Natural Recovery of Persistent Organics in Contaminated Sediments at the Sangamo-Weston/Twelvemile Creek/Lake Hartwell Superfund Site

Contract No. 68-C5-0075
Work Assignment No. 4-30

Submitted to

United States Environmental Protection Agency
National Risk Management Research Laboratory
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ACKNOWLEDGEMENTS

This project could not have been completed without the extensive support and teamwork with the National Risk Management Research Laboratory (NRMRL) of the U.S. Environmental Protection Agency (U.S. EPA), U.S. EPA Region 4, and Battelle. Special thanks are due to Craig Zeller (U.S. EPA, Region 4) for his assistance throughout this study.

Dr. Victor S. Magar managed Battelle's overall effort with guidance and direction by Mr. Richard C. Brenner (U.S. EPA/NRMRL), and with extensive support from Mr. James E. Abbott, Ms. Jennifer A. Ickes, and Ms. Regina M. Lynch (Battelle). PCB chemistry was conducted at the Battelle Ocean Sciences Laboratory in Duxbury, MA. Ms. Carole M.S. Peven-McCarthy managed this extensive effort. Assistance was provided by Dr. Greg S. Durell (Battelle) for the homologue, congener, and toxicity equivalency analyses. Polytopic vector analysis was conducted by Dr. Glenn Johnson (Energy and Geoscience Institute, Department of Civil and Environmental Engineering, University of Utah).

Dr. Eric A. Crecelius, at the Battelle Marine Sciences Research Laboratory Sequim, WA, conducted ^{210}Pb and ^{137}Cs analyses and interpreted the age dating results.

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ACRONYMS AND ABBREVIATIONS

AROS	Adjustable Reciprocating Orbital Shaker
ASTM	American Society for Testing and Materials
BCO	Battelle Columbus Operations
^{137}C	cesium-137
CD	coefficient of determination
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DO	dissolved oxygen
dpm	disintegrations per minute
DUP	duplicate
EH	Eagle Harbor
EM	end-member
EMAP	Environmental Monitoring and Assessment Program
EPC	electronic pressure controlled
GC	gas chromatograph
GC/MS	gas chromatography/mass spectrometry
GPS	Global Positioning System
HCA	hierarchical cluster analysis
HP	Hewlett Packard
IUPAC	International Union of Pure and Applied Chemistry
K-D	Kuderna-Danish
LCS	laboratory control sample
LH	Lake Hartwell
MDL	method detection limit
MS	matrix spike
MSD	mass selective detector
N/A	not applicable
NA	not analyzed
N-Evap	nitrogen evaporation
NOAA	National Oceanic and Atmospheric Administration
NRMRL	National Risk Management Research Laboratory
NS&T	National Status and Trends
ORP	oxidation-reduction potential
OU	operable unit

^{210}Pb	lead-210
PAH	polycyclic aromatic hydrocarbon
PB	procedural blank
PC	principal component
PCA	principal component analysis
PCB	polychlorinated biphenyl
ppb	parts per billion
PSD	particle-size distribution
PVA	polytopic vector analysis
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
^{222}Rn	radon-222
RIS	recovery internal standard(s)
rpm	revolutions per minute
RPM	Remedial Project Manager
ROD	Record of Decision
SCDHEC	South Carolina Department of Health and Environmental Control
SIS	surrogate internal standards
SIM	selected ion monitoring
SOP	Standard Operating Procedure
t-PCB	total PCB
TOC	total organic carbon
TS/TVS	total solids/total volatile solids
^{238}U	uranium-238
USACE	U.S. Army Corps of Engineers
U.S. EPA	U.S. Environmental Protection Agency
WA	Work Assignment
WAL	Work Assignment Leader
WAM	Work Assignment Manager
WES	Waterways Experiment Station

EXECUTIVE SUMMARY

This technical report has been prepared in fulfillment of Contract No. 68-C5-0075, Work Assignment (WA) No. 4-30, by Battelle under the sponsorship of the U.S. Environmental Protection Agency's (U.S. EPA's) National Risk Management Research Laboratory (NRMRL).

The goal of this study was to investigate and identify natural attenuation/natural recovery processes responsible for the recovery of polychlorinated biphenyl (PCB)-contaminated sediments at Lake Hartwell. The study involved the collection of 10 sediment cores from ten transect locations identified in the U.S. EPA Record of Decision (ROD) for this site and used in various studies. The transect locations were Transects T16, W7, Q, P, O, N, L, J, I, and T6.

Cores were subdivided into 5-cm segments and analyzed for lead-210 (^{210}Pb), cesium-137 (^{137}Cs), and PCBs. Sediment ^{210}Pb and ^{137}Cs analyses were conducted to age date sediments and to determine sediment accumulation rates (cm/yr) and sedimentation rates (g/cm^2-yr). Detailed PCB congener analyses were conducted on the 107 individual PCB congeners quantified by gas chromatography/mass spectrometry (GC/MS) analysis to identify vertical and lateral congener profiles and trends.

The most upgradient transect cores (T16, W7, Q, and P) were impacted significantly by sediment built up in the headwaters of Lake Hartwell from the historical sediment releases from upgradient impoundments. As expected, the highest PCB concentrations were associated with silt/clay layers, whereas sand layers contained very low PCB concentrations. The historical sediment releases resulted in substantial burial of PCB-contaminated sediment in the vicinity of these four cores and in surface sediment concentrations well below 100 μg/kg in each core, which is less than the 1 mg/kg t-PCB cleanup goal for Lake Hartwell surface sediments.

Cores O, N, L, J, I, and T6 consisted primarily of silt and were not noticeably impacted by the release of silt and sand from the impoundments. In these cores, surface sediments showed decreasing t-PCB concentrations approaching the target concentration of 1.0 mg/kg; the maximum surface sediment t-PCB concentration was measured at Transect L at 1.58 mg/kg, and the minimum measured surface sediment concentration was measured at Transect I at 0.86 mg/kg.

Sediment accumulation rates (cm/yr) were used to calculate sedimentation rates (g/cm^2-yr), which are a measure of the mass of sediment deposited per year as opposed to the sediment depth per year. The sedimentation rates measured in the five downgradient Lake Hartwell cores ranged from 5.43 g/cm^2-yr in Core L to 0.75 g/cm^2-yr in Core T6. Sediment accumulation rates could not be determined for Core J because of poor sediment recovery at Transect J. Sediment accumulation rates ranged from 0.66 to 19 cm/yr. However, unlike sedimentation rates, sediment accumulation rates are strongly influenced by the sediment water content, and the apparent sediment accumulation rate in cm/yr is much higher near the surface than at depth.

The 1.0 mg/kg t-PCB goal has been achieved in most cores, including the four upgradient cores, and Cores N, I, and T6. The 1.0 mg/kg t-PCB goal is expected to be achieved within 1 to 3 years in the vicinity of Transects O and L. A more stringent future goal of 0.4 mg/kg t-PCB is expected to be achieved within 2 to 5 years in Cores L, I, and T6, and within 5 to 10 years in Cores N and O. An even more stringent long-term out year goal of 0.05 mg/kg t-PCB is expected to be achieved within 8 to 10 years in Core L, 10 to 15 years in Cores I and T6, and 25 to 30 years in Core N.

The HEC-6 model used for the U.S. EPA ROD for the Sangamo-Weston/Twelvemile Creek/Lake Hartwell Superfund site appeared to approximate sediment accumulation reasonably well in the vicinity of the upgradient transects (i.e., Transects T16, W7, Q, and P). Very high levels of sediment accumulation were noted for all four transect cores. Cores T16, W7, and P showed the highest levels of sand accumulation, followed by Core Q.

The HEC-6 model overpredicted sediment accumulation rates in Cores O and N by a factor of four to ten times, and underpredicted rates in Cores I and T6. Transect L was the only downgradient transect whose model-estimated sediment accumulation rate closely matched the measured rate. Without access to the precise model inputs into the HEC-6 model, it is difficult to know exactly why the model-predicted and measured sediment accumulation rates differed for Transects O, N, I, and T6. However, it appears that the model predicted a more gradual transition between the upper and lower portions of Twelvemile Creek, so that higher sedimentation would occur in the vicinity of Transects O and N and lower sedimentation would occur in the vicinity of Cores I and T16. In contrast, the measured rates demonstrated that the sediment accumulation rates throughout the lake and downgradient of Transect P were relatively constant. The sediment depth accumulated over a 10-year period at the five age-dated downgradient transects ranged from approximately 10 to 50 cm, and there was no evidence that there was greater accumulation around the more upgradient of these cores than the more downgradient cores.

PCB composition (i.e., the relative concentrations of PCB congeners) was examined based on PCB homologue (i.e., level of chlorination) data and congener data. The PCB congener composition became increasingly dominated by lower chlorinated congeners with sediment depth and corresponding age of the deposited sediments, which is consistent with changes observed in the homologue composition. A significant loss (45%) of tetra-, penta-, and hexachlorobiphenyl congeners and accumulation of mono-, di-, and trichlorobiphenyls dominated at greater depth.

The shift from higher to lower chlorinated congeners resulted in the accumulation of primarily *ortho*-chlorinated biphenyls, particularly 2,2´- and 2,6-dichlorobiphenyls, both of which have chlorines only in *ortho* positions; these two congeners showed a combined 29% increase. PCB 1 (2-chloro-biphenyl, also an *ortho*-chlorinated congener) was detected at relatively high concentrations in many of the deeper sediment samples that also had high overall PCB concentrations; in a number of those samples, PCB 1 comprised more than 5% of the t-PCB concentration. PCB 4/10 was the most abundant congener in almost all except the most shallow sediments; PCB 4/10 alone constituted more than 25% of the total PCBs in many of the samples, and as much as 44% of the total PCBs in a few samples (i.e., Core P, Segments 8, 9, and 10).

There was surprisingly little difference in PCB homologue and congener distributions along the river; the upgradient locations had distributions and trends that were similar to the downgradient locations when measured from sediment samples closest to the surface (the most recently deposited sediments). In each of the surface sediment samples, tetrachlorobiphenyls were most abundant, followed by the tri- and pentachlorobiphenyls, then by di- and hexachlorobiphenyls, and mono and heptachlorobiphenyls.

The sediments close to the surface had a PCB congener distribution centered around higher molecular weight tetrachlorobiphenyls (approximately around PCB 66), but with significant contributions of key congeners ranging from di- through hexachlorobiphenyls. Major congeners (each generally comprising between 2 and 6 percent of the total PCBs) included the dichlorobiphenyl PCB 4/10; the trichlorobiphenyls PCB 16/32 and PCB 19; the tetrachlorobiphenyls PCB 41, PCB 47, PCB 49, PCB 52, PCB 66, and PCB 70/76; the pentachlorobiphenyls PCB 95, PCB 101/90, PCB 110, and PCB 118; and the hexachlorobiphenyls PCB 138/160/163, PCB 149, and PCB 153. PCB 110 was typically the most abundant PCB congener in the surface and near-surface sediment samples, contributing more than 5% of the total PCB in many of these sediments.

Dechlorination, a PCB transformation process characterized by the removal of one or more chlorine substitutions on the PCB molecule, was observed in the Lake Hartwell sediments. A review of the molecular structures of the congeners for which a large relative concentration decrease was observed (e.g., PCB 22, PCB 28, PCB 33/20, and PCB 44) revealed that these congeners had two or more chlorines in the *meta* or *para* positions, and therefore were highly susceptible to anaerobic dechlorination. On the other hand, the congeners for which the greatest relative concentration increase was observed (e.g., PCB 4/10, PCB 19, PCB 24/27, and PCB 51) had all or most of the chlorines in the *ortho* positions. Dechlorination transformations clearly occurred in these sediments, with *meta* and *para* substituted chlorines being removed from various PCB congener molecules and resulting in an accumulation of primarily *ortho*- substituted congeners.

The very slow dechlorination of congeners with all chlorines in the *ortho* position (e.g., PCB 4, PCB 10, and PCB 19) resulted in their accumulation in the deeper sediments. These three congeners constitute more than 50% of the total PCBs in many of the study sediments that were deposited about 20 years ago, compared to less than 5% of the t-PCB concentration in the surface sediments.

The PCB data generated for this study were modeled using the multivariate statistical method known as polytopic vector analysis (PVA) to identify fingerprint (also known as end-member) compositions from the data generated for Lake Hartwell. End-member (EM) patterns were then compared to source patterns reported in the literature (e.g., Aroclor compositions and known PCB dechlorination or weathering patterns).

PVA resolved three end-member patterns. The composition and distribution of EM-1 had characteristics of a 50/50 mixture of Aroclors 1248 and 1254. The presence of Aroclor 1254 in the EM-1 mixture was not surprising, but the presence of Aroclor 1248 was unexpected because it was not used by the Sangamo-Weston plant. However, other work has demonstrated that when Aroclor 1242 volatilizes from soils, the residue remaining in the soil can have a PCB profile virtually identical to unaltered Aroclor 1248. To the extent that the information indicating that Aroclor 1242 (not 1248) was used is accurate, the Aroclor 1248 pattern in the EM-1 end-member pattern may have been related to a weathered Aroclor 1242, and the EM-1 pattern was consistent with a mixed “weathered” Aroclor 1242/Aroclor 1254 source. Furthermore, the compositions of 1016 and 1242 are very similar; both Aroclors are dominated by Cl-2, Cl-3, and Cl-4 homologues. This similarity suggests that the 1248 pattern also could be due in part from weathered Aroclor 1016. Thus, EM-1 likely represented a mixture of Aroclor 1254 with weathered residues of Aroclors 1242 and 1016, which resembled a 50/50 mixture of Aroclors 1254 and 1248.

EM-2 was dominated by low-chlorinated congeners, including mono-, di-, and trichlorobiphenyls. The congeners that made up EM-2 preferentially exhibited chlorines in the 2 (*ortho*), 4 (*para*), and 6 (*ortho*) positions, including 2,2'/2,6-CB (PCB 4/10), 2 CB (PCB 1), 2,2',6-CB (PCB 19), and 2,2',3/2,4', 6-CB (PCB 16/32). The dominance of *ortho*-chlorines suggested that EM-2 was a result of a microbial dechlorination process.

Comparison of EM-2 with literature-reported congener fingerprints identified Aroclor 1248 dechlorination via *Process C* as a close match. EM-2 showed higher proportions of lower chlorinated congeners and fewer tri- and tetrachlorobiphenyls than the 20-week dechlorinated sample used to demonstrate *Process C*, which may have been due to the much longer incubation time observed with the Lake Hartwell sediments (up to 20 years).

EM-3 was characterized by di-, tri-, and tetrachlorobiphenyl congeners. Review of known dechlorination processes suggested that this pattern was related to *Process H'* dechlorination. *Process H'* involves dechlorination of 23-, 234, and possibly 236-chlorophenyl groups at the *meta* positions, and 34-

and 245-chlorophenyls at the *para* positions. However, unlike *Process C*, reference data from *Process H'* dechlorination experiments were unavailable for comparison with EM-3.

EM-1 was most abundant in the upper sections of the cores in the most recently deposited sediments and was depleted to low or non-detectable levels with increasing depth, suggesting it represented source PCB contamination in Lake Hartwell. In the five age-dated cores, the maximum proportion of EM-2 occurred in sediments with assigned ages between 1977 and 1985. The maximum proportions of EM-2 also roughly corresponded to sediment intervals of highest concentration. Maximum EM-3 concentrations appeared to be associated with samples deposited between 1984 and 1990, with one exception where a high concentration is observed in a sample deposited in 1959 in Core L.

Process C exhibited the highest proportion of lower-chlorinated congeners and the lowest proportion of tri-, tetra-, and higher chlorinated congeners, suggesting that these sediments had undergone the most extensive dechlorination at the site. *Process H'* (EM-3) appeared to be an intermediate between the source (EM-1) sediments and *Process C* (EM-2) sediments, which is consistent with the respective time periods associated with each end member. The *Process H'* (EM-3) sediments had a higher proportion of lower chlorinated congeners than the EM-1 sediments, but they also had a higher proportion of higher chlorinated congeners than the EM-2 sediments.

1.0 DESCRIPTION OF WORK ASSIGNMENT

This technical report has been prepared in fulfillment of Contract No. 68-C5-0075, Work Assignment (WA) No. 4-30 by Battelle under the sponsorship of the U.S. Environmental Protection Agency's (U.S. EPA's) National Risk Management Research Laboratory (NRMRL). The work was conducted at Battelle Memorial Institute, Columbus, OH, during the period of October 1, 1999 to September 30, 2000 (FY00).

Mr. Richard C. Brenner was the U.S. EPA Project Officer for this contract and was also the Work Assignment Manager (WAM). Dr. Jeffrey L. Means was the Battelle Program Manager for this contract. Dr. Victor S. Magar was the Battelle Work Assignment Leader (WAL). The members of the Battelle project staff included Mr. James E. Abbott, Ms. Jennifer A. Ickes, Dr. Greg S. Durell, Ms. Carole M.S. Peven-McCarthy, and Ms. Regina M. Lynch. Dr. Glenn Johnson (Energy and Geoscience Institute, Civil and Environmental Engineering Department, University of Utah) provided technical assistance with the interpretation of polychlorinated biphenyl (PCB) congener patterns using a polyvector analytical approach. Dr. Eric A. Crecelius, at the Battelle Marine Sciences Research Laboratory, Sequim, WA, conducted ^{210}Pb and ^{137}Cs analyses and interpreted the age-dating results.

1.1 Background

U.S. EPA's NRMRL is interested in developing effective, inexpensive remediation technologies for contaminated sediments. This study focuses on the recovery of sediments contaminated with PCB compounds. It has been determined that anaerobic and aerobic biotransformation/biodegradation of PCBs reduces the overall contaminant mass (Quensen and Tiedje, 1997), sorption onto organic particles reduces bioavailability (McGroddy et al., 1996), and sediment containment through natural capping can act as a natural barrier to protect the aquatic environment from contaminated sediments (Cardenas and Lick, 1996). The goal of this study was to achieve a better understanding of the natural mechanisms that contribute to the recovery of PCB-contaminated sediments. The study focused on the natural recovery of PCB-contaminated sediments at the Sangamo-Weston/Twelvemile Creek/Lake Hartwell Superfund site in South Carolina (i.e., the Lake Hartwell [LH] site). A parallel study conducted under this work assignment evaluated the natural recovery of polycyclic aromatic hydrocarbon (PAH)-contaminated sediments at the Wyckoff/Eagle Harbor Superfund site in Bainbridge Island, WA. The results of the Eagle Harbor (EH) study are reported separately (Battelle, 2001).

In general, natural recovery of contaminated sediments relies on two primary mechanisms: 1) burial of contaminated sediments with clean sediments and 2) contaminant weathering. Sediment burial (capping) acts both to protect the water column from the vertical diffusion and advection of contaminants from near surface sediments and to reduce contaminant transport into the food chain that can occur through bioturbation and bioaccumulation in surface or near-surface sediments. (Bioaccumulation/bioturbation were not investigated as part of this work assignment, but these mechanisms are recognized as important factors when considering sediment recovery.) PCB weathering, which includes such mechanisms as dilution, volatilization, biodegradation, and sequestration, can provide a permanent reduction in levels of PCB contamination and of PCB chlorination. Biological reductive dechlorination under anaerobic conditions preferentially dechlorinates higher-chlorinated PCB congeners, transforming them to lower-chlorinated congeners. Other weathering processes such as dilution and volatilization preferentially remove lower-chlorinated PCBs that are more mobile. This study focused on evaluating natural sediment capping and contaminant weathering at the LH site. The contributions of the various potential weathering mechanisms were not examined separately, except by careful analysis of PCB congener profiles in aged sediments.

LH is an artificial lake located in the northwest corner of South Carolina along the Georgia state line. It is bordered by Anderson, Pickens, and Oconee Counties in South Carolina and is bordered by Stephens, Franklin, and Hart Counties in Georgia. It was created between 1955 and 1963 when the U.S. Army Corps of Engineers (USACE) constructed Hartwell Dam on the Upper Savannah River, 7 miles from its confluence with the Seneca and Tugaloo Rivers. LH extends 49 miles up the Tugaloo and 45 miles up the Seneca at normal pool elevation, and covers nearly 56,000 acres of water with a shoreline of 962 miles. It is the second largest lake in South Carolina by volume, and the third largest lake in the state by surface area (South Carolina Department of Health and Environmental Control [SCDHEC], 1993).

The Sangamo-Weston plant was used for manufacturing of electrolytic mica and power factor capacitors from 1955 to 1978 (U.S. EPA, 1994). The plant used a variety of dielectric fluids in its manufacturing processes, including fluids containing PCBs. Waste disposal practices included land burial of off-specification capacitors and wastewater treatment sludge on the plant site and at six satellite disposal areas. PCBs were discharged with effluent directly into Town Creek, a tributary of Twelvemile Creek, which is in turn a major tributary of LH. Between 1955 and 1977, the average quantity of PCBs used by Sangamo-Weston ranged from 700,000 to 2,000,000 lb/year. An estimated 3% of the quantities received and used by the plant were discharged into Town Creek, resulting in an estimated cumulative discharge of 400,000 lb of PCBs. An unspecified amount was buried in six off-site disposal areas. PCB use was terminated in 1977, prior to a U.S. EPA ban on its use in January 1978 (U.S. EPA, 1994).

The site was divided into two operable units (OUs). OU 1 addressed the land-based areas, which included the Sangamo-Weston land and six satellite disposal areas. The source of PCB contamination has been removed as part of the remediation of OU 1. OU 2 consists of sediments contaminated with PCBs that lie at the bottom of LH (Figure 1-1). This study pertains to the natural recovery of sediments in OU 2.

Three impoundments exist on the lower section of Twelvemile Creek. Woodside II is the lower-most and largest impoundment. Woodside I is the middle impoundment. Both Woodside I and II are owned and operated by Consolidated Hydro of Greenville, SC, and produce a combined electrical out put of 2.5 million kWh/yr. Both impoundments result in the accumulation of sediments from Twelvemile Creek. Historically, sediments have been released from the impoundments by opening sluice gates, resulting in the immediate discharge of sediment into LH (U.S. EPA, 1994). In 1984, for example, up to 20 ft of sediments were flushed from behind the lower and middle impoundments, and in 1993, an estimated 43,000 cubic yards of sediment were flushed from Woodside II. More effective sediment passing techniques to facilitate downstream sediment transport and to mitigate short-term impacts to LH water quality and aquatic species are currently being evaluated by U.S. EPA Region 4.

The third, uppermost impoundment, formerly used for hydroelectric power, was purchased in 1962 by the Easley-Central Water District and is used as the intake point for the Easley-Central Water Plant. Approximately 6 ft of sediments are flushed from behind this impoundment quarterly.

The flushing of sediments from these three impoundments is expected to impact PCB concentrations in LH surface sediments. If impounded sediments are contaminated with PCB, their release could result in the distribution of PCB-contaminated sediments in LH. On the contrary, if the sediments are relatively clean, their release could result in the development of a clean sediment cap in portions of the lake.

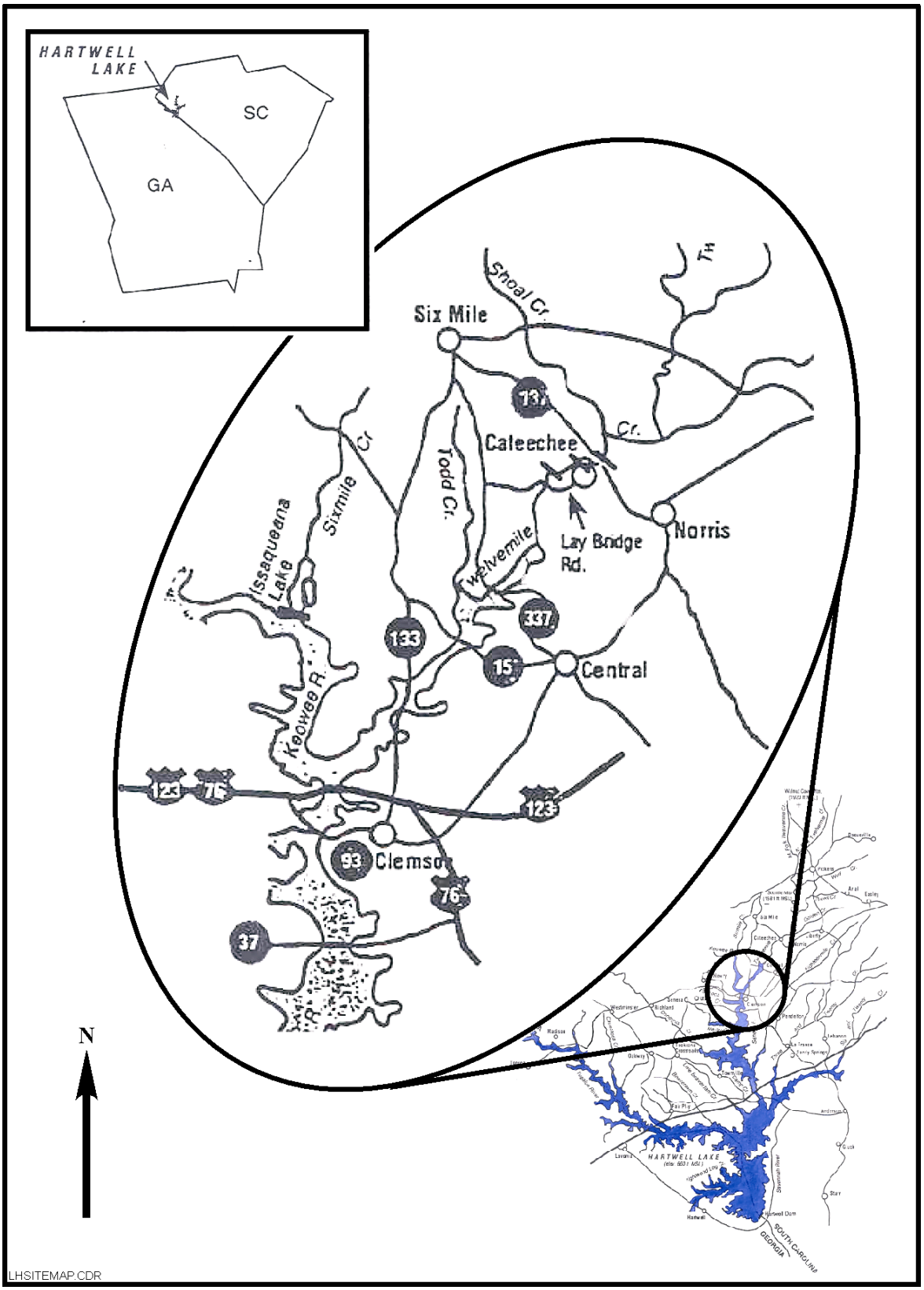

Figure 1-1. Lake Hartwell Site Map

1.2 Environmental System

During a November 4, 1999 site visit, U.S. EPA Region 4 and Battelle staff identified the Sangamo-Weston/Twelvemile Creek/LH site as a suitable candidate to investigate natural recovery of PCB-contaminated sediments. The LH site was selected for this study for the following reasons:

- The site has a documented history of contaminated sediments, primarily from waste disposal practices from the manufacturing plant. Understanding the source of PCB contamination makes it easier to discern the magnitude and extent of dechlorination.

- Modeling of both the clean sediment deposition rate and the recovery of fish and benthic organisms was conducted by U.S. EPA and the USACE Waterways Experiment Station (WES) (U.S. EPA, 1994). The model results suggest that sediment natural recovery should effectively protect human health and the environment through burial of contaminated sediments by clean sediments.

- A 5-year review of natural recovery is currently underway. The data-gathering efforts of this work assingment will be combined with the data-gathering efforts from the 5-year review to determine whether natural recovery does occur to the extent predicted by the models. For this reason, U.S. EPA, Region 4 and USACE have expressed interest in this study and agreed to support the field efforts with data exchange and technical support.

- The site is well characterized, providing a large database of information to select appropriate study locations and provide a history of sediment contamination.

1.3 Project Objectives

The primary objective of WA No. 4-30 was to investigate and identify natural attenuation/natural recovery processes responsible for the recovery of PCB-contaminated sediments at LH. The following tasks were conducted and are addressed in this report:

Task 1. Field sampling
Task 2. Sediment age dating
Task 3. PCB congener analyses
Task 4. PCB partitioning
Task 5. Comparison of data collected under this study with historical sediment characterization and monitoring data.

Task 1 was conducted during January and February 2000. Field sampling involved taking sediment cores and extruding them in the field into 5-cm segments for PCB, age dating, and partitioning analyses. Surface water samples were taken for PCB analyses.

Sediment age dating was conducted during Task 2. Sediment ages were assigned to the extruded intervals in each sediment core based on the relative concentrations of two commonly occurring natural radionuclides, lead-210 (^{210}Pb) and cesium-137 (^{137}Cs). ^{210}Pb is a naturally occurring uranium series radionuclide produced in the atmosphere by the decay of terragenic radon-222 (^{222}Rn), which is a gas produced by natural radium-226 in rocks and soils (Robbins and Edington, 1975; Brugam and Carlson, 1981). ^{137}Cs occurs in the atmosphere due to fallout from historical nuclear testing. ^{210}Pb and ^{137}Cs are removed from the atmosphere through precipitation scavenging, and are rapidly incorporated into sediments through particle settling, resulting in relatively short residence times in natural waters (Schroeder, 1985). The sequestered ^{210}Pb and ^{137}Cs decay with half-lives of 22.3 years and 30 years,

respectively, so that in a constantly accumulating sediment environment the activity of these isotopes show exponential declines with increasing depth according to an exponential (first-order) decay equation for radionuclides (Brugam and Carlson, 1981; Robbins and Edington, 1975; Schroeder, 1985). Particle-size distribution (PSD) (i.e., grain-size analysis) is used to support the assumption that uniform sedimentation processes occurred during the time period of interest. The magnitude of the excess ^{210}Pb concentration together with the precision of the analytical method for this nuclide limits the range of dating by this method to 100 to 200 years before the present time (Robbins and Edington, 1975). The use of the ^{137}Cs nuclide is limited to the early 1950s, at the onset of aboveground nuclear weapons testing.

For Task 3, PCB analyses were conducted for each 5-cm sediment core segment. PCB compounds were characterized to identify the source of contamination and the magnitude and extent of historical PCB weathering to date. Of the 209 possible PCB congeners, approximately 107 congeners were identified and measured. Relative changes in PCB distributions (e.g., a relative change between low- and high-chlorinated PCBs) were used to evaluate the degree of PCB dechlorination and weathering.

For Task 4, PCB desorption from contaminated sediments was examined. PCB-contaminated sediments were incubated with uncontaminated harbor water over a 12-week period, after which PCB concentrations were measured in the aqueous and sediment phases. PCB desorption was measured as the mass of PCB contamination per gram inorganic sediment normalized to the mass of PCB contamination per liter water.

At LH, fish tissue samples have been monitored annually since 1976 to evaluate the level of PCB contamination in fish. As part of the June 1994 Final Record of Decision (U.S. EPA, 1994), aquatic biota monitoring and sediment sampling were required. For Task 5, the results of this study were compared to existing historical data in order to evaluate the coring results against data collected with previously-used monitoring techniques. The comparisons were made on the basis of estimated sedimentation rates, surface sediment recovery rates, and measured sediment PCB concentrations.

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2.0 FIELD SAMPLING AND ANALYTICAL METHODS

This section describes field sampling methods and PCB, ^{210}Pb, and ^{137}Cs analytical methods. Field and analytical methods were conducted in accordance with a U.S. EPA-approved Quality Assurance Project Plan (QAPP) for this study (QAPP I.D. No. 163-Q2) (Battelle, 1999).

The experimental design is described in Section 3.0 of the QAPP (Battelle, 1999). The work assignment consists of the following four technical tasks: sediment coring and water sampling, age dating, PCB analyses, and PCB partitioning studies.

2.1 Sediment Coring and Marine Water Sampling

Sediment cores were collected from 10 locations in LH. Table 2-1 shows sample coordinates, sediment core lengths, and water depths at each sample location. Coring locations are shown in Figure 2-1. A U.S. EPA Region 4 pontoon vessel was used as the sampling platform during sediment coring operations for sample sites O, N, L, J, I, and T6 (Figure 2-2a). Samples for sample sites T16, W7, Q, and P were collected on foot (Figure 2-2b). Sediment cores collected from the pontoon were collected using a gravity corer equipped with 5-cm-diameter Lexan™ tubes (Figure 2-3a). For the gravity corer, sediment core lengths were limited by the vertical depth the gravity corer penetrated the sediment when dropped from the pontoon. Guide vanes on the corer ensured the collection of vertical cores. Sediment cores collected on foot were collected using a conventional sand pounder with 5-cm-diameter Lexan™ tubes (Figure 2-3b) capable of collecting up to 180-cm-long samples. Core lengths were limited by the ability of the field crew to pound the cores into the sediment and retract them by hand.

All cores were collected at predetermined river transects (Figure 2-1) that had already been established by U.S. EPA Region 4 and USACE under the site's ongoing annual monitoring program. As much as possible, samples cores were taken from the deepest portion of the river at each transect. Vertical PCB profiles were established at each transect location. A real time Global Positioning System (GPS) was used for the samples collected from the U.S. EPA vessel, but could not be used when the samples were collected on foot.

Table 2-1. Lake Hartwell Sample Coordinates and Core Depths

Core	Northing	Easting	Core Length (cm)	Water Depth (m)
T16	N/A	N/A	148	0.6
W7	N/A	N/A	172	0.4
Q	N/A	N/A	143	0.5
P	N/A	N/A	135	0.15
O	1058274.90596	1455557.32484	45	3.4
N	1056858.33475	1452967.91292	45	5.5
L	1054728.58522	1451267.30888	85	4.9
J	1052834.16836	1448959.47268	27	7.5
I	1050532.25144	1447400.60106	60	7.0
T6	987026.84513	1443414.11186	50	9.1

N/A = not applicable.

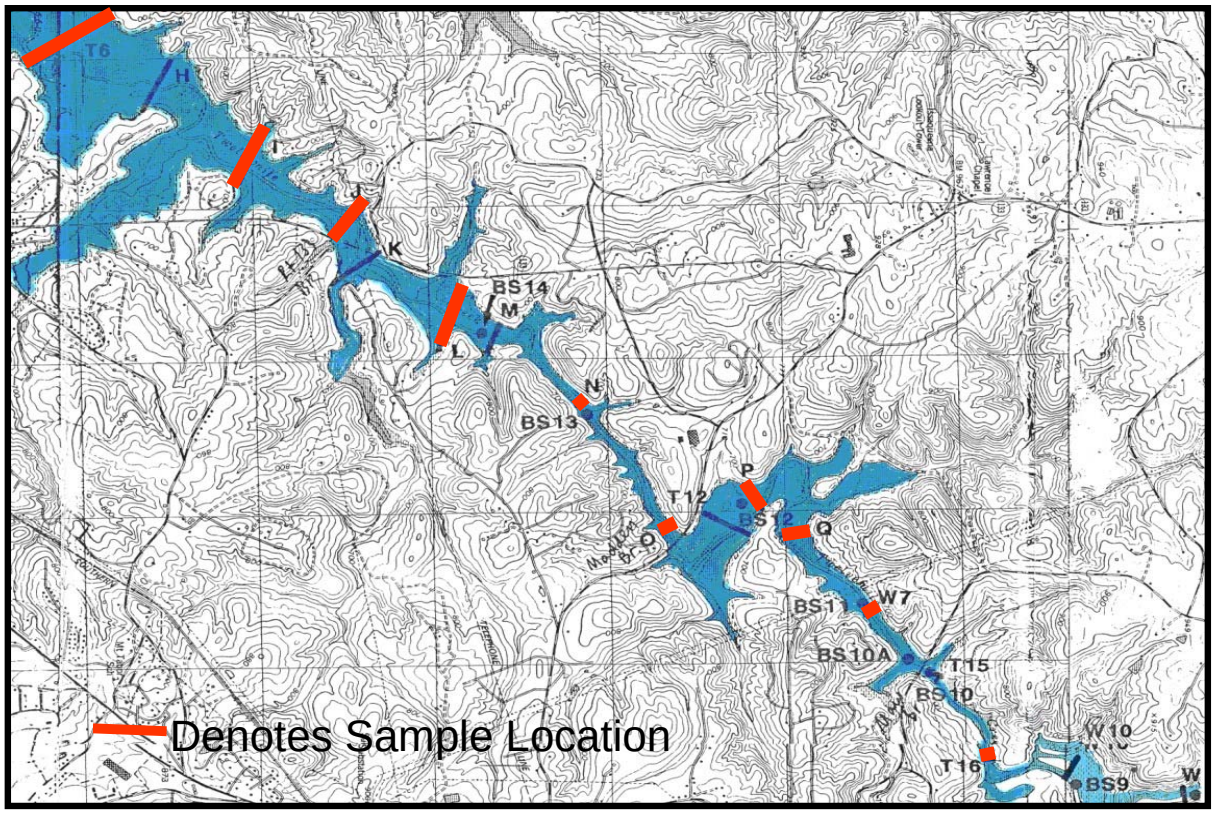

Figure 2-1. Lake Hartwell Coring Locations and Historical Transect Locations

(a) Recording field data during sampling on pontoon.

(b) Driving sediment core for collection on foot.

Figure 2-2. Lake Hartwell Core Sampling

(a) Cores collected on pontoon in deep waters.

(b) Cores collected on foot in shallow waters.

Figure 2-3. Lake Hartwell Core Collection

2.1.1 Sediment Extruding, Sectioning, and Sample Identification. Three parallel cores were drawn from each location for further analysis; one parallel core was dedicated to each of three Battelle laboratories. (Unsuitable cores, such as those with poor sediment recoveries, were discarded.) Suitable cores were extruded on shore into 5-cm segments, and extruded samples were sent to their respective laboratories. PCB analyses were conducted at the Battelle Ocean Sciences Laboratories in Duxbury, MA (Battelle-Duxbury); ^{210}Pb and ^{137}Cs analyses were conducted at the Battelle Marine Research Laboratories in Sequim, WA (Battelle-Sequim); and partitioning experiments were conducted at Battelle Columbus Operations (BCO). Chain-of-custody was conducted in accordance with the QAPP (Battelle, 1999). Chain-of-custody forms, extruded sediment identification codes generated for each sample and each laboratory, and the extruded sediment intervals are shown in Appendix A. Samples were identified by location (e.g., T6-03, L-03, or W7-04) and by segment number beginning with the number 1 for the most shallow sediment sample segment. For example, sediment sample T6-1 was the surface-sediment sample taken from core location T6, and T6-4 was the fourth sediment sample from the surface (i.e. fourth segment down from the sediment surface) taken from the same location. Field notes identified the depth intervals and sample thickness for each sample.

Sediment samples were extruded vertically upward through the cores using a 4.5-cm-diameter rubber gasket connected to a metal dowel, which was used to push each sediment core from the bottom through the top of each Lexan™ tube. The water column was pushed over the top of the core tube and discarded until the sediment-water interface reached the top of the tube. Then the sediment core was extruded in 5-cm increments, each of which was collected in 8-oz glass sample jars.

2.1.2 Field Measurements of the Sediment Cores. Field measurements such as dissolved oxygen (DO) concentration or oxidation reduction potential (ORP) were not taken because it was not possible to obtain porewater samples for these analyses.

2.1.3 Sampling Equipment Decontamination. All sampling equipment was decontaminated before arrival at the site. Following the collection, inspection, and segmentation of a sediment core, the sampling equipment underwent a decontamination process if it was to be used for additional sampling. The bulk of any sediment material adhering to the coring equipment was scraped from the equipment into a containment bucket. The contents of the containment bucket were held for proper disposal.

2.1.4 Water Sample for Lake Hartwell. Lake water from LH was collected for partitioning experiments using glass containers. Five gallons of water were collected from an area of relatively low contamination for partitioning studies along the Seneca River tributary. An additional grab sample was taken from LH to measure background PCB concentrations in the lake. Water samples were collected approximately 25 cm beneath the water surface to minimize the potential of collecting contaminants at the water surface.

2.1.5 Field Observations. The QAPP (Battelle, 1999) recommended using a conventional sand pounder or a VC-3.5 vibracore manufactured by PVL Technologies to collect sediment samples. The vibracore sampler was provided and operated by U.S. EPA Region 4 (Athens, GA). Because of mechanical difficulties with the vibracore, a gravity corer was used to collect 5-cm diameter cores from the lake and a sand pounder was used to collect upriver samples from areas inaccessible by boat.

The QAPP recommended shaving the side walls of the extruded samples to minimize cross-contamination of sediment samples during extrusion. This approach was not practical in the field. Successful cores could not be captured using the vibracore, so triplicate 5-cm diameter Lexan™ tubes were used in place of a single 10-cm diameter core for each location. The smaller Lexan™ tubes proved to be superior to the larger cores in successfully collecting sediment cores. However, the more narrow core diameters made removal of sediment core side walls impractical. Sidewall removal would have resulted in significant loss of sediment sample volumes and poor sediment recoveries, which would have negatively impacted the PCB, age dating, and partitioning analyses.

Because the cores were extruded beginning at the sediment-water interface, core segment depths from each triplicate core could easily be identified and correlated for comparison. Extruding the first 5 to 10 cm of the sediment column at the sediment-water interface proved most difficult. Typically, the interface contained light, partially suspended sediments that did not extrude as a uniform mass. As a result, the first segment often required more than 5 cm to collect sufficient sample volumes for analysis. After the first 10 cm, the sediment core extruded as a uniform mass, making it easy to collect 5-cm diameter disks at 5-cm long intervals.

The QAPP specified measurement of pH, DO, and ORP in the sediment cores. Measurement of these parameters was not practical due to the density of the sediment cores and would have required creating a slurry by diluting samples. Sample dilution and preparation of sediment slurries would have negatively impacted all three measurements. For this reason, these measurements were not taken *in situ*. For future studies, porewater samples could be collected at predetermined depths for pH, DO, and ORP analyses. Porewater samples were not anticipated for this study and, hence, could not be collected.

Visual inspection proved useful in identifying sand versus silt/clay layers. Analytical results confirmed visual observations when the sand layers were associated with relatively low PCB concentrations and the silt/clay layers were associated with relatively high PCB concentrations.

2.2 Sediment Age Dating

Battelle-Sequim conducted sediment dating on 10 cores collected from the LH Site. This sediment dating was conducted using lead and/or cesium isotope analyses (^{210}Pb or ^{137}Cs, respectively) as described by Koide et al. (1973).

^{210}Pb and ^{137}Cs isotopes are relatively common in sediments and typically are used to determine the age of the sediments over years, decades, or centuries. This type of dating relies on two simplifying assumptions: 1) that the sediments to be aged have a relatively uniform grain distribution with depth and 2) that the sediments have a relatively constant annual deposition rate. As much as possible, these conditions were confirmed visually during the initial inspection of the sediment cores. Excess sediment core material not used in the actual age-determination process was analyzed for PSD analyses. The PSD results then were used to determine the percentage of clay, silt, sand, and gravel in the sediments and to assess the uniformity of the sediment samples.

^{210}Pb and ^{137}Cs analyses were conducted in accordance with the QAPP (Battelle, 1999). 100-g aliquots of wet sediment were used for the ^{137}Cs sediment age-dating analysis; approximately 3.0 g of sediment were used for the ^{210}Pb analysis. The wet sediment taken from the core segments and homogenized in clean glass or plastic bowls. The wet sediment was weighed and then freeze-dried (see Standard Operating Procedure [SOP] MSL-C-003-00, Appendix D, of the QAPP) to remove moisture prior to sample analysis and to permit determination of percent solids. Approximately 3.0 g of dry sediment underwent acid digestion followed by plating onto silver disks for ^{210}Pb analysis using the alpha-counting technique described by Koide et al. (1973) (see SOP MSL-M-6, Appendix E, of the QAPP). The remaining sediment was reserved for ^{137}Cs analysis using gamma counting on a Ge-diode detector (see SOP MSL-M-008-00, Appendix F, of the QAPP). These two measurements were used to age date sediment samples.

^{210}Pb and ^{137}Cs analytical results and age dating calculations are reported in Appendix B. Although all of the sediment core segments were analyzed for ^{210}Pb and ^{137}Cs, cores whose PSD analyses showed non-uniform historical sediment deposition could not be age dated. The ^{210}Pb and ^{137}Cs concentration profiles for these cores are reported, but their dates are not. Based on the observed sedimentation patterns, cores T6, I, L, N, and O could be dated, and cores J, P, Q, W7, and T16 could not be dated.

