[1] Tukey's rule of thumb flags values as extreme when they exceed the median ± 1.5 × IQR (IQR = interquartile range = 3rd quartile minus the 1st quartile). These points fall outside the whiskers on the boxplots.

these parameters. Deviations from the general trend can be indicative of a different source, or a different geochemical/depositional environment. This exploratory investigation provided information for understanding some of the possible sediment dynamics in Port Gardner Bay, but was not a deciding factor in excluding samples as outliers.

The correlation between percent fines and percent TOC was strong (Pearson's $r = 0.75$, $df = 28$, $p < 0.001$). The scatterplot for this correlation is shown in Figure H-5. The 5 labeled samples are discussed in Sections 3.1 and 3.2.

H.3.1 Correlations with Grain Size

The relationships between grain size (as percent fines) and analyte concentrations are presented graphically as scatterplots in Figure H-6. The grain size for the samples in this data set were evenly distributed throughout the observed range of 4 to 97 percent fines, which provided a good description of the relationship between Port Gardner Bay sediment chemistry and percent fines for sediment types ranging from coarse to fine grained. The scatterplots showed strong correlations between each of the analytes and percent fines (correlation coefficients are shown in Table 4, Section 4.1 of main report). However, three samples had concentrations for one or more analytes that were higher than expected for this data set given the moderate level of percent fines observed in these samples:

- Sample PG-51 had an arsenic concentration of 11.6 ppm with a grain size of 45 percent fines (Figure H-6). This concentration is not particularly elevated relative to the distribution of arsenic concentrations for this data set (Figures H-1 and H-3), but is higher than expected given this level of percent fines. Concentrations for the other analytes were not elevated in this sample.
- Sample PG-60 had an intermediate grain size of 53 percent fines, and relatively elevated concentrations for every analyte measured (Figure H-6). However, only the cadmium concentration was considered a univariate statistical outlier (Section 2.0) and all of these concentrations were consistent with the higher TOC found at this station.
- Sample PG-53 had an intermediate grain size of 54 percent fines, and a relatively elevated cPAH TEQ at 51 ppb (Figure H-6).

Further investigation into the pattern of contaminants observed for this data set was done using multivariate analyses (Section 4.0).

H.3.2 Correlations with Total Organic Carbon

The relationships between total organic carbon (as percent TOC) and analyte concentrations are presented graphically as scatterplots in Figure H-7. The TOC for the samples in this data set were fairly evenly distributed throughout the observed range of 0.15 to 2.4 percent. The scatterplots show that there are fairly good correlations (all statistically significant with $p < 0.01$,

Table 5, Section 4.1 of main report) between each of the analytes and percent TOC. Similar to the correlations between sediment chemistry and grain size, there were several samples with concentrations of one or more analytes that were higher than expected given the amount of TOC in the sediments.

- Sample PG-51 stood out with a higher than expected arsenic concentration (11.6 ppm) given the low level of TOC (0.9 percent).
- Sample PG-61 had moderate to higher concentrations for all analytes and a relatively low TOC of 0.3 percent (Figure H-7). Consequently, this sample does not follow the positive trends between sediment chemistry and percent TOC displayed by the rest of the samples. However, the percent fines for this sample was relatively high at 83 percent, so the analyte concentrations in this sample were very consistent with the trends between chemistry and grain size (Figure H-6).
- Sample PG-34 was another instance where the concentrations were higher than expected for the level of TOC (1.3 percent; Figure H-7), but were consistent with the higher percentage of fines (89 percent; Figure H-6).

H.4 Multivariate Evaluation of Regional and Natural Background

Multivariate outlier analysis was used to determine whether any samples demonstrated unusual sediment chemistry patterns beyond those associated with the physical correlations to grain size and TOC. An exploratory principal components analysis was used to investigate how the chemical patterns varied among the Port Gardner Bay regional background samples and the Bold natural background samples. This analysis was conducted to place Port Gardner Bay sediment chemistry within the context of Puget Sound at large, and to identify which analytes differed between the two populations. However, the multivariate analyses are limited by the fairly small number of analytes for this study.

H.4.1 Multivariate Outlier Analysis

Multivariate outlier investigations used robust Mahalanobis distances. Mahalanobis distance is a metric very similar to Euclidean distance, which is the familiar metric used to calculate the distance between two points on a line. To identify multivariate outliers, the Mahalanobis distance is calculated as the distance between each observation and the center of mass for the remaining observations, scaled to the covariance among the chemical variables. Simply stated, this is a multivariate extension of the idea of expressing distance from the mean by the number of standard deviations.

A large difference in a direction in which the data covary (i.e., are correlated) is less significant than a smaller difference in a direction that lacks correlation. For example, Figure H-8 shows a theoretical relationship between arsenic and mercury, two metals that are highly correlated with the exception of one unusual sample. The blue dot represents the centroid and is located at the means for the two metals. The Euclidean distances between the centroid and points A and B are 0.3 and 8.7, respectively. However, the Mahalanobis distances, which are scaled to the covariances, are 411 and 25, respectively. It is clear that point A is an unusual data point because it is outside the direction of correlation. An observation that falls outside the multi-dimensional cloud of the other data points (e.g., point A for two dimensions in Figure H-8) could be identified as a multivariate outlier. Within the Port Gardner Bay data set, the Mahalanobis distance represents this same comparison of distance from the mean calculated using multiple analytes.

More specifically, the Mahalanobis distance is a sum of the individual distances for the chemical variables considered, and weights the individual distances by an element from the inverse of the covariance matrix, so that a difference in a direction of high correlation (e.g., point B in Figure H-8) has a lower weight than a difference in a direction that lacks correlation (e.g., point A in Figure H-8). In short, the smaller the Mahalanobis distance, the more closely the sample covaries in the same direction as the rest of the data.

The Mahalanobis distances were calculated using robust estimates of location (center of mass) and scale (covariance), thus avoiding skewing the estimates of the centroid by the presence of any extreme values that this method intends to detect. Robust estimates of location and scale utilized the iterated reweighted minimum covariance determinant (MCD) method of Cerioli (2010), which estimates the location and scale from a central subset (e.g., between 50 and 75 percent) of the data whose covariance matrix has the smallest determinant. The *cerioli2010.irmcd.test* function of the *CerioliOutlierDetection* package (Green 2014) in R was used to estimate robust location and scale, and identify outlying data points based on the reweighted robust Mahalanobis distances. Samples were identified as multivariate outliers using a multiplicity-adjusted threshold that constrains the family-wise type I error rate to the nominal level ($\alpha = 0.05$). Samples that are considered unusual for the population are also flagged by using a threshold that constrains the type I error rate for each sample to the nominal level (0.05).

The (squared) Mahalanobis distances were calculated for six analytes using robust MCD estimators of location and scale; the fraction of observations used to compute robust estimates correspond to the maximum breakpoint case of the MCD (in this case, 17 of the 27 samples, or 63 percent of the data). The squared distances asymptotically follow the chi-square distribution, but for anything other than very large sample sizes this approximation can lead to too many samples being identified as outliers (Cerioli 2010, Green and Martin 2014). A scaled Beta or scaled F distribution provide better thresholds for identifying individual outliers in small samples (Cerioli 2010, Hardin and Rocke 2005, Green and Martin 2014). A quantile-quantile plot for the re-weighted Mahalanobis squared distances is shown in Figure H-9, and the sorted distances are presented in Table H-2.