Soil Technology, Inc. (Bainbridge Island, WA) conducted PSD and total organic carbon (TOC) analyses for three to five discrete sediment samples per core in support of the age-dating analysis. PSD was determined according to American Society for Testing and Materials (ASTM) D 422-*Standard Method for Particle-Size Analysis of Soils*. Data were reported as weight percentages of gravel (>2 mm diameter), sand (2 mm-0.0625 mm diameter), silt (0.0625mm-4 μm diameter), and clay (<2 μm diameter). TOC was determined according to U.S. EPA Method 9060-*Total Organic Carbon*. Results are included in Appendix B of this document.

2.3 PCB Analyses

Sediment samples obtained during Task 1 were prepared for PCB chemical analysis and partitioning according to modified U.S. EPA SW-846 Methods 3550, 3611, and 3660. The Battelle SOP 5-190-05 (*Tissue and Sediment Extraction for Trace Level Semi-Volatile Organic Contaminant Analysis)* for this extraction method is found in Appendix B of the QAPP (Battelle, 1999). This method and any modifications are briefly described in the following paragraphs.

Approximately 50 g (wet weight) of the homogenized sediment samples were collected for solvent extraction and dry-weight determination (Battelle, 1999). The appropriate concentrations of surrogate internal standards (SIS) were added to the samples to allow accurate measurement of target organic compounds. The SIS compounds were PCB 14, PCB 34, PCB 103, and PCB 112.

Anhydrous sodium sulfate was added to absorb water from the samples and facilitate the extraction with an organic solvent. Additionally, activated copper was added to sediment samples in order to complex any sulfur that may have been present in the samples. The sediment homogenates were shaken/tumbled for a minimum of 12 hours with 100 mL of hexane. The sample/solvent was centrifuged, and then the solvent was decanted into pre-cleaned, labeled, Erlenmeyer flasks. The same sediment underwent a second 100-mL solvent extraction and was shaken/tumbled for a period of at least 1 hour. A third and final 100 mL of extraction was conducted for another 1-hour shake/tumble period. The three extracts were combined filtered and dried through glass fiber filters containing sodium sulfate. The filtered/dried extracts were reduced to final sample volumes of 1 mL by using a Kuderna-Danish (K-D) concentration and nitrogen evaporation (N-Evap) techniques.

An aliquot of the concentrated extract was weighed and processed through a 20-g alumina (2% deactivated F20) column to obtain a moderately purified PCB extract. The PCB fraction was eluted from the alumina column with 100 ml of hexane and concentrated to 1 mL using the K-D and N-Evap techniques described above.

The concentrated extracts were treated once again with activated granular copper to complex any remaining sulfur. Final extracts were spiked with appropriate concentrations of recovery internal standard (RIS) containing PCB 103, PCB 104, and PCB 166.

The following quality control samples were processed along with each batch of sediment samples:

1 laboratory control sample (LCS)
1 procedural blank (PB)
1 duplicate (DUP)
1 matrix spike (MS).

Splits of the sediment extracts were analyzed for the concentration of 107 PCB analytes using a modified version of U.S. EPA SW-846 Method 8270. This method employed high-resolution capillary gas chromatography with mass spectrometry (GC/MS). The analytical system was comprised of a Hewlett Packard (HP) 5890 gas chromatograph (GC), equipped with an electronic pressure controlled (EPC) inlet and an HP 5972 mass selective detector (MSD) operating in the selected ion monitoring (SIM) mode. A minimum five-point response factor calibration was run with analyte concentrations in the standard solutions ranging from approximately 0.01 ng/µL to approximately 10 ng/µL. The samples were bracketed by passing standard checks analyzed no less frequently than every 10 samples and at the completion of each sequence.

Total PCB concentrations were determined as the sum of the individual PCB congeners. The 107 target analytes are listed in Table 2-2 according to International Union of Pure and Applied Chemistry (IUPAC) number. PCB congener names associated with the IUPAC numbers are provided in Appendix C. The available method detection limits (MDLs) for the PCB congeners in sediment and aqueous matrixes were identified in the QAPP (Battelle, 1999) and are shown in Appendix D of this document along with a quality assurance/quality control (QA/QC) summary of the data. The IUPAC numbering system and nomenclature for PCBs are used throughout this document, particularly in figures where space does not permit printing congener names.

Table 2-2. Target PCB Congeners Based on IUPAC[a] Nomenclature

IUPAC No.	Number of Chlorines	IUPAC No.	Number of Chlorines	IUPAC No.	Number of Chlorines
1	1	**66**	4	151	6
3	1	70/76	4	**153**	6
4/10	2	74	4	156	6
6	2	82	5	158	6
7/9	2	83	5	167	6
8/5[c]	2	84	5	169	6
12/13	2	85[b]	5	**170/190**	7
16/32	3	87/115/81	5	171/202	7
17/15	3	89	5	172	7
18	3	91	5	173	7
19	3	92	5	174	7
21	3	95	5	175	7
22	3	97	5	176	7
24/27	3	99	5	177	7
25	3	100	5	178	7
26	3	**101/90**	5	**180**	7
28	3	**105**	5	183	7
29	3	107/147	5	184	7
31	3	110/77	5	185	7
33/20	3	114[b]	5	**187/182**	7
40	4	**118**	5	189	7
41/64/71	4	119	5	191	7
42/37	4	124	5	193	7
43	4	**128**	6	194	8
44	4	129/126	6	**195/208**	8
45	4	130	6	197	8
46	4	131	6	198	8
47/75	4	132	6	199	8
48	4	134	6	200	8
49	4	135/144	6	201/157	8
51	4	136	6	203/196	8
52	4	137	6	205	8
53	4	**138/160/163**	6	**206**	9
56/60	4	141/179	6	207	9
59	4	146	6	**209**	10
63	4	149/123	6	—	—

(a) All congeners numbers are listed using the IUPAC nomenclature for PCB congeners. Coeluting congeners are listed in order of abundance in Aroclors 1242/1248/1254 (most abundant listed first). The most abundant single congener was used to calibrate the instrument for the coeluting congener sets. IUPAC congener names are identified by number in Appendix C.

(b) The pesticide 4,4-DDD coelutes with congener 114, and the pesticide 4,4-DDE coelutes with congener 85.

(c) The 18 **bolded** congeners are the National Oceanic and Atmospheric Administration (NOAA) National Status and Trends (NS&T) and U.S. EPA Environmental Monitoring and Assessment Program (EMAP) PCB congeners.

The moisture content of each sediment sample was determined by analytical extractions using a modified version of ASTM Method D 2216. The method is modified as follows: for each sediment sample, approximately 5-10 g sediment were placed in pre-weighed, aluminum weighing pans. The weights were recorded (initial weight), and the pans were placed in a drying oven at 110±5°C. The samples were dried to constant weight (overnight), cooled in a desiccator for at least 30 minutes, and weighed (dry weight). The sediment moisture content was calculated as [1 - (dry wt/initial wt)] × 100%. The percent dry weight was calculated as (dry wt/initial wt) × 100%.

The laboratory-reported PCB concentrations for each extracted sediment sample are provided in Appendix E. Histograms are based on normalized PCB concentrations to total PCB concentrations; PCB congeners are plotted as percent total PCBs.

2.4 PCB Partitioning

Vertical PCB advection and diffusion are controlled by the chemical properties of individual PCB compounds (e.g., their solubilities, diffusivities, and octanol-water partition coefficients) and by the capacity of the PCBs to adsorb to the sediment. Sorption onto sediments is controlled by the hydrophobic nature of the chemical, which is indicated by the octanol-water partition coefficient and by the amount of organic matter in the sediments, which is represented by the sediment TOC. PCB sorption experiments with LH sediments and water were conducted to compare the sorption of PCBs onto these specific sediments with literature-reported sorption coefficients.

Sediment segments were shipped to Battelle for partitioning studies. Partitioning studies were conducted after sediment PCB concentration profiles were determined, so a predefined PCB concentration range could be targeted for the partitioning study; samples were frozen until use. Table 2-3 shows the sediment core intervals used for the PCB partitioning studies, along with target PCB concentrations based on the PCB characterization work described above.

Sediments for Bottles 1 through 8 (Table 2-3) were selected to represent, as much as possible, a linear range of PCB contamination from 1.0 to 85 mg/kg total PCBs (t-PCB). The selected sediment core segments were thawed at room temperature; placed into a clean glass or stainless steel container, and homogenized by manual stirring. The homogenized sediments were analyzed for PCBs congeners and TOC to establish baseline PCB and TOC loadings for the study. Sediments for Bottles 9-20 were selected for the mid-range PCB concentration and were used for time-dependent desorption studies.

Table 2-3. Sediment Core Segments Used for PCB Partitioning Studies

Partitioning Experimental Bottle No.	Sample Identification Number	Sediment Core Segment	Target t-PCB Concentration (mg/kg)
1	SLN-O	1	1
2	SLN-I	3	5
3	SLN-L	4	10
4	SLN-W7	6	25
5	SLN-W7	6 (Duplicate)	25
6	SLN-N	4	50
7	SLN-T16	17	85
8	Sand (Control)	Sand (Control)	–
9-20	SLN-L SLN-N SLN-W7	5, 6, and 9 3 11	23

Eight 250-mL Teflon™ bottles (Bottles 1-8) contained approximately 50 g of sediment (wet weight basis) plus approximately 200 mL of filtered (glass fiber) LH water. The bottles were placed on a temperature-controlled shaker table (Adjustable Reciprocating Orbital Shaker [AROS] 160 inside a Precision Mechanical Convection Incubator), operated at 200 revolutions per minute (rpm), and maintained at a temperature of 10°C. All 8 bottles were shaken at the same time. Samples were protected from light while they were on the shaker table. Sediment cultures were not killed.

Twelve additional 250-mL bottles (Bottles 9-20) contained sediment and lake water and were incubated under the same laboratory conditions as the set of eight bottles described above. The mid-range PCB concentration sediment was used in this set of 250-mL bottles, with 50 g of sediment and 200 mL of lake water. Pairs of bottles were sacrificed after each of 2, 4, 6, 8, 10, and 12 weeks of incubation. The pH of the aqueous matrix was measured using a pH probe and meter that was calibrated against pH 4.0, 7.0, and 10.0 standards on the days of use. The aqueous samples were centrifuged at 3,000 rpm for 1 hour and frozen until they were analyzed for PCB concentrations; sediment PCB concentrations were not determined for this portion of the experiment. All aqueous samples and the original eight bottles were analyzed after the 12-week incubation period.[1] The aqueous samples were used to determine how close the bottles approached sorption equilibrium.

When Bottles 1-8 were harvested, pH readings of the lake water in each bottle were made using a pH probe and meter on the day the bottles were sacrificed. Sacrificed bottles were centrifuged up to 3 hours, or until fines were visually removed from suspension; filtration was not practical due to the potential for PCB sorption onto filter media. Aqueous and sediment samples were maintained at 4°C until analyzed for PCB concentrations. A parallel set of samples was sent to Soil Technology (Bainbridge, WA) for TOC analysis. Total solids/total volatile solids (TS/TVS) analyses were conducted at BCO using American Public Health Methods 2540B and 2540E (Eaton et al., 1995).

[1] Freezing aqueous samples for more than 2 weeks exceeds the criterion that samples be extracted within 2 weeks of collection for organic analyses. However, the ability to extract and analyze samples simultaneously significantly reduced analytical costs for this task. The aqueous concentration over time was a non-critical data parameter and is used solely to identify the extent to which sorption equilibrium was achieved. Consequently, freezing samples was not expected to negatively impact the overall experimental results.

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3.0 EXPERIMENTAL OBSERVATIONS

This section describes the experimental results of the PCB, ^{210}Pb, and ^{137}Cs analyses and age-dating and partitioning studies. A detailed analysis of contaminant sources and the extent of PCB weathering are presented. Age dating correlated the vertical contaminant profiles with specific ages and provided an estimate for the sedimentation rates in the areas sampled at LH. PCB partitioning results were used to identify the potential for PCB desorption from contaminated sediments.

3.1 PCB Concentration Profiles

Sediment core segments were analyzed for PCB concentrations; t-PCB concentrations were determined by the sum of the congener-specific concentrations for each core segment. Figures 3-1 through 3-10 present t-PCB concentration profiles with depth plotted for Cores T16, W7, Q, P, O, N, L, J, I, and T6, respectively. The cores are presented in order of their appearance beginning with the upgradient-most core (i.e., Core T16). Sediment age dates are shown with the cores for which sediment age could be measured and calculated. Age dating analysis is discussed in Section 5.0.

The most upgradient transects (T16, W7, Q, and P) were impacted significantly by sediment built up in the headwaters of LH from the historical sediment releases from the upgradient impoundments. As expected, the highest PCB concentrations were associated with silt/clay layers, whereas sand layers contained very low PCB concentrations. The historical sediment releases resulted in substantial burial of PCB-contaminated sediment in the vicinity of these four cores. Table 3-1 shows the depth of the surface sediment layers in the four upgradient cores and the range of corresponding t-PCB concentrations measured in the sand layers. The t-PCB concentrations measured in the surface 10 cm also are provided. Although maximum t-PCB concentrations in the cores exceeded the 1 mg/kg sediment cleanup goal for LH (U.S. EPA, 1994), all four transect cores contained less than 1 mg/kg total PCBs in the surface 25 to 91 cm.

Table 3-1. Surface Sediment t-PCB Concentrations and Maximum t-PCB in Upgradient Cores

Core	Surface Sand Layer Depth (cm)	t-PCB Concentration Range (μg/kg)	Surface 0-10 cm t-PCB Concentration (μg/kg)	Maximum Core t-PCB Concentration (μg/kg)
T16	0-65	14-90	24	88,700
W7	0-91	24-977	977	21,700
Q	0-25	76-92	76	8,710
P	0-80	66-923	66	138,000

Cores O, N, L, J, I, and T6 consisted primarily of silt and were not noticeably impacted by the release of silt and sand from the impoundments. Of the six downgradient cores, only Cores L and T6 fully penetrated the PCB-contaminated sediments and show a complete profile of PCB concentration (Figures 3-5 through 3-10). These cores exhibited more typical vertical PCB concentration profiles, beginning with relatively low PCB concentrations at the sediment-water interface and increasing in concentration with depth until maximum PCB concentrations were measured near the middle of the cores. The maximum PCB concentrations were followed by progressively decreasing concentrations with depth until concentrations were below detection. The result was an inverted bell-shaped curve: the deepest

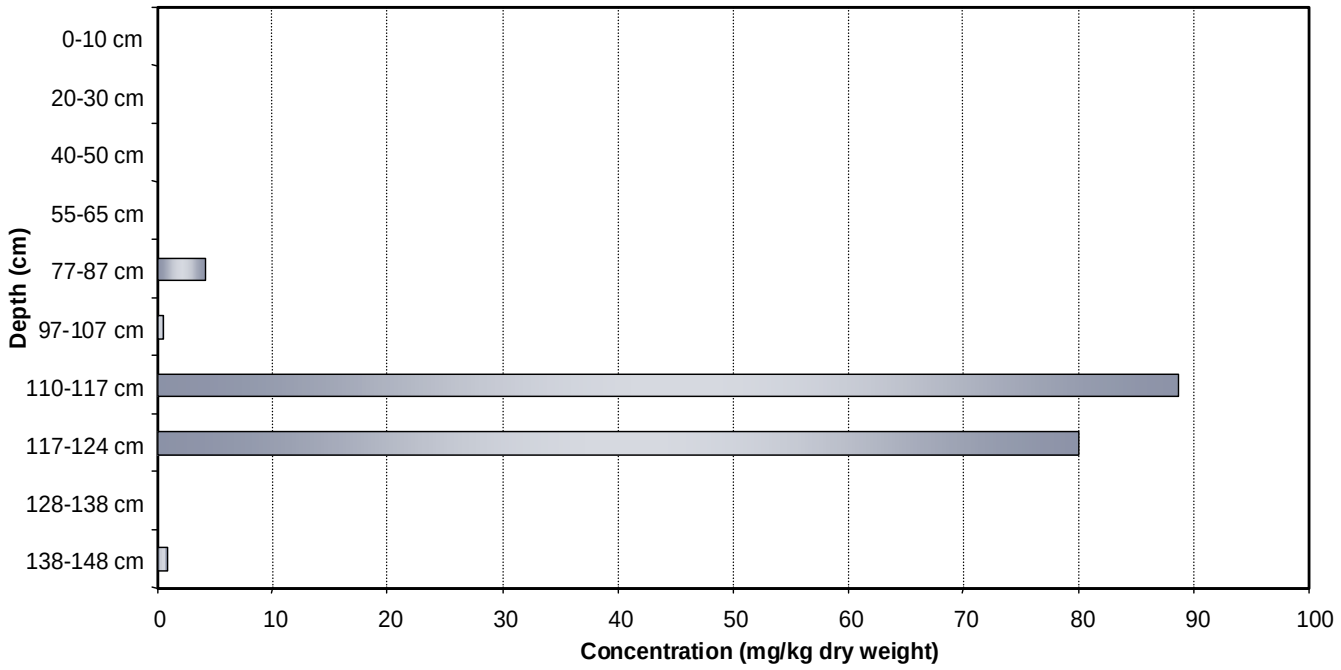

Figure 3-1. t-PCB Vertical Concentration Profile in Upgradient Core T16

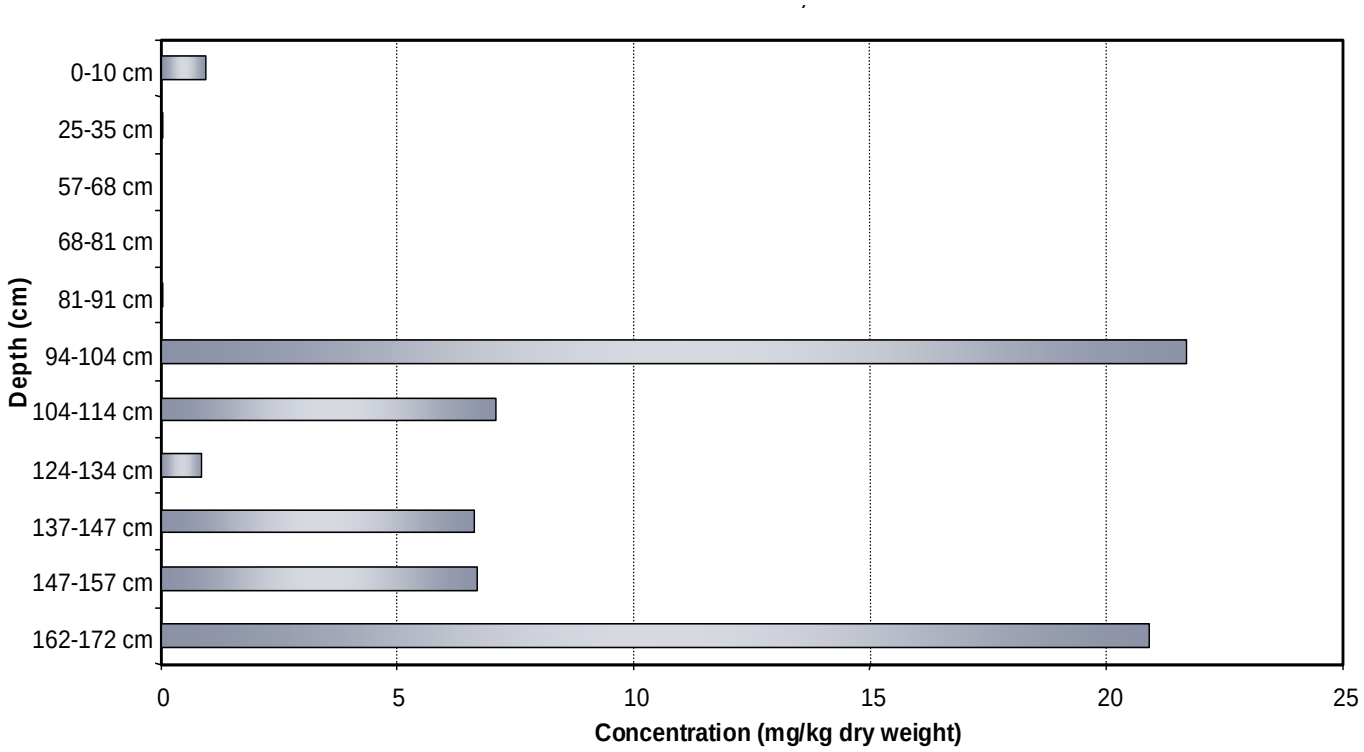

Figure 3-2. t-PCB Vertical Concentration Profile in Upgradient Core W7

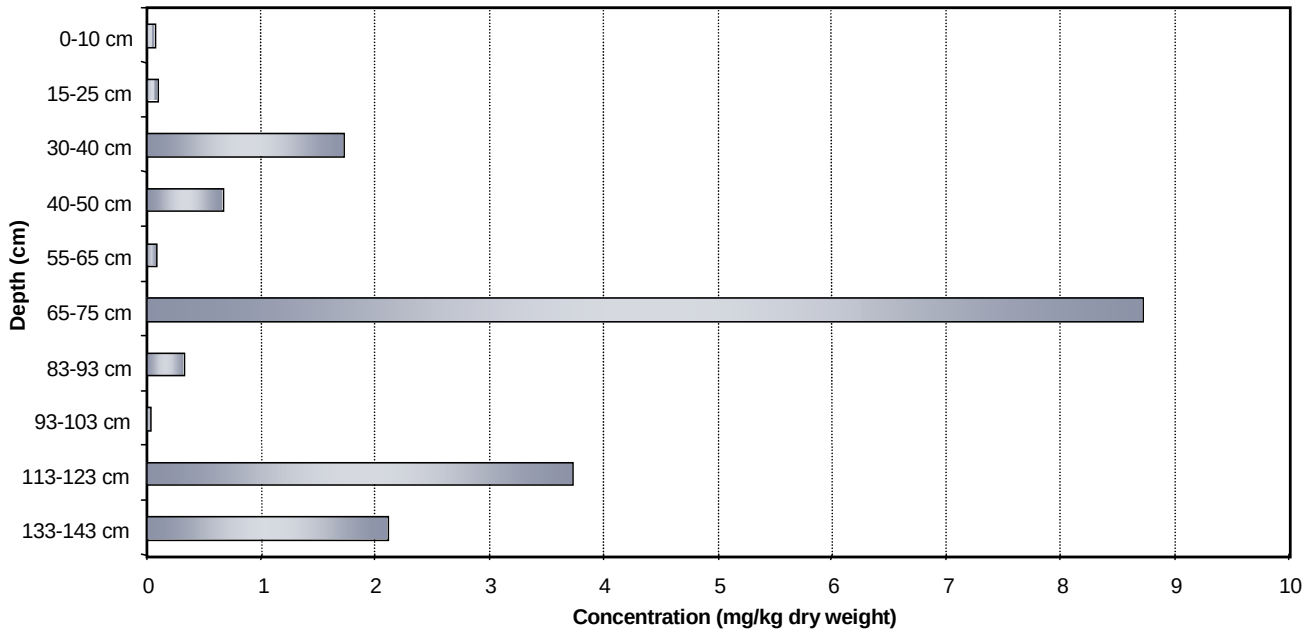

Figure 3-3. t-PCB Vertical Concentration Profile in Upgradient Core Q

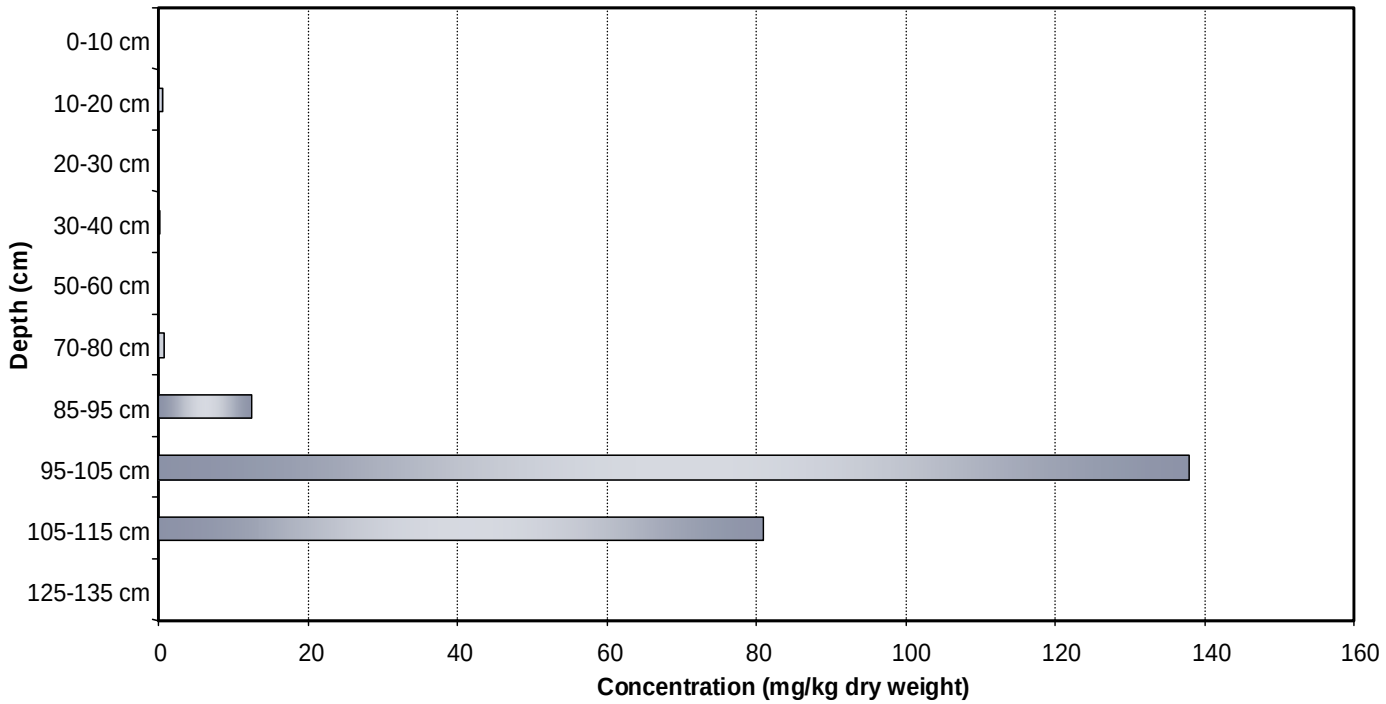

Figure 3-4. t-PCB Vertical Concentration Profile in Upgradient Core P

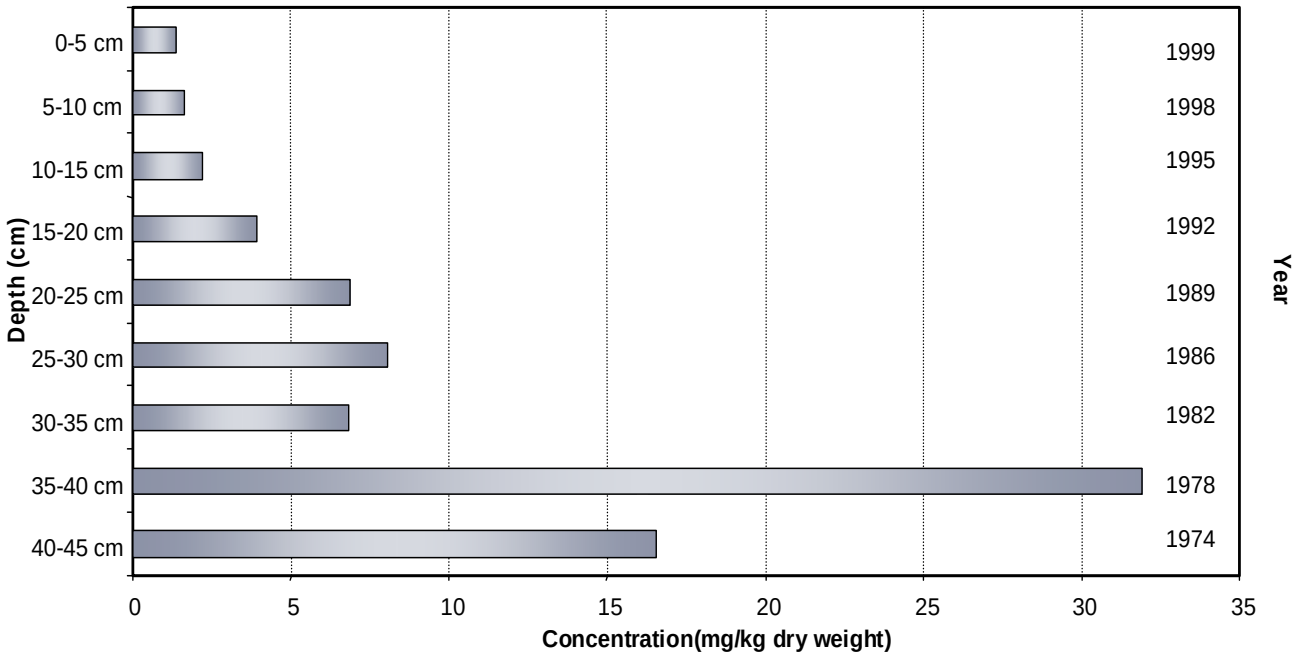

Figure 3-5. t-PCB Vertical Concentration Profile in Downgradient Core O

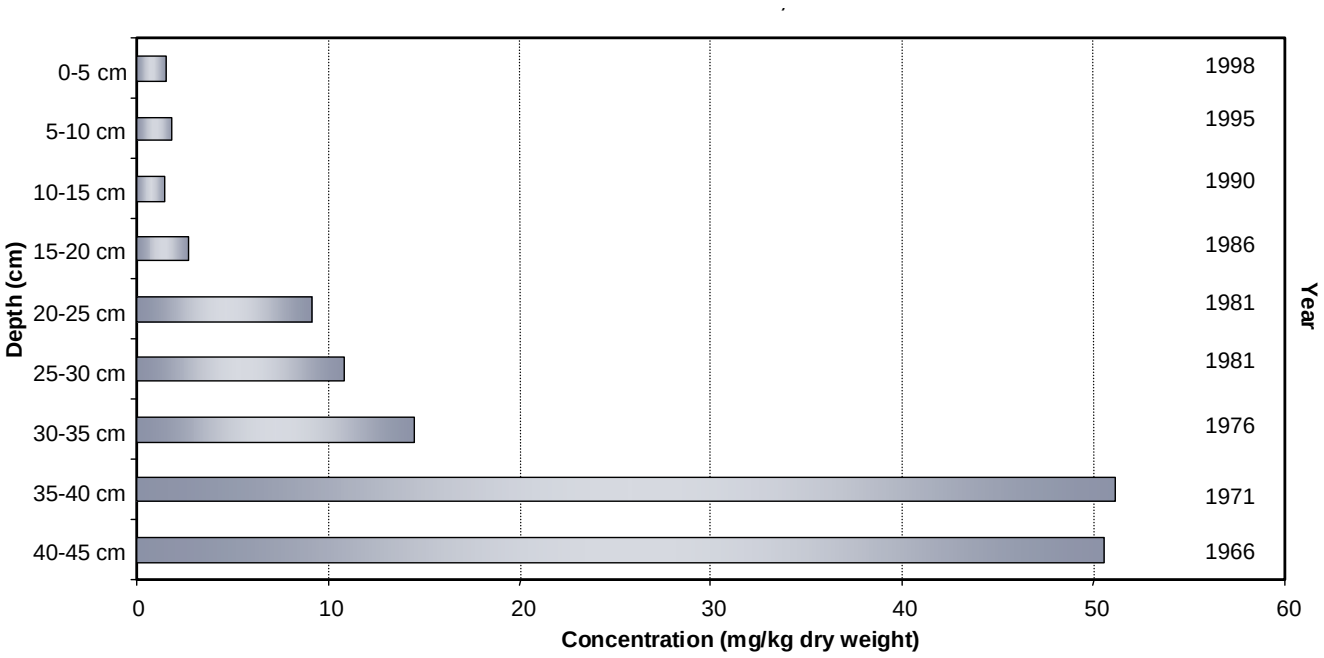

Figure 3-6. t-PCB Vertical Concentration Profile in Downgradient Core N

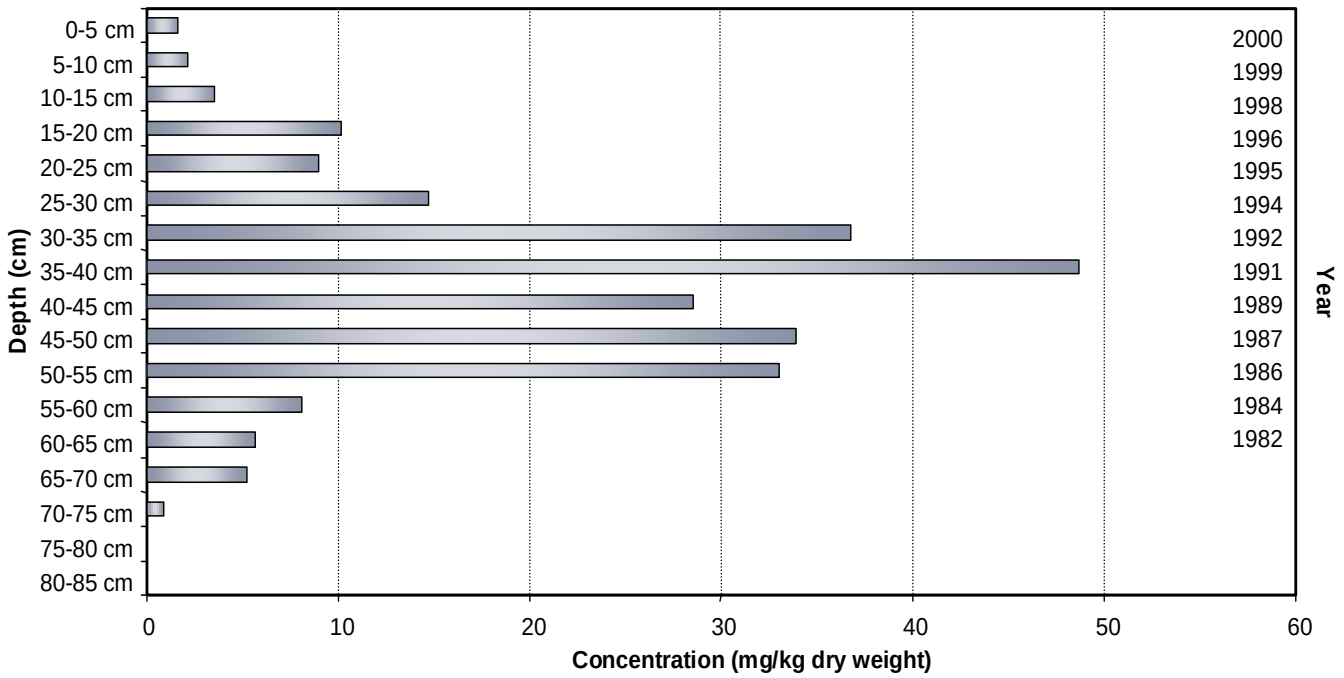

Figure 3-7. t-PCB Vertical Concentration Profile in Downgradient Core L

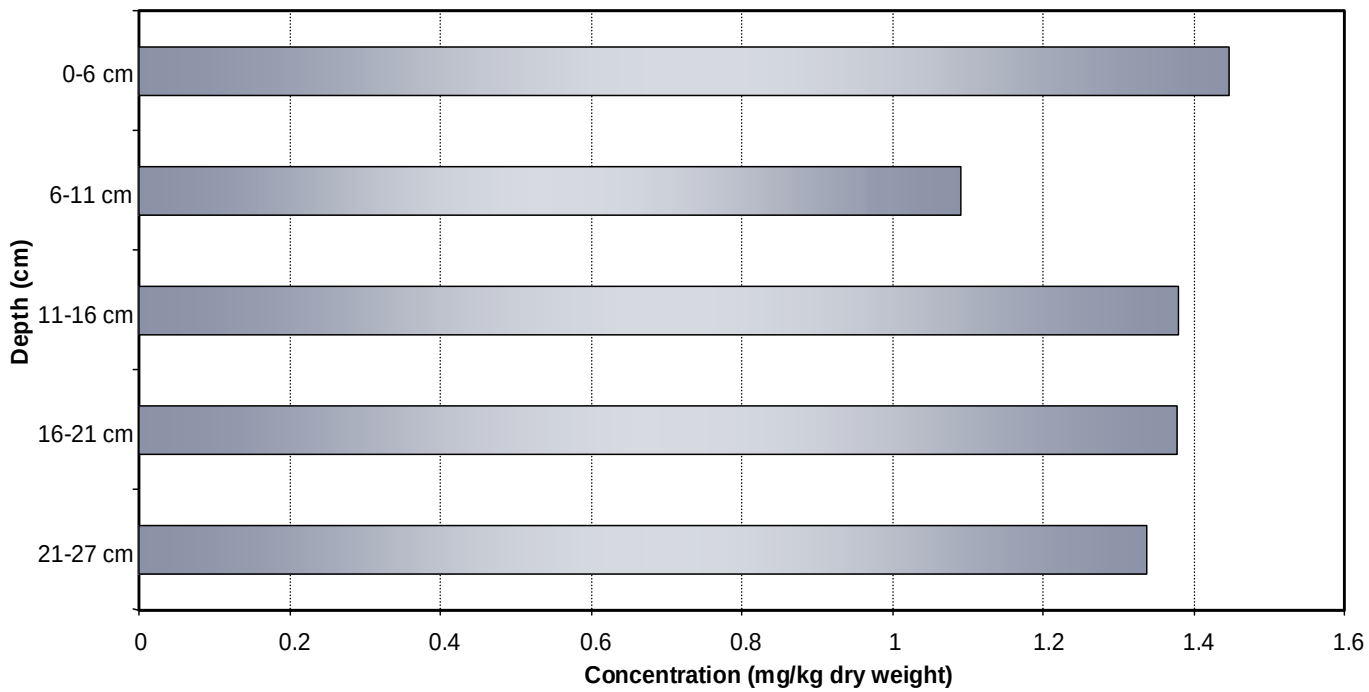

Figure 3-8. t-PCB Vertical Concentration Profile in Downgradient Core J

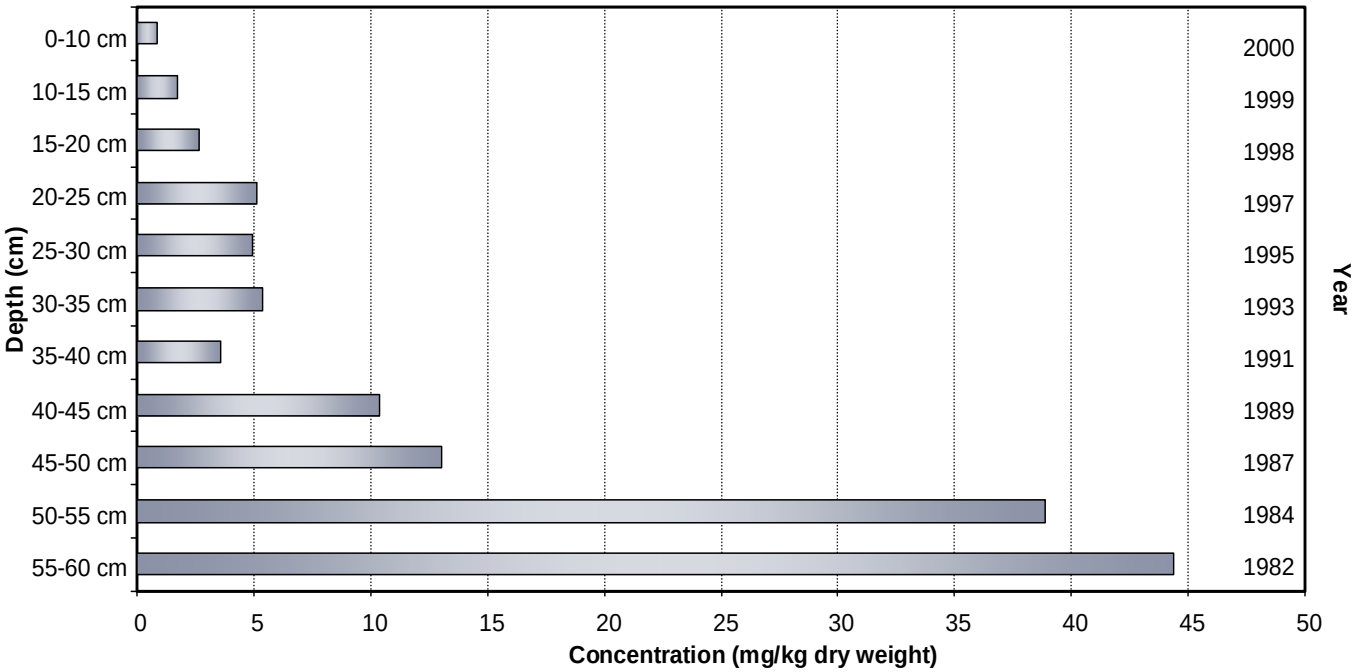

Figure 3-9. t-PCB Vertical Concentration Profile in Downgradient Core I

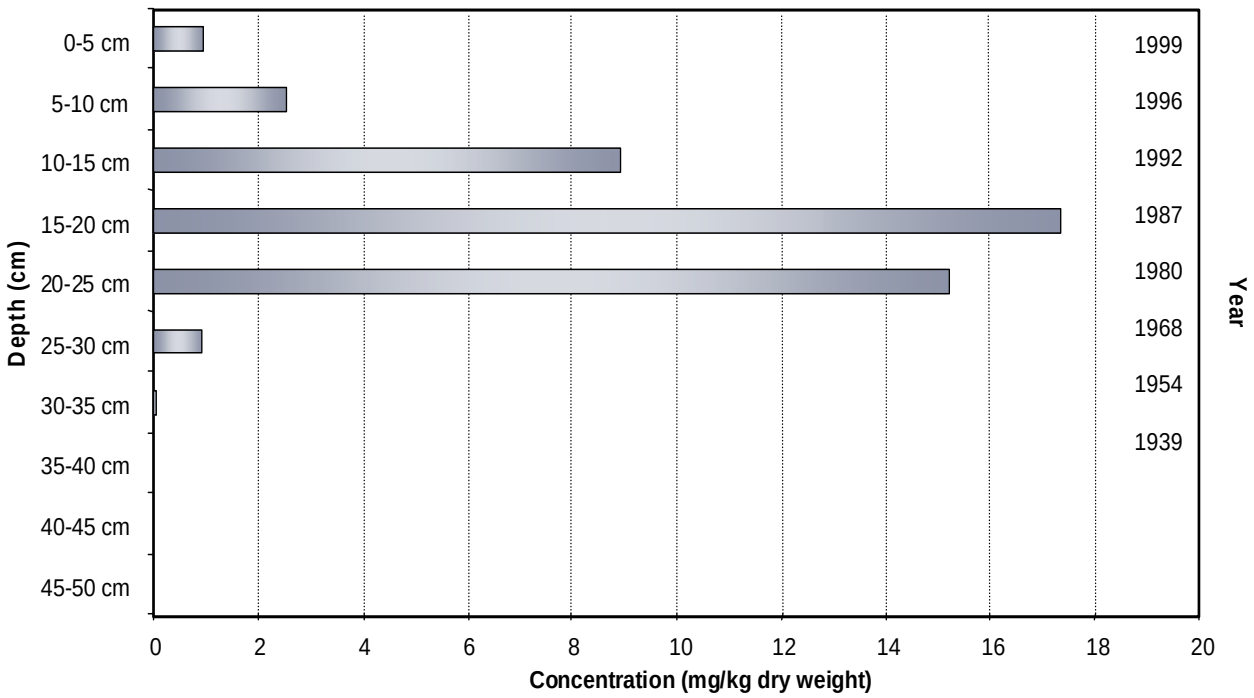

Figure 3-10. t-PCB Vertical Concentration Profile in Downgradient Core T6

portions of these cores where PCB concentrations were near or below detection reflect a historical period before the onset of PCB use at the Sangamo-Weston plant and the subsequent release of PCBs into the environment. The sediments containing the maximum PCB concentrations are associated with the period of maximum PCB release into the lake.

Cores O, N, and I exhibited similar t-PCB concentration profiles in which surface sediments at the sediment-water interface had relatively low t-PCB concentrations and concentrations increased with increasing depth. However, because these cores did not fully penetrate the PCB-contaminated sediments, maximum t-PCB concentrations were measured at or near the bottom of the cores, and a subsequent decrease to non-detect concentrations with depth was not observed. Core J was only 27 cm long and was confined to the surface-most sediments of relatively low t-PCB concentrations, less than 2 mg/kg.

3.2 Surface Sediment Recovery Rates

An evaluation of surface sediment recovery rates was made to determine how quickly surface sediment t-PCB concentrations are approaching the 1.0 mg/kg sediment cleanup goal.

Table 3-2 shows t-PCB concentrations in surface sediments and maximum t-PCB concentrations measured in the six downgradient cores (Cores O, N, L, J, I, and T6). In five of the six cores, t-PCB surface sediment concentrations decreased significantly with increasing sedimentation; Core J was an exception to this observation. The surface 15 cm of each core also showed decreasing t-PCB concentrations with sedimentation approaching the target concentration of 1.0 mg/kg; the maximum surface sediment t-PCB concentration was measured at Transect L at 1.58 mg/kg and the minimum measured surface sediment concentration was measured at Transect I at 0.86 mg/kg.

Table 3-2. Surface Sediment t-PCB Concentrations and Maximum t-PCB in Downgradient Cores

Core	t-PCB Concentration (mg/kg)			
	Surface 0-5 cm	5-10 cm	10-15 cm	Maximum Core Concentration
O	1.38	1.62	2.21	31.9 (35-40 cm)
N	1.50	1.81	1.43	51.1 (35-40 cm)
L	1.58	2.12	3.50	48.7 (35-40 cm)
J[a]	1.45	1.09	1.38	—[b]
I	0.86[c]		1.70	44.4 (55-60 cm)
T6	0.930	2.55	8.92	17.4 (15-20 cm)

(a) The surface Core J extruded intervals spanned 0-6 cm, 6-11 cm, and 11-16 cm.
(b) Core J extended only to a depth of 27 cm where peak t-PCB concentrations were not seen. The t-PCB core concentration was 1.45 mg/kg at the 0-6 cm interval.
(c) The surface Core I interval spanned 0-10 cm.

To determine how quickly surface contaminant concentrations are approaching the target t-PCB concentration of 1.0 mg/kg, sediment concentrations (mg/kg) were plotted against sediment depth for the six downgradient cores (Figure 3-11). Mid-point depths of each sediment segment or interval were used for depth, plotted on the y-axes. For each core, except for Core J, a logarithmic model was fit to the data; each figure illustrates the best-fit logarithmic curve, corresponding equation, and correlation coefficient (r^2). Using these equations, the sedimentation depth required to achieve a surface sediment concentration of 1.0 mg/kg could be determined by setting the t-PCB value (i.e., x-value) to 1.0. Table 3-3 shows the predicted sediment mid-point depth for a 5-cm surface sediment interval to achieve 1.0 mg/kg t-PCB.

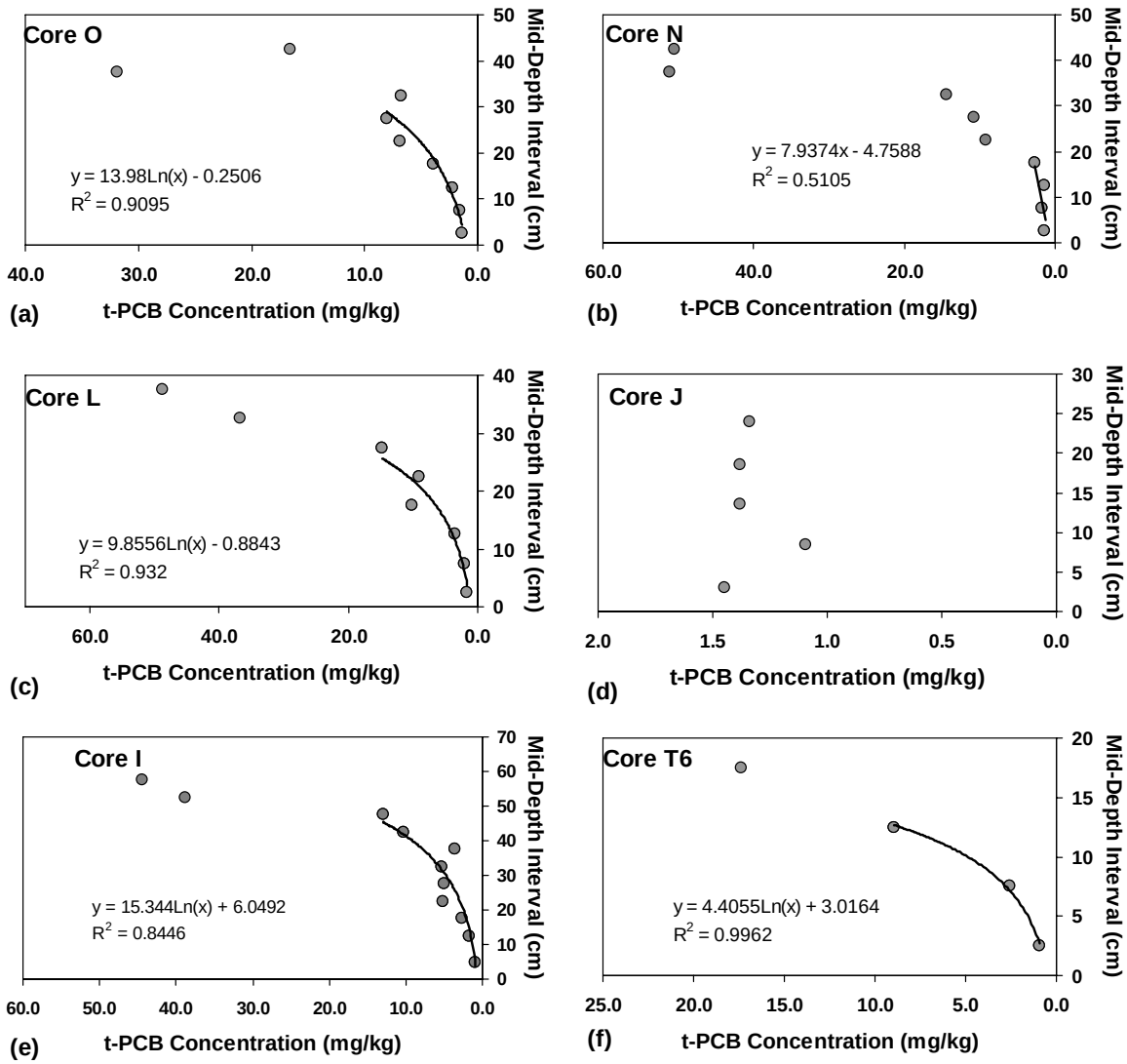

Figure 3-11. Depths (cm) of Mid-Depth Intervals Plotted Against t-PCB Concentrations (mg/kg), for Downgradient Cores

This analysis suggests that an additional 2.8 and 3.4 cm of sedimentation would be required in Cores O and L, respectively, to achieve a 1.0 mg/kg concentration in the surface 5 cm. Not surprisingly, Cores I and T6, which have already achieved the target 1.0 mg/kg concentration, did not require additional sedimentation. Core N was an exception to the regression approach. All second order equations for Core N indicated that surface sediment concentrations were at or below 1 mg/kg in the upper 5 cm. However, data collected for Core N showed that the upper 5 cm PCB concentration was 1.58 mg/kg. In lieu of using a second order equation, a linear regression of the data in the upper 20 cm of Core N was used to estimate the sedimentation requirements for this core for the 1.0 mg/kg t-PCB concentration goal. The linear regression shown in Figure 3-11 resulted in a required sedimentation of 7.3 cm. Lastly, this analysis could not be used for Core J, due to the fact that no change in concentrations were observed in Core J.

The accuracy of this analysis depends on the quality of the data and the thickness of the cored sediment segments. For this study, the cores were extruded in 5-cm intervals. Narrower intervals would

have provided more precise results. However, the thickness of the intervals had to be weighed against the cost of increased sample frequency and the ability to extrude narrower cores, particularly at the sediment-water interface, where coring proved most difficult. Furthermore, the analysis assumed that surface t-PCB concentrations approach zero asymptotically. Mechanisms that influence the rate of surface sediment PCB concentration reductions include the rate of sedimentation, the PCB concentration on particles that continue to be transported and deposited on sediment surfaces, and the amount of mixing in the benthic layer of the surface sediments. More rapid sedimentation and cleaner sediments would enhance the rate of recovery, whereas increased benthic mixing would retard the rate of recovery. If necessary, the same analysis could be done on a congener-specific basis to predict the rate of decline of specific target PCB congeners. A congener-specific analysis was not conducted for this study. A 1 mg/kg t-PCB treatment goal is in place for LH, but a more stringent future goals of 0.4 mg/kg t-PCB and 0.05 mg/kg t-PCB also were considered. The amount of time required to reach these treatment goals for each core is discussed with the age-dating results in Section 5.0.

Table 3-3. Mid-Point Elevations and Required Sedimentations to Achieve the 1.0 mg/kg t-PCB Surface Sediment Concentration Goal

Core	Midpoint Elevation when t-PCB is 1.0 mg/kg (cm)	Required Sedimentation to Achieve 1 mg/kg[(a)] t-PCB (cm)	Required Sedimentation to Achieve 0.4 mg/kg[(b)] t-PCB (cm)	Required Sedimentation to Achieve 0.05 mg/kg[(c)] t-PCB (cm)
O	0.25	2.8	16	45
N	2.5	7.3	7.8	29
L	0.88	3.4	12	33
I	6.0[(d)]	0	11	42
T6	3.0[(d)]	0	3.5	13
Avg.	-1.1 ± 3.4	2.7 ± 3.0	10 ± 4.7	32 ± 13

(a) ROD Surface sediment cleanup goal (U.S. EPA, 1994).
(b) Mean value for site-specific sediment quality criteria calculated using the U.S. EPA's equilibrium partitioning approach (U.S. EPA, 1994).
(c) Effects range-low from NOAA, based on an evaluation of published criteria associated with biological effects on aquatic life (U.S. EPA, 1994).
(d) Negative values imply that the mid-point elevation for a 1 mg/kg 5-cm sediment occurs beneath the existing sediment surface.

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4.0 PCB COMPOSITIONAL CHANGES IN HISTORICALLY-DEPOSITED SEDIMENTS

The PCB composition (i.e., the relative concentrations of PCB congeners) was investigated for each sample, in addition to the assessment of t-PCB concentrations. The composition was studied based on PCB homologue (i.e., level of chlorination) data and using individual PCB congener data. Data tables in Appendix E include total PCB, PCB homologue, and individual PCB congener concentration data for each field sample used in the analysis discussed in this section. Appendix F includes PCB congener plots, and Appendix G present homologue plots for each sample collected at LH, based on the data reported in Appendix E. PCB congener plots have been normalized to t-PCB concentrations for each sample and are presented as percent t-PCB.

PCB congeners are distinguished by the number and position of the chlorine atoms on the biphenyl molecule (Figure 4-1); a PCB congener can have from one to ten chlorine atoms, and there are a total of 209 possible PCB congeners. Each Aroclor formulation is a mixture of approximately 50 different PCB congeners. Most environmental PCB contamination, which includes congeners resulting from environmental transformations, can be characterized by a little more than 100 well-selected congeners, while the remaining 100 or so “theoretically possible” congeners typically are not detected in the environment. The 107 PCB congeners quantified for this project typically comprise approximately 98% - 99% of the total PCBs in most environmental samples.

There are ten PCB homologous series associated with the level of biphenyl chlorination, ranging from monochlorobiphenyls, which contain a single chlorine atom, to decachlorobiphenyl, which contains ten chlorine atoms, one each on the 10 available positions on the biphenyl molecule. The PCB homologue concentrations were determined by calculating the sum of the concentrations of the individual PCB congeners for each of the ten levels of chlorination.

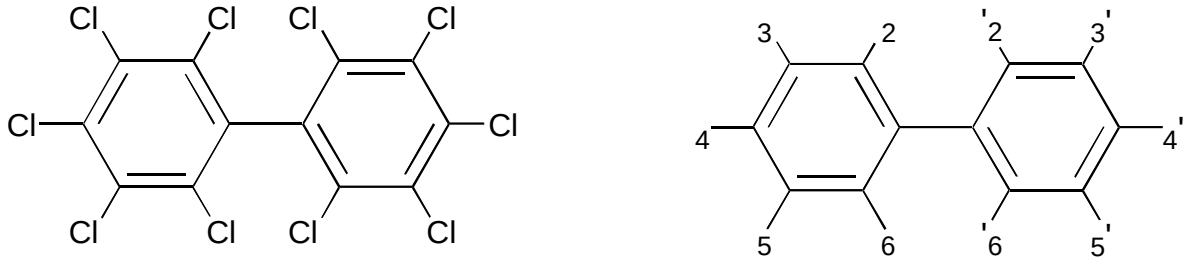
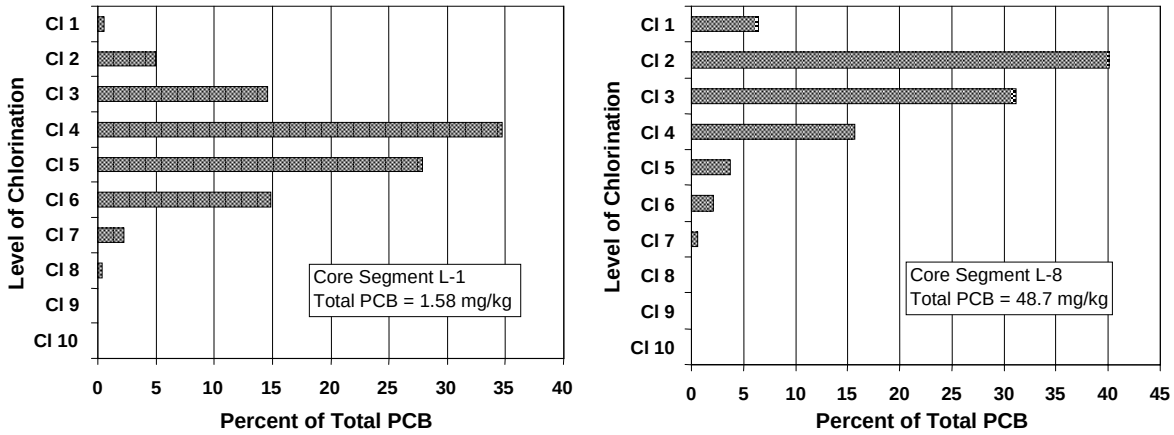


Figure 4-1. PCB Molecule Showing Possible Chlorine Positions

The PCB composition of the field samples was studied to determine characteristic relationships attributable to factors such as the sampling location in the lake or creek (horizontal profile), sample depth (vertical profile), and the age of the sample determined through age dating. The PCB compositions were compared to known Aroclor formulations to examine the extent of PCB weathering and, if possible, to identify the source of contamination. However, direct comparison with Aroclor formulations was recognized to be of limited value considering the significant age of most of the measured contaminants and the associated weathering and other transformation mechanisms that appear to have affected the PCB composition of the samples.

4.1 PCB Composition by Homologue Distribution (Level of Chlorination)

Figure 4-2 illustrates examples of two PCB homologue distributions observed in this study that were taken from Core L. The figures show the PCB homologue distribution in the surface-most sediment segment from Core L (Figure 4-2a) and from sediment segment 8, located at the 35-40 cm depth interval in Core L (Figure 4-2b). Appendix G includes similar homologue plots for sediment segment for all 10 cores. The plots in Appendix G are organized by location beginning with the upgradient-most core, and by depth beginning at the surface-most core segment for each core. Appendix G also includes PCB homologue plots for the nine primary PCB Aroclor formulations (Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268).



(a) Segment 1 at the sediment-water interface.

(b) Segment 8 taken from the 35-40 cm interval.

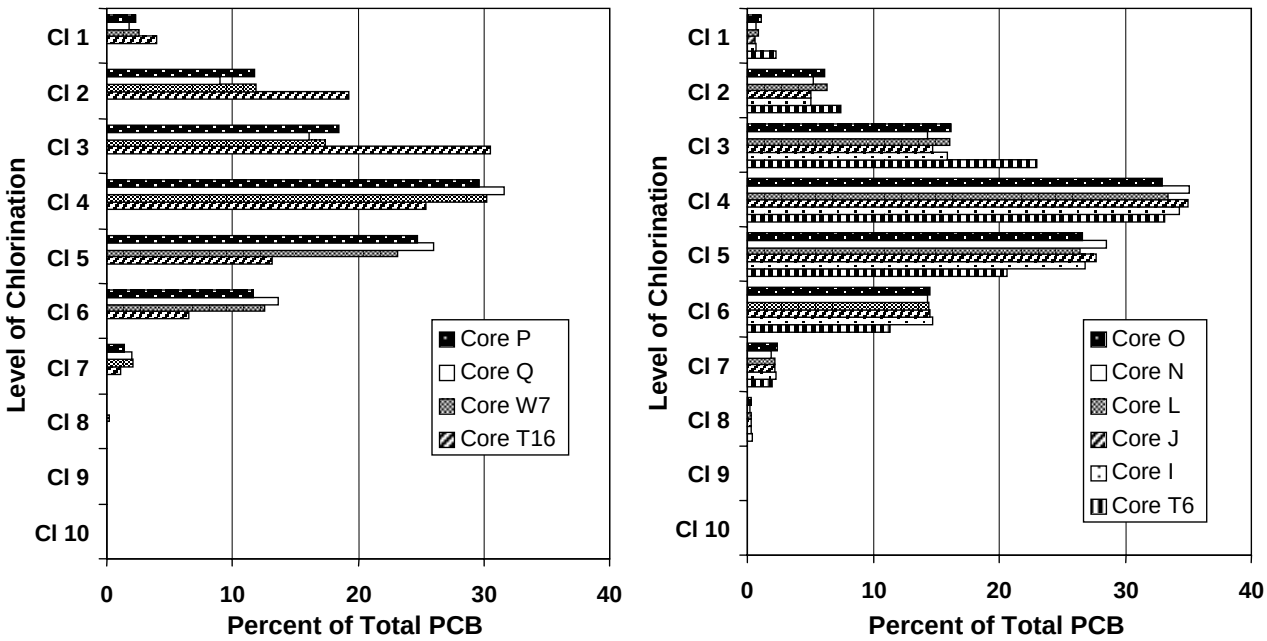
Figure 4-2. PCB Homologue Distributions in Two Core L Segments

The relative concentrations of the PCB homologues shifted towards the less chlorinated congeners with sediment depth and with the age of the deposited sediments. Tetrachlorobiphenyl congeners dominated the surface sample, whereas the 35-40 cm segment was dominated by bi- and trichlorobiphenyl congeners. Monochlorobiphenyl comprised less than 1% of the total PCB in the surface sediment sample compared to more than 6% in the 35-40 cm sample.

At first glance, a relationship appears to exist between the level of chlorination and concentration, where samples with the highest concentrations typically are dominated by less chlorinated biphenyls. However, it is unlikely that the overall PCB input into the lake solely contributed to the observed homologue distributions. The higher overall PCB concentrations are primarily found in the deeper sediments and are dominated by di- and trichlorobiphenyls. These higher concentration sediments were deposited approximately 20-25 years ago and are likely to have been subject to significant PCB compositional changes over this time. Because the PCB homologue data alone are insufficient to assess the extent of PCB weathering, PCB compositional changes are evaluated in more detail below using congener-specific data.

Figure 4-3 summarizes surface sediment homologue distributions determined from the second core segment of each of the 10 sediment cores. The four upgradient cores (P, Q, W7, and T16) are shown in Figure 4-3a, and the six downgradient cores (Cores O, N, L, J, I, and T6) are presented in Figure 4-3b.

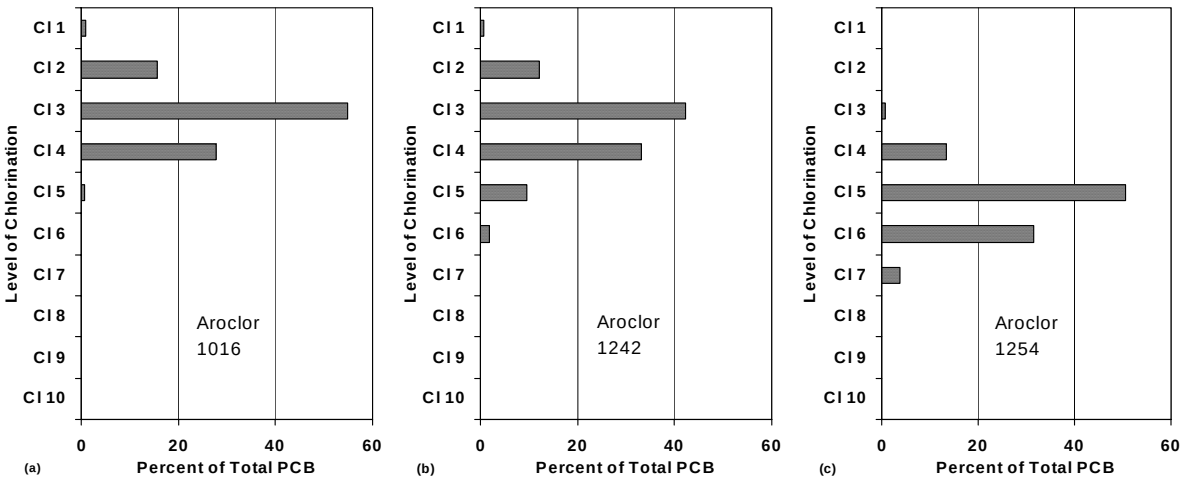
There was surprisingly little difference in PCB homologue distributions along the lake; the upgradient locations had distributions and trends that were similar to the downgradient locations when measured from sediment samples closest to the surface (the most recently deposited sediments). In each of the surface sediment samples, tetrachlorobiphenyls were most abundant, followed by the tri- and pentachlorobiphenyls, then by di- and hexachlorobiphenyls, and mono and heptachlorobiphenyls; thus, the tetrachlorobiphenyl was generally the center of a near bell-shaped homologue distribution plot. Figure 4-4 shows homologue distributions for Aroclors 1016, 1242, and 1254, each of which were reported to have been used at the Sangamo-Weston facility and released into the environment. Aroclor 1016 is dominated by trichlorobiphenyls, Aroclor 1242 is dominated by tri- and tetrachlorobiphenyls, and Aroclor 1254 by penta- and hexachlorobiphenyls. Thus, it is conceivable that a mixture of these Aroclors could result in the homologue distributions shown in Figure 4-3, which are dominated by tri-, tetra-, and pentachlorobiphenyl congeners.



(a) Upgradient Cores (b) Downgradient Cores

Figure 4-3. Surface Sediment PCB Homologue Distributions Taken from the Second Sediment Segment of Each Core

The PCB homologue distributions of the subsurface sediments were dominated at shallower depths by tetrachlorobiphenyls. At greater depths, samples became increasingly dominated by mono-, di-, and trichlorobiphenyls. The homologue distributions of these deeper, high concentration, sediment samples were so dominated by the di- and trichlorobiphenyls, with a clear presence of PCB homologues up to heptachlorobiphenyls (see Appendix G), that they could not be linked to unique Aroclors as primary sources. It is likely that the PCB patterns in these deeper sediments are the results of environmental transformation processes, possibly of Aroclor mixtures similar to those currently being deposited with the surface sediment.



(a) Aroclor 1016 (b) Aroclor 1242 (c) Aroclor 1254

Figure 4-4. Homologue Distributions for Aroclors 1016, 1242, and 1254

4.2 PCB Composition by Congener Distribution

Comparison of the distribution of all measured PCB congeners (i.e., not just homologues) can provide a more detailed comparison of PCB distributions in surface and buried sediments. Figure 4-5 depicts the distribution of Core L segments 1 and 8 (the homologues of these samples were shown in Figure 4-2) and the relative differences in congener distributions between these samples; congener distributions are presented as relative concentrations (percent t-PCB) of the 107 measured congeners. Appendix F shows similar congener distribution plots for each of the core samples, organized by location in the water body (from upgradient to downgradient) and by depth (from surface to deeper intervals). Appendix F also includes PCB congener distribution plots for the nine primary Aroclor formulations.

Core L segments 1 and 8 are typical of surface and deeper sediment congener distributions, respectively. Table 4-1 summarizes some of the more significant congener distribution shifts between Core L segments 1 and 8, shown in Figure 4-5. The PCB congener composition became increasingly dominated by lower chlorinated congeners with sediment depth and corresponding age of the deposited sediments, which is consistent with changes observed in the homologue composition. A significant loss (> 45%) of tetra-, penta-, and hexachlorobiphenyl congeners occurred at greater depth, as did an accumulation of
mono-, di-, and trichlorobiphenyls.

The shift from higher to lower chlorinated congeners resulted in the accumulation of primarily *ortho*-chlorinated biphenyls, particularly 2,2′- and 2,6-dichlorobiphenyls, both of which have chlorines only in *ortho* positions; these two congeners evidenced a combined 29% increase. The only monochlorobiphenyl congener to have had a measurable increase was 2-chlorobiphenyl (PCB 1), also an *ortho*-chlorinated congener. PCB 1 was detected at relatively high concentrations in many of the deeper sediment samples that also had high overall PCB concentrations; in a number of those samples, PCB 1 comprised more than 5% of the t-PCB concentration. PCB 4/10 was the most abundant congener in almost all sediments except the most shallow ones; PCB 4/10 alone constituted more than 25% of the t-PCB in many of the samples, and as much as 44% of the t-PCB in a few samples (i.e., Core P, segments 8, 9, and 10).

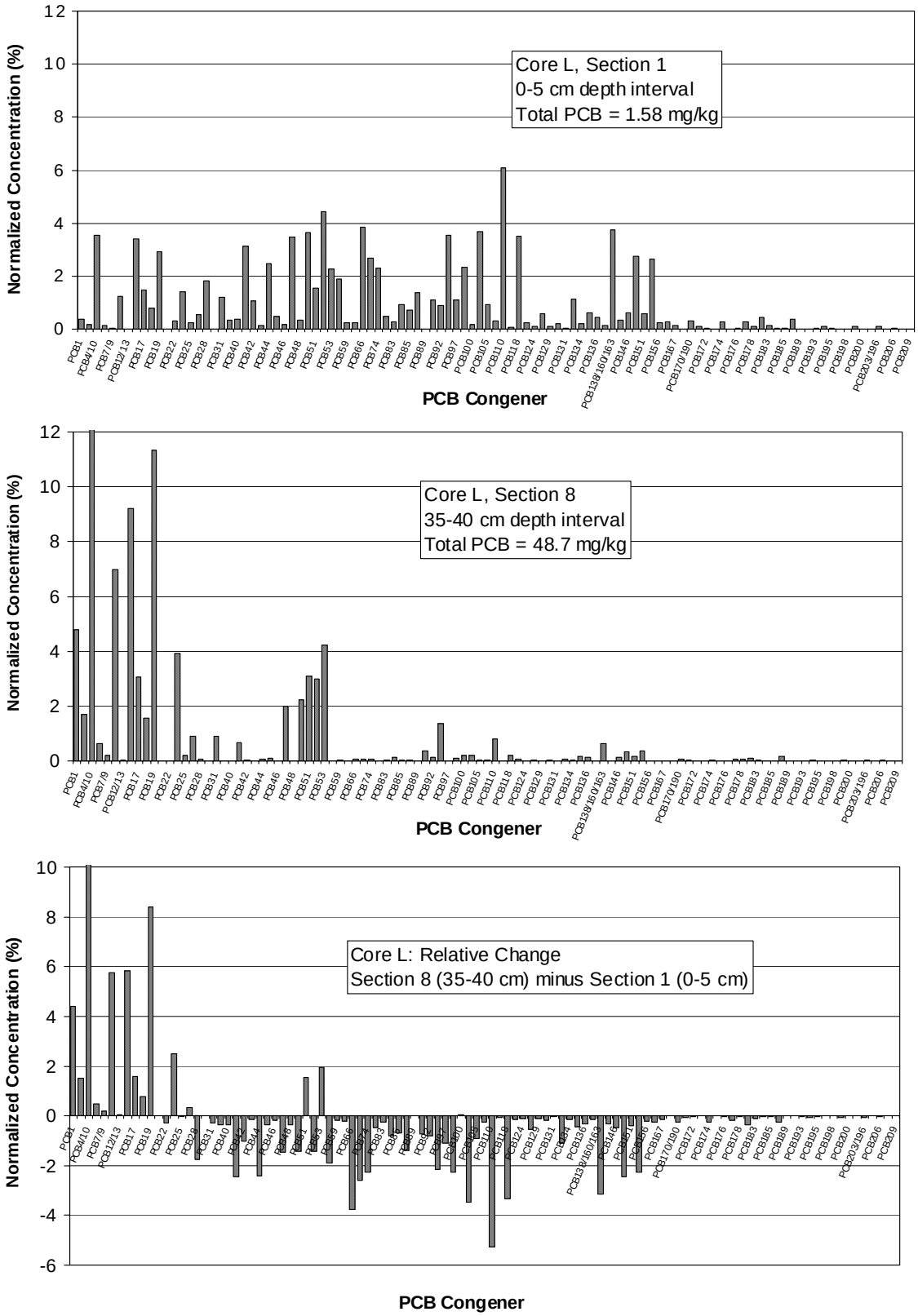


Figure 4-5. Congener Histograms from Core L at a) the 0-5 cm Interval, b) the 35-40 cm Interval, and c) the Relative Difference Between the 35-40 cm and 0-5 cm Intervals

Table 4-1. Major Congener Shifts Observed Between Core Segments L-1 and L-8

IUPAC No.	Congener Name	Percent Change
PCB 1	2-chlorobiphenyl	4.4
PCB 4/10	2,2'/2,6-dichlorobiphenyls	29
PCB 8/5	2,4'/2,3-dichlorobiphenyls	5.8
PCB 16/32	2,2',3/2,4',6-trichlorobiphenyls	5.8
PCB 19	2,2',6-trichlorobiphenyl	8.4
PCB 24/27	2,3,6/2,3',6-trichlorobiphenyls	2.5
PCB 66 through 156	tetra- through hexachlorobiphenyls	-45 (5.3 to 0.03)[(a)]

(a) The range of percent changes is shown in parentheses.

It is important to note that this analysis is based on the assumption the LH sediments have seen a consistent PCB source historically, so that normalized congener distributions in deeper sediments can be compared directly with those of the more shallow sediments. It is theoretically possible that the congener shifts observed between deeper and more shallow sediments are due to changes in the PCB source and not due to concentration shifts of individual congeners. However, the following data do not support this possibility, but rather support the initial assumption that a comparison can be made between the deeper and more shallow sediments:

- Sangamo-Weston reportedly used three Aroclor compounds, Aroclor 1016, 1242, and 1254; Aroclors 1016 and 1242 have relatively high concentrations of lower-chlorinated biphenyls compared to Aroclor 1254. However, Aroclors 1016 and 1242 alone cannot account for the high concentrations of mono-, di-, and trichlorobiphenyls, such as those identified in Table 4-1. For example, the relative concentrations of PCBs 1, 4/10, 8/5, 16/32, 19, and 24/27 in Aroclor 1016 are approximately 0.68%, 3.8%, 8.6%, 6.5%, 1.0%, and 0.76% respectively, which are significantly less than those measured in Core L, segment 8.

- The trend from higher to lower chlorinated congeners is relatively gradual from the more shallow to deeper sediments, suggesting that the dechlorination process has occurred over time. If changes in Aroclor use at the Sangamo-Weston plant had occurred, a more rapid transition from higher to lower chlorinated congeners should be observed.

- Knowledge of PCB dechlorination suggests that the dechlorination of higher chlorinated congeners to form lower chlorinated congeners is relatively common in the natural environment. The distribution patterns of the deeper sediments, which are dominated by *ortho*-chlorinated congeners, matches dechlorination patterns reported in the literature, where the dechlorination of *meta*- and *para*-chlorines is preferred.

The PCB congener compositional analysis revealed the same horizontal characteristics as the PCB homologue data; most upgradient locations had distributions and trends that were similar to most downgradient locations (Appendix F). The sediments close to the surface had a PCB congener distribution centered around higher molecular weight tetrachlorobiphenyls (approximately around PCB 66), but with significant contributions of key congeners ranging from di- through hexachlorobiphenyls. Major congeners (each generally comprising between 2 and 6 percent of the total PCB) included the dichlorobiphenyl PCB 4/10; the trichlorobiphenyls PCB 16/32 and PCB 19; the tetrachlorobiphenyls PCB 41, PCB 47, PCB 49, PCB 52, PCB 66, and PCB 70/76; the pentachlorobiphenyls PCB 95, PCB 101/90, PCB 110, and PCB 118; and the hexachlorobiphenyls PCB 138/160/163, PCB 149, and PCB 153. PCB

110 was typically the most abundant PCB congener in the surface and near-surface sediment samples, contributing more than 5% of the total PCBs in many of these sediments.

4.3 PCB Dechlorination Patterns

As discussed above, congeners that appear to have significantly increased in concentration over time included PCB 1, PCB 4/10, PCB 8/5, PCB 16/32, PCB 19, and PCB 24/27. Congeners PCB 18, PCB 22, PCB 28, PCB 31, PCB 41/64/71, PCB 44, PCB 66, PCB 70/76, PCB 101/90, PCB 110, PCB 118, PCB 138/160/163, PCB 149, and PCB 153 were among the congeners that appeared to have decreased in relative concentration over time in these sediments. Congeners that had similar relative concentrations in these sediments included PCB 17, PCB 49, and PCB 52, which suggests that these congeners may have been relatively inert to the environmental transformation processes that otherwise occurred in these sediments.

Dechlorination, the removal of one or more chlorine substitutions on the PCB molecule, is one of the most important PCB contamination transformation processes in anaerobic sediments. In anaerobic dechlorination, the chlorines in the *meta* and *para* positions are generally most readily removed, and the *ortho*-substituted chlorines are widely recognized as being most resistant to anaerobic dechlorination (Figure 4-6).

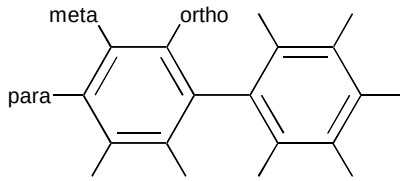


Figure 4-6. Identification of Key Chlorine Substitution Positions on the PCB Molecule

A review of the molecular structures of the congeners for which a large relative concentration decrease was observed (e.g., PCB 22, PCB 28, PCB 33/20, and PCB 44) revealed that these congeners had two or more chlorines in the *meta* or *para* positions, and therefore were highly susceptible to anaerobic dechlorination (see structures summarized in Appendices C and H). On the other hand, the congeners for which the greatest relative concentration increase was observed (e.g., PCB 4/10, PCB 19, PCB 24/27, PCB 51) had all or most of the chlorines in the *ortho* position. Dechlorination transformation clearly appears to be occurring in these sediments, with *meta*- and *para*- substituted chlorines being removed from various PCB congener molecules, resulting in an accumulation of primarily *ortho*-substituted congeners.

Figure 4-7 shows changes in the concentration of two characteristic PCB groups, PCB 4/10 (2,2'- and 2,6-dichlorobiphenyls) and PCB 118 (2,3',4,4',5-pentachlorobiphenyl), relative to t-PCB concentrations in Core L. PCB 4/10 was selected because it exhibited the most abundant increase with depth compared to other increasing congeners. Conversely, PCB 118 exhibited a significant decrease in concentration with depth.

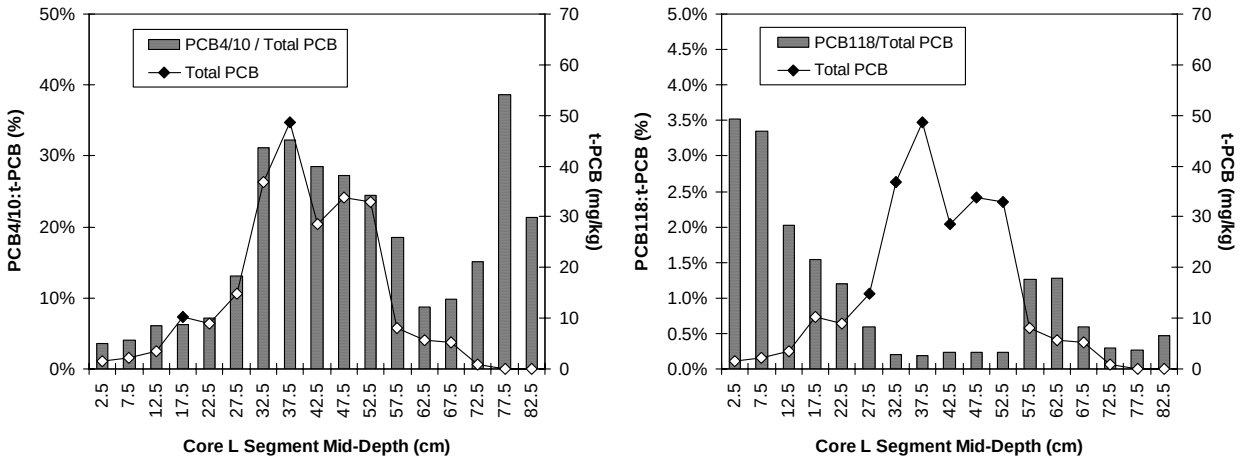


Figure 4-7. Ratios of Two PCB Congeners (4/10 and 118) to t-PCB Concentrations in Core L, Plotted Against Depth

The relative concentration of PCB 4/10 clearly increased and that of PCB 118 clearly decreased with depth, age, and increase in t-PCB concentration. The samples collected at a depth of 60-75 cm did not closely follow this trend, potentially due to unknown environmental conditions that reduced the rate of dechlorination. However, conditions in the deeper sediments (beneath 75 cm) continued the trend. Similar concentration changes were observed for the other downgradient sampling locations and with other corresponding lower and higher chlorinated congeners, respectively.

The very slow dechlorination of congeners with all chlorines in the *ortho* position (e.g., PCB 4, PCB 10, and PCB 19) results in their relative accumulation in anaerobic sediments. These three congeners constitute more than 50% of the total PCB in many of the study sediments that were deposited about 20 years ago, compared to less than 5% of the t-PCB in the surface sediments.

4.4 PCB Source Determination

Comparison of the PCB patterns in the sediments to Aroclor congener distribution patterns is often part of PCB contamination assessments. The similarity of the PCB composition in a given sample to that of the Aroclor formulation (or mixture of Aroclors) can provide information related to potential source(s), the environmental significance of a PCB contamination, and changes that may have occurred since PCB/Aroclor release and deposition into the environment. It is very rare that a perfect (or even close) match between environmental and Aroclor congener compositions is observed, due to the impact of weathering processes. The closest matches are to be expected in samples that correspond to recent releases to the environment, and more so for samples located near the original source of contamination. However, because the commercial production of PCBs was banned in the United States more than 20 years ago, recent deposits are unlikely to be found. Because LH is approximately 15 miles downgradient from the Sangamo-Weston plant, deposits near the source were not collected.

Most environmental sediment PCB contamination is the result of multiple sources, including atmospheric deposition and runoff, in addition to such point sources as the Sangamo-Weston plant. LH PCBs are likely to be dominated by the Sangamo-Weston point source. However, as discussed above, the PCB makeup of any particular point source may have varied with time (e.g., different Aroclor formulations tended to be “in favor” and would be manufactured at different times). At the Sangamo-Weston plant, three Aroclors were known to have been used: Aroclors 1016, 1242, and 1254.

Also, even when there is a relatively consistent source, the PCB composition will begin to change as soon it enters the environment. Selective PCB congener alterations tend to occur due to different weathering processes. For example, relatively high solubility, low sorption to organic matter, and high volatility will result in the more rapid loss of lower chlorinated (e.g., lower molecular weight) congeners in favor of the higher chlorinated congeners. Conversely, microbial reductive dechlorination processes more significantly affect the higher chlorinated congeners. These processes affect the distribution of PCB congeners after their release into the environment, and are relatively unpredictable due to different and changing environmental conditions. Consequently, the PCB congener composition will, with time, change substantially from the Aroclor mixtures that were originally released.

Despite these obstacles, a review and analysis of the composition of PCBs relative to Aroclor formulations can provide potentially valuable information for and insight into a PCB contamination issue. As expected, due to weathering effects, none of the field samples closely resembled the composition of known Aroclors. The PCB composition of the field samples also does not, at first review, closely resemble a presumed mixture of the three reported Aroclors (e.g., 1:1 mixture of Aroclors 1016/1242, 1016/1254, or 1242/1254). However, the level of chlorination and molecular weight range of the PCB congeners in the near-surface sediments suggest a predominance of an Aroclor dominated by mid-molecular-weight congeners, such as Aroclors 1248 and/or 1254 with contributions of low molecular weight congeners such as 1016 and 1242.

It is unlikely that Aroclor 1248 contributed significantly to the PCB contamination in LH, because 1248 is dominated by tetrachlorbiphenyl congeners, which would have been expected to be present in greater relative abundance in the surface sediment samples. Specific congeners that would be expected at higher concentrations if Aroclor 1248 was an important source material include PCB 44, PCB 56/60, and PCB 70/76. It is more likely that the observed PCB composition in the surface sediments is the result of contributions by Aroclors 1016, 1242, and 1254. Further evidence for this conclusion is provided in Section 5.0.

4.5 PCA/HCA Analysis of PCB Concentrations

Principal component analysis (PCA) and hierarchical cluster analysis (HCA) are data analysis tools designed to explore large data sets, focusing on the variability between samples. Both tools were used to investigate the PCB data sets for this study. PCA and HCA algorithms are designed to reduce large and complex data sets to a suite of principal components (PCs) or clusters comprised of similar characteristics. PCA output typically consists of two- or three-dimensional PC score plots. The distances between sample points on such plots provide a measure of the chemical similarity between samples. That is, samples that visually “cluster” tend to be chemically similar and vice versa. Another form of PCA output, factor loading plots, also can be used to determine which individual variables (in this case, PCB congeners) are responsible for any visual “clustering” observed. As such, PCA is a useful data analysis and exploration tool. PCA alone cannot resolve differences and similarities between chemical groups and must be combined with knowledge of a site and, in this case, PCB chemistry and weathering processes to elucidate chemical similarities or differences.

In HCA, distances between pairs of samples (or variables) in a data set are calculated and compared using mathematical clustering algorithms. As with PCA, a relatively small distance between samples implies that the samples are chemically similar, whereas a relatively large distance between samples implies that samples are chemically dissimilar. HCA can be performed on either samples or diagnostic groups (e.g., PCB congeners or homologues).

Both methods produce graphical depictions of relationships between samples and/or diagnostic groups based on pattern recognition. These exploratory techniques were used to help recognize groups of

samples that share similar PCB compositions (i.e., similar *relative* PCB homologue or PCB congener concentrations) and those that have clearly different compositions.

Prior to performing PCA and HCA on the data from this study, the PCB homologue and PCB congener data were normalized to the total concentration in each sample in order to eliminate influences caused by concentration alone. The goal of these analyses was to identify differences and similarities between samples based on PCB pattern recognition. Normalized Aroclor data also were included in the data set for reference. In addition to the homologue and full congener set analyses, PCA and HCA were run on a data set that included a list of 23 PCB congeners that appeared to be significantly influenced by dechlorination, either because of their relative increase or decrease with sediment depth, and on selected congeners that were significant in the original Aroclor material and appeared to be relatively resistant to dechlorination. Congeners that were not detected in most/all samples were removed from the data set, as were samples that had very low total PCB concentrations (<0.1 ppm). These data were assumed to be of minor significance to the entire data set. Eliminating these data had no significant impact on the final analysis.

PCA and HCA are iterative processes that often require the analysis of a variety of data sets to detect noticeable trends. Selected plots associated with each of the analyses conducted for this study are provided in Appendix I. Included among the PCA and HCA performed on the LH data were analyses using three data sets (i.e., level of chlorination, full congener list, and the subset of 23 key congeners) and several sample lists (i.e., a full sample list, the four upgradient or six downgradient core samples, and selected cores). The goal was to discern PCB composition similarities and dissimilarities based on factors such as the following:

- Horizontal distribution of the sites, including locations upgradient from station O (stations P, Q, W7, and T16) and downgradient locations (stations O, N, L, J, I, and T6)

- Vertical profiles by depth and/or age

- Sections containing the highest total PCB concentrations from each core.

Upon review of the data, the most apparent trend was that sample clustering was broadly related to depth. As with the homologue and PCB congener pattern analyses, PCA did not reveal any clear relationships based on horizontal distribution (i.e., the location the sediment core was taken). Using the three primary data sets and sample lists, PCA indicated that the data tended to cluster by core section depth (Figure 4-8).