Sample PG-51 had the greatest Mahalanobis distance for the pattern of analytes (Table H-2). However, the Mahalanobis distance of individual samples depends on the choice and number of chemical parameters included in the analysis (changing the list of chemicals affects the nature of the patterns, i.e., the covariance matrix, as well as the degrees of freedom).

Several of the samples identified by the bivariate plots with percent fines and TOC (Figures H-6 and H-7) were identified by the multivariate analysis:

- The analysis based on the six analytes identified sample PG-51 as a potential multivariate outlier due to elevated arsenic (11.6 mg/kg) that was inconsistent with the low-to-moderate concentrations for the rest of the analytes in this sample. Sample PG-53 was identified as a potential multivariate outlier using the lower threshold (the nominal alpha) due to high cPAH TEQ (51 μg/kg) that was inconsistent with the concentrations for the other analytes in this sample.

When percent fines and TOC were included in the multivariate analysis, the two dominant samples from Figures H-6 and H-7 (i.e., PG-60 and PG-51) were identified based on relatively unusual relationships between analyte concentrations and sediment conventional parameters. Location PG-60 was near the edge of the multivariate cluster (Figure H-9), but was only statistically significant if fines and TOC were included in the analysis.

H.4.2 Principal Components Analysis

PCA is a statistical method for reducing the complexity of a complex, multivariate data set. In reducing the complexity, PCA groups samples with shared components and reveals underlying patterns in the data that would otherwise go unnoticed based on simple evaluations of individual chemical endpoints.

Data from the Bold natural background (and the Port Gardner Bay Phase II data sets were used in the PCA:

1. Port Gardner Bay included the 27 locations from Port Gardner Bay Phase II data set (Phase II data, Appendix E).
2. Natural Background included the 70 samples from the Bold data set. The “Plus” portion of Bold Plus was not used as not all of the analytes were represented in each sample.

A PCA was run on the combined data set of 97 samples with results for the six chemical endpoints included in the Port Gardner Bay data set (i.e., arsenic, cadmium, mercury, and TEQs for cPAHs, dioxin/furans, and PCBs). The PCA was run twice, substituting non-detected values with 0 or the detection limit to determine the influence of non-detects on the PCA outcomes. The PCA results for these data using substitution at zero for the non-detected values showed nearly identical patterns and results, indicating that the observed results were not driven by the

detection limits. The PCA was run on the correlation matrices of the data to remove the influence of large differences in magnitude of the concentration scales for the different chemicals.

Figure H-10 shows the PCA model outputs for the Port Gardner Bay and natural background data set using substitution at the detection limit for non-detected values. The first principal component was an overall average of all the variables used in the PCA (low values of component 1 were associated with overall higher concentrations), and represented 51 percent of the total variance. The second principal component represented an additional 24 percent of the total variance and was associated with lower concentrations of organics (only cPAH and PCB TEQs) and higher concentrations of metals, predominantly cadmium. The third principal component (not shown) representing 11 percent of the total variance was associated primarily with dioxin/furan TEQ. This component captured the skewness in the dioxin TEQ values driven by three natural background samples (i.e., SS_9, SS_0, and CAR_5).

In the biplot the loading vectors (the red arrows in Figure H-10) overlap for arsenic and mercury, and for cPAH and PCB TEQs, which indicates that these two pairs of chemicals have nearly identical loadings on the first two principal components. Unusual samples were primarily distinguished by higher cadmium in some of the natural background samples (i.e., CAR4, HC2, HOL4; the blue dots in Figure H-10). There is substantial overlap between the two data sets, but the Port Gardner Bay data diverge from the natural background data set generally due to higher levels of organic contaminants and lower concentrations of metals than the Bold natural background samples.

H.4.3 Discussion of Unusual Samples from the Port Gardner Bay Data Set

When sample sizes are small, a sample that looks like an outlier may simply lack sufficient evidence from the field. The precision estimates for the analytes in the Port Gardner Bay Phase II data set were good, ranging from 10 to 19 percent of the mean (Table 5 of main report), indicating relatively little heterogeneity in the sampled data set. The sample design achieved spatial balance across the entire AOI without leaving large areas unsampled. This provides confidence that the collected samples have sufficiently described the general conditions in the AOI. However, small-scale spatial anomalies may still be associated with the unusual sample results. The boxplot comparisons to the natural background analyte distributions (Figures H-3 and H-4) and the PCA (Figure H-10) were conducted to provide context for the concentrations observed in Port Gardner Bay.

The samples identified by the exploratory investigations are discussed below:

- PG-51 is located in the most northwestern corner of the AOI, just off the steep shelf from Hat Island (Figure 2 in the main report). The sample contained 45 percent fines, and TOC was 0.9 percent. The arsenic concentration in this sample was the highest within the Port

Gardner Bay data set (11.6 mg/kg), but was not particularly elevated relative to the other Port Gardner Bay samples, nor relative to natural background (Figures H-1 and H-3). No other analytes were elevated or unusual for this sample.

- PG-53 is located in the northeastern corner of the AOI, on the western edge of the Snohomish River delta (Figure 2 in the main report). The sample contained 54 percent fines and TOC was 1.5 percent. This sample had moderate concentrations for all analytes except for cPAH TEQ, which was elevated relative to most other samples. The cPAH TEQ concentration (51 mg/kg) was elevated primarily in the context of its relationship to fines and TOC. The cPAH TEQ concentration was also elevated relative to the moderate concentrations of mercury, and PCB and dioxin/furan TEQs. However, it was not the highest cPAH concentration within Port Gardner Bay.

- PG-60 contained 53 percent fines and TOC was 2.1 percent. Concentrations from this sample were within the upper tail of the distributions (80^{th} percentile or higher) for every analyte within Port Gardner Bay. It had the highest concentrations in Port Gardner Bay for cadmium and mercury (0.61 mg/kg and 0.16 mg/kg, respectively), but these values were at or near the 90^{th} percentile values for the natural background data set (Bold Plus). PG-60 also had the highest dioxin/furan TEQ value in Port Gardner Bay (3.9 ng TEQ/kg), which was approximately the 95^{th} percentile value for natural background. Concentrations were elevated given the moderate percentage of fines in this sample, but were consistent with the level of TOC (Figures H-6 and H-7).

  The concentrations of cadmium, mercury, and dioxin/furans are all within natural background even with this location included. There were other Port Gardner Bay locations with higher concentrations than PG-60 for the other analytes and there was no substantive change to the regional background numbers when this station was excluded.

- Samples PG-34 and PG-61 were located in deeper water, to the west and the northeast (respectively) of the DMMP disposal site (Figure 2 in the main report). These samples had concentrations of one or more analytes that were higher than expected given their levels of TOC (Figure H-6). Concentrations for all analytes in sample PG-61 were moderate, but TOC was quite low (0.3 percent). Sample PG-34 had moderate TOC for Port Gardner Bay (1.3 percent), and concentrations that were moderate to high for all analytes, including cPAH TEQ, which was the maximum (55.4 ng TEQ/kg) for Port Gardner Bay. However, the concentrations of analytes for these samples were not elevated relative to the other values in the data set based on the univariate analysis.

H.5 References

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Table H-7. Best Fit distribution for each analyte in the Port Gardner Bay data set.

	Best Fit Distribution(s)	Correlation Coefficient of the QQ-Plot for the best fit distribution(s)	Detection Frequency
Arsenic	Normal	0.975	**27/27**
Cadmium	Gamma or Normal	0.989 (Gamma) 0.971 (Normal)	**25/27**
Mercury	Normal	0.969	**25/30**
cPAH TEQ	Normal	0.980	**27/27**
Dioxin/Furan TEQ	None/Normal	0.961 (Normal)	**25/27**
PCB TEQ	Normal	0.970	**22/27**

Table H-2. Mahalanobis distances used to identify multivariate outliers.

Sample	Mahalanobis Distance (analytes)[1]	Potential Outlier	Sample	Mahalanobis Distance (analytes plus Fines and TOC)[2]	Potential Outlier
PG-51-S	54.3	**	PG-60-S	343.2	**
PG-53-S	11.8	*	PG-51-S	73.9	**
PG-60-S	10.7		PG-65	12.6	
PG-28-S	9.6		PG-53-S	11.8	
PG-65	9.5		PG-61-S	11.6	
PG-55-S	8.4		PG-54-S	11.3	
PG-10	7.4		PG-12-S	11.1	
PG-62-S	7.2		PG-28-S	11.0	
PG-54-S	6.9		PG-34-S	10.9	
PG-27-S	6.7		PG-27-S	9.4	
PG-05-S	6.1		PG-55-S	9.0	
PG-59-S	6.1		PG-62-S	8.9	
PG-23-S	5.7		PG-10	8.4	
PG-21-S	5.5		PG-21-S	7.0	
PG-01-S	5.1		PG-01-S	6.6	
PG-64-S	4.9		PG-58-S	6.6	
PG-57-S	4.8		PG-05-S	6.5	
PG-58-S	4.0		PG-59-S	6.2	
PG-17-S	3.7		PG-57-S	6.0	
PG-09-S	3.7		PG-23-S	5.9	
PG-34-S	3.1		PG-64-S	4.8	
PG-31-S	2.6		PG-17-S	4.6	
PG-12-S	2.2		PG-09-S	3.9	
PG-04-S	2.1		PG-31-S	3.7	
PG-08-S	2.1		PG-15-S	2.5	
PG-61-S	2.0		PG-04-S	2.3	
PG-15-S	1.2		PG-08-S	2.1	

Notes:
1 - The chemical parameters included in the analysis were the analytes: arsenic, cadmium, mercury, cPAH TEQ, D/F TEQ, and PCB TEQ.
2 – The chemical parameters included in the analysis were the analytes plus % fines, % TOC.
** Sample is an outlier based on the multiplicity adjusted threshold (family-wise error rate constrained to 0.05).

* Sample is an outlier based on the nominal threshold (comparison-wise error rate is 0.05).

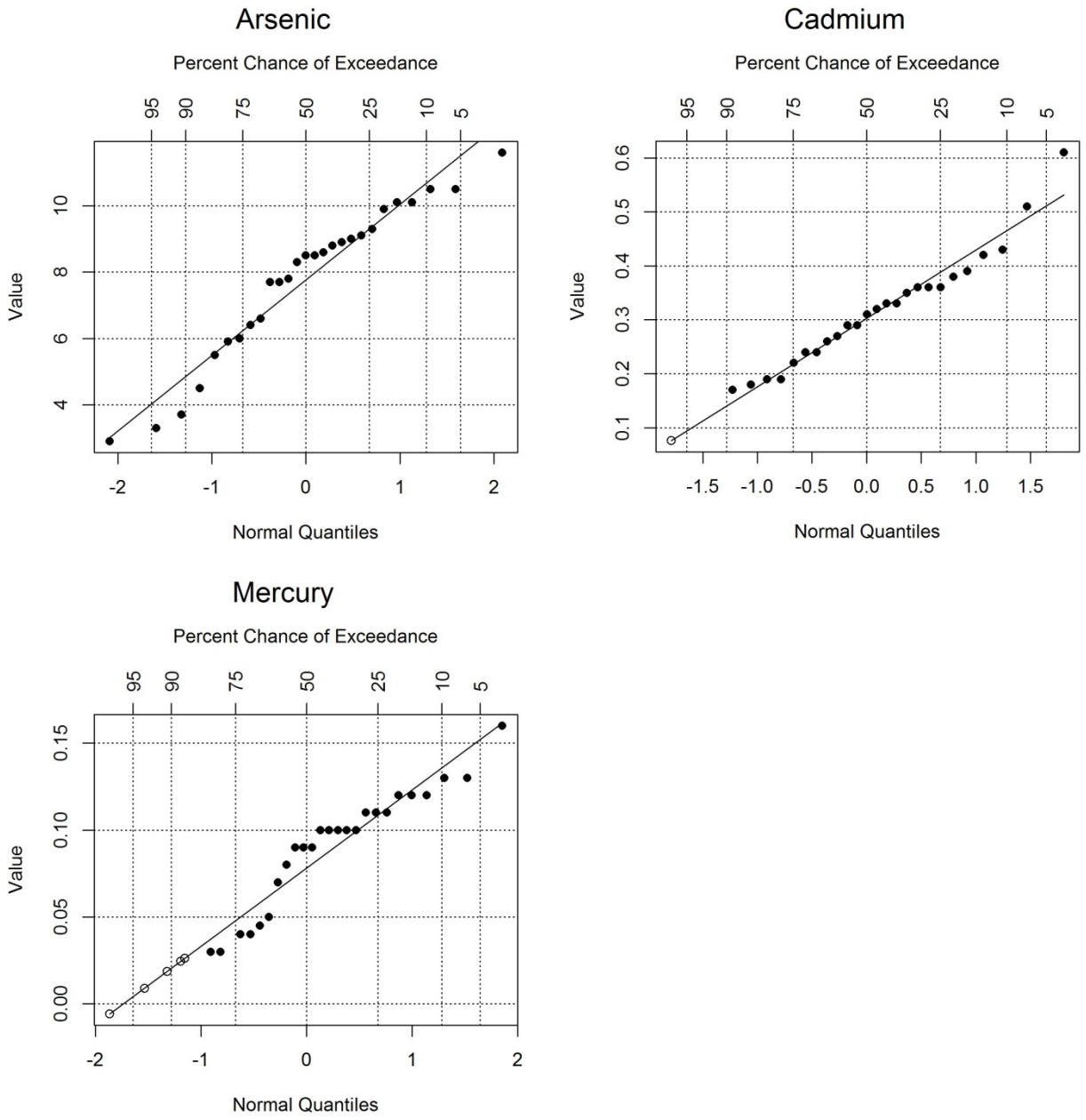

Figure H-1. Normal probability plots for metals in Port Gardner Bay sediments. Note: Censored (non-detect) data points are shown on the graphs as open circles, their quantiles are estimated from the distribution of the detected data using regression on order statistics. The quantiles observed from the sample data (y-axis) are plotted against the corresponding quantiles from the standard normal distribution (bottom x-axis). The top axis and vertical grid lines show the percent chance of exceedance for the normal distribution (e.g., a 5 percent chance of exceedance is the 95th percentile, which intersects the estimated distribution for mercury, represented by the line through the data, at a concentration of approximately 0.152 ppm). When the data points fall along a straight line, they are approximately normally distributed. Extreme values and systematic deviations from normality can be observed on these plots based on where the data points fall relative to the line.