In the PC factor loading plot shown on Figure 4-9, the samples form a crescent, where the shallower core sections cluster at the top of the crescent and the deeper sections cluster at the bottom of the crescent. Similar clustering patterns were generated from the HCA analysis and for each of the three different PCB diagnostic data sets shown in Appendix I. Additional observations based on the PCA and HCA analysis include the following:

- The surface sediment data tended to cluster closest to a mixture of Aroclors 1242 and 1254.

- The intermediate depth sediment data tended to spread out along a distribution closer to Aroclors 1242, 1016, and 1232, but did not closely match any individual Aroclor or projected mixed model. This trend is consistent with a decrease in the average level of chlorination with sediment depth.

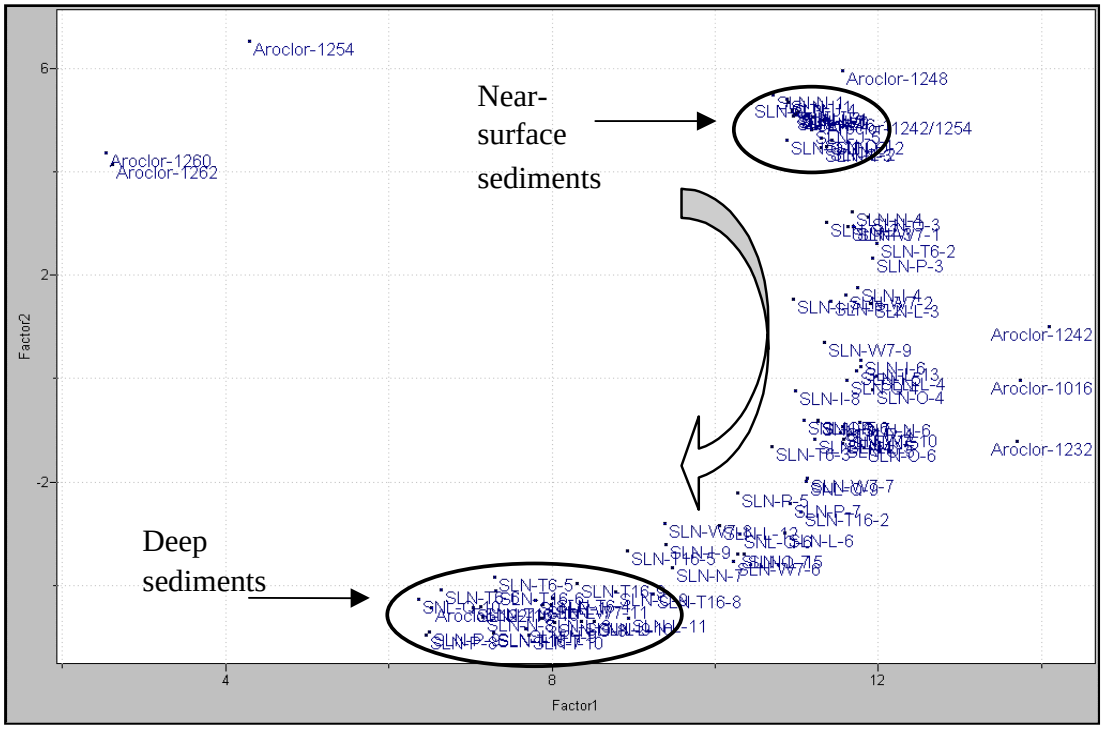


Figure 4-8. PCA Plot Using Samples With More Than 50 ppb t-PCB and 23 Key Congeners

- The samples with the highest PCB concentrations, which were generally also among the deepest sediments, clustered relatively close to Aroclor 1221, which is primarily an indication of the significance of the low molecular weight congeners in these samples, and not necessarily a close match with this particular Aroclor.

- The congeners with the lowest levels of chlorination tended to drive the variability between samples, and the spread and clustering in the PCA and HCA analyses (see Figure 4-9). Bi- and trichlorobiphenyl congeners caused the most spread and least clustering among congeners. The higher chlorinated congeners had the highest level of clustering and the greatest compositional similarity.

4.6 Polytopic Vector Analysis of Lake Hartwell PCB Distribution

The PCB data generated for this study were modeled using the multivariate statistical method known as polytopic vector analysis (PVA). PVA is a valuable tool for chemical fingerprinting in complex multisource/multiprocess environmental systems. For this study, PVA was conducted to identify fingerprint (also known as end-member [EM]) compositions from the data generated for LH, and to compare the end members with literature reported source patterns (e.g., Aroclor compositions and known PCB dechlorination or weathering patterns). This analysis was conducted by Dr. Glenn W. Johnson at the Energy & Geoscience Institute, Department of Civil and Environmental Engineering, University of Utah. Data analysis methods were conducted as outlined by Johnson et al. (2000).

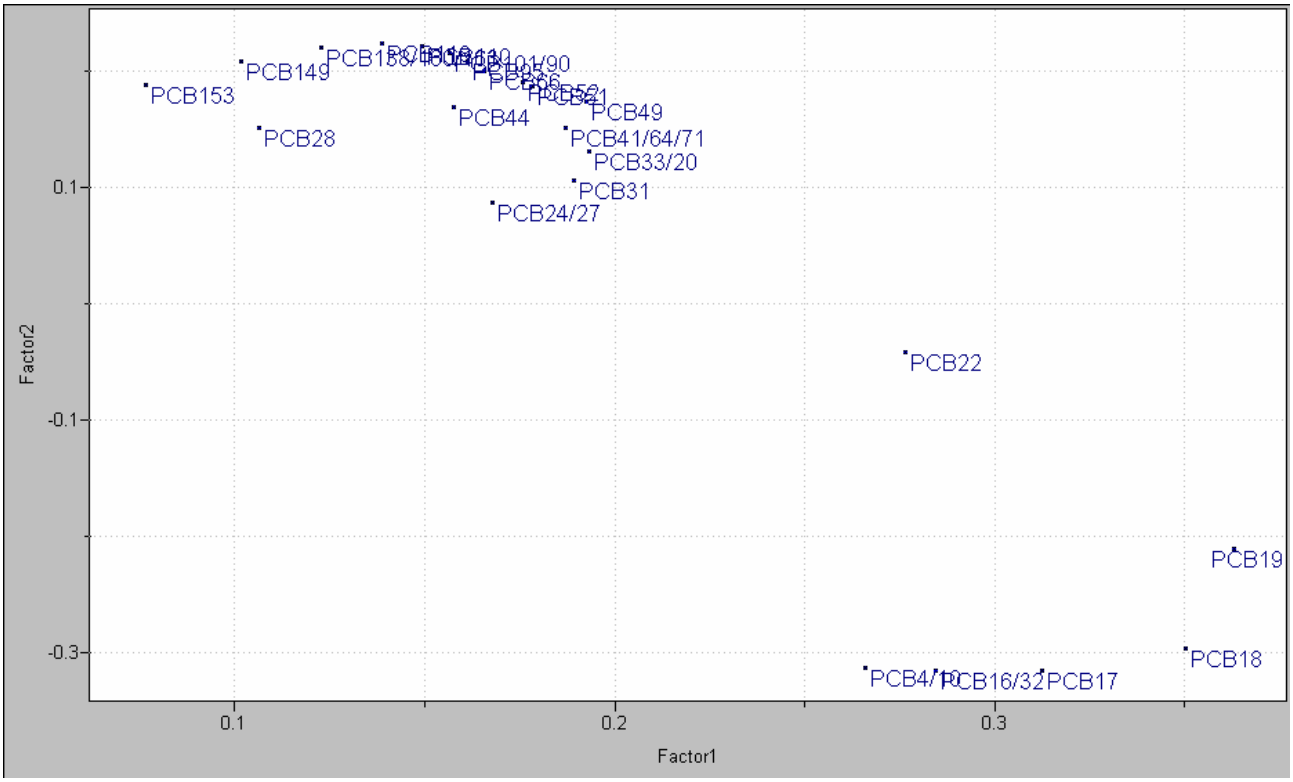


Figure 4-9. PC Factor Loading Plot for Selected PCB Congeners

The PVA algorithm has evolved over a period of 40 years, primarily within the mathematical geology literature. The conceptual model involves resolution of three parameters of concern in a complex, mixed system: 1) the number of components (i.e., fingerprints or end-members) in the system, 2) the chemical composition of each end-member, and 3) the relative proportions of each end-member in each sample. The analysis is performed in two steps. In Step 1, the number of components in the system is determined through PCA and subsequent goodness-of-fit analysis. In Step 2, an iterative process is used to determine chemical end-member compositions and the mixing proportions in each sample.

A major advantage of this fingerprinting approach is that it does not require *a priori* assumptions of the number, chemical composition, or geographic distribution of the contributing fingerprints. End-member patterns generated using this method are a mathematical construct and are not selected to fit a specific data set (i.e., end members are not generated to deliberately match a specific Aroclor pattern).

4.6.1 Data Pre-Processing/Data Reduction. In PVA modeling, it is usually necessary to reduce a data set to a robust matrix of high concentration samples with relatively few non-detects. The 102 sample by 107 congener matrix was reduced first by removing all samples with less than 30 ng/g t-PCB. The 30 ng/g cutoff criterion resulted in deletion of five of the 102 samples, reducing the data set to 97 samples by 107 congeners. The following samples were deleted using this criterion: T6-9 (26 ng/g), T6-10 (2 ng/g), T16-1 (24 ng/g), T16-4 (14 ng/g), and W7-3 (24 ng/g).

The data quality assurance/quality control (QA/QC) qualifiers generated by the laboratory also were used to reduce the data matrix. All congeners that were flagged with a “U” qualifier (non-detect) in more than five samples were removed from the analysis. This resulted in removal of 51 congeners, resulting in a matrix of 97 samples by 56 congeners. For the most part, data flagged with a “J” qualifier

(detected, but below the sample specific MDL) did not appear to adversely effect the model, with one notable exception: PCB 184 was reported as non-detect in only 2 of the 97 samples, but had a "J" qualifier across the entire data set. The goodness-of-fit diagnostic analysis indicated that this analyte could not be back-calculated from principal component space with accuracy. As such, PCB 184 was removed from the analysis.

In a preliminary model run, one of the derived fingerprints was very similar to a dechlorination pattern reported by Quensen et al. (1990). However, Quensen did not report as many congeners as did the BCO laboratory. Three additional congeners (PCB 84, PCB 92, and PCB 128) were removed from the data set so that the LH data would be directly comparable to the Quensen et al. (1990) study.

Several data outliers were identified. Three of these outliers coincided with samples with coarse grain size distributions. Although no QA/QC problems could be identified for the outliers, these samples were removed from the analysis in the interest of obtaining a robust data set. Their removal does not imply that they are invalid, but rather that they are unique with respect to at least one congener. The outlier samples that were removed included the following: Q-3, T6-6, T16-5, W7-8, W7-9, and W7-10. Future analyses of this data set may warrant closer scrutiny of these samples and the reason(s) for their unique behavior.

The data processing steps described above resulted in an input matrix composed of 91 samples (Table 4-2) and 52 PCB congeners (Table 4-3). Lastly, all concentrations were normalized to t-PCB concentrations as percentages. This is important because it removes congener concentration as a variable in the analysis. For t-PCB concentrations, the reader is referred to Section 3.0 of this report.

4.6.2 Number of Fingerprints. The first step in PVA is the determination of the number of end-members (i.e., the number of unique fingerprint patterns) in the system. For example, a mixture of two Aroclors would be expected to provide two end-member patterns. However, if one of the Aroclors exhibited extensive weathering, a third "weathered" end-member pattern could appear.

Table 4-2. Samples Used in the PVA Model

Core T16	Core W7	Core Q	Core P	Core O	Core N	Core L	Core J	Core I	Core T6
T16-2	W7-1	Q-1	P-1	O-1	N-1	L-1	J-1	I-1	T6-1
T16-3	W7-2	Q-2	P-2	O-2	N-2	L-2	J-2	I-2	T6-2
T16-6	W7-4	Q-4	P-3	O-3	N-3	L-3	J-3	I-3	T6-3
T16-7	W7-5	Q-5	P-4	O-4	N-4	L-4	J-4	I-4	T6-4
T16-8	W7-6	Q-6	P-5	O-5	N-5	L-5	J-5	I-5	T6-5
T16-9	W7-7	Q-7	P-6	O-6	N-6	L-6		I-6	T6-7
T16-10	W7-11	Q-8	P-7	O-7	N-7	L-7		I-7	T6-8
		Q-9	P-8	O-8	N-8	L-8		I-8	
		Q-10	P-9	O-9	N-9	L-9		I-9	
			P-10			L-10		I-10	
						L-11		I-11	
						L-12			
						L-13			
						L-14			
						L-15			
						L-16			
						L-17			

Table 4-3. Congeners Used in the PVA Model

IUPAC No.	No. of Chlorines	Congener Name
PCB 1	1	2-chlorobiphenyl
PCB 3	1	4-chlorobiphenyl
PCB 4/10	2	2,2'/2,6-dichlorobiphenyl
PCB 6	2	2,3'-dichlorobiphenyl
PCB 7/9	2	2,4/2,5-dichlorobiphenyl
PCB 8/5	2	2,4'/2,3-dichlorobiphenyl
PCB 16/32	3	2,2',3/2,4',6-trichlorobiphenyl
PCB 17	3	2,2',4-trichlorobiphenyl
PCB 18	3	2,2',5-trichlorobiphenyl
PCB 19	3	2,2',6-trichlorobiphenyl
PCB 24/27	3	2,3,6/2,3',6-trichlorobiphenyl
PCB 25	3	2,3',4-trichlorobiphenyl
PCB 26	3	2,3',5-trichlorobiphenyl
PCB 28	3	2,4,4'-trichlorobiphenyl
PCB 31	3	2,4',5-trichlorobiphenyl
PCB 41/64/71	4	2,2',3,4/2,3,4',6/2,3',4',6-tetrachlorobiphenyl
PCB 42	4	2,2',3,4'-tetrachlorobiphenyl
PCB 44	4	2,2',3,5'-tetrachlorobiphenyl
PCB 45	4	2,2',3,6-tetrachlorobiphenyl
PCB 47/75	4	2,2',4,4'/2,4,4',6-tetrachlorobiphenyl
PCB 49	4	2,2',4,5'-tetrachlorobiphenyl
PCB 51	4	2,2',4,6'-tetrachlorobiphenyl
PCB 52	4	2,2',5,5'-tetrachlorobiphenyl
PCB 53	4	2,2',5,6'-tetrachlorobiphenyl
PCB 56/60	4	2,3,3',4'/2,3,4,4'-tetrachlorobiphenyl
PCB 59	4	2,3,3',6-tetrachlorobiphenyl
PCB 63	4	2,3,4',5-tetrachlorobiphenyl
PCB 66	4	2,3',4,4'-tetrachlorobiphenyl
PCB 70/76	4	2,3',4',5/2',3,4,5-tetrachlorobiphenyl
PCB 74	4	2,4,4',5-tetrachlorobiphenyl
PCB 85	5	2,2',3,4,4'-pentachlorobiphenyl
PCB 91	5	2,2',3,4',6-pentachlorobiphenyl
PCB 95	5	2,2',3,5',6-pentachlorobiphenyl
PCB 97	5	2,2',3',4,5-pentachlorobiphenyl
PCB 99	5	2,2',4,4’,5-pentachlorobiphenyl
PCB 101/90	5	2,2',4,5,5'/2,2',3,4',5-pentachlorobiphenyl
PCB 105	5	2,3,3',4,4'-pentachlorobiphenyl
PCB 110	5	2,3,3',4',6-pentachlorobiphenyl
PCB 118	5	2,3',4,4',5-pentachlorobiphenyl
PCB 132	6	2,2',3,3',4,6'-hexachlorobiphenyl
PCB 135/144	6	2,2',3,3',5,6'/2,2',3,4,5',6-hexachlorobiphenyl
PCB 136	6	2,2',3,3',6,6'-hexachlorobiphenyl
PCB 138/160/163	6	2,2',3,4,4',5'/2,3,3',4,5,6/2,3,3',4',5,6-hexachlorobiphenyl
PCB 146	6	2,2',3,4',5,5'-hexachlorobiphenyl
PCB 149	6	2,2',3,4',5',6-hexachlorobiphenyl
PCB 151	6	2,2',3,5,5',6-hexachlorobiphenyl
PCB 153	6	2,2',4,4',5,5'-hexachlorobiphenyl
PCB 156	6	2,3,3',4,4',5-hexachlorobiphenyl
PCB 174	7	2,2',3,3',4,5,6'-heptachlorobiphenyl
PCB 177	7	2,2',3,3',4',5,6-heptachlorobiphenyl
PCB 180	7	2,2',3,4,4',5,5'-heptachlorobiphenyl
PCB 187/182	7	2,2',3,4',5,5',6/2,2',3,4,4',5,6'-heptachlorobiphenyl

Determination of the number of end members is accomplished by evaluating the number of significant principal components. Criteria used included the normalized loadings method of Ehrlich and Full (1987), the signal-to-noise criterion of Henry et al. (1999), and inspection of goodness-of-fit indices and scatter-plots as described by Miesch (1976) and Johnson et al. (2000). After an end-member model is identified, it is used to back-calculate analyte concentrations. The back-calculated concentrations then are compared to the measured analyte concentrations for "goodness of fit." Given a perfect fit, all data points will plot on a 1:1 slope, and the Miesch coefficient of determination (CD) (Miesch, 1976) will be 1.0.

In this study, back-calculation plots were developed for each of the 52 congeners, for each potential number of end-members (e.g., for two-, three-, and four-end-member models). A three-end-member model (i.e., a three-PC model) was determined to best fit the LH data set. The back-calculation plots for the three-end-member model are shown in Figure 4-10. The *x*-axis of each plot shows the measured amount of each congener in percent. The *y*-axis shows the back-calculated value using the three-end-member model. The 1:1 slope and Miesch CD values are shown for each congener. Goodness-of-fit diagnostics were in good agreement with the three-PC system, and the three-end-member model could back-calculate the vast majority of the 52 analytes with good agreement for most congeners. Five PCB peaks that were not accurately back-calculated from three end-members were: PCB 3, PCB 7/9, PCB 18, PCB 25, and PCB 26. The feasibility of a four-PC system was evaluated, to determine whether a fourth end-member was unaccounted for in the three end-member model. In the four-end-member model, the fourth fingerprint profile proved to be an intermediate of two patterns resolved in the three-end-member model, and provided no additional information about the PCB patterns observed at the site. The four-end-member model also did not noticeably improve the back-calculated values of the five PCB peaks troubled by the three-end-member model. These results led to the conclusion that the three-PC system (i.e., the three-end-member model) best suited the LH data set.

4.6.3 Fingerprint Compositions and Geographic Temporal Distributions. PVA resolved the three-end-member patterns. The end-member congener compositions and their mixing proportions in each core sample are shown graphically in Figures 4-11, 4-12, and 4-13 and in tabular form in Tables 4-4 and 4-5. On each graph, the vertical distribution of the end-member fingerprint is plotted for each of the 10 cores in this study. For each core, the age of the sample with the maximum amount of that particular fingerprint pattern is labeled. For cores J, P, Q, W7, and T16, age estimates could not be calculated, and the maxima in these cores are labeled as "N."

Interpretation of end-member patterns was accomplished by comparison to reference data sets, including: 1) Aroclor compositions provided by Battelle; 2) Aroclor compositions reported by Frame et al. (1996); and 3) PCB patterns resulting from environmental fate processes such as dechlorination and volatilization (Chiarenzelli et al., 1997; Johnson and Chiarenzelli, 2000; Bedard and Quensen, 1995; Johnson and Quensen, 2000). The end-member compositions reported were derived by PVA, solely through analysis of the ambient data. The reference data sets were used only on the back end of the analysis for interpretation of the derived end-member patterns. In other words, the suspected source and alteration patterns presented in these referenced papers were not used to derive the model or to predict the outcome of the end-member patterns. No training data set was used. The chemical composition, geographic/temporal distribution, and interpretations for each end-member fingerprint (EM-1, EM-2, and EM-3), are discussed below.

End-Member 1. The composition and distribution of EM-1 are shown in Table 4-4 and Figure 4-11. Initial visual inspection of Aroclor patterns in comparison to EM-1 suggested that the pattern had characteristics of both Aroclors 1248 and 1254. Mixture of these two Aroclors was evaluated by calculation until the best possible match was established with EM-1 based on cosine theta (θ) values. The cosine θ (Davis, 1986) calculates the cosine of the angle between two multivariate vectors. A cosine θ value of 0 would indicate two completely dissimilar, orthogonal vectors, and a cosine θ value of 1.0

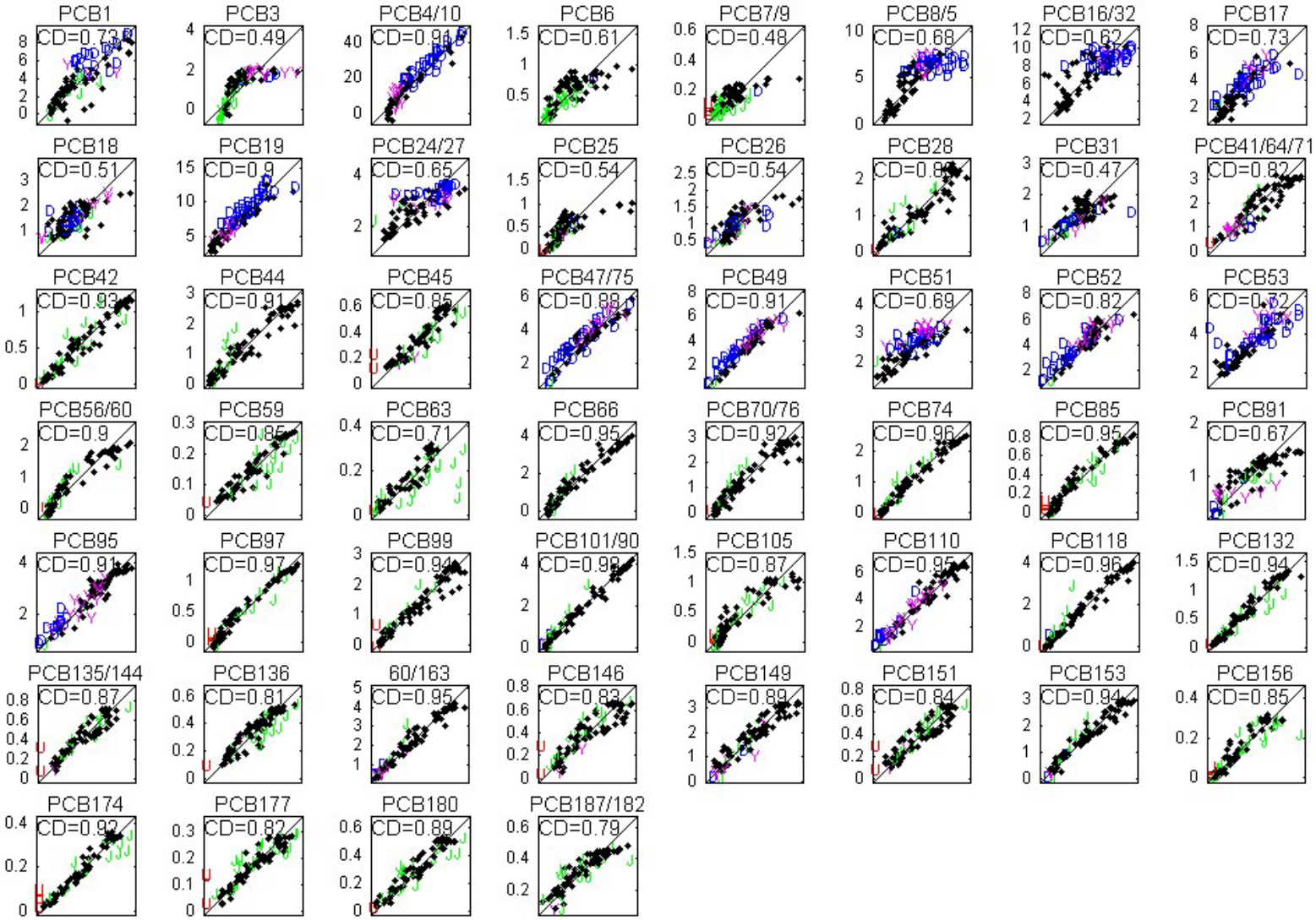


Figure 4-10. Miesch CD Scatter Plots for the Three-End-Member (i.e., Three-PC) Model. Solid dots indicate data with no QA/QC qualifiers. Qualified data are indicated by letter. J (green) indicates detected, but below the sample specific MDL. Y (magenta) indicates peak area higher than the highest calibration standard. U (red) indicates analyte not detected (Concentration reported as 0.0 ng/g). D (blue) indicates diluted sample concentration reported.

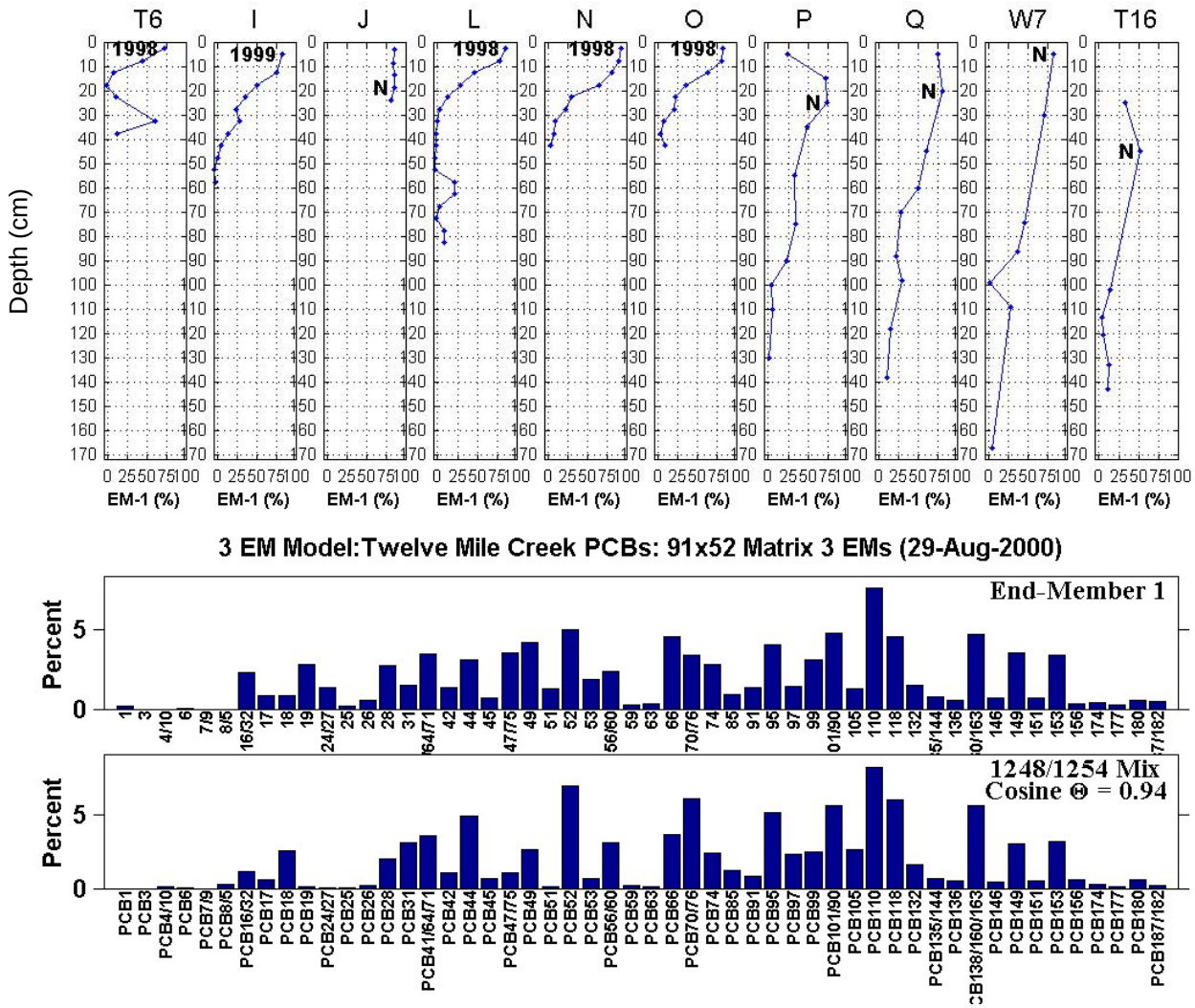


Figure 4-11. Composition and Distribution of EM-1. The upper bar graph is the chemical composition of EM-1 as reported in Table 4-4. The lower bar graph is a 50/50 Mixture of Aroclor 1248 and Aroclor 1254. Cosine θ is a quantitative measure of the similarity of two multivariate vectors ranging from 0 (dissimilar) to 1.0 (equivalent). The EM-1 pattern is interpreted as representative of a homogenized 1248/1254 source, or alternatively, a homogenized 1242/1254 source where the low molecular weight congeners of Aroclor 1242 have volatilized. Vertical EM concentration profiles are shown. Dates correspond to segments with maximum concentrations; N is used for cores that could not be dated.

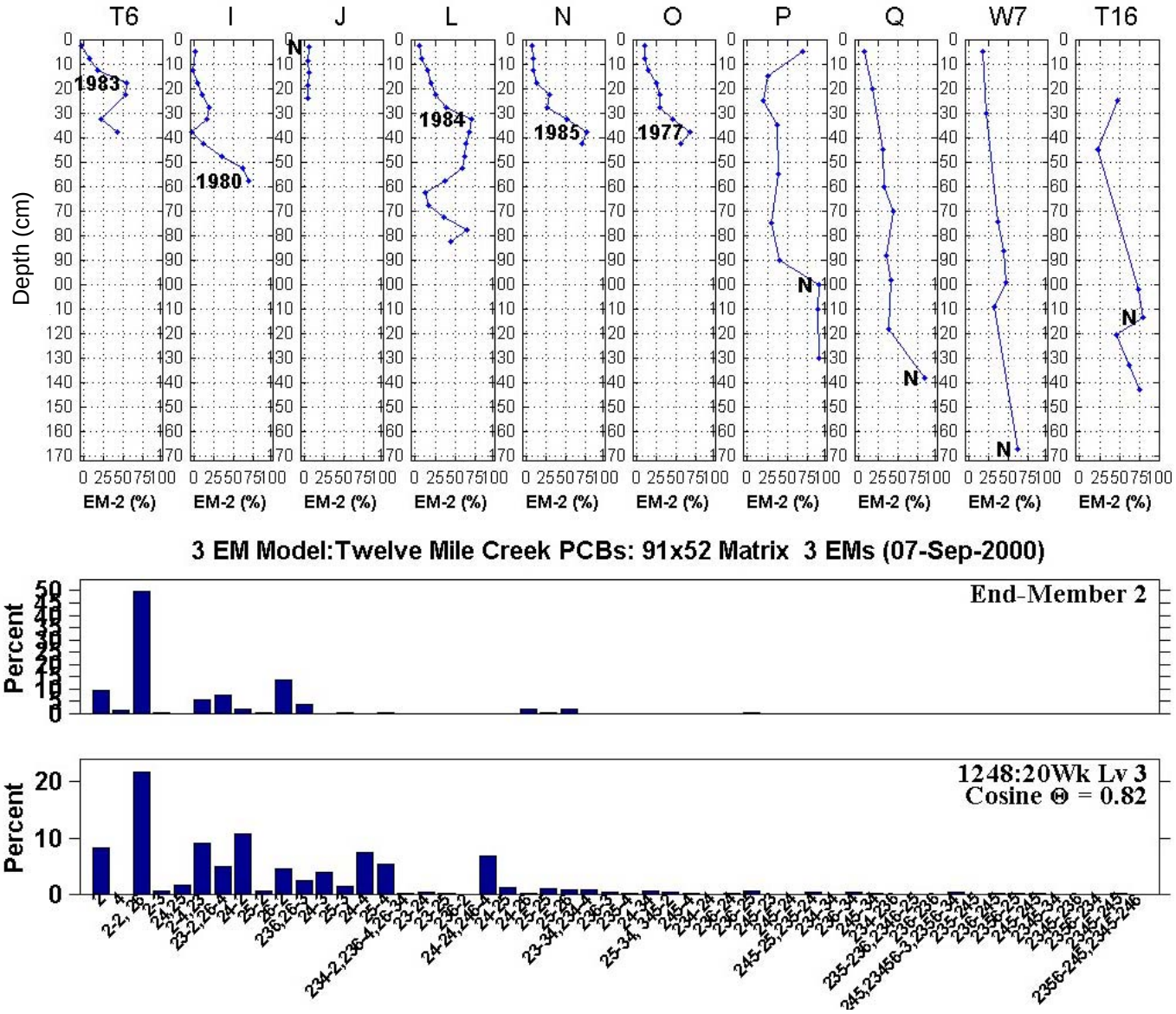


Figure 4-12. Composition and Distribution of EM-2. The upper bar graph is the EM-2 chemical composition as reported in Table 4-4. The lower bar graph represents process C dechlorination operated on Aroclor 1248 spiked sediments for a 20-week period, based on data reported by Quensen et al. (1990). Vertical EM concentration profiles are shown. Dates correspond to segments with maximum concentrations; N is used for cores that could not be dated.

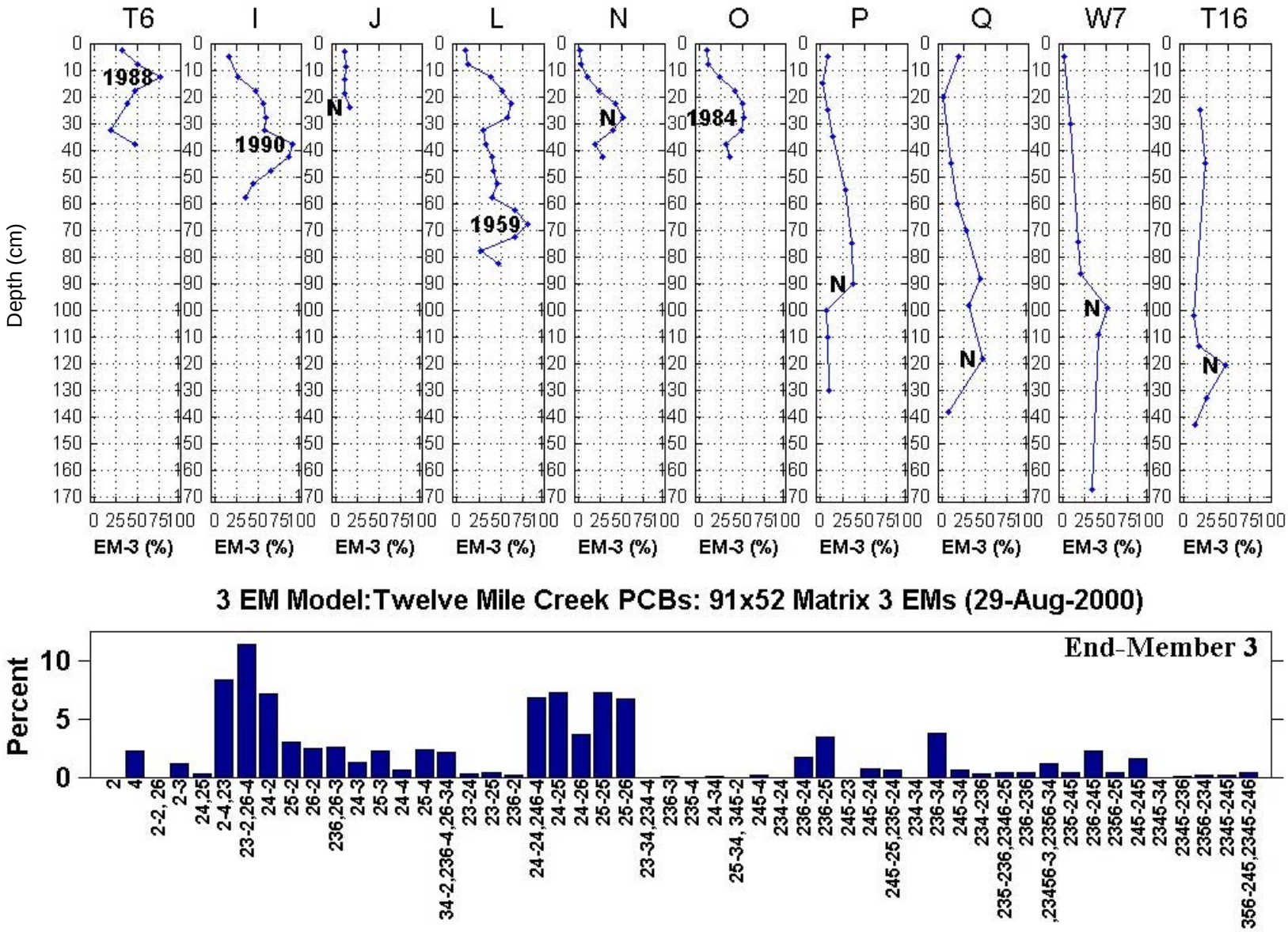


Figure 4-13. Composition and Distribution of EM-3. The bar graph is the EM-3 chemical composition as reported in Table 4-4. Vertical EM concentration profiles are shown. Dates correspond to segments with maximum concentrations; N is used for cores that could not be dated.

Table 4-4. End-Member Compositions for the Three-End-Member Model

IUPAC	Structure	EM-1 %	EM-2 %	EM-3 %
PCB 1	2-chlorobiphenyl	0.22	9.69	0.00
PCB 3	4-chlorobiphenyl	0.00	1.62	2.26
PCB 4/10	2,2'/2,6-dichlorobiphenyl	0.00	49.52	0.00
PCB 6	2,3'-dichlorobiphenyl	0.05	0.43	1.15
PCB 7/9	2,4/2,5-dichlorobiphenyl	0.03	0.04	0.35
PCB 8/5	2,4'/2,3-dichlorobiphenyl	0.00	5.73	8.37
PCB 16/32	2,2',3/2,4',6-trichlorobiphenyl	2.30	7.43	11.31
PCB 17	2,2',4-trichlorobiphenyl	0.88	1.84	7.09
PCB 18	2,2',5-trichlorobiphenyl	0.88	0.49	3.05
PCB 19	2,2',6-trichlorobiphenyl	2.86	13.83	2.53
PCB 24/27	2,3,6/2,3',6-trichlorobiphenyl	1.38	3.67	2.63
PCB 25	2,3',4-trichlorobiphenyl	0.18	0.00	1.29
PCB 26	2,3',5-trichlorobiphenyl	0.55	0.30	2.23
PCB 28	2,4,4'-trichlorobiphenyl	2.78	0.00	0.68
PCB 31	2,4',5-trichlorobiphenyl	1.50	0.30	2.42
PCB 41/64/71	2,2',3,4/2,3,4',6/2,3',4',6-tetrachlorobiphenyl	3.49	0.00	2.14
PCB 42	2,2',3,4'-tetrachlorobiphenyl	1.38	0.00	0.37
PCB 44	2,2',3,5'-tetrachlorobiphenyl	3.14	0.00	0.43
PCB 45	2,2',3,6-tetrachlorobiphenyl	0.69	0.06	0.22
PCB 47/75	2,2',4,4'/2,4,4',6-tetrachlorobiphenyl	3.59	0.11	6.78
PCB 49	2,2',4,5'-tetrachlorobiphenyl	4.20	0.00	7.25
PCB 51	2,2',4,6'-tetrachlorobiphenyl	1.31	2.10	3.71
PCB 52	2,2',5,5'-tetrachlorobiphenyl	5.06	0.37	7.26
PCB 53	2,2',5,6'-tetrachlorobiphenyl	1.92	2.03	6.67
PCB 56/60	2,3,3',4'/2,3,4,4'-tetrachlorobiphenyl	2.39	0.00	0.00
PCB 59	2,3,3',6-tetrachlorobiphenyl	0.31	0.01	0.11
PCB 63	2,3,4',5-tetrachlorobiphenyl	0.36	0.00	0.05
PCB 66	2,3',4,4'-tetrachlorobiphenyl	4.59	0.00	0.09
PCB 70/76	2,3',4',5/2',3,4,5-tetrachlorobiphenyl	3.44	0.00	0.05
PCB 74	2,4,4',5-tetrachlorobiphenyl	2.88	0.00	0.23
PCB 85	2,2',3,4,4'-pentachlorobiphenyl	0.94	0.00	0.00
PCB 91	2,2',3,4',6-pentachlorobiphenyl	1.35	0.05	1.69
PCB 95	2,2',3,5',6-pentachlorobiphenyl	4.11	0.35	3.51
PCB 97	2,2',3',4,5-pentachlorobiphenyl	1.45	0.00	0.00
PCB 99	2,2',4,4’,5-pentachlorobiphenyl	3.11	0.00	0.81
PCB 101/90	2,2',4,5,5'/2,2',3,4',5-pentachlorobiphenyl	4.81	0.00	0.69
PCB 105	2,3,3',4,4'-pentachlorobiphenyl	1.31	0.00	0.00
PCB 110	2,3,3',4',6-pentachlorobiphenyl	7.62	0.00	3.78
PCB 118	2,3',4,4',5-pentachlorobiphenyl	4.57	0.00	0.62
PCB 132	2,2',3,3',4,6'-hexachlorobiphenyl	1.52	0.00	0.28
PCB 135/144	2,2',3,3',5,6'/2,2',3,4,5',6-hexachlorobiphenyl	0.82	0.00	0.46
PCB 136	2,2',3,3',6,6'-hexachlorobiphenyl	0.57	0.02	0.46
PCB 138/160/163	2,2',3,4,4',5'/2,3,3',4,5,6/2,3,3',4',5,6-hexachlorobiphenyl	4.77	0.00	1.19
PCB 146	2,2',3,4',5,5'-hexachlorobiphenyl	0.76	0.00	0.44
PCB 149	2,2',3,4',5',6-hexachlorobiphenyl	3.60	0.00	2.26
PCB 151	2,2',3,5,5',6-hexachlorobiphenyl	0.75	0.00	0.41
PCB 153	2,2',4,4',5,5'-hexachlorobiphenyl	3.41	0.00	1.61
PCB 156	2,3,3',4,4',5-hexachlorobiphenyl	0.36	0.00	0.01
PCB 174	2,2',3,3',4,5,6'-heptachlorobiphenyl	0.42	0.00	0.11
PCB 177	2,2',3,3',4',5,6-heptachlorobiphenyl	0.31	0.00	0.22
PCB 180	2,2',3,4,4',5,5'-heptachlorobiphenyl	0.60	0.00	0.27
PCB 187/182	2,2',3,4',5,5',6/2,2',3,4,4',5,6'-heptachlorobiphenyl	0.49	0.00	0.47
	Total	100%	100%	100%

Table 4-5. End-Member Mixing Proportions in Core Samples

Sample	EM-1	EM-2	EM-3
Core T16			
T16-2	33%	48%	19%
T16-3	52%	23%	24%
T16-6	14%	74%	11%
T16-7	4%	80%	17%
T16-8	6%	46%	48%
T16-9	13%	62%	25%
T16-10	11%	75%	13%
Core W7			
W7-1	82%	17%	0%
W7-2	70%	22%	8%
W7-4	46%	37%	17%
W7-5	36%	43%	20%
W7-6	1%	47%	52%
W7-7	27%	33%	40%
W7-11	4%	62%	34%
Core Q			
Q-1	75%	7%	18%
Q-2	81%	18%	1%
Q-4	59%	31%	10%
Q-5	50%	32%	18%
Q-6	28%	44%	28%
Q-7	22%	35%	43%
Q-8	29%	40%	31%
Q-9	15%	38%	47%
Q-10	10%	84%	7%
Core P			
P-1	24%	69%	8%
P-2	72%	26%	2%
P-3	73%	19%	8%
P-4	49%	37%	15%
P-5	33%	38%	29%
P-6	34%	30%	36%
P-7	23%	40%	37%
P-8	4%	90%	6%
P-9	5%	88%	7%
P-10	1%	90%	9%

Sample	EM-1	EM-2	EM-3
Core O			
O-1	82%	10%	8%
O-2	80%	10%	10%
O-3	63%	14%	23%
O-4	35%	25%	40%
O-5	22%	29%	49%
O-6	20%	29%	51%
O-7	6%	45%	49%
O-8	2%	68%	30%
O-9	9%	55%	36%
Core N			
N-1	93%	6%	1%
N-2	89%	8%	2%
N-3	82%	9%	10%
N-4	64%	12%	23%
N-5	29%	29%	42%
N-6	22%	26%	52%
N-7	9%	52%	39%
N-8	6%	76%	18%
N-9	2%	71%	27%
Core L			
L-1	85%	5%	10%
L-2	79%	8%	13%
L-3	46%	15%	39%
L-4	28%	20%	52%
L-5	13%	25%	62%
L-6	3%	39%	58%
L-7	0%	70%	30%
L-8	-2%	69%	33%
L-9	-3%	63%	40%
L-10	-3%	61%	42%
L-11	-4%	59%	46%
L-12	22%	38%	40%
L-13	22%	12%	66%
L-14	2%	17%	81%
L-15	-3%	36%	67%
L-16	8%	65%	27%
L-17	8%	44%	47%

Sample	EM-1	EM-2	EM-3
Core J			
J-1	85%	6%	10%
J-2	84%	4%	12%
J-3	85%	5%	10%
J-4	86%	4%	11%
J-5	80%	4%	16%
Core I			
I-1	83%	2%	15%
I-2	75%	-2%	27%
I-3	49%	4%	47%
I-4	35%	9%	56%
I-5	23%	18%	58%
I-6	27%	16%	57%
I-7	13%	-3%	90%
I-8	4%	11%	86%
I-9	0%	36%	65%
I-10	-5%	61%	44%
I-11	-4%	69%	35%
Core T6			
T6-1	71%	-4%	32%
T6-2	44%	6%	50%
T6-3	7%	17%	76%
T6-4	-2%	54%	47%
T6-5	9%	53%	38%
T6-7	60%	22%	18%
T6-8	11%	42%	47%

would indicate two identical vectors. The highest cosine θ (0.94) was achieved when EM-1 was compared with a 50/50 mixture of Aroclors 1248 and 1254. The lower bar graph in Figure 4-11 shows the 50/50 mix in comparison to EM-1.