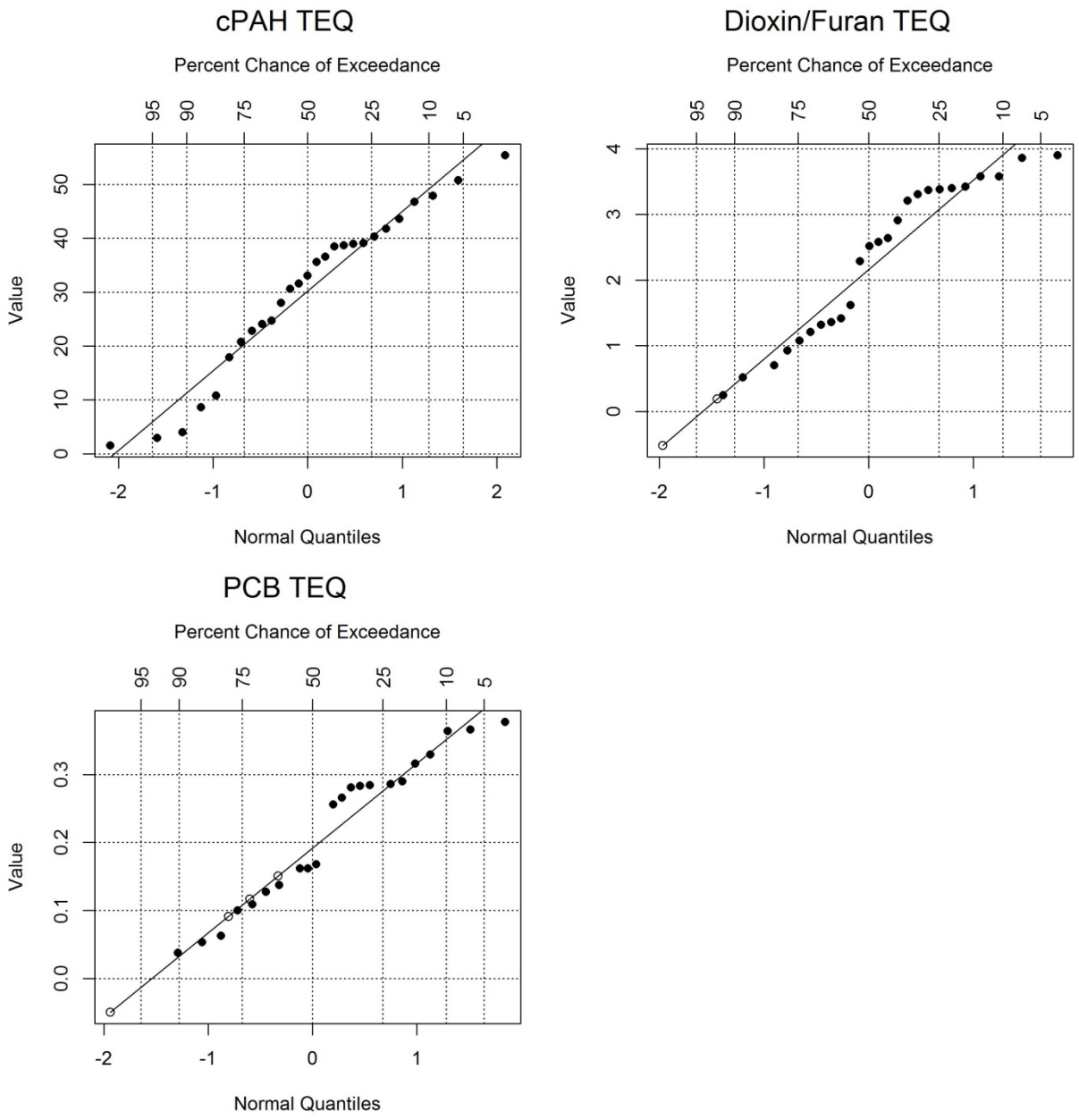

Figure H-2. Normal probability plots for organics in Port Gardner Bay sediments. Note: Censored (non-detect) data points are shown on the graphs as open circles, their quantiles are estimated from the distribution of the detected data using regression on order statistics. The quantiles observed from the sample data (y-axis) are plotted against the corresponding quantiles from the standard normal distribution (bottom x-axis). The top axis and vertical grid lines show the percent chance of exceedance for the normal distribution (e.g., a 5 percent chance of exceedance is the 95th percentile, which intersects the estimated distribution for cPAH TEQ, represented by the line through the data, at a concentration of approximately 53 ppb). When the data points fall along a straight line, they are approximately normally distributed. Extreme values and systematic deviations from normality can be observed on these plots based on where the data points fall relative to the line.

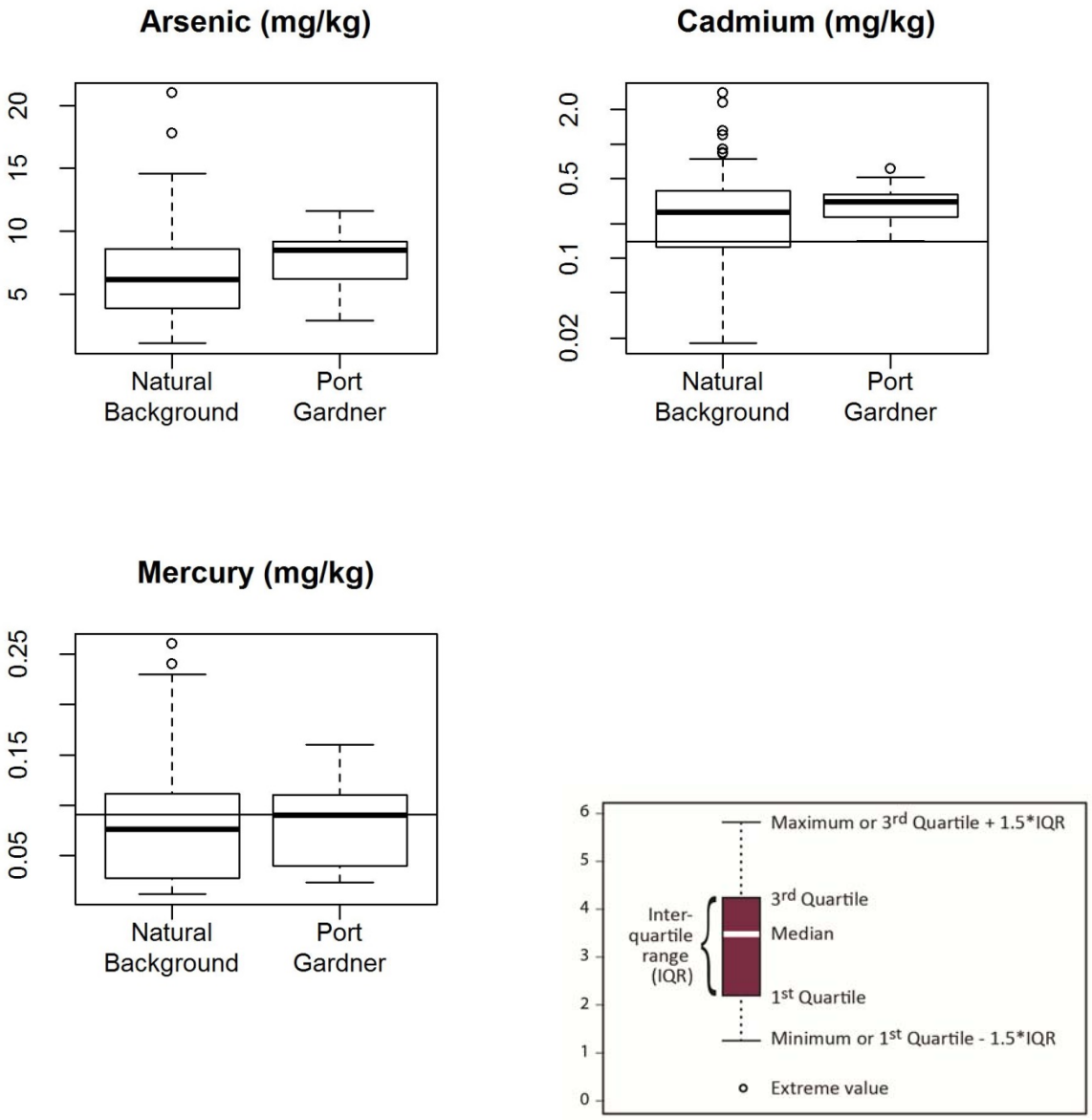

Figure H-3. Boxplots showing the distribution of metals concentrations in Port Gardner Bay sediments and Puget Sound natural background (Bold Plus). Note: The 1st, 2nd, and 3rd quartiles are estimated using Kaplan-Meier for censored data; horizontal lines indicate the level of the highest detection limit. Due to skewness in the cadmium concentrations in the natural background data set, the concentration scale (y-axis) for cadmium is log-scaled.

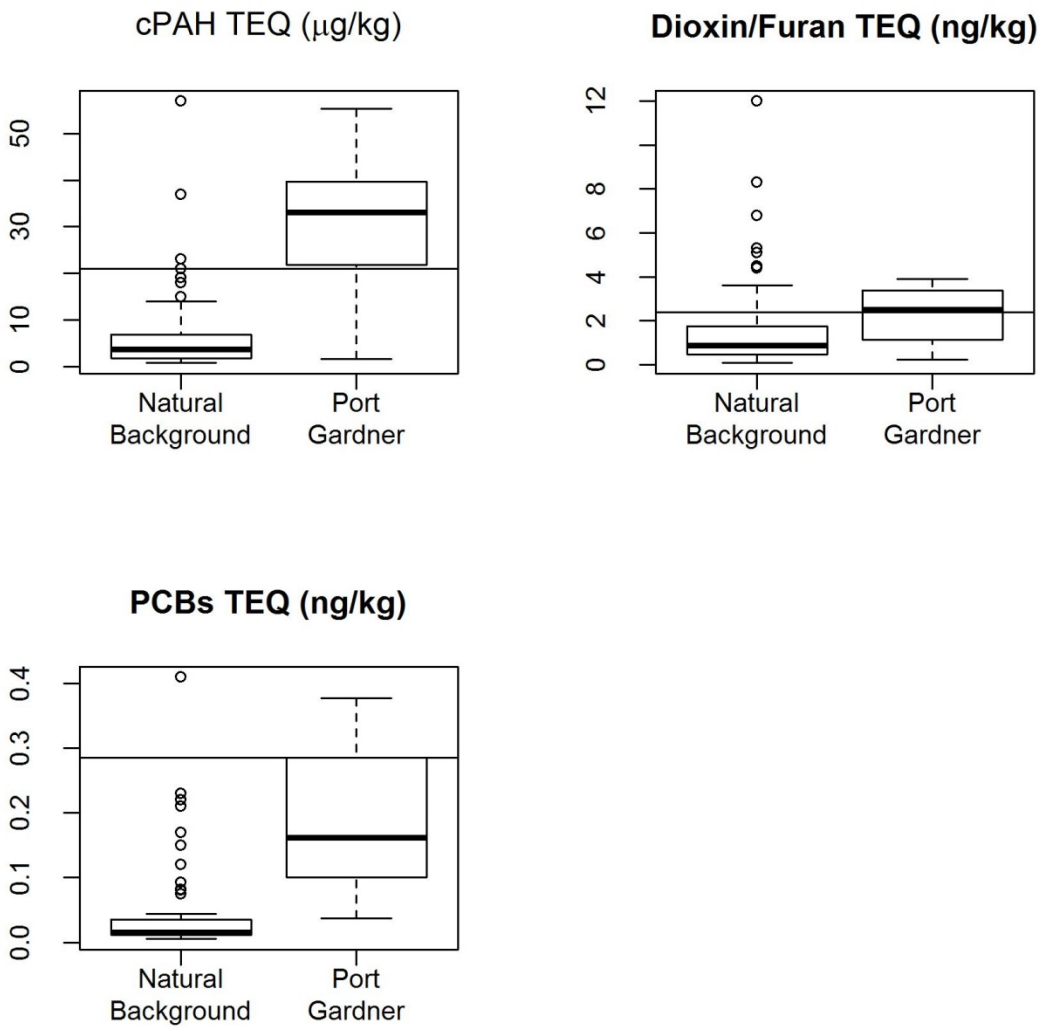

Figure H-4. Boxplots showing the distribution of organics concentrations in Port Gardner Bay sediments.

Note: The 1st, 2nd, and 3rd quartiles are estimated using Kaplan-Meier for censored data; horizontal lines indicate the level of the highest detection limit. *The natural background data were incomplete for samples in the Bold Plus data set, so sample sizes for the organic CoCs range from 70 (PCB TEQ) to 91 (dioxin/furan TEQ).