Information from the Sangamo-Weston/Twelvemile Creek/LH ROD (U.S. EPA, 1994) and discussions with Mr. Craig Zeller, the U.S. EPA Site Remedial Project Manager (RPM) indicated that the Sangamo-Weston plant primarily used Aroclors 1016, 1242, and 1254. Thus, the presence of Aroclor 1254 in the EM-1 mixture was not surprising, but the presence of Aroclor 1248 was unexpected because it was not used. However, work by Chiarenzelli and colleagues (Chiarenzelli et al., 1997; Johnson and Chiarenzelli, 2000) demonstrated that when Aroclor 1242 volatilizes from soils, the residue remaining in the soil can have a PCB profile virtually identical to unaltered Aroclor 1248. To the extent that the information indicating that Aroclor 1242 (not 1248) was used is accurate, the Aroclor 1248 pattern in the EM-1 end-member pattern may be related to a weathered Aroclor 1242, and the EM-1 pattern is consistent with a mixed weathered Aroclor 1242/Aroclor 1254 source.

The compositions of Aroclors 1016 and 1242 are very similar (Appendix F) in that both Aroclors are dominated by Cl-2, Cl-3 and Cl-4 homologues (Figure 4-4 and Appendix G). This similarity suggests that the 1248 pattern also could be partly the result of weathered Aroclor 1016. Although Chiarenzelli and colleagues did not study Aroclor 1016 volatilization, Aroclors 1016 and 1242 are similar enough that they would likely weather similarly. Separating their individual contributions to EM-1 is not possible using the existing data set; thus, EM-1 likely represents a mixture of Aroclor 1254 with weathered residues of Aroclors 1242 and 1016, which resembles a 50/50 mixture of Aroclors 1254 and 1248.

Resolution of a source pattern with mixed characteristics of two sources indicates that the two were deposited on the lake floor in relatively constant proportions. This result suggests that either 1) a single source of mixed Aroclors is present or 2) two or more sources contributed to the pattern, but their relative contributions were somehow homogenized prior to their deposition. The EM-1 distribution figures in Figure 4-11 indicate that EM-1 is most abundant in the upper section of the cores (in the most recently deposited sediments) and is depleted to low or non-detectable levels with increasing depth.

End-Member 2. End-Member 2 did not exhibit a good match with any known Aroclor or calculated Aroclor mixtures. The pattern is dominated by low chlorinated congeners, including mono-, di-, and trichlorobiphenyls. More specifically, the congeners that make up EM-2 preferentially exhibit chlorines in the 2 (*ortho*), 4 (*para*), and 6 (*ortho*) positions. The dominant congeners are 2,2'/2,6-CB (PCB 4/10), 2 CB (PCB 1), 2,2',6-CB (PCB 19), and 2,2',3/2,4',6-CB (PCB 16/32) (Figure 4-10). The inferred Aroclor 1242/1254 source in the study area and the dominance of *ortho*- and *para*-chlorines (i.e., the absence of congeners with chlorines in *meta* positions) suggest that EM-2 is a result of a microbial dechlorination process.

Bedard and Quensen (1995) review a variety of dechlorination processes reported in the literature; these processes have been identified as *Process M*, *Process Q*, *Processes H* and *H'*, *Process P*, *Process N*, and *Process C*. The EM-2 end-member pattern most closely resembles *Process C*, described by Bedard and Quensen (1995) and Quensen et al. (1990). Quensen et al. (1990) reported this pattern as a result of laboratory dechlorination experiments using organisms from Hudson River sediments. Results from one of these experiments are shown in Figure 4-14, where the top bar graph is unaltered Aroclor 1242, the middle bar graph is the dechlorinated 1242 composition after a 20-week incubation period, and the bottom graph shows the difference between these two patterns. The figures show a significant increase in lower chlorinated, *ortho*- and *para*- dominated congeners with dechlorination.

Quensen et al. (1990) also demonstrated that *Process C* could operate on Aroclors 1248 (as shown on Figure 4-12) and Aroclor 1254 (not shown), in addition to Aroclor 1242 (Figure 4-14). The

20-week dechlorination pattern based on Aroclor 1248 is shown in Figure 4-12 for comparison with EM-2. The cosine θ between these two patterns is 0.82, suggesting that the patterns are similar. EM-2 exhibits higher proportions of lower chlorinated congeners and fewer tri- and tetrachlorobiphenyls than the 20-week dechlorinated sample. This result may be due to the much longer incubation observed with the LH sediments (0 to 20 years), which would be expected to result in more extensive dechlorination of the tri- and tetrachlorobiphenyl congeners.

EM-2 is encountered in high proportions in all cores except Core J (Figure 4-12). In the five dated cores, the maximum proportion of EM-2 occurs in sediments with assigned ages between 1977 and 1985. The maximum proportions of EM-2 roughly correspond to sediment intervals of highest total PCB concentration (Figures 3-1 through 3-10). *Process C* may have been favored in LH sediments due to the unique microbial community or possibly to high PCB concentrations in the sediments.

End-Member 3. End-member 3 is characterized by di-, tri-, and tetrachlorobiphenyl congeners (Figure 4-13). Review of known dechlorination processes suggest that this pattern is related to *Process H'* dechlorination (Bedard and Quensen, 1995; Alder et al., 1993; Rhee et al., 1993). *Process H'* involves dechlorination of 23-, 234, and possibly 236-chlorophenyl groups at the *meta* (i.e., 3 and 5) positions, and 34- and 245-chlorophenyls at the *para* (i.e., 4) position. However, unlike *Process C*, reference data from *Process H'* dechlorination experiments were unavailable for comparison with EM-3.

Figure 4-15 illustrates the inferred dechlorination of EM-1 (assuming EM-1 as the source) and EM-3 (assuming EM-3 as an intermediate byproduct). The congeners that are lost in the process (i.e., those that show a negative difference on the bottom bar chart graph of Figure 4-15) all have chlorine groups that Bedard and Quensen (1995) indicate are susceptible to *Process H'* dechlorination (i.e., PCB congeners with 23-, 34-, 234-, 245-, 236-, 2345-, and 23456-groups). Congeners that they report as characteristic end-products resulting from *Process H'* (2,3'-, 2,4'-, 2,2',4-, 2,2',5-, 2,4',5-, 2,2',4,5'-, and 2,2',5,5'-) generally show positive differences in Figure 4-15. There are some exceptions (e.g., 2,4,4' is a predicted *H'* dechlorination product but a negative difference is indicated in Figure 4-15), but for most congeners, EM-3 appears consistent with *Process H'* dechlorination.

The EM-3 pattern is observed in high proportions in samples from each of the 10 cores (Figure 4-13). Maximum EM-3 concentrations appear to be associated with samples deposited between 1984 and 1990, with one exception in Core L where a high concentration is observed in a sample deposited in 1959.

4.6.4 PVA and End-Member Identification Summary. PVA was used to analyze sediment PCB data from LH. Three chemical fingerprints (end-members) were resolved. EM-1 was interpreted to be an unaltered source mixture of Aroclor 1254 and weathered Aroclor 1242 and/or 1016. As expected, the unaltered source pattern is present in highest proportions in recently deposited sediments (dated between 1998 and 1999) and is depleted to low or nondetected concentrations with increasing sediment depth. In most cores the upper sediment intervals also correspond with lower t-PCB concentrations. The unaltered source patterns in these upper sediments in cores suggest that PCBs in younger, surface sediments are the result of recent transport and deposition from unaltered sources located upgradient. It is unlikely that the EM-1 PCBs are the result of the resuspension and redeposition of deeply deposited sediments from within or upgradient of LH. If the PCBs in the surface sediments resulted from the disturbance and redeposition of deep sediment deposits, a greater degree of dechlorination should have been evident and the samples would have more closely resembled EM-2 and EM-3 or other reported dechlorination patterns. In fact, an opposite trend was apparent: surface sediments exhibited a relative depletion of lower chlorinated congeners and an accumulation of higher chlorinated congeners, suggesting that they were affected by weathering and not dechlorination.

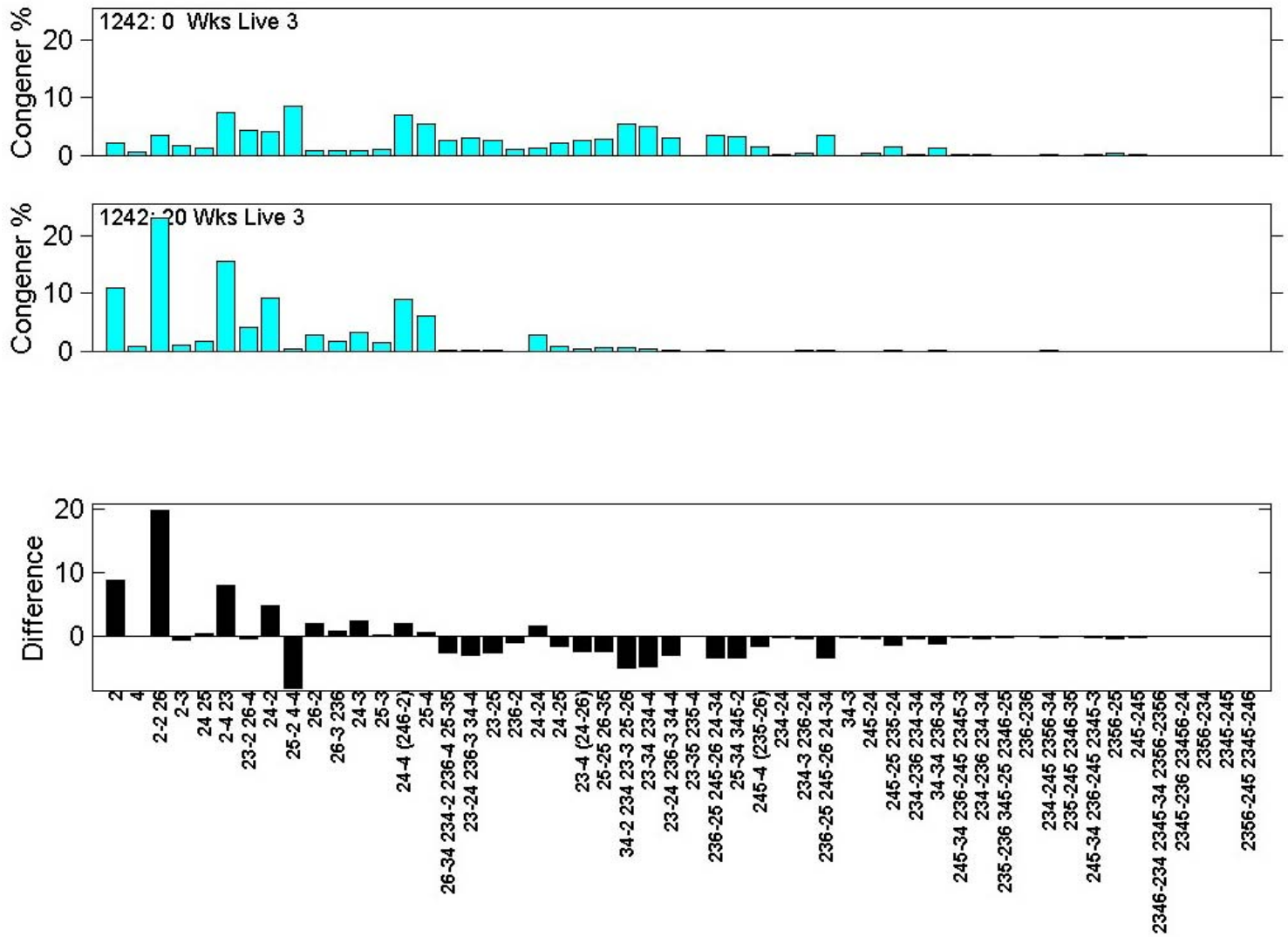


Figure 4-14. Illustration of Results from Aroclor 1242 Dechlorination Experiment Described by Quensen et al. (1990). "0 Wks Live" represents the unaltered composition of Aroclor 1242. "20 Wks Live" represents dechlorinated congener composition after 20 weeks incubation in presence of anaerobic microorganisms from Hudson River sediments. The bottom bar graph represents the difference between the "0 Wks Live" and "20 Wks Live" congener compositions. Note similarity of the "20 Wks Live" composition to EM-2 (Figure 4-12).

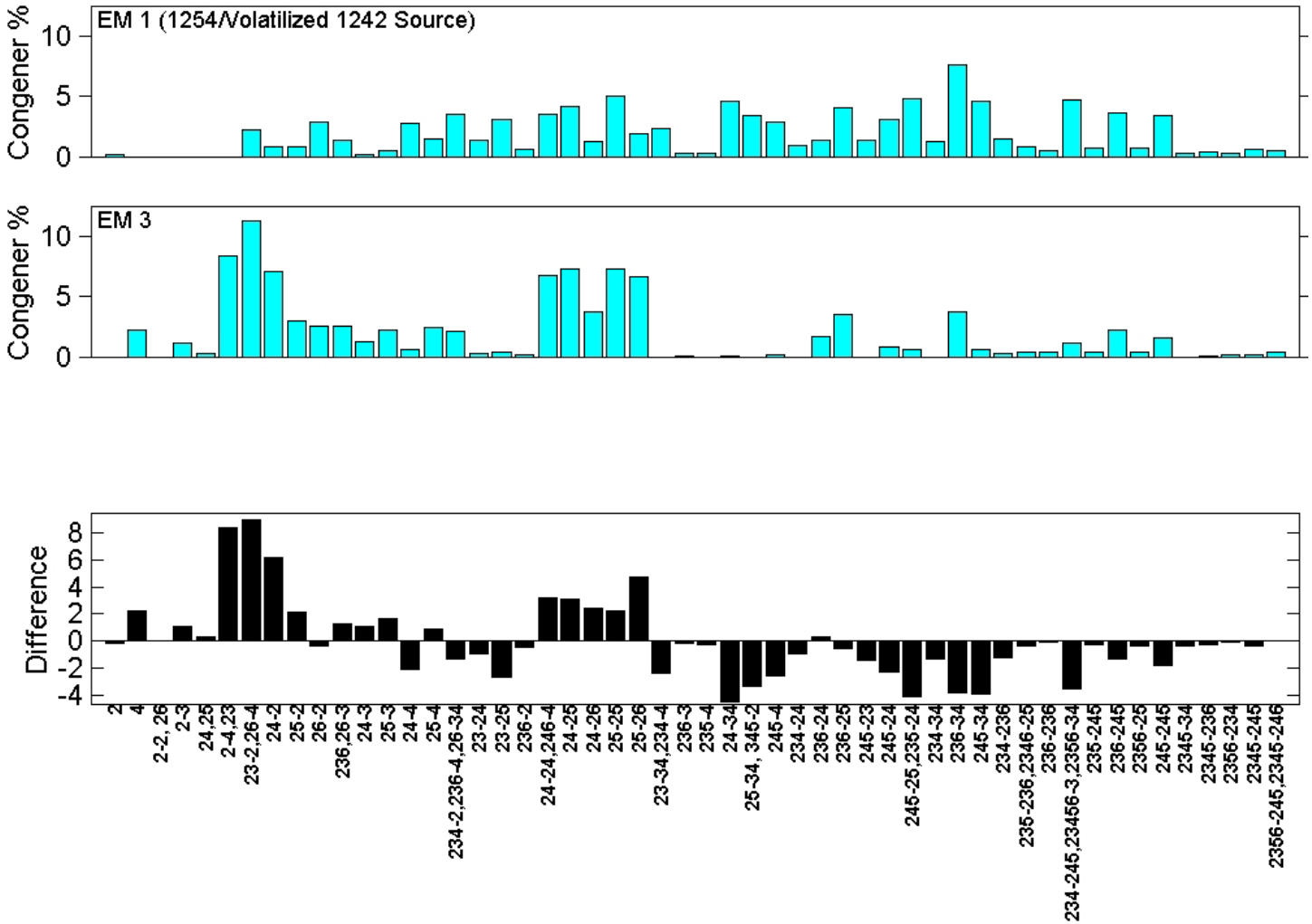


Figure 4-15. Comparison of EM-1 (Upper Bar Graph) and EM-3 (Middle Bar Graph). EM-1 is consistent with a mixture of Aroclor 1254 and weathered Aroclors 1242 and/or 1016; EM-3 is consistent with *Process H'* (Bedard and Quensen, 1995; Rhee et al., 1993; and Alder et al., 1993). The bottom graph shows the difference between the EM-1 and EM-3 congener distributions; congeners showing a net loss have chlorine groups consistent with expected *Process H'* dechlorination, including congeners with 23-, 34-, 234-, 236-, 245-, 2345, and 23456-groups. Resulting dominant congeners in EM-3 are consistent with *Process H'* dechlorination products.

The other two fingerprint patterns are related to microbial dechlorination processes (*Process C* and *Process H'*). Both patterns were found in highest proportions in buried sediments. Samples with proportions of the *Process C* (EM-2) fingerprint coincided with the core intervals with maximum t-PCB concentrations and sediments deposited between 1977 and 1985. The *Process H'* (EM-3) sediments were associated with sediments deposited between 1984 and 1990. *Process C* exhibited the highest proportion of lower-chlorinated congeners and the lowest proportion of tri-, tetra-, and higher-chlorinated congeners, suggesting that these sediments had undergone the most extensive dechlorination at the site. *Process H'* appeared to be an intermediate between the source (EM-1) sediments and *Process C* (EM-2) sediments. The *Process H'* (EM-3) sediments had a higher proportion of lower chlorinated congeners than did the EM-1 sediments, but they also had a higher proportion of higher chlorinated congeners than did the EM-2 sediments.

5.0 AGE DATING RESULTS AND LAKE HARTWELL SEDIMENTATION RATES

Sediment cores from Twelvemile Creek and LH were age dated using the natural radioisotope ^{210}Pb. The activity of ^{137}Cs, a radioisotope present in the environment primarily from atmospheric fallout from nuclear weapons testing, also was measured and used to confirm the age dating. Both of these isotopes entered the LH system primarily from atmospheric deposition and are adsorbed to the surface of particles. ^{210}Pb is a decay product of the uranium-238 (^{238}U) decay series and has a half-life of 22.3 years. Crustal material contains ^{238}U and ^{210}Pb that is in equilibrium with the decay of the ^{238}U. This activity of ^{210}Pb in equilibrium with the ^{238}U is referred to as "supported", and ^{210}Pb that is derived from atmospheric deposition and the water column is referred to as "excess". The activity of excess ^{210}Pb decreases with depth in sediments as ^{210}Pb decays; the depth at which the activity is half that of the surface is 22.3 years old.

^{137}Cs was released in the atmosphere mainly between 1957 and 1965. In freshwater systems, ^{137}Cs is bound to clay minerals. In many lake cores, ^{137}Cs profiles are recorded as a peak with no detectable activity prior to the 1950s and relatively little activity since the mid-1960s. However, soil erosion and sediment deposition containing ^{137}Cs can result in the presence of ^{137}Cs in deposits many years after the 1960s. For the purpose of dating sediments, the ^{137}Cs profile is used as a benchmark for sediment deposited in the early 1960s.

Because these two isotopes adsorb to the surface of particles, fine-grained sediment contains much higher activity than sandy sediment. Two assumptions for dating sediments are: 1) the sediment grain size is relatively uniform though the profile to be dated, and 2) the sedimentation rate has been uniform over the period to be dated (i.e., over the length of the core). If these two conditions are not met (i.e., there has not been a constant sedimentation rate or uniform grain size), the dating procedure is not likely to provide accurate results. These two criteria are evaluated through particle grain size and moisture content analyses.

For this study, moisture content, ^{210}Pb concentrations, and ^{137}Cs concentrations were determined for all core segments. PSD and TOC analyses were conducted on three or more sediment segments per core. All analyses were conducted in accordance with the methods described in the QAPP (Battelle, 1999). The concentration/activity of ^{210}Pb and ^{137}Cs, moisture content, PSD, and TOC values for the 10 cores are listed in Tables 5-1 to 5-10.

The sedimentation process in Twelvemile Creek/LH has been influenced by two hydroelectric impoundments and a water supply reservoir, upgradient of LH. Historically, the dams have acted as temporary sediment impoundments. Sediment release events created multiple silt/sand layers in the creekriver and lake, and these layers were most evident in the four most upgradient cores (i.e., cores T16, W7, Q, and P). As expected, the sand layers in these four cores contained very low TOC concentrations, relatively large grain size, and little ^{210}Pb and ^{137}Cs (Tables 5-1 through 5-4, respectively). For example, in Core W7 (Table 5-2), sandy sections contained $\leq$2% silt and $\leq$1% clay (segments 2, 4, and 8), compared to >50% silt and >10% clay in silty sections (i.e., segments 6 and 10). TOC in the sandy sections was less than or equal to 0.25% compared to 3.46% and 2.69% measured in segments 6 and 10, respectively. Comparison of ^{210}Pb and ^{137}Cs concentrations in Core W7 revealed similar results: ^{210}Pb was measured at less than 0.9 dpm/g in sandy sections compared to 1.31 to 3.56 dpm/g in silty sections; ^{137}Cs was measured at less than 0.2 dpm/g in sandy sections compared to 0.14 to 0.53 dpm/g in silty sections. The irregular sediment distribution in the upgradient cores meant that the sediments could not be age dated using ^{210}Pb or ^{137}Cs.

Table 5-1. ^{210}Pb, ^{137}Cs, Moisture Content, PSD, and TOC Results for Core T16

Core Segment	Segment Depth (cm)	^{210}Pb (dpm/g)	^{137}Cs (dpm/g)	% Moisture	Particle Size Distribution (PSD)				%TOC
					% Gravel	% Sand	% Silt	% Clay	
T16-1	15-20	0.240	0.101	22.1	1.00	98.0	1.00	0.00	0.19
T16-2	42-47	0.352	0.113	22.4	NA	NA	NA	NA	NA
T16-3	59-64	0.300	0.100	22.7	NA	NA	NA	NA	NA
T16-4	74-79	0.236	0.133	22.6	8.00	91.0	1.00	0.00	0.28
T16-5	98-104	0.524	0.130	34.4	NA	NA	NA	NA	NA
T16-6	109-114	0.190	0.130	21.9	1.00	98.0	1.0	0.0	0.16
T16-7	116-121	2.79	0.818	57.5	NA	NA	NA	NA	NA
T16-8	126-131	4.72	0.534	38.1	0.00	52.0	34.0	14.0	1.80
T16-9	136-141	1.92	0.340	27.3	NA	NA	NA	NA	NA
T16-10	146-151	0.795	0.148	26.2	NA	NA	NA	NA	NA

NA = not analyzed.
Shading indicates that sand was visually evident in the field, during coring.

Table 5-2. ^{210}Pb, ^{137}Cs, Moisture Content, PSD, and TOC Results for Core W7

Core Segment	Segment Depth (cm)	^{210}Pb (dpm/g)	^{137}Cs (dpm/g)	% Moisture	Particle Size Distribution (PSD)				%TOC
					% Gravel	% Sand	% Silt	% Clay	
W7-1	7-13	1.31	0.174	31.2	NA	NA	NA	NA	NA
W7-2	13-20	0.418	0.0872	21.1	3.00	94.0	2.00	1.00	0.25
W7-3	43-50	0.858	0.0862	20.7	NA	NA	NA	NA	NA
W7-4	64-70	0.263	0.105	20.5	7.00	91.0	2.00	0.00	0.13
W7-5	78-84	0.175	0.0679	21.7	NA	NA	NA	NA	NA
W7-6	101-108	3.56	0.530	49.0	0.00	24.0	63.0	13.0	3.46
W7-7	108-115	1.78	0.396	37.6	NA	NA	NA	NA	NA
W7-8	120-127	0.237	0.117	22.4	0.00	98.0	2.00	0.00	0.05
W7-9	137-144	1.97	0.139	40.92	NA	NA	NA	NA	NA
W7-10	151-158	2.92	0.496	43.81	0.00	38.0	51.0	11.0	2.69
W7-11	165-172	1.45	0.495	36.47	NA	NA	NA	NA	NA

NA = not analyzed.
Shading indicates that sand was visually evident in the field, during coring.

Table 5-3. ^{210}Pb, ^{137}Cs, Moisture Content, PSD, and TOC Results for Core Q

Core Segment	Segment Depth (cm)	^{210}Pb (dpm/g)	^{137}Cs (dpm/g)	% Moisture	Particle Size Distribution (PSD)				%TOC
					% Gravel	% Sand	% Silt	% Clay	
Q-1	0-5	0.238	0.174	30.4	0.00	98.0	2.00	0.00	0.16
Q-2	15-20	2.97	0.575	50.1	NA	NA	NA	NA	NA
Q-3	21-26	3.26	0.415	46.8	0.00	39.0	47.0	14.0	3.55
Q-4	26-31	1.66	0.131	31.2	NA	NA	NA	NA	NA
Q-5	47-52	0.434	0.162	22.2	0.00	94.0	5.00	1.00	0.32
Q-6	73-78	2.80	0.456	42.1	0.00	49.0	41.0	10.0	2.77
Q-7	88-93	0.253	0.152	14.2	NA	NA	NA	NA	NA
Q-8	103-108	0.102	0.108	18.9	NA	NA	NA	NA	NA
Q-9	118-123	0.157	0.108	21.5	NA	NA	NA	NA	NA
Q-10	133-138	1.23	0.299	32.2	0.00	84.0	9.00	7.00	0.20

NA = not analyzed.
Shading indicates that sand was visually evident in the field, during coring.

Table 5-4. ^{210}Pb, ^{137}Cs, Moisture Content, PSD, and TOC Results for Core P

Core Segment	Segment Depth (cm)	^{210}Pb (dpm/g)	^{137}Cs (dpm/g)	% Moisture	Particle Size Distribution (PSD)				%TOC
					% Gravel	% Sand	% Silt	% Clay	
P-1	0-5	0.356	0.0884	28.3	0.00	99.0	0.00	1.00	0.33
P-2	5-10	0.310	0.114	24.7	NA	NA	NA	NA	NA
P-3	20-25	0.753	0.129	32.5	NA	NA	NA	NA	NA
P-4	35-40	0.668	0.150	23.4	0.00	96.0	2.00	2.00	0.22
P-5	50-55	0.430	0.130	24.6	0.00	97.0	2.00	1.00	0.24
P-6	65-70	4.29	0.715	49.5	NA	NA	NA	NA	NA
P-7	80-85	3.84	0.731	45.1	NA	NA	NA	NA	NA
P-8	95-100	3.18	1.66	47.8	0.00	10.0	63.0	27.0	2.57
P-9	110-115	2.65	0.309	30.3	NA	NA	NA	NA	NA
P-10	125-130	2.27	0.157	30.9	0.00	37.0	43.0	20.0	1.14

NA = not analyzed.

Table 5-5. ^{210}Pb, ^{137}Cs, Moisture Content, PSD, and TOC Results for Core O

Core Segment	Segment Depth (cm)	^{210}Pb (dpm/g)	^{137}Cs (dpm/g)	% Moisture	Particle Size Distribution (PSD)				%TOC
					% Gravel	% Sand	% Silt	% Clay	
O-1	0-5	3.71	0.455	64.3	0.00	25.0	57.0	18.0	2.52
O-2	5-10	3.52	0.633	51.7	NA	NA	NA	NA	NA
O-3	10-15	5.46	0.611	52.1	NA	NA	NA	NA	NA
O-4	15-20	3.26	0.703	52.0	NA	NA	NA	NA	NA
O-5	20-25	2.94	0.827	47.8	NA	NA	NA	NA	NA
O-6	25-30	2.17	0.78	46.0	0.00	63.0	27.0	10.0	1.81
O-7	30-35	1.74	0.532	42.6	NA	NA	NA	NA	NA
O-8	35-40	1.12	0.645	32.7	1.00	78.0	10.0	11.0	1.74
O-9	40-45	0.832	0.576	35.3	NA	NA	NA	NA	NA

NA = not analyzed.

Table 5-6. ^{210}Pb, ^{137}Cs, Moisture Content, PSD, and TOC Results for Core N

Core Segment	Segment Depth (cm)	^{210}Pb (dpm/g)	^{137}Cs (dpm/g)	% Moisture	Particle Size Distribution (PSD)				%TOC
					% Gravel	% Sand	% Silt	% Clay	
N-1	0-7	6.09	0.474	66.4	NA	NA	NA	NA	NA
N-2	7-12	5.83	0.626	58.9	0.00	23.0	60.0	17.0	3.21
N-3	12-17	6.62	0.532	58.7	NA	NA	NA	NA	NA
N-4	17-22	5.03	0.586	58.8	NA	NA	NA	NA	NA
N-5	22-27	5.86	0.772	57.9	NA	NA	NA	NA	NA
N-7	32-37	3.75	0.869	55.8	NA	NA	NA	NA	NA
N-8	37-42	2.91	0.881	58.4	3.00	36.0	43.0	18.0	5.00
N-9	42-47	2.49	0.748	52.9	NA	NA	NA	NA	NA

NA = not analyzed.

Table 5-7. ^{210}Pb, ^{137}Cs, Moisture Content, PSD, and TOC Results for Core L

Core Segment	Segment Depth (cm)	^{210}Pb (dpm/g)	^{137}Cs (dpm/g)	% Moisture	Particle Size Distribution (PSD)				%TOC
					% Gravel	% Sand	% Silt	% Clay	
L-1	0-7	7.08	0.867	73.4	NA	NA	NA	NA	NA
L-2	7-12	7.03	0.860	64.3	0.00	9.00	61.0	30.0	2.89
L-3	12-17	6.16	0.921	63.1	NA	NA	NA	NA	NA
L-4	17-22	4.95	0.983	64.2	NA	NA	NA	NA	NA
L-5	22-27	4.04	1.21	59.7	NA	NA	NA	NA	NA
L-6	27-32	4.78	0.958	58.3	0.00	16.0	60.0	24.0	2.63
L-7	32-37	4.18	1.10	57.2	NA	NA	NA	NA	NA
L-8	37-42	4.44	1.29	55.3	NA	NA	NA	NA	NA
L-9	42-47	3.52	1.05	53.2	NA	NA	NA	NA	NA
L-10	47-52	4.54	0.829	52.9	0.00	16.0	65.0	19.0	2.99
L-11	52-57	4.31	1.34	54.6	NA	NA	NA	NA	NA
L-12	57-62	4.24	1.28	51.9	NA	NA	NA	NA	NA
L-13	62-67	4.43	1.38	52.0	NA	NA	NA	NA	NA

NA = not analyzed.

Table 5-8. ^{210}Pb, ^{137}Cs, Moisture Content, PSD, and TOC Results for Core I

Core Segment	Segment Depth (cm)	^{210}Pb (dpm/g)	^{137}Cs (dpm/g)	% Moisture	Particle Size Distribution (PSD)				%TOC
					% Gravel	% Sand	% Silt	% Clay	
I-1	0-7.5	9.40	0.648	73.5	NA	NA	NA	NA	NA
I-2	7.5-12.5	8.94	0.765	68.7	0.00	3.00	57.0	40.0	2.70
I-3	12.5-17.5	7.91	1.28	67.1	NA	NA	NA	NA	NA
I-4	17.5-22.5	7.37	1.47	66.3	NA	NA	NA	NA	NA
I-5	22.5-27.5	7.03	1.88	65.4	NA	NA	NA	NA	NA
I-6	27.5-32.5	5.79	2.30	63.9	NA	NA	NA	NA	NA
I-7	32.5-37.5	6.48	2.66	60.6	0.00	3.00	41.0	56.0	2.48
I-8	37.5-42.5	6.10	2.90	61.5	NA	NA	NA	NA	NA
I-9	42.5-47.5	6.29	1.92	61.2	NA	NA	NA	NA	NA
I-10	47.5-52.5	5.51	1.62	60.5	NA	NA	NA	NA	NA
I-11	52.5-57.5	5.61	1.94	62.6	0.00	1.00	34.0	65.0	2.17

NA = not analyzed.

Table 5-9. ^{210}Pb, ^{137}Cs, Moisture Content, PSD, and TOC Results for Core J

Core Segment	Segment Depth (cm)	^{210}Pb (dpm/g)	^{137}Cs (dpm/g)	% Moisture	Particle Size Distribution (PSD)				%TOC
					% Gravel	% Sand	% Silt	% Clay	
J-1	0-8	7.18	0.779	64.0	0.00	44.0	38.0	18.0	2.57
J-2	8-13	6.46	0.794	55.3	NA	NA	NA	NA	NA
J-3	13-18	3.32	0.874	45.8	NA	NA	NA	NA	NA
J-5	23-29	1.79	0.647	43.4	2.00	79.0	8.00	11.0	0.91

NA = not analyzed.

Table 5-10. ^{210}Pb, ^{137}Cs, Moisture Content, PSD, and TOC Results for Core T6

Core Segment	Segment Depth (cm)	^{210}Pb (dpm/g)	^{137}Cs (dpm/g)	% Moisture	Particle Size Distribution (PSD)				%TOC
					% Gravel	% Sand	% Silt	% Clay	
T6-1	0-7.5	9.37	2.23	75.5	0.00	47.0	34.0	19.0	2.76
T6-2	7.5-12.5	6.77	3.41	67.9	NA	NA	NA	NA	NA
T6-3	12.5-17.5	6.94	2.65	63.5	NA	NA	NA	NA	NA
T6-4	17.5-22.5	3.58	1.51	44.6	0.00	30.0	35.0	35.0	2.04
T6-5	22.5-27.5	3.68	0.0973	34.7	NA	NA	NA	NA	NA
T6-6	27.5-32.5	4.20	0.0722	33.6	NA	NA	NA	NA	NA
T6-7	32.5-37.5	3.08	0.0744	29.2	0.00	40.0	39.0	21.0	1.44
T6-8	37.5-42.5	3.23	0.0803	29.4	NA	NA	NA	NA	NA

NA = not analyzed.

Five of the six remaining cores collected in LH (cores O, N, L, I, and T6) analyzed for ^{210}Pb and ^{137}Cs could be dated. These five cores are located farthest from the dam at the headwaters of LH and, therefore, were less influenced by sand layers. Due to its closer proximity to the headwaters of the lake, Core P also was impacted by sand deposition from the dam release events and could not be dated. The presence of excess ^{137}Cs in all the core segments, including the upgradient cores, indicates that the sediment cores collected from LH did not sample sediment deposited before the 1960s. This may not be surprising because USACE created the lake between 1955 and 1963; thus, lake sediments preceding the era of aboveground nuclear testing may not be present.

The data used to calculate sedimentation rates for the five dated cores (Cores O, N, L, I, and T6) are shown in Tables 5-11 through 5-15, respectively. Each table includes the following information: the depth interval and mean depth for each core section (cm), the total accumulated dry sediment from the surface of the sediment core to the mean depth of the section (g/cm^2), the years since the section was deposited (yr) and the year of deposition, and the sediment accumulation rate in units of cm/yr of wet sediment. Cores O, N, L, I, and T6 were dated as far back as 1974, 1966, 1982, 1982, and 1939, respectively. Surprisingly, the deepest sediments collected from Core L were not the oldest sediments collected. This result may be due to differing sedimentation rates at each core transect, as discussed in the following paragraphs.

Sediment accumulation rates (cm/yr) are plotted against core segment age in Figure 5-1. Sedimentation rates were highest at the surfaces of the cores and decreased rapidly with core depth due to sediment compaction and water loss with depth. Cores L and I had similar sediment accumulation rates (see Table 5-16). Cores T6, O, and N also had similar rates to each other, but their rates were substantially lower than those measured in Cores L and I.

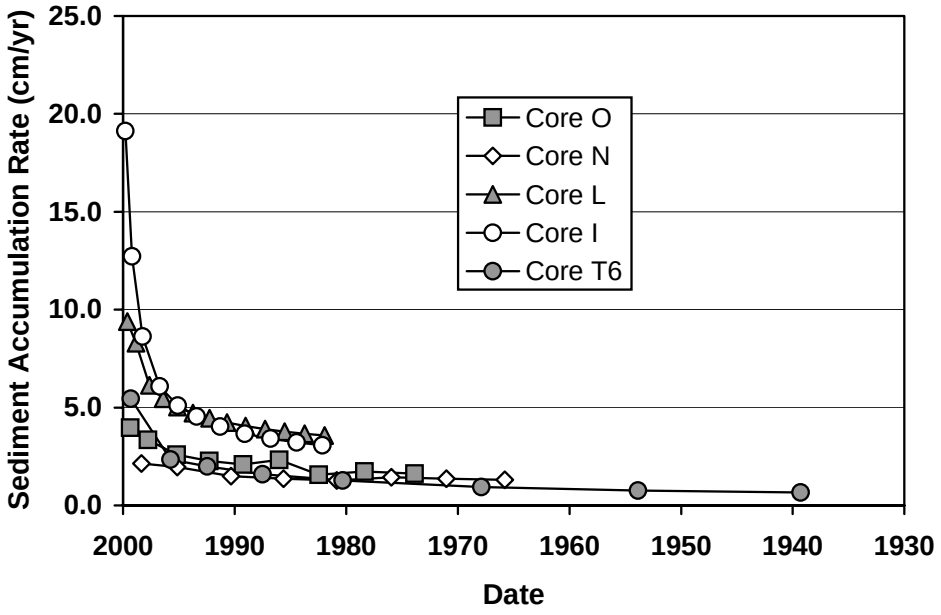


Figure 5-1. Lake Hartwell Sediment Accumulation Rates for Cores O, N, L, I, and T6

Table 5-11. Sediment Accumulation, Sediment Age, Year of Deposition, and Sediment Accumulation Rates for Core O

Core Segment	Segment Depth (cm)	Mean Depth (cm)	Total Dry Sediment Accumulation at Mean Depth (g/cm^2)	Sediment Age (yr)	Year of Deposition	Sediment Accumulation Rate (cm/yr)
O-1	0-5	2.5	1.74	0.629	1999	3.97
O-2	5-10	7.5	7.05	2.24	1998	3.35
O-3	10-15	12.5	15.9	4.81	1995	2.60
O-4	15-20	17.5	26.0	7.72	1992	2.27
O-5	20-25	22.5	36.4	10.8	1989	2.09
O-6	25-30	27.5	47.5	14.0	1986	2.32
O-7	30-35	32.5	59.6	17.5	1982	1.57
O-8	35-40	37.5	73.5	21.6	1978	1.73
O-9	40-45	42.5	89.2	26.1	1974	1.63

Table 5-12. Sediment Accumulation, Sediment Age, Year of Deposition, and Sediment Accumulation Rates for Core N

Core Segment	Segment Depth (cm)	Mean Depth (cm)	Total Dry Sediment Accumulation at Mean Depth (g/cm^2)	Sediment Age (yr)	Year of Deposition	Sediment Accumulation Rate (cm/yr)
N-1	0-7	3.5	2.40	1.64	1998	2.13
N-2	7-12	9.5	7.71	4.84	1995	1.96
N-3	12-17	14.5	16.0	9.69	1990	1.50
N-4	17-22	19.5	24.0	14.4	1986	1.36
N-5	22-27	24.5	32.0	19.1	1981	1.28
N-7	32-37	34.5	40.4	24.0	1976	1.43
N-8	37-42	39.5	48.8	29.0	1971	1.36
N-9	42-47	44.5	57.6	34.2	1966	1.30

Table 5-13. Sediment Accumulation, Sediment Age, Year of Deposition, and Sediment Accumulation Rates for Core L

Core Segment	Segment Depth (cm)	Mean Depth (cm)	Total Dry Sediment Accumulation at Mean Depth (g/cm^2)	Sediment Age (yr)	Year of Deposition	Sediment Accumulation Rate (cm/yr)
L-1	0-7	3.5	1.73	0.373	2000	9.39
L-2	7-12	9.5	5.78	1.15	1999	8.30
L-3	12-17	14.5	12.4	2.36	1998	6.14
L-4	17-22	19.5	19.0	3.58	1996	5.44
L-5	22-27	24.5	26.0	4.88	1995	5.02
L-6	27-32	29.5	33.4	6.25	1994	4.72
L-7	32-37	34.5	41.5	7.75	1992	4.45
L-8	37-42	39.5	50.0	9.32	1991	4.24
L-9	42-47	44.5	59.0	11.0	1989	4.05
L-10	47-52	49.5	68.4	12.7	1987	3.89
L-11	52-57	54.5	78.0	14.5	1986	3.76
L-12	57-62	59.5	87.6	16.3	1984	3.66
L-13	62-67	64.5	97.4	18.1	1982	3.57

Table 5-14. Sediment Accumulation, Sediment Age, Year of Deposition, and Sediment Accumulation Rates for Core I

Core Segment	Segment Depth (cm)	Mean Depth (cm)	Total Dry Sediment Accumulation at Mean Depth (g/cm^2)	Sediment Age (yr)	Year of Deposition	Sediment Accumulation Rate (cm/yr)
I-1	0-7.5	3.75	0.493	0.196	2000	19.1
I-2	7.5-12.5	10	2.16	0.785	1999	12.7
I-3	12.5-17.5	15	4.95	1.74	1998	8.62
I-4	17.5-22.5	20	9.48	3.29	1997	6.08
I-5	22.5-27.5	25	14.2	4.91	1995	5.09
I-6	27.5-32.5	30	19.2	6.60	1993	4.55
I-7	32.5-37.5	35	25.1	8.70	1991	4.02
I-8	37.5-42.5	40	31.6	10.9	1989	3.67
I-9	42.5-47.5	45	38.3	13.2	1987	3.41
I-10	47.5-52.5	50	45.2	15.5	1984	3.22
I-11	52.5-57.5	55	52.0	17.9	1982	3.08

Table 5-15. Sediment Accumulation, Sediment Age, Year of Deposition, and Sediment Accumulation Rates for Core T6

Core Segment	Segment Depth (cm)	Mean Depth (cm)	Total Dry Sediment Accumulation at Mean Depth (g/cm^2)	Sediment Age (yr)	Year of Deposition	Sediment Accumulation Rate (cm/yr)
T6-1	0-7.5	3.75	0.448	0.688	1999	5.45
T6-2	7.5-12.5	10	3.05	4.26	1996	2.35
T6-3	12.5-17.5	15	5.50	7.55	1992	1.99
T6-4	17.5-22.5	20	9.07	12.5	1987	1.60
T6-5	22.5-27.5	25	14.4	19.7	1980	1.27
T6-6	27.5-32.5	30	23.2	32.1	1968	0.935
T6-7	32.5-37.5	35	33.7	46.1	1954	0.758
T6-8	37.5-42.5	40	44.6	60.7	1939	0.659

Table 5-16. Supported ^{210}Pb and Sedimentation Rates in Cores O, N, L, I, and T6

Core	Supported ^{210}Pb (dpm/g)	Sedimentation Rate (g/cm^2-yr)
O	0.75	3.45
N	0.33	1.70
L	1.00	5.43
I	1.00	2.93
T6	0.85	0.75
Average	0.79 ± 0.28	2.85 ± 1.79

The sediment accumulation rates were used to calculate sedimentation rates, measured in g/cm^2-yr. This is a measure of the mass of sediment deposited per year, as opposed to the sediment depth per year. Sedimentation rates should be relatively constant and are not influenced by sediment compaction. The sedimentation rates measured in the five downgradient LH cores are shown in Table 5-16. Core L had the highest sedimentation rate of 5.43 g/cm^2-yr, and Core T6 had the lowest rate of 0.75 g/cm^2-yr.