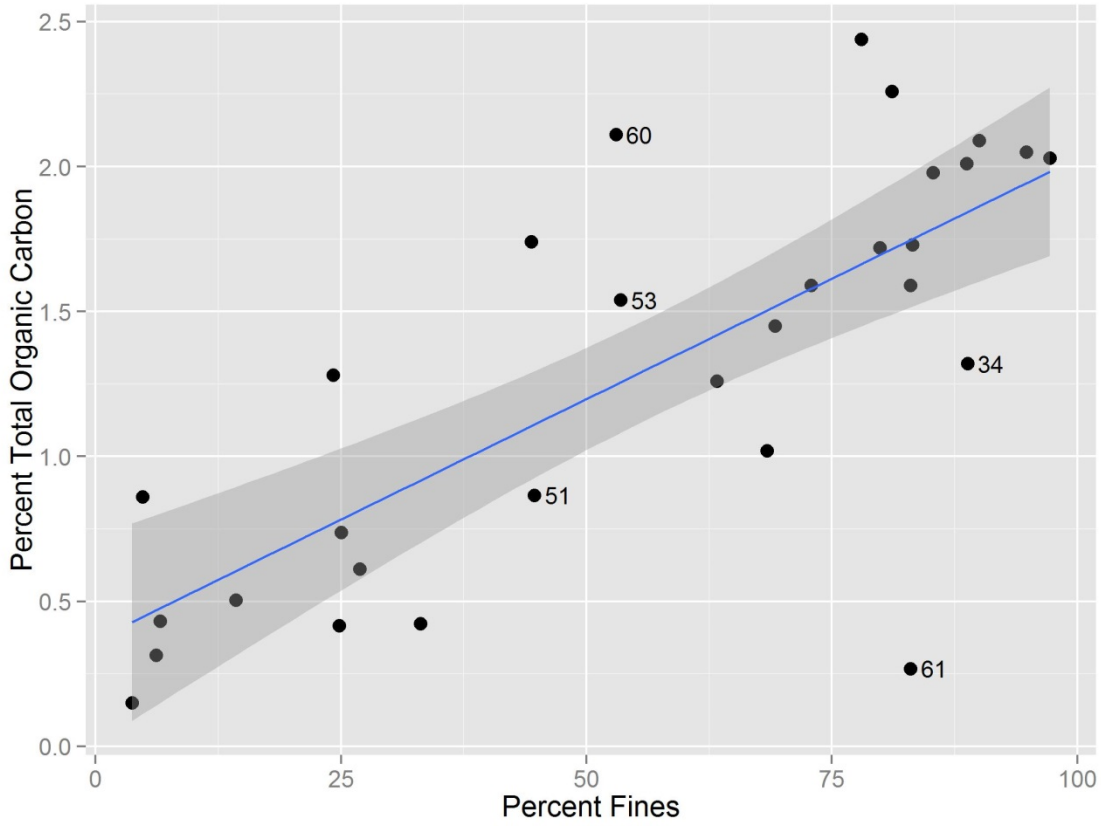

Figure H-5. Relationship between percent fines and percent total organic carbon in Port Gardner Bay sediments.

Note: The ordinary least squares regression line and its 95 percent confidence interval are shown for these data. Five samples (PG-34, PG-51, PG-53, PG-60, and PG-61) are labeled, due to the fact that these samples were identified as unusual by one or more of the methods used in this Appendix H. See text for more details.

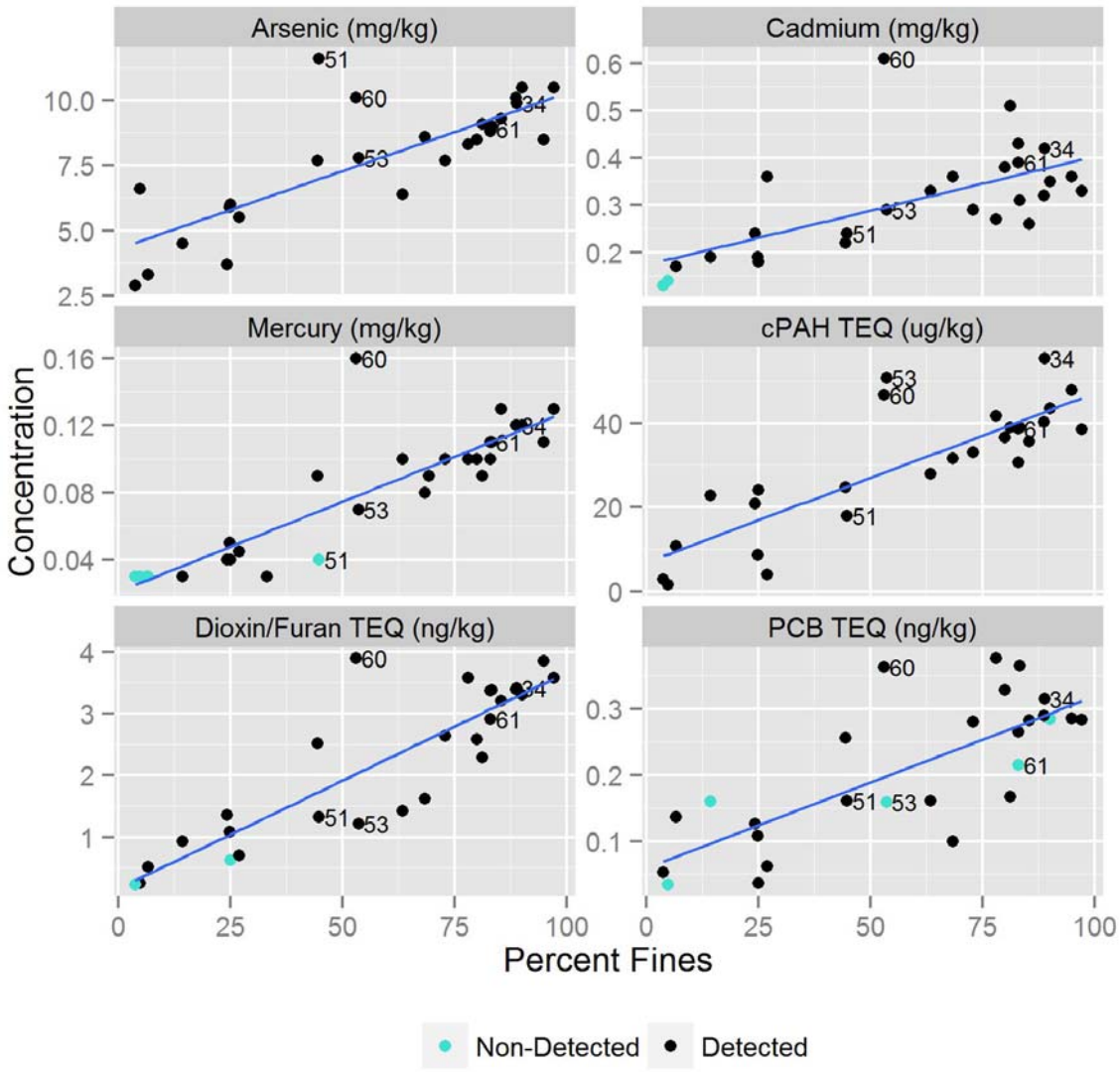

Figure H-6. Relationship between percent fines and each CoC in Port Gardner Bay sediments.

Note: Non-detected values (turquoise data points) are shown at the reported detection limit. The ordinary least squares regression line is shown for the data in each panel. Five samples (PG-34, PG-51, PG-53, PG-60, and PG-61) are labeled, due to the fact that these samples were identified as unusual by one or more of the methods used in this Appendix H. See text for more details.