Because of the greater water content in surface sediments than subsurface sediments, the apparent sediment accumulation rate in cm/yr is much higher near the surface than at depth. The sedimentation rates for the five cores ranged from 0.75 to 5.4 g/cm^2-yr while the sediment accumulation rates ranged from 0.66 to 19 cm/yr.

Table 3-3 showed the required sedimentation in Cores O, N, L, I, and T6 to achieve t-PCB concentrations of 1.0 mg/kg, 0.4 mg/kg, and 0.05 mg/kg. The 1.0 mg/kg t-PCB concentration is the surface sediment cleanup goal for the lake, and the times to achieve these cleanup goals are shown in Table 5-17, based on the known sediment accumulation rates shown in Tables 5-11 through 5-15 and in Figure 5-1. Due to the relative inaccuracy of these measurements, ranges are provided for the time for cleanup.

The 1.0 mg/kg t-PCB goal has been achieved in most cores, including the four upgradient cores, and Cores I and T6. The 1.0 mg/kg t-PCB goal is expected to be achieved within 1 to 3 years in the vicinity of Transects O and L, and within 5 to 10 years in the vicinity of Core N. The longer estimated time period for Core N may be an artifact of having used a linear equation to determine the required sedimentation to achieve the 1.0 mg/kg t-PCB goal (see Section 3.2 and Figure 3-11). The 0.4 mg/kg t-PCB goal is expected to be achieved within 2 to 5 years in Cores L, I, and T6, and within 5 to 10 years in Cores N and O. Lastly, the 0.05 mg/kg t-PCB goal is expected to be achieved within 8 to 10 years in Core L, 10 to 15 years in Cores I and T6, and 25 to 30 years in Core N. The time to achieve 0.05 mg/kg t-PCB could not be determined for Core O because the required sedimentation depth exceeded the core depth.

Table 5-17. Time Required to Achieve 1.0, 0.4, and 0.05 mg/kg t-PCB Concentrations in the Upper 5-cm Surface Sediments

Core	Time Required to Achieve 1 mg/kg[(a)] t-PCB (yr)	Time Required to Achieve 0.4 mg/kg[(b)] t-PCB (yr)	Time Required to Achieve 0.05 mg/kg[(c)] t-PCB (yr)
O	1-3	8-10	>28
N	5-10	5-10	25-30
L	1-3	3-5	8-10
I	—	2-5	10-15
T6	—	2-5	10-15

(a) ROD surface sediment cleanup goal (U.S. EPA, 1994).
(b) Mean value for site-specific sediment quality criteria calculated using the U.S. EPA's equilibrium partitioning approach (U.S. EPA, 1994).
(c) Effects range-low from NOAA, based on an evaluation of published criteria associated with biological effects on aquatic life (U.S. EPA, 1994).

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6.0 COMPARISON OF FIELD RESULTS WITH HISTORICAL DATA FROM LAKE HARTWELL

6.1 Surface Sediment Accumulation

Future PCB fate and transport in the Twelvemile Creek/LH system was modeled to predict the fate and transport of PCBs in the system over a 30-year period (U.S. EPA, 1994). The modeling effort consisted of 1) future sediment transport/deposition using the HEC-6 computer model *Scour and Deposition in Rivers and Reservoirs, Version 4.0*, developed by the Hydraulic Engineering Center of the USACE; 2) future PCB fate and transport using the *Water Quality Analysis Simulation Program (WASP-4), Version 4.0* developed and supported by the U.S. EPA; and 3) future aquatic bioaccumulation modeling using the FGETS model (U.S. EPA, 1994). Results of this study are compared to the HEC-6 sediment deposition modeling results.

The sediment deposition model assumed that the historic hydrologic flow regime and sediments loading to the system remain unchanged over a 30-year period. Figure 6-1 shows an illustration of expected sediment deposition rates as predicted by the HEC-6 model (U.S. EPA, 1994). The model identified three distinct sediment transport regimes. The upper-most regime (Transects T19 to T16; may include T16, investigated in this study) acted as a river and generated high-energy gradients, bottom shear stresses, turbulence, and high potential for sediment transport, all of which resulted in a small amount of scour in this regime. The second regime (Transects T16 through N; includes Transects W7 [located between Transects T15 and Q, in Figure 2-1], Q, P, O, and N, investigated in this study), represented a transition zone from the high-energy fluid environment (river) to a low-energy environment (lake). Energy gradients, bottom shear stresses, and turbulence levels decreased as the transition from the river to lake occurred, resulting in high sediment deposition rates (1.4 to 13.1 cm/yr) and a 30-year accumulation of nearly 10 ft of sediment in some areas. This second regime is strongly influenced by the impoundment and subsequent release of sediments at the three upgradient impoundments. The third regime (Transects M through T1; includes Transects L, J, I, and T16, investigated in this study) behaved as a "natural" impoundment with low-energy gradients and turbulence levels, which favored sediment deposition. However, only small deposition rates were predicted because most of the sediment was deposited upgradient, and only slow-settling, clay-sized particles were available for downgradient deposition, resulting in modeled deposition rates of 0 to 1.8 cm/yr, for a total modeled deposition of 0 to 54 cm over the 30-year period.

Table 6-1 compares HEC-6-predicted and measured sedimentation rates and predicted and measured sediment accumulation over a 10-year period. Because only the five downgradient cores could be dated, direct comparisons between predicted and measured rates and sediment accumulation could be made only at the transects represented by the dated cores (i.e., Transects O, N, L, I, and T6). However, qualitative comparisons were made for the other transects based on the observed accumulation of sand and consequent burial of PCB-contaminated sediments in the upgradient portion of the river, between Transects T16 and O.

The comparison of sediment accumulation predicted by the ROD (U.S. EPA 1994) and measured as part of this study must be made on the basis of predicted and measured sediment accumulation over a finite time period (in this case, 10 years), instead of on the basis of predicted and measured sediment accumulation *rates*. An obvious difficulty in comparing the sediment accumulation *rates* reported in the ROD, based on HEC-6 modeling results, with those reported in this study is that the two sediment accumulation measurements do not represent the same physical trend. The values reported in the ROD represent average sediment accumulation rate values and do not distinguish between compacted and uncompacted sediment. In contrast, careful evaluation of the results presented in Section 5

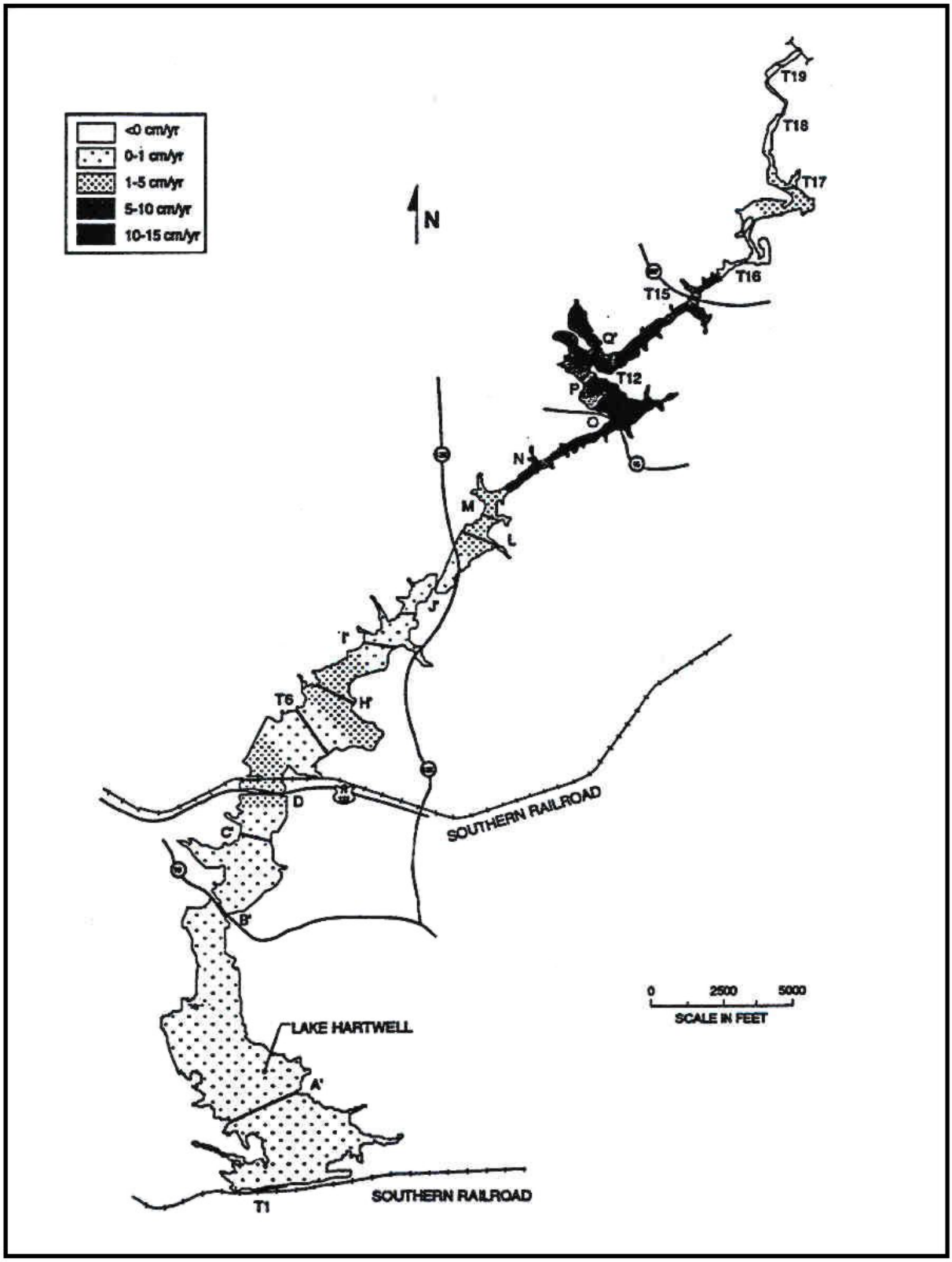

Figure 6-1. Predicted Average Sediment Burial Rates in Lake Hartwell (Source: U.S. EPA, 1994)

Table 6-1. Comparison of Predicted (U.S. EPA, 1994) and Measured Sediment Accumulation and Sediment Accumulation Rates at Transects Investigated in This Study

Transect (Core Location)	Sedimentation Accumulation Rates (cm/yr)				Sediment Accumulation (cm)		Comments
	HEC-6 Predicted	Measured Rates at Various Depth Intervals [(a)]			HEC-6 Predicted	Measured	
		Surface	Mid-depth	Deep			
T16	10-15	—			100-150	—	Measured 70-110 cm of relatively clean sand above contaminated sediment (Figure 3-1)
W7	10-15	—			100-150	—	Measured 90 cm of relatively clean sand above contaminated sediment (Figure 3-2)
Q	10-15	—			100-150	—	Measured 25 cm of relatively clean sand above contaminated sediment (Figure 3-3)
P	5-10	—			50-100	—	Measured 80 cm of relatively clean silty sand above contaminated sediment (Figure 3-4)
O	5-10	4.0 (2.5)	2.0 (22.5)	1.6 (42.5)	50-100	20-25	HEC-6 overestimated sediment accumulation
N	5-10	2.1 (3.5)	1.3 (24.5)	1.3 (44.5)	50-100	12-17	HEC-6 overestimated sediment accumulation
L	1-5	9.4 (3.5)	4.5 (34.5)	3.6 (64.5)	10-50	37-47	HEC-6 accurately estimated sediment accumulation
J	0-1	—			≤ 10	—	Sediment core segments could not be dated
I	0-1	19.1 (3.75)	4.6 (30.0)	3.1 (55.0)	≤ 10	32-43	HEC-6 underestimated sediment accumulation
T6	0-1	5.5 (3.75)	1.6 (20.0)	0.7 (40.0)	≤ 10	12-22	HEC-6 underestimated sediment accumulation

(a) The mid-depths of the sediment intervals are reported in (parentheses) for the measured sediment accumulation rates reported in this table.
— Indicates sediment accumulation and accumulation rates could not be measured.

(Tables 5-11 through 5-15) reveals that sediment accumulation rates decrease with increasing sediment depth due to sediment compaction and the loss of water from sediment pore space. For example, if the 9.4 cm/yr surface-sediment-accumulation rate for Core L were used as the Core L sediment accumulation rate, a 10-year accumulation of 94 cm of sediment would be predicted. However, sediment accumulation rates in the deepest portions of Core L are only 3.5 to 5 cm/yr, and coring results and age dating reveal a 10-year accumulation of only 42 cm between approximately 1990 and 2000, the difference being due to sediment compaction. For this reason, Table 6-1 shows the predicted and measured 10-year accumulation of sediments in Cores O, N, L, I, and T6, with predicted and measured sediment accumulation *rates* for these cores. Also shown are the predicted sediment accumulation and sedimentation rates for the five cores that could not be dated.

The predicted 10-year accumulation values were determined by multiplying the ROD-reported sediment accumulation rates by 10. The measured accumulation rates were determined by using the measured core depth over an approximate 10-year period between 1990 and 2000, based on the results reported in Tables 5-11 through 5-15. ROD-predicted sedimentation rates are based on those shown in Figure 6-1, as reported in the ROD (U.S. EPA, 1994). Measured rates are based on reported rates for surface, mid-depth, and deep sediment layers in Tables 5-11 through 5-15.

The HEC-6 model overpredicted sediment accumulation rates in Cores O and N by a factor of four to ten times, and underpredicted rates in Cores I and T6. Transect L was the only transect which had a model-estimated sediment accumulation rate closely match the measured rate. Without access to the precise model inputs into the HEC-6 model, it is difficult to know exactly why the model-predicted and measured sediment accumulation rates for Transects O, N, I, and T6 differed. However, it appears that the model predicted a more gradual transition between the three sedimentation regimes so that higher sedimentation would occur in the vicinity of Transects O and N and lower sedimentation would occur in the vicinity of Cores I and T16. In contrast, the measured rates demonstrated that the sediment accumulation rates throughout the lake and downgradient of Transect P were relatively constant. The sediment depth accumulated at the five measured transects ranged from approximately 10 to 50 cm, and there was no evidence that there was greater accumulation around the upgradient cores than the downgradient cores.

The HEC-6 model appeared to approximate sediment accumulation reasonably well in the vicinity of the upgradient transects (i.e., Transects T16, W7, Q, and P). All four transect cores showed very high levels of sediment accumulation (Table 6-1). Cores T16, W7, and P showed the highest levels of sand accumulation, followed by Core Q. Although none of the accumulation levels matched the HEC-6-predicted levels, the accumulations predicted and measured by HEC-6 were not measured on the same basis and therefore are not comparable. The HEC-6-predicted accumulation is based on a 10-year period, whereas the time for accumulation of the sand layers could not be determined. Furthermore, values provided in Table 6-1 represent sand depths to the first recognizable silt layers that contain relatively high t-PCB concentrations (Figures 3-1 through 3-4). Significant sand accumulation also was observed beneath these first silt layers, resulting in the stratification of silt and sand layers throughout the cores, and the accumulation of more sand than the first sand layers represent. The time periods for these events are not known.

Sluice gates from the Woodside I and II impoundments were flushed in 1983 and 1985, releasing large amounts of sediment. Records were not maintained between 1985 and 1993. In September 1993, 43,000 yd^3 were flushed, mostly from Woodside II. An additional 7,000 yd^3 and 10,000 yd^3 were dredged in October 1998 and July 1999, respectively. These flushing events are expected to have had the greatest impact on the accumulation of sand and silt in the upgradient reaches, upgradient of Madden Bridge (i.e., in the vicinity of Transects T16, W7, Q, and P). The layering of silt and sand attests to the fact that sediment accumulation in this area is due primarily to sudden releases of sediment from the

impoundments. A more gradual release of sediments would have resulted in a more regular distribution of clays, silts, and sands through the sediment column.

6.2 Surface Sediment PCB Concentrations

The ROD (U.S. EPA, 1994) identified three reaches (i.e., sedimentation zones) based on the HEC-6 modeling results. The first reach (Reach 1) extended just below the Woodside II impoundment (Transect T19) to just upgradient of Maw Bridge (Transect T16). This reach was upgradient of the area included in this study, which began at Transect T16. The second reach (Reach 2) extended from Maw Bridge (Transect T16) to just above the Hwy 133 Bridge (Transect L) and includes the four upgradient transects heavily influenced by sediment impoundment release events (i.e., Transects T16, W7, Q, and P) plus three downgradient transects (i.e., Transects O, N, and L). The third reach (Reach 3) extends from Hwy 133, past U.S. 123, to the Hwy 37 Bridge. This reach extended beyond the area of this study, but included Transects J, I, and T6.

The results of this study subdivide the second reach into two sedimentation zones, based on observed and measured sedimentation characteristics. The first zone (Reach 2a) occurs between Lay Bridge and Madden Bridge and includes Transects T16, W7, Q, and P. The second zone (Reach 2b) occurs downgradient of Madden Bridge and includes Transects O, N, and L.

Annual monitoring performed since 1995 shows surface PCB concentrations decreasing with time and with increasing distance from the Twelvemile Creek arm of LH. Results of these events are shown in Table 6-2.

Table 6-2. Historical Surface Sediment PCB Monitoring Results (mg/kg), Based on Surface 10-15 cm

Transect	Sampling Event				
	1991 (Elzermann)[a]	1998 (RMT, Inc)[b,c]	1999 (RMT, Inc)[b,c]	This Study, 1999 (Battelle)[d]	
	(0-10 cm)	(0-15 cm)	(0-15 cm)	(0-5 cm)	(5-10 cm)
T16	7.03 (2)	-	-	0.024	
W7		0.255	0.308	0.98	
Q		0.283	2.28	0.076	
P	27.54 (6)	<0.141	2.35	0.066	
O	0.11 (2)	2.05	3.06	1.4	1.6
N		-	-	1.5	1.8
L	21.14 (1)	2.53-2.83	2.19-3.93	1.6	2.1
J	6.88 (2)	-	-	1.4[e]	1.1[e]
I	16.1 (1)	-	-	0.86	
T6	13.75 (6)	2.25	5.78	0.93	2.6

(a) Source: Elzermann et al., 1991. Average sector concentration for the top 10 cm of sediment from multiple cores for seven out of 30 LH sectors that matched transects investigated under this study. Values in (parentheses) indicate the number of cores averaged together to obtain the surface sediment PCB concentration.
(b) Source: U.S. EPA, 1998a and 1999.
(c) Individual grab samples were taken using a petite ponar dredge.
(d) Merged cells show sediment t-PCB concentrations in the surface 10 cm.
(e) Core J segments were from 0-6 cm and 6-11 cm.

6.3 Time to Achieve Sediment Cleanup Goals

Results from the WASP-4 simulations indicated that clean sediment from the upgradient tributaries is being deposited over the contaminated sediments, resulting in the burial and dilution of the contaminated sediments over time (U.S. EPA, 1994). The net results of the transport processes are 1) a reduction in surface- and bed-sediment PCB concentrations in the upper and middle portions of the system and 2) an increase in LH surface- and bed-sediment PCB concentrations near the lower end of the system.

The results of this study predict that the 1.0 mg/kg sediment cleanup goal will be achieved within 3 years, the 0.4 mg/kg cleanup goal within 10 years, and the 0.05 mg/kg cleanup goal within 30 years (Table 3-3 and 5-17). These results are based on the assumption that the PCB source has been depleted and that clean sediment is being deposited in LH. The level of contamination of suspended sediments with the potential to be deposited in LH was not investigated for this study. These results suggest that LH will meet the treatment goals established in the ROD (U.S. EPA, 1994) within 5 years and that sediment recovery will continue over the next three decades.

The ROD also presents predicted cleanup goals in terms of mg/L PCB concentrations in the water column. A single LH water sample revealed low PCB concentrations (34 μg/L t-PCB) in the water column; the highest individual congener concentration was 11 μg/L for PCB 4/10 (2,2′/2,6-dichloro-biphenyls). The presence of PCB 4/10 is not surprising due to its abundance in sediments and its relatively low molecular weight and higher solubility than higher-chlorinated congeners. The ROD predicts concentrations below 100 μg/L throughout the lake after a 30-year period. This single lake-water result would seem to suggest that lake-water concentrations in portions of the lake already achieved this goal. However, a single lake-water sample is hardly representative of the entire lake, and additional sampling is warranted. Also, the PCB concentration in the water column is not necessarily an accurate indicator of its potential to accumulate in benthic animals and fish tissue. For this reason, biological sampling continues to be part of the ongoing LH monitoring program.

A Seneca River sample revealed only trace PCB levels (4.86 μg/L t-PCB), indicating negligible background concentrations in this clean portion of the river system.

7.0 CONCLUSIONS

The goal of this study was to investigate and identify natural attenuation/natural recovery processes responsible for the recovery of PCB-contaminated sediments at the LH site. The study involved the collection of 10 sediment cores from 10 transect locations identified in the U.S. EPA ROD for this site and used in various studies. The transect locations were Transects T16, W7, Q, P, O, N, L, J, I, and T6.

Cores were subdivided into 5-cm segments and analyzed for ^{210}Pb, ^{137}Cs, and PCBs. Sediment ^{210}Pb and ^{137}Cs analyses were conducted to age date sediments and to determine sediment accumulation rates (cm/yr) and sedimentation rates (g/cm^2-yr). Detailed PCB congener analyses were conducted on the 107 individual PCB congeners quantified by GC/MS analysis to identify vertical and lateral congener profiles and trends.

7.1 PCB Concentration Profiles

Total PCB concentrations were determined by summing the congener-specific concentrations for each core segment. The most upgradient transects (T16, W7, Q, and P) were impacted significantly by sediment builtup in the headwaters of LH from the historical sediment releases from the upgradient impoundments. As expected, the highest PCB concentrations were associated with silt/clay layers, whereas sand layers contained very low PCB concentrations. The historical sediment releases resulted in substantial burial of PCB-contaminated sediment in the vicinity of these four cores. All four of these upgradient cores contained less than the 1.0 mg/kg t-PCB cleanup goal for LH surface sediments.

Cores O, N, L, J, I, and T6 consisted primarily of silt and were not noticably impacted by the release of silt and sand from the impoundments. These downgradient cores exhibited more typical vertical PCB concentration profiles for a depositional area, beginning with relatively low PCB concentrations at the sediment-water interface and increasing in concentration with depth until maximum PCB concentrations were measured, followed by progressively decreasing concentrations with depth until concentrations were below detection. (Not all the cores penetrated the PCB-contaminated sediments, and some of the cores terminated at the high-concentration regime of the cores.) The result was an inverted bell-shaped curve for each core. The deepest portions of the deepest cores had PCB concentrations near or below detection, which would reflect a historical period before the onset of PCB use at the Sangamo-Weston plant and the subsequent release of PCBs into the environment. The sediments containing the maximum PCB concentrations were associated with the period of maximum PCB release into the lake.

In each downgradient core, the surface sediments showed decreasing t-PCB concentrations approaching the target concentration of 1.0 mg/kg; the maximum surface sediment t-PCB concentration was measured at Transect L at 1.58 mg/kg, and the minimum measured surface sediment concentration was measured at Transect I at 0.86 mg/kg.

To determine how quickly surface contaminant concentrations are approaching the target t-PCB concentration of 1.0 mg/kg, sediment concentrations (mg/kg) were plotted against sediment depth for the six downgradient cores. The sedimentation depth required to achieve a surface sediment concentration of 1.0 mg/kg was 2.8 cm, 7.3 cm, and 3.4 cm for Cores O, N and L; Cores I and T6 have already achieved the target 1.0 mg/kg concentration in the surface 5 cm.

The accuracy of this analysis depended on the quality of the data and on the thickness of the cored sediment segments. For this study, the cores were extruded in 5-cm intervals. Narrower intervals

would have provided more precise results. However, the thickness of the intervals had to be weighed against the cost of increased sample frequency and the ability to extrude narrower core intervals, particularly at the sediment-water interface, where coring proved most difficult.

Mechanisms that influence the reduction rate of surface sediment PCB concentrations include the rate of sedimentation, the PCB concentration of particles that continue to be transported and deposited on sediment surfaces, and the amount of mixing in the benthic layer of the surface sediments. More rapid sedimentation and cleaner sediments enhance the rate of recovery, whereas increased benthic mixing retards the rate of recovery.

7.2 PCB Compositional Changes

The PCB composition (i.e., the relative concentrations of PCB congeners) was investigated for each sample. The composition was studied based on PCB homologue (i.e., level of chlorination) data and/or individual PCB congener data. The PCB composition of the field samples was studied to determine characteristic relationships attributable to factors such as the sampling location in the river (horizontal profile), sample depth (vertical profile), and the age of the sample determined through age dating. The PCB compositions were compared to known Aroclor formulations in order to examine the extent of PCB weathering and, if possible, to identify the source of contamination. However, direct comparison with Aroclor formulations was recognized to be of limited value considering the significant age of most of the measured contaminants and the associated weathering and other transformation mechanisms that appear to have affected the PCB composition of the samples.

7.2.1 PCB Composition by Homologue Distribution (Level of Chlorination). The relative concentrations of the PCB homologues shifted towards the less chlorinated congeners with sediment depth and with the age of the deposited sediments. In the downgradient reaches of the lake (i.e., those not noticeably impacted by sediment release events from the impoundments), tetrachlorobiphenyl congeners dominated surface samples, and the deeper segments were dominated by bi- and trichlorobiphenyl congeners. Monochlorobiphenyl comprised less than 1% of the total PCB in the surface sediment sample compared to over 6% in the deeper segments.

There was surprisingly little difference in PCB homologue distributions along the river; the upgradient locations had distributions and trends similar to those observed in the downgradient locations when measured from sediment samples closest to the surface (the most recently deposited sediments). In each of the surface sediment samples, tetrachlorobiphenyls were most abundant, followed by the tri- and pentachlorobiphenyls, then by di- and hexachlorobiphenyls, and mono and heptachlorobiphenyls; thus, tetrachlorobiphenyl was generally the center of a near bell-shaped homologue distribution plot.

Aroclors 1016, 1242, and 1254 were reported to have been used by the Sangamo-Weston plant and released into the environment. Aroclor 1016 is dominated by trichlorobiphenyls, Aroclor 1242 is dominated by tri- and tetrachlorobiphenyls, and Aroclor 1254 is dominated by penta- and hexachlorobiphenyls. Thus, it is conceivable that a mixture of these Aroclors could have resulted in the homologue distributions in the surface sediments.

The PCB homologue distribution of the subsurface sediments was first dominated by tetrachlorobiphenyls. At greater depths, samples became increasingly dominated by mono-, di-, and trichlorobiphenyls. The homologue distributions of these deeper, high-concentration sediment samples were so dominated by the dichlorobiphenyls that they could not be linked to unique Aroclors as primary sources. It is likely that the PCB patterns in these deeper sediments are the results of environmental transformation processes, possibly of Aroclor mixtures similar to those seen in the surface sediments.

7.2.2 PCB Composition by Congener Distribution. Comparison of the distribution of all measured PCB congeners, not just homologues, provided a more detailed assessment of PCB distributions in surface and buried sediments. The PCB congener composition became increasingly dominated by lower chlorinated congeners with sediment depth and corresponding age of the deposited sediments, which is consistent with changes observed in the homologue composition. A significant loss (45%) of tetra-, penta-, and hexachlorobiphenyl congeners and accumulation of mono-, di-, and trichlorobiphenyls dominated at greater depth.

The shift from higher to lower chlorinated congeners resulted in the accumulation of primarily *ortho*-chlorinated biphenyls, particularly 2,2′- and 2,6-dichlorobiphenyls, both of which have chlorines only in *ortho* positions; these two congeners showed a combined 29% increase. PCB 1 (2-chloro-biphenyl, also an *ortho*-chlorinated congener) was detected at relatively high concentrations in many of the deeper sediment samples that also had high overall PCB concentrations; in a number of those samples, PCB 1 comprised more than 5% of the t-PCB concentration. PCB 4/10 was the most abundant congener in almost all except the most shallow sediments; PCB 4/10 alone constituted more than 25% of the total PCBs in many of the samples, and as much as 44% of the total PCBs in a few samples (i.e., Core P, segments 8, 9, and 10).

The PCB congener compositional analysis indicated the same horizontal characteristics as the PCB homologue data; most upgradient locations had distributions and trends that were similar to most downgradient locations. The sediments close to the surface had a PCB congener distribution centered around higher-molecular-weight tetrachlorobiphenyls (approximately around PCB 66), but with significant contributions of key congeners ranging from di- through hexachlorobiphenyls. Major congeners (each generally comprising between 2 and 6% of the total PCBs) included the dichlorobiphenyl PCB 4/10; the trichlorobiphenyls PCB 16/32 and PCB 19; the tetrachlorobiphenyls PCB 41, PCB 47, PCB 49, PCB 52, PCB 66, and PCB 70/76; the pentachlorobiphenyls PCB 95, PCB 101/90, PCB 110, and PCB 118; and the hexachlorobiphenyls PCB 138/160/163, PCB 149, and PCB 153. PCB 110 was typically the most abundant PCB congener in the surface and near-surface sediment samples, contributing more than 5% of the total PCB in many of these sediments.

Dechlorination, the removal of one or more chlorine substitutions on the PCB molecule, is one of the most important PCB contamination transformation processes in anaerobic sediments. In anearobic dechlorination, the chlorines in the *meta* and *para* positions are generally most readily removed, and the *ortho* substituted chlorines are widely recognized as being most resistant to anaerobic dechlorination.

A review of the molecular structures of the congeners for which a large relative concentration decrease was observed (e.g., PCB 22, PCB 28, PCB 33/20, and PCB 44) revealed that these congeners had two or more chlorines in the *meta* or *para* positions, and, therefore, were highly susceptible to anaerobic dechlorination. On the other hand, the congeners for which the greatest relative concentration increase was observed (e.g., PCB 4/10, PCB 19, PCB 24/27, and PCB 51) had all or most of their chlorines in the *ortho* position. Dechlorination transformations clearly occurred in these sediments, with *meta* and *para* substituted chlorines being removed from various PCB congener molecules and resulting in an accumulation of primarily *ortho* substituted congeners.

The very slow dechlorination of congeners with all chlorines in the ortho position (e.g., PCB 4, PCB 10, and PCB 19) resulted in their accumulation in the deeper sediments. These three congeners constitute more than 50% of the t-PCB in many of the study sediments that were deposited about 20 years ago, compared to less than 5% of the t-PCB in the surface sediments.

7.2.3 PCA/HCA Analysis of PCB Concentrations. PCA and HCA were used to explore the large PCB congener data set. The goal of these tests was to discern PCB composition similarities and dissimilarities based on factors such as:

- Horizontal distribution of the site, including locations upgradient from station O (stations P, Q, W7, T16) and downgradient locations (stations O, N, L, J, I, and T6)

- Vertical profiles by depth and/or age

- Sections containing the highest total PCB concentrations from each core.

Upon review of the data, the most apparent trend was that sample clustering was broadly related to depth. As with the homologue and PCB congener pattern analyses, the PCA analysis did not reveal any clear relationships based on horizontal distribution (i.e., the location from under the sediment core was taken). Additional observations based on the PCA and HCA analyses include:

- The surface sediment data tended to cluster closest to a mixture of Aroclors 1242 and 1254.

- The intermediate depth sediment data tended to spread out along a distribution closer to Aroclors 1242, 1016, and 1232, but did not closely match any individual Aroclor or projected mixed model. This trend is consistent with a decrease in the average level of chlorination with sediment depth.

- The samples with the highest PCB concentrations, which were generally also among the deepest sediments, clustered relatively close to Aroclor 1221. This result is primarily an indication of the significance of the low-molecular-weight congeners in these samples, and not necessarily a close match with this particular Aroclor.

- The congeners with the lowest levels of chlorination tended to drive the variability between samples, and the spread and clustering in the PCA and HCA analyses. Bi- and trichlorobiphenyl congeners caused the most spread and least clustering among congeners. The higher chlorinated congeners had the highest level of clustering and the greatest compositional similarity.

7.2.4 Polytopic Vector Analysis of Lake Hartwell PCB Distribution. The PCB data generated for this study were modeled using the multivariate statistical method known as PVA. For this study, PVA was conducted to identify fingerprint (also known as end-member) compositions from the data generated for LH, and to compare the end-members with source patterns reported in the literature (e.g., Aroclor compositions and known PCB dechlorination or weathering patterns). This analysis was conducted by Dr. Glenn Johnson at the Energy & Geoscience Institute, Department of Civil and Environmental Engineering, University of Utah.

PVA resolved three end-member patterns. Interpretation of end-member patterns was accomplished by comparison to reference data sets, including: 1) Aroclor compositions provided by Battelle; 2) Aroclor compositions reported by Frame et al. (1996); and 3) PCB patterns resulting from environmental fate processes such as dechlorination and volatilization (Chiarenzelli et al., 1997; Johnson and Chiarenzelli, 2000; Bedard and Quensen, 1995; Johnson and Quensen, 2000).

The composition and distribution of EM-1 had characteristics of both Aroclors 1248 and 1254. Mixtures of these two Aroclors were evaluated by calculation until the best possible match was

established with EM-1, resulting in a 50/50 distribution of both congeners. Information from the Sangamo-Weston/Twelvemile Creek/LH Record of Decision (U.S. EPA, 1994) and discussions with Mr. Craig Zeller, the U.S. EPA Site RPM indicated that the Sangamo-Weston plant primarily used Aroclors 1016, 1242, and 1254. Thus, the presence of Aroclor 1254 in the EM-1 mixture was not surprising, but the presence of Aroclor 1248 was unexpected because it was not used. However, work by Chiarenzelli and colleagues (Chiarenzelli et al., 1997; Johnson and Chiarenzelli, 2000) demonstrated that when Aroclor 1242 volatilizes from soils, the residue remaining in the soil can have a PCB profile virtually identical to unaltered Aroclor 1248. To the extent that the information indicating that Aroclor 1242 (not 1248) was used at the Sangamo-Weston facility is accurate, the Aroclor 1248 pattern in the EM-1 end-member pattern may have been related to a weathered Aroclor 1242, and the EM-1 pattern was consistent with a mixed weathered Aroclor 1242/Aroclor 1254 source. Furthermore, the compositions of 1016 and 1242 are very similar; both Aroclors are dominated by Cl-2, Cl-3 and Cl-4 homologues. This similarity suggests that the 1248 pattern also could be due in part to weathered Aroclor 1016. Thus, EM-1 likely represented a mixture of Aroclor 1254 with weathered residues of Aroclors 1242 and 1016, which resembles a 50/50 mixture of Aroclors 1254 and 1248.

EM-1 was most abundant in the upper section of the cores in the most recently deposited sediments, and was depleted to low or non-detectable levels with increasing depth.

EM-2 was dominated by low-chlorinated congeners, including mono-, di-, and trichlorobiphenyls. The congeners that make up EM-2 preferentially exhibit chlorines in the 2 (*ortho*), 4 (*para*), and 6 (*ortho*) positions, including 2,2'/26-CB (PCB 4/10), 2 CB (PCB 1), 2,2',6-CB (PCB 19), and 2,2',3/2,4',6-CB (PCB 16/32). The dominance of *ortho*-chlorines suggested that EM-2 is a result of a microbial dechlorination process.

Comparison of EM-2 with literature-reported congener fingerprints identified Aroclor 1248 dechlorination via *Process C* (Quensen et al., 1990; Bedard and Quensen, 1995) as a close match. The cosine θ between these two patterns was 0.82, suggesting that the patterns were similar. EM-2 showed higher proportions of lower chlorinated congeners and fewer tri- and tetrachlorobiphenyls than the 20-week dechlorinated sample used to demonstrate *Process C*. This may have been due to the much longer incubation observed with the LH sediments (up to 20 years), which would likely have resulted in more extensive dechlorination of the tri- and tetrachlorobiphenyl congeners.

EM-2 was encountered in high proportions in all cores except Core J. In the five dated cores, the maximum proportion of EM-2 occurred in sediments with assigned ages between 1977 and 1985. The maximum proportions of EM-2 also roughly corresponded to sediment intervals of highest t-PCB concentration.

EM-3 was characterized by di-, tri-, and tetrachlorobiphenyl congeners. A review of known dechlorination processes suggested that this pattern was related to *Process H'* dechlorination (Bedard and Quensen, 1995; Alder et al., 1993; Rhee et al., 1993). *Process H'* involves dechlorination of 23-, 234-, and possibly 236-chlorophenyl groups at the *meta* positions, and 34- and 245-chlorophenyls at the *para* positions. However, unlike *Process C*, reference data from *Process H'* dechlorination experiments were unavailable for comparison with EM-3.

The EM-3 pattern was observed in high proportions in samples from each of the 10 dated cores. Maximum EM-3 concentrations appeared to be associated with samples deposited between 1984 and 1990, with one exception where a high concentration is observed in a Core L sample deposited in 1959.

The unaltered source patterns in these upper core sediments suggest that PCBs in younger, surface sediments are the result of recent transport and deposition from unaltered sources located

upgradient. It is unlikely that the EM-1 PCBs are the result of the resuspension and redeposition of deeply deposited sediments from within or upgradient of LH. If the PCBs in the surface sediments resulted from the disturbance and redeposition of deep sediment deposits, a greater degree of dechlorination should have been evident and the samples would have more closely resembled EM-2 and EM-3 or other reported dechlorination patterns. In fact, an opposite trend was apparent; surface sediments exhibited a relative depletion of lower-chlorinated congeners and an accumulation of higher-chlorinated congeners, suggesting that they were affected by weathering and not dechlorination.

The other two fingerprint patterns are related to microbial dechlorination processes (*Process C* and *Process H'*). Both patterns were found in highest proportions in buried sediments. Samples with proportions of the *Process C* fingerprint coincided with the core intervals with maximum t-PCB concentrations and sediments deposited between 1977 and 1985. The *Process H'* (EM-3) sediments were associated with sediments deposited between 1984 and 1990. *Process C* exhibited the highest proportion of lower-chlorinated congeners and the lowest proportion of tri-, tetra-, and higher-chlorinated congeners, suggesting that these sediments had undergone the most extensive dechlorination at the site. *Process H'* appeared to be an intermediate between the source (EM-1) sediments and *Process C* (EM-2) sediments. The *Process H'* (EM-3) sediments had a higher proportion of lower-chlorinated congeners than did the EM-1 sediments, but they also had a higher proportion of higher-chlorinated congeners than did the EM-2 sediments.

7.3 Sediment Accumulation and Accumulation Rates

Sediment cores from Sangamo River/LH were age dated using the natural radioisotope ^{210}Pb. For the purpose of dating sediments, the ^{137}Cs profile is used as a benchmark for sediment deposited in the early 1960s. However, the presence of the excess ^{137}Cs in all the cores, including the upgradient cores, indicated that the sediment cores collected from LH did not include sediment deposited before the 1960s.

The irregular sediment distribution in upgradient Cores T16, W7, Q, and P meant that the sediments at these transects could not be age dated. Five of the six remaining cores collected in LH (Cores O, N, L, I, and T6) analyzed were age dated. These five cores were among the farthest from the dam at the headwaters of LH and, therefore, were less influenced by sand layers.

Sediment accumulation rates (cm/yr) were used to calculate sedimentation rates (measured in g/cm^2-yr) which is a measure of the mass of sediment deposited per year as opposed to the sediment depth per year. The sedimentation rates measured in the five downgradient LH cores ranged from 5.43 g/cm^2-yr in Core L to 0.75 g/cm^2-yr in Core T6. Sediment accumulation rates ranged from 0.66 to 19 cm/yr. However, unlike sedimentation rates, sediment accumulation rates are strongly influenced by the sediment water content, and the apparent sediment accumulation rate in cm/yr is much higher near the surface than at depth.

The 1.0 mg/kg t-PCB goal has been achieved in most cores, including the four upgradient cores, and Cores I and T6. The 1.0 mg/kg t-PCB goal is expected to be achieved within 1 to 3 years in the vicinity of Transects O and L and within 5 to 10 years in the vicinity of Core N. The 0.4 mg/kg t-PCB goal is expected to be achieved within 2 to 5 years in Cores L, I, and T6 and within 5 to 10 years in Cores N and O. The 0.05 mg/kg t-PCB goal is expected to be achieved within 8 to 10 years in Core L, 10 to 15 years in Cores I and T6, and 25 to 30 years in Core N.

The HEC-6 model used for the ROD for the Sangamo-Weston/Twelvemile Creek/LH Superfund site (U.S. EPA, 1994) appeared to approximate sediment accumulation reasonably well in the vicinity of the upgradient transects (i.e., Transects T16, W7, Q, and P). Evidence for very high levels of sediment

accumulation was seen in all four transect cores; Cores T16, W7, and P showed the highest levels of sand accumulation, followed by Core Q.

The HEC-6 model over-predicted sediment accumulation rates in Cores O and N by a factor of four to ten times, and under-predicted rates in Cores I and T6. Transect L was the only downgradient transect whose model-estimated sediment accumulation rate closely matched the measured rate. Without access to the precise model inputs into the HEC-6 model, it is difficult to know exactly why the model-predicted and measured sediment accumulation rates for Transects O, N, I, and T6 differed. However, it appears that the model predicted a more gradual transition between the three sedimentation regimes so that higher sedimentation would occur in the vicinity of Transects O and N and lower sedimentation would occur in the vicinity of Cores I and T16. In contrast, the measured rates demonstrated that the sediment accumulation rates throughout the lake and downgradient of Transect P were relatively constant. The sediment depth accumulated over a 10-year period at the five age dated transects ranged from approximately 10 to 50 cm, and there was no evidence that there was greater accumulation around the upgradient cores than the downgradient cores.