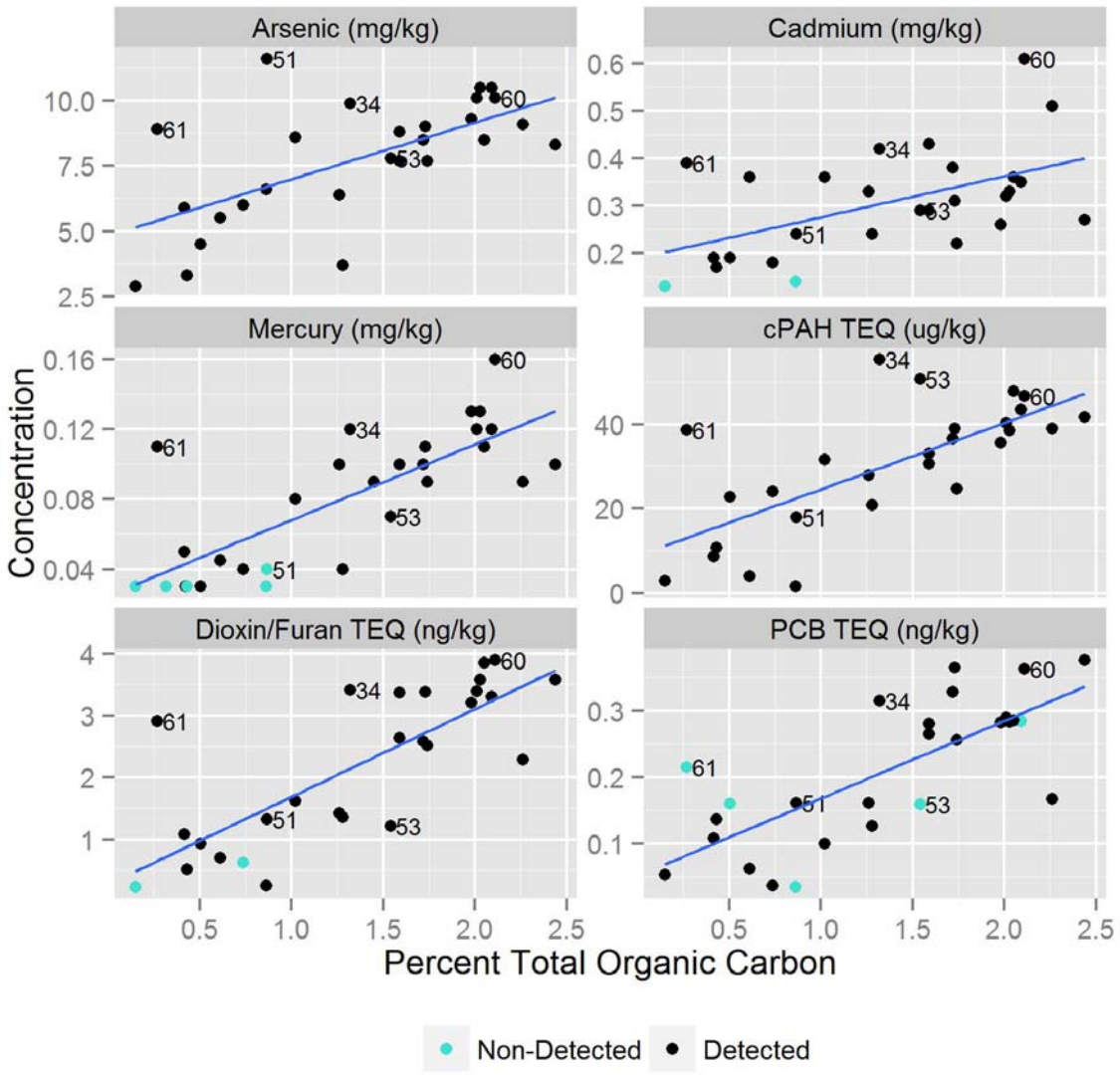

Figure H-7. Relationship between percent total organic carbon and each analyte in Port Gardner Bay sediments.

Note: Non-detected values (turquoise data points) are shown at the reported detection limit. The ordinary least squares regression line is shown for the data in each panel. Five samples (PG-34, PG-51, PG-53, PG-60, and PG-61) are labeled, due to the fact that these samples were identified as unusual by one or more of the methods used in this Appendix H. See text for more details.

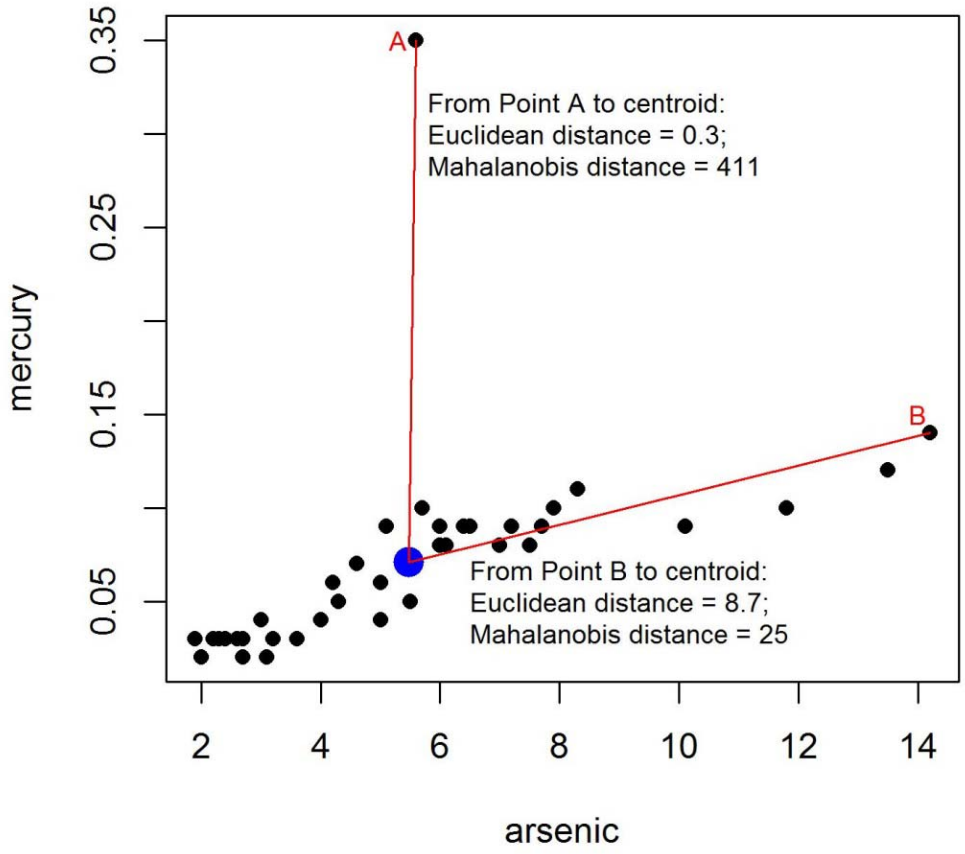

Figure H-8. Scatterplot of arsenic versus mercury for a theoretical data set. Note: The centroid is shown as the blue dot, located at the mean concentrations for the two metals. The absolute Euclidean distance from the centroid to Point A (0.3) is smaller but much more unusual than the distance from the centroid to Point B (8.7) due to the direction of covariance/correlation. The Mahalanobis distance is scaled to the covariance and reflects the unexpected result for Point A.

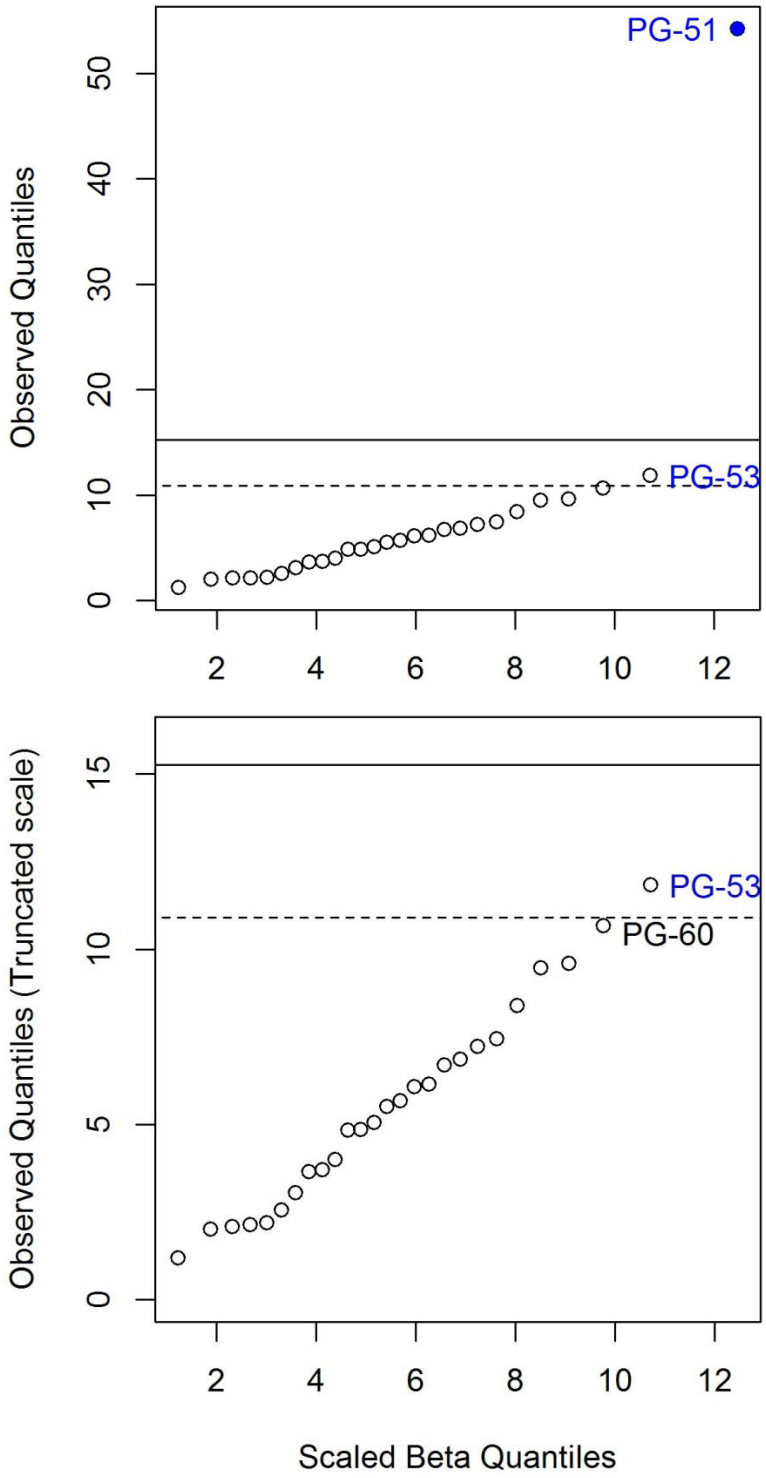

Figure H-9. QQ-Plot of the reweighted Mahalanobis squared distances (six CoCs [*p* = 6]) for the Port Gardner Bay data set. Note: top plot shows the distances for the full dataset (*n* = 27); bottom plot shows the same data with a truncated y-axis to illustrate the differences among samples at the lower end of the spectrum (*n* = 26). Solid horizontal line indicates the threshold for a significant outlier (Sidak adjusted family-wise type I error rate of 0.05); dashed horizontal line indicates the threshold for outliers at a nominal α (0.05).

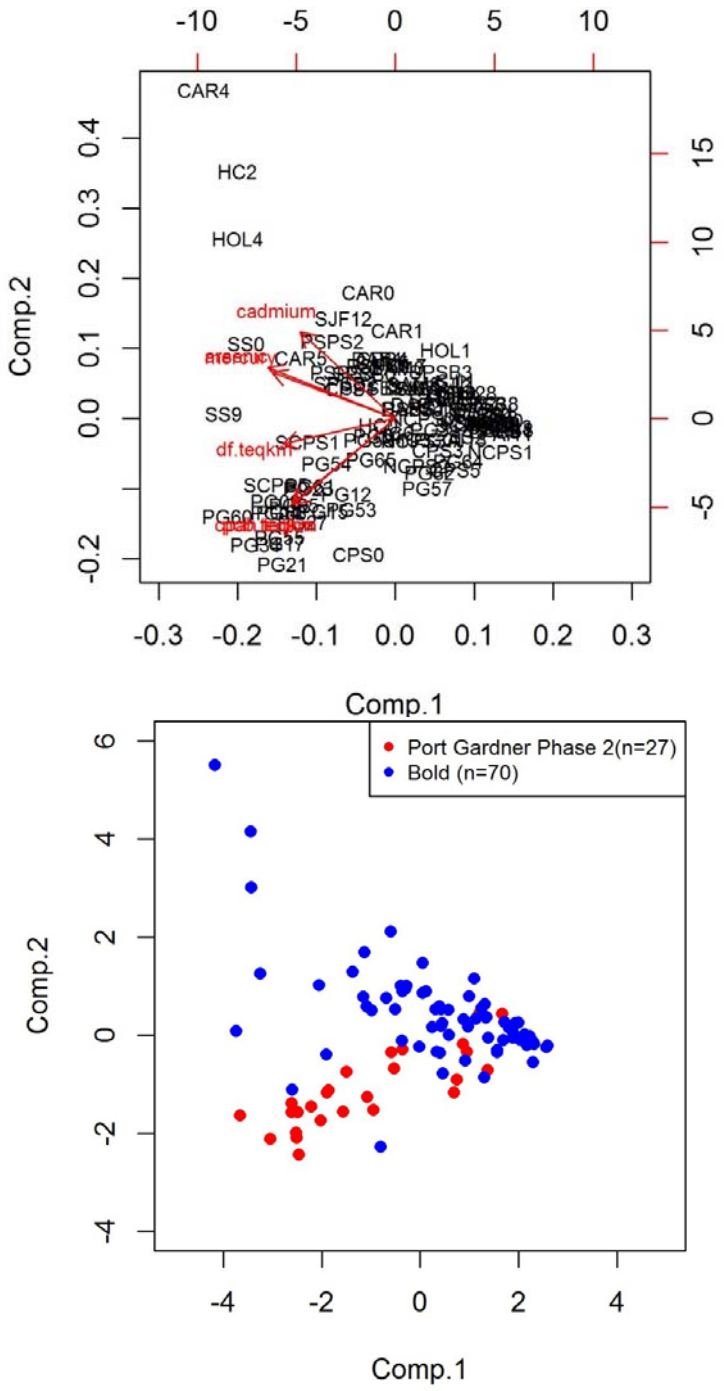

Figure H-10. Principal components analysis (PCA) results for the first two principal components on the combined Port Gardner Bay (*n* = 27) and Bold (*n* = 70) data sets, with non-detects set at the detection limits. The biplot (left) shows both the orientation of the sample points on the first two principal components, and the relationship between the six original chemical variables and these principal components as indicated by the red arrows. The length and direction of a these vectors indicate how the chemical variables are associated with these two principal components. The right plot shows the same orientation of sample points, highlighting the differences between the Port Gardner Bay and Bold data sets.