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8.0 REFERENCES

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APPENDIX A

CHAIN OF CUSTODY FORMS EXTRUDED SEDIMENT IDENTIFICATION CODES, EXTRUDED SEDIMENT INTERVALS, AND FIELD LOG BOOK

Battelle
Columbus Laboratories

Form No. _____

CHAIN OF CUSTODY RECORD

Proj. No.	Project Title
G335430	SANGAMO - WESTON

SAMPLERS: (Signature) Abbott

DATE	TIME	SAMPLE I.D.	SAMPLE TYPE (√) RCB	Container No.	Number of Containers	Remarks
1/26/00	1550	SLN - T6 - 1 through 10	✓		10	
1/26/00	1650	SLN - I - 1 through 11	✓		11	
1/27/00	1650	EQUIPMENT RINSATE - TUBE 1	✓		1	
1/27/00	1650	EQUIPMENT RINSATE - TUBE 2	✓		1	
1/27/00	1650	RINSATE WATER	✓		1	
1/26/00	1000	SENECA RIVER	✓		1	[illegible]
1/27/00	1530	SLN - O - 1 through 9	✓		9	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Abbott	1/27/00 0912				
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

Page 1 of 1

Battelle
Columbus Laboratories

Form No. _____

CHAIN OF CUSTODY RECORD

Proj. No.	Project Title
G335430	SANGAMO - WESTON

SAMPLERS: (Signature) J Abbott

DATE	TIME	SAMPLE I.D.	SAMPLE TYPE (√) RCB	Container No.	Number of Containers	Remarks
1/27/00	1530	SLN - O - LAKE WATER	✓		3	
1/27/00	1300	SLN - L - 1 through 17	✓		17	
1/27/00	1030	SLN - J - 1 through 5	✓		5	
~~1/27/00~~	~~1500~~	~~SLN - N - 1 through 9~~	✓		~~9~~	

JEA 1/27/00

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J Abbott	1/27/00 0915				

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Battelle
Columbus Laboratories

Form No. _____

CHAIN OF CUSTODY RECORD

Proj. No.	Project Title
G335430	SANGAMO - WESTON

SAMPLERS: (Signature) Abbott

DATE	TIME	SAMPLE I.D.	SAMPLE TYPE (√) PCB														Container No.	Number of Containers	Remarks
1/27/00	1500	SLN - N - 1 through 9	X															9	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Abbott	1/27/00 0930				
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Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

Page 1 of 1

Battelle
Columbus Laboratories

Form No. _____

CHAIN OF CUSTODY RECORD

Proj. No.: G335430

Project Title: SANGAMO - WESTON

SAMPLERS: (Signature) [signature]

DATE	TIME	SAMPLE I.D.	SAMPLE TYPE (√) Cs-137 Pb-210	Container No.	Number of Containers	Remarks
1/26/00	1550	SLN - T6 - 1 through 8	X		8	
1/26/00	1650	SLN - I - 1 through 11	X		11	
1/26/00	1550	SLN - T6 - SURFACE	X		1	
1/27/00	1030	SLN - J - 1 through 5	X		5	
1/27/00	1300	SLN - L - 1 through 17	X		17	
1/27/00	1500	SLN - N - 1 through 9	X		9	
1/27/00	1530	SLN - O - 1 through 9	X		9	

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[signature]	1/27/00 0850				

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Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Battelle
Columbus Laboratories

Form No. _____

CHAIN OF CUSTODY RECORD

Proj. No.	Project Title
G335430-	SALAMO - WESTON

SAMPLERS: (Signature) [signature]

DATE	TIME	SAMPLE I.D.	SAMPLE TYPE (√) H2O2 PARTITIONING EXPERIMENT	Container No.	Number of Containers	Remarks
1/26/00	1550	SLN - T6 - 1 through 4	X		4	
1/26/00	1650	SLN - I - 1 through 6	X		6	
1/27/00	1300	SLN - L - 1 through 10	X		10	
1/27/00	1500	SLN - N - 1 through 4	X		4	
1/27/00	1530	SLN - O - 1 through 4	X		4	
1/26/00	1000	SEQUOIA RIVER WATER	X		3	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	1/27/00 0841				
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

Page 1 of 1

Battelle
Columbus Laboratories

Form No. _____

CHAIN OF CUSTODY RECORD

Proj. No.	Project Title
G335430	SANGAMO - WESTON

SAMPLERS: (Signature) J Abbott

DATE	TIME	SAMPLE I.D.	SAMPLE TYPE (√) Hold for Partitioning Experiment														Container No.	Number of Containers	Remarks
1/26/00	1000	SENECA RIVER	X															8	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
J Abbott	1/27/00 0925				
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Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

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Battelle
Columbus Laboratories

Form No. _____

CHAIN OF CUSTODY RECORD

Proj. No.	Project Title
G335430	SANGAMO - WESTON

SAMPLERS: (Signature) [signature]

DATE	TIME	SAMPLE I.D.	SAMPLE TYPE (√): HOLD FOR PARTITIONING EXPERIMENT													Container No.	Number of Containers	Remarks
1/26/00	1000	SENECA RIVER	X														8	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	1/27/00 0930				
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Columbus Laboratories

Form No. _____

CHAIN OF CUSTODY RECORD

Proj. No.: G335430-

Project Title: SANGAMO-WESTON

SAMPLERS: (Signature) Abbott / JAI

DATE	TIME	SAMPLE I.D.	SAMPLE TYPE (√) PCB	Container No.	Number of Containers	Remarks
2/15/00	1600	SLN-T16-1 through 4	✓		4	
2/16/00	1300	SLN-Q-1 through 10	✓		10	
2/17/00	1230	SLN-P-1 through 10	✓		10	

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Abbott	2/17/00 @ 2015hrs				

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Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

Battelle
Columbus Laboratories

CHAIN OF CUSTODY RECORD

Form No. _____

Proj. No.	Project Title
G335430 -	SANGAMO - WESTON

SAMPLERS: (Signature) [signature] / JAI

DATE	TIME	SAMPLE I.D.	PCB	Container No.	Number of Containers	Remarks
2/15/00	1600	SLN - T16 - 5 through 10	✓		6	
2/15/00	1200	SLN - ~~T16~~ W7 - 1 Through 11	✓		11	

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[signature]	2/17/00 2030				

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Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks

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Battelle
Columbus Laboratories

Form No. _____

CHAIN OF CUSTODY RECORD

Proj. No.	Project Title
G335430	SANGAMO - WESTON

SAMPLERS: (Signature) [illegible] / JAI

DATE	TIME	SAMPLE I.D.	SAMPLE TYPE (√) Cs-137 Pb-210	Container No.	Number of Containers	Remarks
2/15/00	1200	SLN - W7 - 1 through 11	X		11	
2/15/00	1600	SLN - T16 - 1 through 10	X		10	
2/16/00	1300	SLN - Q - 1 through 10	X		10	
2/17/00	1230	SLN - P - 1 through 10	X		10	

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[illegible]	2/17/00 2040				
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Battelle
Columbus Laboratories

Form No. _____

CHAIN OF CUSTODY RECORD

Proj. No.: G335430-

Project Title: SANGAMO - WESTON

SAMPLERS: (Signature) [signature] / JAI

DATE	TIME	SAMPLE I.D.	SAMPLE TYPE (√): HOLD FOR PARTITIONING EXPERIMENT	Container No.	Number of Containers	Remarks
2/15/00	1200	SLN - W7 - 1 through 11	✓		11	
2/15/00	1600	SLN - T16 - 1 through 10	✓		10	
2/16/00	1300	SLN - ~~FEA~~ Q - 1 through 10	✓		10	

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[signature]	2/17/00 2030				

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

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SEDIMENT CORING LOG SHEET (SCLS)

CORE - DOXBURY

DATE/TIME: 1/26/00 · 1550

SAMPLE LOCATION COORDINATES (GPS): N ~~LAT.~~ 34° 31.947 W ~~LONG.~~ 82° 50.891

SAMPLING LOCATION NUMBER: SLN- T6

SAMPLER'S NAME(S): COATES LEE, MASAR, Abbott

DEPTH OF WATER COLUMN: ≈ 30'

TOP

CORE LENGTH 50 cm

		TEMP	pH	ORP
5 cm ✓SLN- T6 -~~A~~ 1				
10 cm ✓SLN- T6 -~~B~~ 2				
15 cm ✓SLN- T6 -~~C~~ 3				
20 cm ✓SLN- T6 -~~D~~ 4				
25 cm ✓SLN- T6 -~~E~~ 5				
30 cm ✓SLN- T6 -~~F~~ 6				
35 cm ✓SLN- T6 -~~G~~ 7				
40 cm ✓SLN- T6 -~~H~~ 8				
45 cm ✓SLN- T6 -~~I~~ 9				
50 cm ✓SLN- T6 -~~J~~ 10				

BOTTOM

COMMENTS

SEDCORELOG01.CDR

CORE - BCO

Battelle
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SEDIMENT CORING LOG SHEET (SCLS)

DATE/TIME: 1/26/00 · 1550

SAMPLE LOCATION COORDINATES (GPS): N LAT. 34° 31.947 W LONG. 82° 50.891

SAMPLING LOCATION NUMBER: SLN- T6

SAMPLER'S NAME(S): COATES, LEE, MA

DEPTH OF WATER COLUMN: ≈30'

Top

CORE LENGTH 40 cm

		TEMP	pH	ORP
10 cm	SLN- T6 -~~A~~ 1			
20 cm	SLN- T6 -~~B~~ 2			
30 cm	SLN- T6 -~~C~~ 3			
40 cm	SLN- T6 -~~D~~ 4			
cm	SLN- -E			
cm	SLN- -F			
cm	SLN- -G			
cm	SLN- -H			
cm	SLN- -I			
cm	SLN- -J			

Bottom

COMMENTS

SEDCORELOG01.CDR

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SEDIMENT CORING LOG SHEET (SCLS)

Core - BATTELLE - SEQUIM

DATE/TIME: 1-26-00 · 1550

SAMPLING LOCATION NUMBER: SLN- T6

DEPTH OF WATER COLUMN: ≈30'

SAMPLE LOCATION COORDINATES (GPS): ~~LAT.~~ N 34° 31.947 ~~LONG.~~ W 82° 50.891

SAMPLER'S NAME(S): COATES ABBOTT
LEE
MAGAR

TOP

CORE LENGTH 46 cm

			TEMP	pH	ORP
7.5 cm	SLN- T6	1 ~~A~~			
12.5 cm	SLN- T6	2 ~~B~~			
17.5 cm	SLN- T6	3 ~~C~~			
22.5 cm	SLN- T6	4 ~~D~~			
27.5 cm	SLN- T6	5 ~~E~~			
32.5 cm	SLN- T6	6 ~~F~~			
37.5 cm	SLN- T6	7 ~~G~~			
42.5 cm	SLN- T6	8 ~~H~~			
____ cm	SLN- ____	-I			
____ cm	SLN- ____	-J			

Bottom

COMMENTS

SEDCORELOG01.CDR

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SEDIMENT CORING LOG SHEET (SCLS)

Sequim

DATE/TIME: 1-26-00

SAMPLING LOCATION NUMBER: SLN- T6 - SURFACE

DEPTH OF WATER COLUMN: ≈30'

SAMPLE LOCATION COORDINATES (GPS): N LAT. 34° 31.947 W LONG. 82° 50.891

SAMPLER'S NAME(S): COATES MAGAR LEE ABBOTT ~~LEWIS~~ JEA

CORE LENGTH 20 cm

TOP

			TEMP	pH	ORP
9 cm	SLN- T6	SURFACE -A			
cm	SLN-	-B			
cm	SLN-	-C			
cm	SLN-	-D			
cm	SLN-	-E			
cm	SLN-	-F			
cm	SLN-	-G			
cm	SLN-	-H			
cm	SLN-	-I			
cm	SLN-	-J			

BOTTOM

COMMENTS

SEDCORELOG01.CDR

Core - Duxbury

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SEDIMENT CORING LOG SHEET (SCLS)

DATE/TIME: 1/27/00 · 1030

SAMPLING LOCATION NUMBER: SLN- J

DEPTH OF WATER COLUMN: ≈ 24 - 25'

SAMPLE LOCATION COORDINATES (GPS): N ~~LAT.~~ 34° 42.811 W ~~LONG.~~ 82° 50.019

SAMPLER'S NAME(S): COATES, LEWIS, Lee

TOP

CORE LENGTH 39 cm

		TEMP	pH	ORP
6 cm	SLN- J -~~A~~ 1			
11 cm	SLN- J -~~B~~ 2			
16 cm	SLN- J -~~C~~ 3			
21 cm	SLN- J -~~D~~ 4			
27 cm	SLN- J -~~E~~ 5			
cm	SLN- -F			
cm	SLN- -G			
cm	SLN- -H			
cm	SLN- -I			
cm	SLN- -J			

BOTTOM

COMMENTS

Lost sample while @ beginning extruding + Did Not Collect Last 3 cm

SEDCORELOG01.CDR

Core - SEQUIM

Battelle
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SEDIMENT CORING LOG SHEET (SCLS)

DATE/TIME: 1/27/00 1030

SAMPLE LOCATION COORDINATES (GPS): N LAT. 34° 42.811 W LONG. 82° 50.019

SAMPLING LOCATION NUMBER: SLN- J

SAMPLER'S NAME(S): COATES, LEWIS, LEE

DEPTH OF WATER COLUMN: ≈ 24-25'

Top

CORE LENGTH 29 cm

				TEMP	pH	ORP
8 cm	SLN- J	1 ~~A~~				
~~8~~ 13 cm	SLN- J	2 ~~B~~				
~~8~~ 18 cm	SLN- J	3 ~~C~~				
23 cm	SLN- J	4 ~~D~~				
29 cm	SLN- J	5 ~~E~~				
cm	SLN-	-F				
cm	SLN-	-G				
cm	SLN-	-H				
cm	SLN-	-I				
cm	SLN-	-J				

COMMENTS

*LOST SAMPLE

DIFFICULT CORE/LOCATION DUE TO SAND - HARD TO WORK WITH

SEDCORELOG01.CL

BOTTOM

Core - DUXBURY

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SEDIMENT CORING LOG SHEET (SCLS)

DATE/TIME: 1/26/00 1650

SAMPLING LOCATION NUMBER: SLN- I

DEPTH OF WATER COLUMN: ≈ 23'

SAMPLE LOCATION COORDINATES (GPS): N ~~LAT.~~ 34° 42.427 W ~~LONG.~~ 82° ~~8~~ JEB 50.322

SAMPLER'S NAME(S): COATES, LEE, LEWIS

Top

CORE LENGTH 60 cm

	TEMP	pH	ORP
10 cm ✓SLN- I -~~A~~ 1			
15 cm ✓SLN- I -~~B~~ 2			
20 cm ✓SLN- I -~~C~~ 3			
25 cm ✓SLN- I -~~D~~ 4			
30 cm ✓SLN- I -~~E~~ 5			
35 cm ✓SLN- I -~~F~~ 6			
40 cm ✓SLN- I -~~G~~ 7			
45 cm ✓SLN- I -~~H~~ 8			
50 cm ✓SLN- I -~~I~~ 9			
55 cm ✓SLN- I -~~J~~ 10			
60 cm ✓SLN- I -11			

Bottom

COMMENTS

SEDCORELOG01.CDR

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CORE - BCO

SEDIMENT CORING LOG SHEET (SCLS)

DATE/TIME: 1/26/00 · 1650

SAMPLE LOCATION COORDINATES (GPS): N ~~LAT.~~ 34° 42.427 W ~~LONG.~~ 82° ~~8~~ 50.322

SAMPLING LOCATION NUMBER: SLN- I

SAMPLER'S NAME(S): COATES, LEE, LEWIS

DEPTH OF WATER COLUMN: ≈ 23'

Top

CORE LENGTH 65 cm

		TEMP	pH	ORP
15 cm	SLN- I -1 ~~A~~			
25 cm	SLN- I -2 ~~B~~			
35 cm	SLN- I -3 ~~C~~			
45 cm	SLN- I -4 ~~D~~			
55 cm	SLN- I -5 ~~E~~			
65 cm	SLN- I -6 ~~F~~			
cm	SLN- -G			
cm	SLN- -H			
cm	SLN- -I			
cm	SLN- -J			

Bottom

COMMENTS

SEDCORELOG01.CDR

SEDIMENT CORING LOG SHEET (SCLS)

Core - Battelle Sequim

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DATE/TIME: 1-26-00 · 1650

SAMPLE LOCATION COORDINATES (GPS): N ~~LAT.~~ 34° 42.427 W ~~LONG.~~ 82° 50.322

SAMPLING LOCATION NUMBER: SLN- I

SAMPLER'S NAME(S): COATES, LEE, LEWIS

DEPTH OF WATER COLUMN: 23'

TOP

CORE LENGTH 65 cm

		TEMP	pH	ORP
7.5 cm	SLN- I -~~A~~ 1			
12.5 cm	SLN- I -~~B~~ 2			
17.5 cm	SLN- I -~~C~~ 3			
22.5 cm	SLN- I -~~D~~ 4			
27.5 cm	SLN- I -~~E~~ 5			
32.5 cm	SLN- I -~~F~~ 6			
37.5 cm	SLN- I -~~G~~ 7			
42.5 cm	SLN- I -~~H~~ 8			
47.5 cm	SLN- I -~~I~~ 9			
52.5 cm	SLN- I -~~J~~ 10			
57.5 cm	SLN - I 11			

Bottom

COMMENTS

SEDCORELOG01.CDR

Core - Sequim

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SEDIMENT CORING LOG SHEET (SCLS)

DATE/TIME: 1/27/00 JEA 1300

SAMPLE LOCATION COORDINATES (GPS): N LAT. 34° 43.130 W LONG. 82° 49.565

SAMPLING LOCATION NUMBER: SLN- L

SAMPLER'S NAME(S): LEWIS OTHER LEE COTTES

DEPTH OF WATER COLUMN: ≈ 16'

TOP

CORE LENGTH 86 cm

			TEMP	pH	ORP
7 cm	SLN- L	1 A			
12 cm	SLN- L	2 B			
17 cm	SLN- L	3 C			
22 cm	SLN- L	4 D			
27 cm	SLN- L	5 E			
32 cm	SLN- L	6 F			
37 cm	SLN- L	7 G			
42 cm	SLN- L	8 H			
47 cm	SLN- L	9 I			
52 cm	SLN- L	10 J			
57cm		11			

COMMENTS

SEDCORELOG01.CDR

62cm SLN - L 12
67cm SLN - L 13
72cm SLN - L 14
77cm SLN - L 15

82cm SLN - L - 16
86 cm SLN - L - 17

BOTTOM

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SEDIMENT CORING LOG SHEET (SCLS)

Core - BCO

DATE/TIME: 1/27/00 · 1300

SAMPLING LOCATION NUMBER: SLN- L

DEPTH OF WATER COLUMN: ≈ 16'

SAMPLE LOCATION COORDINATES (GPS): N ~~LAT.~~ 34° 43.130 W ~~LONG.~~ 82° 49.565

SAMPLER'S NAME(S): Lewis
Coates
OTHER

Top

CORE LENGTH 55 ~~50~~ cm

			TEMP	pH	ORP
10 cm	SLN- L	1 ~~A~~			
15 cm	SLN- L	2 ~~B~~			
20 cm	SLN- L	3 ~~C~~			
25 cm	SLN- L	4 ~~D~~			
30 cm	SLN- L	5 ~~E~~			
35 cm	SLN- L	6 ~~F~~			
40 cm	SLN- L	7 ~~G~~			
45 cm	SLN- L	8 ~~H~~			
50 cm	SLN- L	9 ~~I~~			
55 cm	SLN- L	10 ~~J~~			

Bottom

COMMENTS

* extruded sample from bottom
Due to stuck core
Samples were cut ≈ every 5 cm *

SEDCORELOG01.CDR

Core - Duxbury

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SEDIMENT CORING LOG SHEET (SCLS)

DATE/TIME: 1/27/00 1300

SAMPLE LOCATION COORDINATES (GPS): N LAT. 34° 43.130 W LONG. 82° 49.565

SAMPLING LOCATION NUMBER: SLN- L

SAMPLER'S NAME(S): LEWIS OTHER
LEE
SCOTT

DEPTH OF WATER COLUMN: ≈ 16'

Top

CORE LENGTH 87 cm

		TEMP	pH	ORP
5 cm	SLN- L -~~A~~ 1			
10 cm	SLN- L -~~B~~ 2			
15 cm	SLN- L -~~C~~ 3			
20 cm	SLN- L -~~D~~ 4			
25 cm	SLN- L -~~E~~ 5			
30 cm	SLN- L -~~F~~ 6			
35 cm	SLN- L -~~G~~ 7			
40 cm	SLN- L -~~H~~ 8			
45 cm	SLN- L -~~I~~ 9			
50 cm	SLN- L -~~J~~ 10			
55 cm	SLN- L 11			
60 cm	SLN- L -12			
65 cm	SLN- L -13			
70 cm	SLN- L -14			
75 cm	SLN- L -15			
80 cm	SLN- L -16			
85 cm	SLN- L -17			

COMMENTS

Lost 2 cm @ top

Bottom

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SEDIMENT CORING LOG SHEET (SCLS)

Core - Duxbury

DATE/TIME: 1/27/00 ~~1300~~ JEA 1500

SAMPLE LOCATION COORDINATES (GPS): N LAT. 34° 43.486 W LONG. 82° 49.233

SAMPLING LOCATION NUMBER: SLN- N

SAMPLER'S NAME(S): LEWIS OTHER, COATES, LEE

DEPTH OF WATER COLUMN: ≈ 18'

Top

CORE LENGTH 48 cm

		TEMP	pH	ORP
5 cm	SLN- N -~~A~~ 1			
10 cm	SLN- N -~~B~~ 2			
15 cm	SLN- N -~~C~~ 3			
20 cm	SLN- N -~~D~~ 4			
25 cm	SLN- N -~~E~~ 5			
30 cm	SLN- N -~~F~~ 6			
35 cm	SLN- N -~~G~~ 7			
40 cm	SLN- N -~~H~~ 8			
45 cm	SLN- N -~~I~~ 9			
___ cm	SLN- ___ -J			

Bottom

COMMENTS

Lost 3 cm During extruding - From Bottom

SEDCORELOG01.CDR

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SEDIMENT CORING LOG SHEET (SCLS)

Core - SEQUIM

DATE/TIME: 1/27/00 1500

SAMPLING LOCATION NUMBER: SLN- N

DEPTH OF WATER COLUMN: ≈ 18'

SAMPLE LOCATION COORDINATES (GPS): N ~~LAT.~~ 34° 43.486 W ~~LONG.~~ 82° 49.233

SAMPLER'S NAME(S): Lewis Other
Lee
Coates

TOP

CORE LENGTH 49 cm

			TEMP	pH	ORP
7 cm	SLN- N	1 ~~A~~			
12 cm	SLN- N	2 ~~B~~			
17 cm	SLN- N	3 ~~C~~			
22 cm	SLN- N	4 ~~D~~			
27 cm	SLN- N	5 ~~E~~			
32 cm	SLN- N	6 ~~F~~			
37 cm	SLN- N	7 ~~G~~			
42 cm	SLN- N	8 ~~H~~			
47 cm	SLN- N	9 ~~I~~			
cm	SLN-	-J			

Bottom

COMMENTS

Lost 2 Cm During extruding - @ bottom

SEDCORELOG01.CDR

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SEDIMENT CORING LOG SHEET (SCLS)

Core - BCO

DATE/TIME: 1/27/00 1500

SAMPLE LOCATION COORDINATES (GPS): N LAT. 34° 43.486 W LONG. 82° 49.233

SAMPLING LOCATION NUMBER: SLN- N

SAMPLER'S NAME(S): LEWIS OTHER, LEE, COATES

DEPTH OF WATER COLUMN: ≈18'

TOP

CORE LENGTH 42 cm

BOTTOM

				TEMP	pH	ORP
10 cm	SLN- N	1 -A				
20 cm	SLN- N	2 -B				
30 cm	SLN- N	3 -C				
40 cm	SLN- N	4 -D				
cm	SLN-	-E				
cm	SLN-	-F				
cm	SLN-	-G				
cm	SLN-	-H				
cm	SLN-	-I				
cm	SLN-	-J				

COMMENTS

SEDCORELOG01.CDR

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SEDIMENT CORING LOG SHEET (SCLS)

Core - Doxbury

DATE/TIME: 1/27/00 1530

SAMPLE LOCATION COORDINATES (GPS): N LAT. 34° 43.727 W LONG. 82° 48.721

SAMPLING LOCATION NUMBER: SLN- 0

SAMPLER'S NAME(S): LEWIS OTHER, LEE, COATES

DEPTH OF WATER COLUMN: ≈11'

CORE LENGTH 49 cm

Top

				TEMP	pH	ORP
5 cm	SLN- 0	-A	1			
10 cm	SLN- 0	-B	2			
15 cm	SLN- 0	-C	3			
20 cm	SLN- 0	-D	4			
25 cm	SLN- 0	-E	5			
30 cm	SLN- 0	-F	6			
35 cm	SLN- 0	-G	7			
40 cm	SLN- 0	-H	8			
45 cm	SLN- 0	-I	9			
cm	SLN-	-J				

Bottom

COMMENTS

Lost 4 cm when pushing on extruder - @ Bottom

SEDCORELOG01.CDR

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SEDIMENT CORING LOG SHEET (SCLS)

Case - Sequim

DATE/TIME: 1/27/00 1530

SAMPLE LOCATION COORDINATES (GPS): N LAT. 34° 43.727 W LONG. 82° 48.721

SAMPLING LOCATION NUMBER: SLN- 0

SAMPLER'S NAME(S): Lewis OTHER
Lee
Coates

DEPTH OF WATER COLUMN: ≈ 11'

Top

CORE LENGTH 46 cm

Bottom

		TEMP	pH	ORP
5 cm	SLN- 0 -~~A~~ 1			
10 cm	SLN- 0 -~~B~~ 2			
15 cm	SLN- 0 -~~C~~ 3			
20 cm	SLN- 0 -~~D~~ 4			
25 cm	SLN- 0 -~~E~~ 5			
30 cm	SLN- 0 -~~F~~ 6			
35 cm	SLN- 0 -~~G~~ 7			
40 cm	SLN- 0 -~~H~~ 8			
45 cm	SLN- 0 -~~I~~ 9			
___ cm	SLN- ___ -J			

COMMENTS

Lost 1 cm while extruding @ Bottom

SEDCORELOG01.CDR

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SEDIMENT CORING LOG SHEET (SCLS)

Core - Columbus

DATE/TIME: 1/27/00 1530

SAMPLING LOCATION NUMBER: SLN- 0

DEPTH OF WATER COLUMN: ≈11'

SAMPLE LOCATION COORDINATES (GPS): N ~~LAT.~~ 34° 43.727 W ~~LONG.~~ 82° 48.721

SAMPLER'S NAME(S): Lewis Other
Coates
Lee

Top

CORE LENGTH 38 cm

			TEMP	pH	ORP
10 cm	SLN- 0	1 ~~-A~~			
20 cm	SLN- 0	2 ~~-B~~			
27 cm	SLN- 0	3 ~~-C~~			
34 cm	SLN- 0	4 ~~-D~~			
cm	SLN-	-E			
cm	SLN-	-F			
cm	SLN-	-G			
cm	SLN-	-H			
cm	SLN-	-I			
cm	SLN-	-J			

Bottom

COMMENTS

Lost ~~3~~ 2 EA 4 cm During extruding @ Bottom (3cm) @ top (1cm)

SEDCORELOG01.CDR

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SEDIMENT CORING LOG SHEET (SCLS) Core - Duxbury

DATE/TIME: 2/15/00 · 1200

SAMPLE LOCATION COORDINATES (GPS): NA LAT. ____ LONG. ____

SAMPLING LOCATION NUMBER: SLN- W7

SAMPLER'S NAME(S): COATES, ABBOTT, ICKES

DEPTH OF WATER COLUMN: 16"

CORE LENGTH 172 cm

Top

		TEMP	pH	ORP
0 cm	SLN-W7-A1			
25 cm	SLN-W7-B2			
57-68 cm	SLN-W7-C3			
68-81 cm	SLN-W7-D4			
81-91 cm	SLN-W7-E5			
94-104 cm	SLN-W7-F6			
114 cm	SLN-W7-G7			
134 cm	SLN-W7-H8			
147 cm	SLN-W7-I9			
157 cm	SLN-W7-J10			

Bottom 172 cm SLN-W7-11

COMMENTS

SEDCORELOG01.CDR

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SEDIMENT CORING LOG SHEET (SCLS)

Core - Sequim

DATE/TIME: 2/15/00 12:00

SAMPLE LOCATION COORDINATES (GPS): NA LAT. ____ LONG. ____

SAMPLING LOCATION NUMBER: SLN- W7

SAMPLER'S NAME(S): Coates, Abbott, Ickes

DEPTH OF WATER COLUMN: 16"

TOP

CORE LENGTH 172 cm

		TEMP	pH	ORP
	7-13 cm SLN-W7-A1			
	13-20 cm SLN-W7-B2			
	43-50 cm SLN-W7-C3			
	64-70 cm SLN-W7-D4			
	~~65~~ 78-84 cm SLN-W7-E5			
	101-108 cm SLN-W7-F6			
	108-115 cm SLN-W7-G7			
	120-127 cm SLN-W7-H8			
	137-144 cm SLN-W7-I9			
	151-158 cm SLN-W7-J10			
	165-172 cm SLN-W7-11			

COMMENTS

SEDCORELOG01.CDR

Bottom

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SEDIMENT CORING LOG SHEET (SCLS)

Core - Columbus

DATE/TIME: 2/15/00 · 12:00

SAMPLE LOCATION COORDINATES (GPS): NA LAT. ____ LONG. ____

SAMPLING LOCATION NUMBER: SLN- W7

SAMPLER'S NAME(S): Coates, Abbott, Ickes

DEPTH OF WATER COLUMN: 116"

TOP

CORE LENGTH 170 cm

		TEMP	pH	ORP
7-17 cm	SLN- W7 -A1			
17-27 cm	SLN- W7 -B2			
42-52 cm	SLN- W7 -C3			
62-72 cm	SLN- W7 -D4			
82-92 cm	SLN- W7 -E5			
92-100 cm	SLN- W7 -F6			
100-108 cm	SLN- W7 -G7			
112-122 cm	SLN- W7 -H8			
140-150 cm	SLN- W7 -I9			
150-160 cm	SLN- W7 -J10			
160-170	SLN - W7 - 11			

COMMENTS

SEDCORELOG01.CDR

bottom

Core - Sequim

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SEDIMENT CORING LOG SHEET (SCLS)

DATE/TIME: 2/15/00 · 1600

SAMPLE LOCATION COORDINATES (GPS): NA LAT. ____ LONG. ____

SAMPLING LOCATION NUMBER: SLN- T16

SAMPLER'S NAME(S): Contes, Abbott, Ickes

DEPTH OF WATER COLUMN: 24"

Top

CORE LENGTH 157 cm

		TEMP	pH	ORP
15-20 cm	SLN- T16-A1			
42-47 cm	SLN- T16-B2			
59-64 cm	SLN- T16-C3			
74-79 cm	SLN- T16-D4			
98-104 cm	SLN- T16-E5			
109-114 cm	SLN- T16-F6			
116-121 cm	SLN- T16-G7			
126-131 cm	SLN- T16-H8			
136-141 cm	SLN- T16-I9			
146-151 cm	SLN- T16-J10			

Bottom

COMMENTS

Most lo cm while extruding from bottom

SEDCORELOG01.CDR

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SEDIMENT CORING LOG SHEET (SCLS)

Core - Duxbury

DATE/TIME: 2/15/00 · 1600

SAMPLE LOCATION COORDINATES (GPS): NA LAT. ____ LONG. ____

SAMPLING LOCATION NUMBER: SLN- T16

SAMPLER'S NAME(S): Coates, Abbott, Ickes

DEPTH OF WATER COLUMN: 24"

Top

CORE LENGTH 148 cm

		TEMP	pH	ORP
	0-10 cm SLN- T16 -A 1			
	20-30 cm SLN- T16 -B 2			
	40-50 cm SLN- T16 -C 3			
	55-65 cm SLN- T16 -D 4			
	77-87 cm SLN- T16 -E 5			
	97-107 cm SLN- T16 -F 6			
	110-117 cm SLN- T16 -G 7			
	117-124 cm SLN- T16 -H 8			
	128-138 cm SLN- T16 -I 9			
	138-148 cm SLN- T16 -J 10			

COMMENTS

SEDCORELOG01.CDR

Bottom

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SEDIMENT CORING LOG SHEET (SCLS)

Core - BCO

DATE/TIME: 2/15/00 · 1600

SAMPLE LOCATION COORDINATES (GPS): NA LAT. ____ LONG. ____

SAMPLING LOCATION NUMBER: SLN- T16

SAMPLER'S NAME(S): Coates, Abbott, Ickes

DEPTH OF WATER COLUMN: 24"

TOP

CORE LENGTH 155 cm

		TEMP	pH	ORP
	10-20 cm SLN- T16-A1			
	25-35 cm SLN- T16-B2			
	45-55 cm SLN- T16-C3			
	70-80 cm SLN- T16-D4			
	82-92 cm SLN- T16-E5			
	92-102 cm SLN- T16-F6			
	105-115 cm SLN- T16-G7			
	121-131 cm SLN- T16-H8			
	133-143 cm SLN- T16-I9			
	145-155 cm SLN- T16-J10			

COMMENTS

SEDCORELOG01.CDR

Bottom

Core - Sequim

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SEDIMENT CORING LOG SHEET (SCLS)

DATE/TIME: 2/16/00 · 1300

SAMPLE LOCATION COORDINATES (GPS): NA LAT. ____ LONG. ____

SAMPLING LOCATION NUMBER: SLN- Q

SAMPLER'S NAME(S): Coates, Abbott, Ickes

DEPTH OF WATER COLUMN: 20"

Top

CORE LENGTH 138 cm

		TEMP	pH	ORP
0-5 cm	SLN- Q -A1			
15-20 cm	SLN- Q -B2			
21-26 cm	SLN- Q -C3			
26-31 cm	SLN- Q -D4			
47-52 cm	SLN- Q -E5			
73-78 cm	SLN- Q -F6			
88-93 cm	SLN- Q -G7			
103-108 cm	SLN- Q -H8			
118-123 cm	SLN- Q -I9			
133-138 cm	SLN- Q -J10			

COMMENTS

SEDCORELOG01.CDR

Bottom

Core - BCO

Battelle
... Putting Technology To Work

SEDIMENT CORING LOG SHEET (SCLS)

DATE/TIME: 2/16/00 · 1300

SAMPLE LOCATION COORDINATES (GPS): NA LAT. ____ LONG. ____

SAMPLING LOCATION NUMBER: SLN- Q

SAMPLER'S NAME(S): Coates, Abbott, Ickes

DEPTH OF WATER COLUMN: 80'

TOP

CORE LENGTH 147 cm

		TEMP	pH	ORP
0-10 cm	SLN- Q -A1			
15-25 cm	SLN- Q -B2			
25-35 cm	SLN- Q -C3			
42-52 cm	SLN- Q -D4			
57-67 cm	SLN- Q -E5			
67-77 cm	SLN- Q -F6			
77-87 cm	SLN- Q -G7			
97-107 cm	SLN- Q -H8			
117-127 cm	SLN- Q -I9			
137-147 cm	SLN- Q -J10			

COMMENTS

SEDCORELOG01.CDR

Bottom

SEDIMENT CORING LOG SHEET (SCLS)

Core · Duxbury

Battelle
... Putting Technology To Work

DATE/TIME: 2/16/00 · 1300

SAMPLE LOCATION COORDINATES (GPS): NA LAT. ____ LONG. ____

SAMPLING LOCATION NUMBER: SLN- Q

SAMPLER'S NAME(S): Coates, Abbott, Ickes

DEPTH OF WATER COLUMN: 20"

TOP

CORE LENGTH 143 cm

		TEMP	pH	ORP
0-10 cm	SLN- Q -A1			
15-25 cm	SLN- Q -B2			
30-40 cm	SLN- Q -C3			
40-50 cm	SLN- Q -D4			
55-65 cm	SLN- Q -E5			
65-75 cm	SLN- Q -F6			
83-93 cm	SLN- Q -G7			
93-103 cm	SLN- Q -H8			
113-123 cm	SLN- Q -I9			
133-143 cm	SLN- Q -J10			

COMMENTS

SEDCORELOG01.CDR

Bottom

Core - Duxbury

Battelle
... Putting Technology To Work

SEDIMENT CORING LOG SHEET (SCLS)

DATE/TIME: 12/17/00 12:30

SAMPLE LOCATION COORDINATES (GPS): LAT. ____ LONG. ____

SAMPLING LOCATION NUMBER: SLN- P

SAMPLER'S NAME(S): Coates, Knaub

DEPTH OF WATER COLUMN: 6"

TOP

CORE LENGTH 135 cm

		TEMP	pH	ORP
0-10 cm	SLN- P -A1			
10-20 cm	SLN- P -B2			
20-30 cm	SLN- P -C3			
30-40 cm	SLN- P -D4			
50-60 cm	SLN- P -E5			
70-80 cm	SLN- P -F6			
85-95 cm	SLN- P -G7			
95-105 cm	SLN- P -H8			
105-115 cm	SLN- P -I9			
125-135 cm	SLN- P -J10			

COMMENTS

SEDCORELOG01.CDR

Bottom

Core - Sequim

Battelle
... Putting Technology To Work

SEDIMENT CORING LOG SHEET (SCLS)

DATE/TIME: 12/17/00 · 12:30

SAMPLE LOCATION COORDINATES (GPS): LAT. _____ LONG. _____

SAMPLING LOCATION NUMBER: SLN- P

SAMPLER'S NAME(S): Oates, Knaub

DEPTH OF WATER COLUMN: 6"

Top

CORE LENGTH 130 cm

		TEMP	pH	ORP
	0-5 cm SLN- P -A1			
	5-10 cm SLN- P -B2			
	20-25 cm SLN- P -C3			
	35-40 cm SLN- P -D4			
	50-55 cm SLN- P -E5			
	65-70 cm SLN- P -F6			
	80-85 cm SLN- P -G7			
	95-100 cm SLN- P -H8			
	100-115 cm SLN- P -I9			
	125-130 cm SLN- P -J10			

COMMENTS

SEDCORELOG01.CDR

Bottom

APPENDIX B

^{210}Pb, ^{137}Cs, PSD MOISTURE CONTENT, PARTICLE SIZE DISTRIBUTION (PSD) AND TOTAL ORGANIC CARBON (TOC) ANALYTICAL RESULTS

Appendix B. Results for Pb-210 Age Dating of Sediment Core Sections from the Sangamo-Weston/Twelvemile Creek/Lake Hartwell Superfund Site

CORE I

Sample #	Section Depth (cm)	Pb-210 (dpm/g)	Cs-137 (dpm/g)	% Moisture	Grain Size % gravel	% sand	% silt	% clay	%TOC
SLN-I-1	0-7.5	9.40	0.648	73.5	NA	NA	NA	NA	NA
SLN-I-2	7.5-12.5	8.94	0.765	68.7	0.00	3.00	57.0	40.0	2.70
SLN-I-3	12.5-17.5	7.91	1.28	67.1	NA	NA	NA	NA	NA
SLN-I-4	17.5-22.5	7.37	1.47	66.3	NA	NA	NA	NA	NA
SLN-I-5	22.5-27.5	7.03	1.88	65.4	NA	NA	NA	NA	NA
SLN-I-6	27.5-32.5	5.79	2.30	63.9	NA	NA	NA	NA	NA
SLN-I-7	32.5-37.5	6.48	2.66	60.6	0.00	3.00	41.0	56.0	2.48
SLN-I-8	37.5-42.5	6.10	2.90	61.5	NA	NA	NA	NA	NA
SLN-I-9	42.5-47.5	6.29	1.92	61.2	NA	NA	NA	NA	NA
SLN-I-10	47.5-52.5	5.51	1.62	60.5	NA	NA	NA	NA	NA
SLN-I-11	52.5-57.5	5.61	1.94	62.6	0.00	1.00	34.0	65.0	2.17

CORE J

Sample #	Section Depth (cm)	Pb-210 (dpm/g)	Cs-137 (dpm/g)	% Moisture	Grain Size % gravel	% sand	% silt	% clay	%TOC
SLN-J-1	0-8	7.18	0.779	64.0	0.00	44.0	38.0	18.0	2.57
SLN-J-2	8-13	6.46	0.794	55.3	NA	NA	NA	NA	NA
SLN-J-3	13-18	3.32	0.874	45.8	NA	NA	NA	NA	NA
SLN-J-5	23-29	1.79	0.647	43.4	2.00	79.0	8.00	11.0	0.910

CORE L

Sample #	Section Depth (cm)	Pb-210 (dpm/g)	Cs-137 (dpm/g)	% Moisture	Grain Size % gravel	% sand	% silt	% clay	%TOC
SLN-L-1	0-7	7.08	0.867	73.4	NA	NA	NA	NA	NA
SLN-L-2	7-12	7.03	0.860	64.3	0.00	9.00	61.0	30.0	2.89
SLN-L-3	12-17	6.16	0.921	63.1	NA	NA	NA	NA	NA
SLN-L-4	17-22	4.95	0.983	64.2	NA	NA	NA	NA	NA
SLN-L-5	22-27	4.04	1.21	59.7	NA	NA	NA	NA	NA
SLN-L-6	27-32	4.78	0.958	58.3	0.00	16.0	60.0	24.0	2.63
SLN-L-7	32-37	4.18	1.10	57.2	NA	NA	NA	NA	NA
SLN-L-8	37-42	4.44	1.29	55.3	NA	NA	NA	NA	NA
SLN-L-9	42-47	3.52	1.05	53.2	NA	NA	NA	NA	NA
SLN-L-10	47-52	4.54	0.829	52.9	0.00	16.0	65.0	19.0	2.99
SLN-L-11	52-57	4.31	1.34	54.6	NA	NA	NA	NA	NA
SLN-L-12	57-62	4.24	1.28	51.9	NA	NA	NA	NA	NA
SLN-L-13	62-67	4.43	1.38	52.0	NA	NA	NA	NA	NA

Appendix B. Results for Pb-210 Age Dating of Sediment Core Sections from the Sangamo-Weston/Twelvemile Creek/Lake Hartwell Superfund Site

CORE N

Sample #	Section Depth (cm)	Pb-210 (dpm/g)	Cs-137 (dpm/g)	% Moisture	Grain Size % gravel	% sand	% silt	% clay	%TOC
SLN-N-1	0-7	6.09	0.474	66.4	NA	NA	NA	NA	NA
SLN-N-2	7-12	5.83	0.626	58.9	0.00	23.0	60.0	17.0	3.21
SLN-N-3	12-17	6.62	0.532	58.7	NA	NA	NA	NA	NA
SLN-N-4	17-22	5.03	0.586	58.8	NA	NA	NA	NA	NA
SLN-N-5	22-27	5.86	0.772	57.9	NA	NA	NA	NA	NA
SLN-N-7	32-37	3.75	0.869	55.8	NA	NA	NA	NA	NA
SLN-N-8	37-42	2.91	0.881	58.4	3.00	36.0	43.0	18.0	5.00
SLN-N-9	42-47	2.49	0.748	52.9	NA	NA	NA	NA	NA

CORE O

Sample #	Section Depth (cm)	Pb-210 (dpm/g)	Cs-137 (dpm/g)	% Moisture	Grain Size % gravel	% sand	% silt	% clay	%TOC
SLN-O-1	0-5	3.71	0.455	64.3	0.00	25.0	57.0	18.0	2.52
SLN-O-2	5-10	3.52	0.633	51.7	NA	NA	NA	NA	NA
SLN-O-3	10-15	5.46	0.611	52.1	NA	NA	NA	NA	NA
SLN-O-4	15-20	3.26	0.703	52.0	NA	NA	NA	NA	NA
SLN-O-5	20-25	2.94	0.827	47.8	NA	NA	NA	NA	NA
SLN-O-7	30-35	1.74	0.532	42.6	0.00	63.0	27.0	10.0	1.81
SLN-O-6	25-30	2.17	0.751	46.0	NA	NA	NA	NA	NA
SLN-O-8	35-40	1.12	0.645	32.7	1.00	78.0	10.0	11.0	1.74
SLN-O-9	40-45	0.832	0.576	35.3	NA	NA	NA	NA	NA

CORE T6

Sample #	Section Depth (cm)	Pb-210 (dpm/g)	Cs-137 (dpm/g)	% Moisture	Grain Size % gravel	% sand	% silt	% clay	%TOC
SLN-T6-1	0-7.5	9.37	2.23	75.5	0.00	47.0	34.0	19.0	2.76
SLN-T6-2	7.5-12.5	6.77	3.41	67.9	NA	NA	NA	NA	NA
SLN-T6-3	12.5-17.5	6.94	2.65	63.5	NA	NA	NA	NA	NA
SLN-T6-4	17.5-22.5	3.58	1.51	44.6	0.00	30.0	35.0	35.0	2.04
SLN-T6-5	22.5-27.5	3.68	0.0973	34.7	NA	NA	NA	NA	NA
SLN-T6-6	27.5-32.5	4.20	0.0722	33.6	NA	NA	NA	NA	NA
SLN-T6-7	32.5-37.5	3.08	0.0744	29.2	0.00	40.0	39.0	21.0	1.44
SLN-T6-8	37.5-42.5	3.23	0.0803	29.4	NA	NA	NA	NA	NA

Appendix B. Results for Pb-210 Age Dating of Sediment Core Sections from the Sangamo-Weston/Twelvemile Creek/Lake Hartwell Superfund Site

CORE W7							Grain Size		
Sample #	Section Depth (cm)	Pb-210 (dpm/g)	Cs-137 (dpm/g)	% Moisture	% gravel	% sand	% silt	% clay	%TOC
SLN-W7-1	7-13	1.31	0.174	31.2	NA	NA	NA	NA	NA
SLN-W7-2	13-20	0.418	0.0872	21.1	3.00	94.0	2.00	1.00	0.25
SLN-W7-3	43-50	0.858	0.0862	20.7	NA	NA	NA	NA	NA
SLN-W7-4	64-70	0.263	0.105	20.5	7.00	91.0	2.00	0.00	0.13
SLN-W7-5	78-84	0.175	0.0679	21.7	NA	NA	NA	NA	NA
SLN-W7-6	101-108	3.56	0.530	49.0	0.00	24.0	63.0	13.0	3.46
SLN-W7-7	108-115	1.78	0.396	37.6	NA	NA	NA	NA	NA
SLN-W7-8	120-127	0.237	0.117	22.4	0.00	98.0	2.00	0.00	0.050
SLN-W7-9	137-144	1.97	0.139	40.92	NA	NA	NA	NA	NA
SLN-W7-10	151-158	2.92	0.496	43.81	0.00	38.0	51.0	11.0	2.69
SLN-W7-11	165-172	1.45	0.495	36.47	NA	NA	NA	NA	NA

CORE T16							Grain Size		
Sample #	Section Depth (cm)	Pb-210 (dpm/g)	Cs-137 (dpm/g)	% Moisture	% gravel	% sand	% silt	% clay	%TOC
SLN-T16-1	15-20	0.240	0.101	22.1	1.00	98.0	1.00	0.00	0.19
SLN-T16-2	42-47	0.352	0.113	22.4	NA	NA	NA	NA	NA
SLN-T16-3	59-64	0.300	0.100	22.7	NA	NA	NA	NA	NA
SLN-T16-4	74-79	0.236	0.133	22.6	8.00	91.0	1.00	0.00	0.28
SLN-T16-5	98-104	0.524	0.130	34.4	NA	NA	NA	NA	NA
SLN-T16-6	109-114	0.190	0.130	21.9	1.00	98.0	1.0	0.0	0.16
SLN-T16-7	116-121	2.79	0.818	57.5	NA	NA	NA	NA	NA
SLN-T16-8	126-131	4.72	0.534	38.1	0.00	52.0	34.0	14.0	1.80
SLN-T16-9	136-141	1.92	0.340	27.3	NA	NA	NA	NA	NA
SLN-T16-1C	146-151	0.795	0.148	26.2	NA	NA	NA	NA	NA

Appendix B. Results for Pb-210 Age Dating of Sediment Core Sections from the Sangamo-Weston/Twelvemile Creek/Lake Hartwell Superfund Site

CORE Q

Sample #	Section Depth (cm)	Pb-210 (dpm/g)	Cs-137 (dpm/g)	% Moisture	Grain Size % gravel	% sand	% silt	% clay	%TOC
SLN-Q-1	0-5	0.238	0.174	30.4	0.00	98.0	2.00	0.00	0.16
SLN-Q-2	15-20	2.97	0.575	50.1	NA	NA	NA	NA	NA
SLN-Q-3	21-26	3.26	0.415	46.8	0.00	39.0	47.0	14.0	3.55
SLN-Q-4	26-31	1.66	0.131	31.2	NA	NA	NA	NA	NA
SLN-Q-5	47-52	0.434	0.162	22.2	0.00	94.0	5.00	1.00	0.32
SLN-Q-6	73-78	2.80	0.456	42.1	0.00	49.0	41.0	10.0	2.77
SLN-Q-7	88-93	0.253	0.152	14.2	NA	NA	NA	NA	NA
SLN-Q-8	103-108	0.102	0.108	18.9	NA	NA	NA	NA	NA
SLN-Q-9	118-123	0.157	0.108	21.5	NA	NA	NA	NA	NA
SLN-Q-10	133-138	1.23	0.299	32.2	0.00	84.0	9.00	7.00	0.20

CORE P

Sample #	Section Depth (cm)	Pb-210 (dpm/g)	Cs-137 (dpm/g)	% Moisture	Grain Size % gravel	% sand	% silt	% clay	%TOC
SLN-P-1	0-5	0.356	0.0884	28.3	0.00	99.0	0.00	1.00	0.33
SLN-P-2	5-10	0.310	0.114	24.7	NA	NA	NA	NA	NA
SLN-P-3	20-25	0.753	0.129	32.5	NA	NA	NA	NA	NA
SLN-P-4	35-40	0.668	0.150	23.4	0.00	96.0	2.00	2.00	0.22
SLN-P-5	50-55	0.430	0.130	24.6	0.00	97.0	2.00	1.00	24.0
SLN-P-6	65-70	4.29	0.715	49.5	NA	NA	NA	NA	NA
SLN-P-7	80-85	3.84	0.731	45.1	NA	NA	NA	NA	NA
SLN-P-8	95-100	3.18	1.66	47.8	0.00	10.0	63.0	27.0	2.57
SLN-P-9	110-115	2.65	0.309	30.3	NA	NA	NA	NA	NA
SLN-P-10	125-130	2.27	0.157	30.9	0.00	37.0	43.0	20.0	1.14

APPENDIX C

INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY (IUPAC) PCB NOMENCLATURE AND NUMERICAL IDENTIFICATION STANDARDS

Appendix C. IUPAC PCB Nomenclature and Numerical Identification

PCB Congener	Level of Chlorination	Compound Name	PCB Congener	Level of Chlorination	Compound Name
PCB1	1	2-chlorobiphenyl	PCB47	4	2,2',4,4'-tetrachlorobiphenyl
PCB2	1	3-chlorobiphenyl	PCB48	4	2,2',4,5-tetrachlorobiphenyl
PCB3	1	4-chlorobiphenyl	PCB49	4	2,2',4,5'-tetrachlorobiphenyl
PCB4	2	2,2'-dichlorobiphenyl	PCB50	4	2,2',4,6-tetrachlorobiphenyl
PCB5	2	2,3-dichlorobiphenyl	PCB51	4	2,2',4,6'-tetrachlorobiphenyl
PCB6	2	2,3'-dichlorobiphenyl	PCB52	4	2,2',5,5'-tetrachlorobiphenyl
PCB7	2	2,4-dichlorobiphenyl	PCB53	4	2,2',5,6'-tetrachlorobiphenyl
PCB8	2	2,4'-dichlorobiphenyl	PCB54	4	2,2',6,6'-tetrachlorobiphenyl
PCB9	2	2,5-dichlorobiphenyl	PCB55	4	2,3,3',4-tetrachlorobiphenyl
PCB10	2	2,6-dichlorobiphenyl	PCB56	4	2,3,3',4'-tetrachlorobiphenyl
PCB11	2	3,3'-dichlorobiphenyl	PCB57	4	2,3,3',5-tetrachlorobiphenyl
PCB12	2	3,4-dichlorobiphenyl	PCB58	4	2,3,3',5'-tetrachlorobiphenyl
PCB13	2	3,4'-dichlorobiphenyl	PCB59	4	2,3,3',6-tetrachlorobiphenyl
PCB14	2	3,5-dichlorobiphenyl	PCB60	4	2,3,4,4'-tetrachlorobiphenyl
PCB15	2	4,4'-dichlorobiphenyl	PCB61	4	2,3,4,5-tetrachlorobiphenyl
PCB16	3	2,2',3-trichlorobiphenyl	PCB62	4	2,3,4,6-tetrachlorobiphenyl
PCB17	3	2,2',4-trichlorobiphenyl	PCB63	4	2,3,4',5-tetrachlorobiphenyl
PCB18	3	2,2',5-trichlorobiphenyl	PCB64	4	2,3,4',6-tetrachlorobiphenyl
PCB19	3	2,2',6-trichlorobiphenyl	PCB65	4	2,3,5,6-tetrachlorobiphenyl
PCB20	3	2,3,3'-trichlorobiphenyl	PCB66	4	2,3',4,4'-tetrachlorobiphenyl
PCB21	3	2,3,4-trichlorobiphenyl	PCB67	4	2,3',4,5-tetrachlorobiphenyl
PCB22	3	2,3,4'-trichlorobiphenyl	PCB68	4	2,3',4,5'-tetrachlorobiphenyl
PCB23	3	2,3,5-trichlorobiphenyl	PCB69	4	2,3',4,6-tetrachlorobiphenyl
PCB24	3	2,3,6-trichlorobiphenyl	PCB70	4	2,3',4',5-tetrachlorobiphenyl
PCB25	3	2,3',4-trichlorobiphenyl	PCB71	4	2,3',4',6-tetrachlorobiphenyl
PCB26	3	2,3',5-trichlorobiphenyl	PCB72	4	2,3',5,5'-tetrachlorobiphenyl
PCB27	3	2,3',6-trichlorobiphenyl	PCB73	4	2,3',5',6-tetrachlorobiphenyl
PCB28	3	2,4,4'-trichlorobiphenyl	PCB74	4	2,4,4',5-tetrachlorobiphenyl
PCB29	3	2,4,5-trichlorobiphenyl	PCB75	4	2,4,4',6-tetrachlorobiphenyl
PCB30	3	2,4,6-trichlorobiphenyl	PCB76	4	2',3,4,5-tetrachlorobiphenyl
PCB31	3	2,4',5-trichlorobiphenyl	PCB77	4	3,3',4,4'-tetrachlorobiphenyl
PCB32	3	2,4',6-trichlorobiphenyl	PCB78	4	3,3',4,5-tetrachlorobiphenyl
PCB33	3	2',3,4-trichlorobiphenyl	PCB79	4	3,3',4,5'-tetrachlorobiphenyl
PCB34	3	2',3,5-trichlorobiphenyl	PCB80	4	3,3',5,5'-tetrachlorobiphenyl
PCB35	3	3,3',4-trichlorobiphenyl	PCB81	4	3,4,4',5-tetrachlorobiphenyl
PCB36	3	3,3',5-trichlorobiphenyl	PCB82	5	2,2',3,3',4-pentachlorobiphenyl
PCB37	3	3,4,4'-trichlorobiphenyl	PCB83	5	2,2',3,3',5-pentachlorobiphenyl
PCB38	3	3,4,5-trichlorobiphenyl	PCB84	5	2,2',3,3',6-pentachlorobiphenyl
PCB39	3	3,4',5-trichlorobiphenyl	PCB85	5	2,2',3,4,4'-pentachlorobiphenyl
PCB40	4	2,2',3,3'-tetrachlorobiphenyl	PCB86	5	2,2',3,4,5-pentachlorobiphenyl
PCB41	4	2,2',3,4-tetrachlorobiphenyl	PCB87	5	2,2',3,4,5'-pentachlorobiphenyl
PCB42	4	2,2',3,4'-tetrachlorobiphenyl	PCB88	5	2,2',3,4,6-pentachlorobiphenyl
PCB43	4	2,2',3,5-tetrachlorobiphenyl	PCB89	5	2,2',3,4,6'-pentachlorobiphenyl
PCB44	4	2,2',3,5'-tetrachlorobiphenyl	PCB90	5	2,2',3,4',5-pentachlorobiphenyl
PCB45	4	2,2',3,6-tetrachlorobiphenyl	PCB91	5	2,2',3,4',6-pentachlorobiphenyl
PCB46	4	2,2',3,6'-tetrachlorobiphenyl	PCB92	5	2,2',3,5,5'-pentachlorobiphenyl

Appendix C (cont'd). IUPAC PCB Nomenclature and Numerical Identification Standard

PCB Congener	Level of Chlorination	Compound Name	PCB Congener	Level of Chlorination	Compound Name
PCB93	5	2,2',3,5,6-pentachlorobiphenyl	PCB140	6	2,2',3,4,4',6'-hexachlorobiphenyl
PCB94	5	2,2',3,5,6'-pentachlorobiphenyl	PCB141	6	2,2',3,4,5,5'-hexachlorobiphenyl
PCB95	5	2,2',3,5',6-pentachlorobiphenyl	PCB142	6	2,2',3,4,5,6-hexachlorobiphenyl
PCB96	5	2,2',3,6,6'-pentachlorobiphenyl	PCB143	6	2,2',3,4,5,6'-hexachlorobiphenyl
PCB97	5	2,2',3',4,5-pentachlorobiphenyl	PCB144	6	2,2',3,4,5',6-hexachlorobiphenyl
PCB98	5	2,2',3',4,6-pentachlorobiphenyl	PCB145	6	2,2',3,4,6,6'-hexachlorobiphenyl
PCB99	5	2,2',4,4',5-pentachlorobiphenyl	PCB146	6	2,2',3,4',5,5'-hexachlorobiphenyl
PCB100	5	2,2',4,4',6-pentachlorobiphenyl	PCB147	6	2,2',3,4',5,6-hexachlorobiphenyl
PCB101	5	2,2',4,5,5'-pentachlorobiphenyl	PCB148	6	2,2',3,4',5,6'-hexachlorobiphenyl
PCB102	5	2,2',4,5,6'-pentachlorobiphenyl	PCB149	6	2,2',3,4',5',6-hexachlorobiphenyl
PCB103	5	2,2',4,5',6-pentachlorobiphenyl	PCB150	6	2,2',3,4',6,6'-hexachlorobiphenyl
PCB104	5	2,2',4,6,6'-pentachlorobiphenyl	PCB151	6	2,2',3,5,5',6-hexachlorobiphenyl
PCB105	5	2,3,3',4,4'-pentachlorobiphenyl	PCB152	6	2,2',3,5,6,6'-hexachlorobiphenyl
PCB106	5	2,3,3',4,5-pentachlorobiphenyl	PCB153	6	2,2',4,4',5,5'-hexachlorobiphenyl
PCB107	5	2,3,3',4,5'-pentachlorobiphenyl	PCB154	6	2,2',4,4',5,6'-hexachlorobiphenyl
PCB108	5	2,3,3',4,6-pentachlorobiphenyl	PCB155	6	2,2',4,4',6,6'-hexachlorobiphenyl
PCB109	5	2,3,3',4',5-pentachlorobiphenyl	PCB156	6	2,3,3',4,4',5-hexachlorobiphenyl
PCB110	5	2,3,3',4',6-pentachlorobiphenyl	PCB157	6	2,3,3',4,4',5'-hexachlorobiphenyl
PCB111	5	2,3,3',5,5'-pentachlorobiphenyl	PCB158	6	2,3,3',4,4',6-hexachlorobiphenyl
PCB112	5	2,3,3',5,6-pentachlorobiphenyl	PCB159	6	2,3,3',4,5,5'-hexachlorobiphenyl
PCB113	5	2,3,3',5',6-pentachlorobiphenyl	PCB160	6	2,3,3',4,5,6-hexachlorobiphenyl
PCB114	5	2,3,4,4',5-pentachlorobiphenyl	PCB161	6	2,3,3',4,5',6-hexachlorobiphenyl
PCB115	5	2,3,4,4',6-pentachlorobiphenyl	PCB162	6	2,3,3',4',5,5'-hexachlorobiphenyl
PCB116	5	2,3,4,5,6-pentachlorobiphenyl	PCB163	6	2,3,3',4',5,6-hexachlorobiphenyl
PCB117	5	2,3,4',5,6-pentachlorobiphenyl	PCB164	6	2,3,3',4',5',6-hexachlorobiphenyl
PCB118	5	2,3',4,4',5-pentachlorobiphenyl	PCB165	6	2,3,3',5,5',6-hexachlorobiphenyl
PCB119	5	2,3',4,4',6-pentachlorobiphenyl	PCB166	6	2,3,4,4',5,6-hexachlorobiphenyl
PCB120	5	2,3',4,5,5'-pentachlorobiphenyl	PCB167	6	2,3',4,4',5,5'-hexachlorobiphenyl
PCB121	5	2,3',4,5',6-pentachlorobiphenyl	PCB168	6	2,3',4,4',5',6-hexachlorobiphenyl
PCB122	5	2',3,3',4,5-pentachlorobiphenyl	PCB169	6	3,3',4,4',5,5'-hexachlorobiphenyl
PCB123	5	2',3,4,4',5-pentachlorobiphenyl	PCB170	7	2,2',3,3',4,4',5-heptachlorobiphenyl
PCB124	5	2',3,4,5,5'-pentachlorobiphenyl	PCB171	7	2,2',3,3',4,4',6-heptachlorobiphenyl
PCB125	5	2',3,4,5,6'-pentachlorobiphenyl	PCB172	7	2,2',3,3',4,5,5'-heptachlorobiphenyl
PCB126	5	3,3',4,4',5-pentachlorobiphenyl	PCB173	7	2,2',3,3',4,5,6-heptachlorobiphenyl
PCB127	5	3,3',4,5,5'-pentachlorobiphenyl	PCB174	7	2,2',3,3',4,5,6'-heptachlorobiphenyl
PCB128	6	2,2',3,3',4,4'-hexachlorobiphenyl	PCB175	7	2,2',3,3',4,5',6-heptachlorobiphenyl
PCB129	6	2,2',3,3',4,5-hexachlorobiphenyl	PCB176	7	2,2',3,3',4,6,6'-heptachlorobiphenyl
PCB130	6	2,2',3,3',4,5'-hexachlorobiphenyl	PCB177	7	2,2',3,3',4',5,6-heptachlorobiphenyl
PCB131	6	2,2',3,3',4,6-hexachlorobiphenyl	PCB178	7	2,2',3,3',5,5',6-heptachlorobiphenyl
PCB132	6	2,2',3,3',4,6'-hexachlorobiphenyl	PCB179	7	2,2',3,3',5,6,6'-heptachlorobiphenyl
PCB133	6	2,2',3,3',5,5'-hexachlorobiphenyl	PCB180	7	2,2',3,4,4',5,5'-heptachlorobiphenyl
PCB134	6	2,2',3,3',5,6-hexachlorobiphenyl	PCB181	7	2,2',3,4,4',5,6-heptachlorobiphenyl
PCB135	6	2,2',3,3',5,6'-hexachlorobiphenyl	PCB182	7	2,2',3,4,4',5,6'-heptachlorobiphenyl
PCB136	6	2,2',3,3',6,6'-hexachlorobiphenyl	PCB183	7	2,2',3,4,4',5',6-heptachlorobiphenyl
PCB137	6	2,2',3,4,4',5-hexachlorobiphenyl	PCB184	7	2,2',3,4,4',6,6'-heptachlorobiphenyl
PCB138	6	2,2',3,4,4',5'-hexachlorobiphenyl	PCB185	7	2,2',3,4,5,5',6-heptachlorobiphenyl
PCB139	6	2,2',3,4,4',6-hexachlorobiphenyl	PCB186	7	2,2',3,4,5,6,6'-heptachlorobiphenyl

Appendix C (cont'd). IUPAC PCB Nomenclature and Numerical Identification Standard

PCB Congener	Level of Chlorination	Compound Name
PCB187	7	2,2',3,4',5,5',6-heptachlorobiphenyl
PCB188	7	2,2',3,4',5,6,6'-heptachlorobiphenyl
PCB189	7	2,3,3',4,4',5,5'-heptachlorobiphenyl
PCB190	7	2,3,3',4,4',5,6-heptachlorobiphenyl
PCB191	7	2,3,3',4,4',5',6-heptachlorobiphenyl
PCB192	7	2,3,3',4,5,5',6-heptachlorobiphenyl
PCB193	7	2,3,3',4',5,5',6-heptachlorobiphenyl
PCB194	8	2,2',3,3',4,4',5,5'-octachlorobiphenyl
PCB195	8	2,2',3,3',4,4',5,6-octachlorobiphenyl
PCB196	8	2,2',3,3',4,4',5,6'-octachlorobiphenyl
PCB197	8	2,2',3,3',4,4',6,6'-octachlorobiphenyl
PCB198	8	2,2',3,3',4,5,5',6-octachlorobiphenyl
PCB199	8	2,2',3,3',4,5,5',6'-octachlorobiphenyl
PCB200	8	2,2',3,3',4,5,6,6'-octachlorobiphenyl
PCB201	8	2,2',3,3',4,5',6,6'-octachlorobiphenyl
PCB202	8	2,2',3,3',5,5',6,6'-octachlorobiphenyl
PCB203	8	2,2',3,4,4',5,5',6-octachlorobiphenyl
PCB204	8	2,2',3,4,4',5,6,6'-octachlorobiphenyl
PCB205	8	2,3,3',4,4',5,5',6-octachlorobiphenyl
PCB206	9	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl
PCB207	9	2,2',3,3',4,4',5,6,6'-nonachlorobiphenyl
PCB208	9	2,2',3,3',4,5,5',6,6'-nonachlorobiphenyl
PCB209	10	decachlorobiphenyl

Appendix C. IUPAC PCB Nomenclature and Numerical Identification

PCB Congener	Level of Chlorination	Compound Name	PCB Congener	Level of Chlorination	Compound Name
PCB1	1	2-chlorobiphenyl	PCB47	4	2,2',4,4'-tetrachlorobiphenyl
PCB2	1	3-chlorobiphenyl	PCB48	4	2,2',4,5-tetrachlorobiphenyl
PCB3	1	4-chlorobiphenyl	PCB49	4	2,2',4,5'-tetrachlorobiphenyl
PCB4	2	2,2'-dichlorobiphenyl	PCB50	4	2,2',4,6-tetrachlorobiphenyl
PCB5	2	2,3-dichlorobiphenyl	PCB51	4	2,2',4,6'-tetrachlorobiphenyl
PCB6	2	2,3'-dichlorobiphenyl	PCB52	4	2,2',5,5'-tetrachlorobiphenyl
PCB7	2	2,4-dichlorobiphenyl	PCB53	4	2,2',5,6'-tetrachlorobiphenyl
PCB8	2	2,4'-dichlorobiphenyl	PCB54	4	2,2',6,6'-tetrachlorobiphenyl
PCB9	2	2,5-dichlorobiphenyl	PCB55	4	2,3,3',4-tetrachlorobiphenyl
PCB10	2	2,6-dichlorobiphenyl	PCB56	4	2,3,3',4'-tetrachlorobiphenyl
PCB11	2	3,3'-dichlorobiphenyl	PCB57	4	2,3,3',5-tetrachlorobiphenyl
PCB12	2	3,4-dichlorobiphenyl	PCB58	4	2,3,3',5'-tetrachlorobiphenyl
PCB13	2	3,4'-dichlorobiphenyl	PCB59	4	2,3,3',6-tetrachlorobiphenyl
PCB14	2	3,5-dichlorobiphenyl	PCB60	4	2,3,4,4'-tetrachlorobiphenyl
PCB15	2	4,4'-dichlorobiphenyl	PCB61	4	2,3,4,5-tetrachlorobiphenyl
PCB16	3	2,2',3-trichlorobiphenyl	PCB62	4	2,3,4,6-tetrachlorobiphenyl
PCB17	3	2,2',4-trichlorobiphenyl	PCB63	4	2,3,4',5-tetrachlorobiphenyl
PCB18	3	2,2',5-trichlorobiphenyl	PCB64	4	2,3,4',6-tetrachlorobiphenyl
PCB19	3	2,2',6-trichlorobiphenyl	PCB65	4	2,3,5,6-tetrachlorobiphenyl
PCB20	3	2,3,3'-trichlorobiphenyl	PCB66	4	2,3',4,4'-tetrachlorobiphenyl
PCB21	3	2,3,4-trichlorobiphenyl	PCB67	4	2,3',4,5-tetrachlorobiphenyl
PCB22	3	2,3,4'-trichlorobiphenyl	PCB68	4	2,3',4,5'-tetrachlorobiphenyl
PCB23	3	2,3,5-trichlorobiphenyl	PCB69	4	2,3',4,6-tetrachlorobiphenyl
PCB24	3	2,3,6-trichlorobiphenyl	PCB70	4	2,3',4',5-tetrachlorobiphenyl
PCB25	3	2,3',4-trichlorobiphenyl	PCB71	4	2,3',4',6-tetrachlorobiphenyl
PCB26	3	2,3',5-trichlorobiphenyl	PCB72	4	2,3',5,5'-tetrachlorobiphenyl
PCB27	3	2,3',6-trichlorobiphenyl	PCB73	4	2,3',5',6-tetrachlorobiphenyl
PCB28	3	2,4,4'-trichlorobiphenyl	PCB74	4	2,4,4',5-tetrachlorobiphenyl
PCB29	3	2,4,5-trichlorobiphenyl	PCB75	4	2,4,4',6-tetrachlorobiphenyl
PCB30	3	2,4,6-trichlorobiphenyl	PCB76	4	2',3,4,5-tetrachlorobiphenyl
PCB31	3	2,4',5-trichlorobiphenyl	PCB77	4	3,3',4,4'-tetrachlorobiphenyl
PCB32	3	2,4',6-trichlorobiphenyl	PCB78	4	3,3',4,5-tetrachlorobiphenyl
PCB33	3	2',3,4-trichlorobiphenyl	PCB79	4	3,3',4,5'-tetrachlorobiphenyl
PCB34	3	2',3,5-trichlorobiphenyl	PCB80	4	3,3',5,5'-tetrachlorobiphenyl
PCB35	3	3,3',4-trichlorobiphenyl	PCB81	4	3,4,4',5-tetrachlorobiphenyl
PCB36	3	3,3',5-trichlorobiphenyl	PCB82	5	2,2',3,3',4-pentachlorobiphenyl
PCB37	3	3,4,4'-trichlorobiphenyl	PCB83	5	2,2',3,3',5-pentachlorobiphenyl
PCB38	3	3,4,5-trichlorobiphenyl	PCB84	5	2,2',3,3',6-pentachlorobiphenyl
PCB39	3	3,4',5-trichlorobiphenyl	PCB85	5	2,2',3,4,4'-pentachlorobiphenyl
PCB40	4	2,2',3,3'-tetrachlorobiphenyl	PCB86	5	2,2',3,4,5-pentachlorobiphenyl
PCB41	4	2,2',3,4-tetrachlorobiphenyl	PCB87	5	2,2',3,4,5'-pentachlorobiphenyl
PCB42	4	2,2',3,4'-tetrachlorobiphenyl	PCB88	5	2,2',3,4,6-pentachlorobiphenyl
PCB43	4	2,2',3,5-tetrachlorobiphenyl	PCB89	5	2,2',3,4,6'-pentachlorobiphenyl
PCB44	4	2,2',3,5'-tetrachlorobiphenyl	PCB90	5	2,2',3,4',5-pentachlorobiphenyl
PCB45	4	2,2',3,6-tetrachlorobiphenyl	PCB91	5	2,2',3,4',6-pentachlorobiphenyl
PCB46	4	2,2',3,6'-tetrachlorobiphenyl	PCB92	5	2,2',3,5,5'-pentachlorobiphenyl

Appendix C (cont'd). IUPAC PCB Nomenclature and Numerical Identification Standard

PCB Congener	Level of Chlorination	Compound Name	PCB Congener	Level of Chlorination	Compound Name
PCB93	5	2,2',3,5,6-pentachlorobiphenyl	PCB140	6	2,2',3,4,4',6'-hexachlorobiphenyl
PCB94	5	2,2',3,5,6'-pentachlorobiphenyl	PCB141	6	2,2',3,4,5,5'-hexachlorobiphenyl
PCB95	5	2,2',3,5',6-pentachlorobiphenyl	PCB142	6	2,2',3,4,5,6-hexachlorobiphenyl
PCB96	5	2,2',3,6,6'-pentachlorobiphenyl	PCB143	6	2,2',3,4,5,6'-hexachlorobiphenyl
PCB97	5	2,2',3',4,5-pentachlorobiphenyl	PCB144	6	2,2',3,4,5',6-hexachlorobiphenyl
PCB98	5	2,2',3',4,6-pentachlorobiphenyl	PCB145	6	2,2',3,4,6,6'-hexachlorobiphenyl
PCB99	5	2,2',4,4',5-pentachlorobiphenyl	PCB146	6	2,2',3,4',5,5'-hexachlorobiphenyl
PCB100	5	2,2',4,4',6-pentachlorobiphenyl	PCB147	6	2,2',3,4',5,6-hexachlorobiphenyl
PCB101	5	2,2',4,5,5'-pentachlorobiphenyl	PCB148	6	2,2',3,4',5,6'-hexachlorobiphenyl
PCB102	5	2,2',4,5,6'-pentachlorobiphenyl	PCB149	6	2,2',3,4',5',6-hexachlorobiphenyl
PCB103	5	2,2',4,5',6-pentachlorobiphenyl	PCB150	6	2,2',3,4',6,6'-hexachlorobiphenyl
PCB104	5	2,2',4,6,6'-pentachlorobiphenyl	PCB151	6	2,2',3,5,5',6-hexachlorobiphenyl
PCB105	5	2,3,3',4,4'-pentachlorobiphenyl	PCB152	6	2,2',3,5,6,6'-hexachlorobiphenyl
PCB106	5	2,3,3',4,5-pentachlorobiphenyl	PCB153	6	2,2',4,4',5,5'-hexachlorobiphenyl
PCB107	5	2,3,3',4,5'-pentachlorobiphenyl	PCB154	6	2,2',4,4',5,6'-hexachlorobiphenyl
PCB108	5	2,3,3',4,6-pentachlorobiphenyl	PCB155	6	2,2',4,4',6,6'-hexachlorobiphenyl
PCB109	5	2,3,3',4',5-pentachlorobiphenyl	PCB156	6	2,3,3',4,4',5-hexachlorobiphenyl
PCB110	5	2,3,3',4',6-pentachlorobiphenyl	PCB157	6	2,3,3',4,4',5'-hexachlorobiphenyl
PCB111	5	2,3,3',5,5'-pentachlorobiphenyl	PCB158	6	2,3,3',4,4',6-hexachlorobiphenyl
PCB112	5	2,3,3',5,6-pentachlorobiphenyl	PCB159	6	2,3,3',4,5,5'-hexachlorobiphenyl
PCB113	5	2,3,3',5',6-pentachlorobiphenyl	PCB160	6	2,3,3',4,5,6-hexachlorobiphenyl
PCB114	5	2,3,4,4',5-pentachlorobiphenyl	PCB161	6	2,3,3',4,5',6-hexachlorobiphenyl
PCB115	5	2,3,4,4',6-pentachlorobiphenyl	PCB162	6	2,3,3',4',5,5'-hexachlorobiphenyl
PCB116	5	2,3,4,5,6-pentachlorobiphenyl	PCB163	6	2,3,3',4',5,6-hexachlorobiphenyl
PCB117	5	2,3,4',5,6-pentachlorobiphenyl	PCB164	6	2,3,3',4',5',6-hexachlorobiphenyl
PCB118	5	2,3',4,4',5-pentachlorobiphenyl	PCB165	6	2,3,3',5,5',6-hexachlorobiphenyl
PCB119	5	2,3',4,4',6-pentachlorobiphenyl	PCB166	6	2,3,4,4',5,6-hexachlorobiphenyl
PCB120	5	2,3',4,5,5'-pentachlorobiphenyl	PCB167	6	2,3',4,4',5,5'-hexachlorobiphenyl
PCB121	5	2,3',4,5',6-pentachlorobiphenyl	PCB168	6	2,3',4,4',5',6-hexachlorobiphenyl
PCB122	5	2',3,3',4,5-pentachlorobiphenyl	PCB169	6	3,3',4,4',5,5'-hexachlorobiphenyl
PCB123	5	2',3,4,4',5-pentachlorobiphenyl	PCB170	7	2,2',3,3',4,4',5-heptachlorobiphenyl
PCB124	5	2',3,4,5,5'-pentachlorobiphenyl	PCB171	7	2,2',3,3',4,4',6-heptachlorobiphenyl
PCB125	5	2',3,4,5,6'-pentachlorobiphenyl	PCB172	7	2,2',3,3',4,5,5'-heptachlorobiphenyl
PCB126	5	3,3',4,4',5-pentachlorobiphenyl	PCB173	7	2,2',3,3',4,5,6-heptachlorobiphenyl
PCB127	5	3,3',4,5,5'-pentachlorobiphenyl	PCB174	7	2,2',3,3',4,5,6'-heptachlorobiphenyl
PCB128	6	2,2',3,3',4,4'-hexachlorobiphenyl	PCB175	7	2,2',3,3',4,5',6-heptachlorobiphenyl
PCB129	6	2,2',3,3',4,5-hexachlorobiphenyl	PCB176	7	2,2',3,3',4,6,6'-heptachlorobiphenyl
PCB130	6	2,2',3,3',4,5'-hexachlorobiphenyl	PCB177	7	2,2',3,3',4',5,6-heptachlorobiphenyl
PCB131	6	2,2',3,3',4,6-hexachlorobiphenyl	PCB178	7	2,2',3,3',5,5',6-heptachlorobiphenyl
PCB132	6	2,2',3,3',4,6'-hexachlorobiphenyl	PCB179	7	2,2',3,3',5,6,6'-heptachlorobiphenyl
PCB133	6	2,2',3,3',5,5'-hexachlorobiphenyl	PCB180	7	2,2',3,4,4',5,5'-heptachlorobiphenyl
PCB134	6	2,2',3,3',5,6-hexachlorobiphenyl	PCB181	7	2,2',3,4,4',5,6-heptachlorobiphenyl
PCB135	6	2,2',3,3',5,6'-hexachlorobiphenyl	PCB182	7	2,2',3,4,4',5,6'-heptachlorobiphenyl
PCB136	6	2,2',3,3',6,6'-hexachlorobiphenyl	PCB183	7	2,2',3,4,4',5',6-heptachlorobiphenyl
PCB137	6	2,2',3,4,4',5-hexachlorobiphenyl	PCB184	7	2,2',3,4,4',6,6'-heptachlorobiphenyl
PCB138	6	2,2',3,4,4',5'-hexachlorobiphenyl	PCB185	7	2,2',3,4,5,5',6-heptachlorobiphenyl
PCB139	6	2,2',3,4,4',6-hexachlorobiphenyl	PCB186	7	2,2',3,4,5,6,6'-heptachlorobiphenyl

Appendix C (cont'd). IUPAC PCB Nomenclature and Numerical Identification Standard

PCB Congener	Level of Chlorination	Compound Name
PCB187	7	2,2',3,4',5,5',6-heptachlorobiphenyl
PCB188	7	2,2',3,4',5,6,6'-heptachlorobiphenyl
PCB189	7	2,3,3',4,4',5,5'-heptachlorobiphenyl
PCB190	7	2,3,3',4,4',5,6-heptachlorobiphenyl
PCB191	7	2,3,3',4,4',5',6-heptachlorobiphenyl
PCB192	7	2,3,3',4,5,5',6-heptachlorobiphenyl
PCB193	7	2,3,3',4',5,5',6-heptachlorobiphenyl
PCB194	8	2,2',3,3',4,4',5,5'-octachlorobiphenyl
PCB195	8	2,2',3,3',4,4',5,6-octachlorobiphenyl
PCB196	8	2,2',3,3',4,4',5,6'-octachlorobiphenyl
PCB197	8	2,2',3,3',4,4',6,6'-octachlorobiphenyl
PCB198	8	2,2',3,3',4,5,5',6-octachlorobiphenyl
PCB199	8	2,2',3,3',4,5,5',6'-octachlorobiphenyl
PCB200	8	2,2',3,3',4,5,6,6'-octachlorobiphenyl
PCB201	8	2,2',3,3',4,5',6,6'-octachlorobiphenyl
PCB202	8	2,2',3,3',5,5',6,6'-octachlorobiphenyl
PCB203	8	2,2',3,4,4',5,5',6-octachlorobiphenyl
PCB204	8	2,2',3,4,4',5,6,6'-octachlorobiphenyl
PCB205	8	2,3,3',4,4',5,5',6-octachlorobiphenyl
PCB206	9	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl
PCB207	9	2,2',3,3',4,4',5,6,6'-nonachlorobiphenyl
PCB208	9	2,2',3,3',4,5,5',6,6'-nonachlorobiphenyl
PCB209	10	decachlorobiphenyl

APPENDIX D

METHOD DETECTION LIMITS AND DATA QUALITY ASSURANCE/QUALITY CONTROL SUMMARY

D.0 QUALITY CONTROL DATA SUMMARY

This appendix presents PCB method detection limits (MDL), and reviews the approach and results of the quality assurance/quality control (QA/QC) program for this study. The QA/QC program was conducted in accordance with QAPP 163-Q2 (Battelle, 1999).

D.1 PCB Method Detection Limits (MDL)

Target PCB analytes and associated detection limits[b] in sediment and water (ng/g dry weight and ng/L).

PCB Congener[a]	Sed RL[b] ng/g	H2O RL ng/L	PCB Congener[a]	Sed RL[b] ng/g	H2O RL ng/L	PCB Congener[a]	Sed RL[b] ng/g	H2O RL ng/L	PCB Congener[a]	Sed RL[b] ng/g	H2O RL ng/L
PCB1	1.56	23.4	PCB47/75	0.56	8.4	PCB110/77	0.56	8.4	PCB173	0.56	8.4
PCB3	1.56	23.4	PCB48	0.56	8.4	PCB114	0.56	8.4	PCB174	0.66	9.9
PCB4/10	1.56	23.4	PCB49	0.66	9.9	**PCB118**	0.66	9.9	PCB175	0.56	8.4
PCB6	1.12	16.8	PCB51	0.56	8.4	PCB119	0.56	8.4	PCB176	0.56	8.4
PCB7/9	0.56	8.4	**PCB52**	0.66	9.9	PCB124	0.56	8.4	PCB177	0.66	9.9
PCB8/5[c]	0.66	9.9	PCB53	0.56	8.4	**PCB128**	0.66	9.9	PCB178	0.56	8.4
PCB12/13	0.56	8.4	PCB56/60	0.66	9.9	PCB129/126	0.56	8.4	**PCB180**	0.66	9.9
PCB16/32	0.56	8.4	PCB59	0.56	8.4	PCB130	0.56	8.4	PCB183	0.66	9.9
PCB17/15	0.56	8.4	PCB63	0.56	8.4	PCB131	0.56	8.4	PCB184	0.56	8.4
PCB18	0.66	9.9	**PCB66**	0.66	9.9	PCB132	0.66	9.9	PCB185	0.56	8.4
PCB19	0.56	8.4	PCB70/76	0.66	9.9	PCB134	0.56	8.4	**PCB187/182**	0.66	9.9
PCB21	0.56	8.4	PCB74	0.66	9.9	PCB135/144	0.66	9.9	PCB189	0.56	8.4
PCB22	0.56	8.4	PCB82	0.56	8.4	PCB136	0.66	9.9	PCB191	0.56	8.4
PCB24/27	0.56	8.4	PCB83	0.56	8.4	PCB137	0.66	9.9	PCB193	0.56	8.4
PCB25	0.56	8.4	PCB84	0.66	9.9	**PCB138/160/163**	0.66	9.9	PCB194	0.66	9.9
PCB26	0.56	8.4	PCB85	0.66	9.9	PCB141/179	0.66	9.9	**PCB195/208**	0.66	9.9
PCB28	0.66	9.9	PCB87/115/81	0.66	9.9	PCB146	0.66	9.9	PCB197	0.56	8.4
PCB29	0.56	8.4	PCB89	0.56	8.4	PCB149/123	0.66	9.9	PCB198	0.56	8.4
PCB31	0.66	9.9	PCB91	0.56	8.4	PCB151	0.66	9.9	PCB199	0.56	8.4
PCB33/20	0.66	9.9	PCB92	0.66	9.9	**PCB153**	0.66	9.9	PCB200	0.56	8.4
PCB40	0.56	8.4	PCB95	0.66	9.9	PCB156	0.66	9.9	PCB201/157	0.56	8.4
PCB41/64/71	0.66	9.9	PCB97	0.66	9.9	PCB158	0.66	9.9	PCB203/196	0.66	9.9
PCB42/37	0.66	9.9	PCB99	0.66	9.9	PCB167	0.66	9.9	PCB205	0.44	6.6
PCB43	0.56	8.4	PCB100	0.56	8.4	PCB169	0.54	8.1	**PCB206**	0.66	9.9
PCB44	0.66	9.9	**PCB101/90**	0.66	9.9	**PCB170/190**	0.56	8.4	PCB207	0.44	6.6
PCB45	0.56	8.4	**PCB105**	0.66	9.9	PCB171/202	0.66	9.9	**PCB209**	0.66	9.9
PCB46	0.56	8.4	PCB107/147	0	0	PCB172	0.56	8.4			

[a] Co eluting congeners are listed in order of abundance in Aroclors 1242/1248/1254 (most abundant listed first). The most abundant single congener will be used to calibrate the instrument for the co eluting congener sets.
[b] RLs based on low calibration standard.
[c] The 18 bolded congeners are the NOAA NS&T and EPA EMAP PCB analytes.

Source of MDLs – based on low standard

Parameter	Sediment/Water
PCB	$RL = [(C_L * PIV * DF)/(S_W)]$ Where, C_L = concentration in low standard (0.005 to 0.014 ng/µL) PIV = pre-injection volume (1000 µL) DF = sample dilution factor (1.667) S_W = Sample dry weight (~15 g dry/1 L) **Actual sample-specific RLs will vary depending upon PIV, DF and S_W**

D.2 QA/QC Approach

The quality control program associated with this project was designed to monitor analytical precision and accuracy, as well as extraction efficiency and any laboratory contamination. The following quality control (QC) samples were processed and analyzed with each batch of 20 or fewer field samples:

Procedural Blank (PB). The PB sample is a combination of all reagents used in the extraction and sample preparation process. The PB was extracted along with, and handled exactly like, the field samples. The PB data is used to quantify any laboratory contamination that may have occurred during processing and analysis.

Laboratory Control Sample (LCS). The LCS sample is a combination of all reagents used in the extraction process extraction and sample preparation process. The sample is spiked with target analytes of interest and is extracted along with, and handled exactly like, the field samples. The LCS is used to monitor procedural efficiency and analytical accuracy.

Matrix Spike (MS). The MS is prepared using a field sample that is spiked with target analytes of interest. The sample is extracted along with, and handled exactly like, the field samples. The MS is used to quantify procedural efficiency and analytical accuracy in the actual matrix. Should the analytical results of the LCS and MS samples be significantly different from each other, it may be attributable to the sample matrix.

Field Sample Duplicate (DUP). The DUP sample is prepared using a second aliquot of a field sample, and it is extracted side-by-side with the original sample. The DUP sample data can be used to determine analytical precision.

In addition to the QC samples listed above, each sample processed and analyzed for PCBs was spiked with surrogate internal standard compounds prior to extraction, in order to quantify and monitor the extraction efficiency on an individual sample basis. The surrogate recoveries are reported along with the field sample data in Appendix E.

The results of the quality control sample analyses are reported below. The data are grouped by sample type. For example, all the PB samples are reported together. A discussion of data quality objectives (DQOs), actual results, exceedances, and what, if any, impact any exceedances may have on the reliability of the field sample data, is provided below. These discussions are presented by QC sample type.

One item of particular note relates to a spiking solution used during the preparation of some of the laboratory control samples (LCS) and matrix spike (MS) samples. The PCB congener spiking solutions

were prepared as two separate solutions, each containing approximately 50 congeners. These two mixtures were prepared in large volumes (>100 mL), and stored at –20 °C in individual 4 mL vials. When spiking the MS and LCS samples, separate aliquots of each of these two solutions were added to the samples. In three of the LCS and MS sample sets, ***all*** of the congeners from one of the two solutions were recovered at levels approximately 2 times the expected concentration. It is our assumption that the particular vial used to spike these 6 quality control sample was corrupt (e.g., possibly had a loose cap and concentrated over time), resulting in these over-recoveries. Because the recoveries of the congeners from the second solution were consistent between the batches and met the DQOs, as did recoveries of ***all*** congeners in the LCS and MS in the other analytical batches, we are confident that there were no extraction efficiency issues, and the observation is related to the spiking solution. Additionally, an independent check solution was analyzed with several of the sample batches, from a completely different source than these two spiking solutions, and the results confirm that the analysis was in control.

D.3 QA/QC Results

In general, the quality control sample results indicate that the sample preparation and analysis methods were appropriate, that the procedures were in control, and that the analytical results for the field samples can be used with confidence.

Procedural Blanks (PB). Very few, if any, PCB congeners were detected in the PB samples indicating that laboratory and sample preparation procedures was not responsible for introducing PCB into the samples. The sum of the congener concentrations ranged from not detected (ND) to 3.7 ng/g dry weight in the PB samples. The total PCB concentration in the field samples was always at least 10 times higher (and generally much more than this) than the PCB concentration in the associated PB.

Laboratory Control Samples (LCS). The recoveries of almost all of the PCB congeners spiked into the LCS samples were acceptable; three minor exceptions include PCB158, which was recovered at 117% in two LCS samples, and PCB167, with 128% recovery in one LCS sample. Other DQO exceedances were associated with the corrupt spiking solution used in the three sample batches, as described above. No target analytes were outside the DQOs in the LCS samples that were prepared using the second spiking solution (the one considered reliable).

Matrix Spike Samples (MS). The recoveries of the PCB congeners were excellent in the MS samples where little or no PCB was detected in the background matrix. No DQO exceedances were noted for any congeners that were spiked at levels at least 5 times greater than the concentration in the background matrix (MS data should only be used for data quality assessment if the spiking levels are at least 5 times the background concentration). The only DQO exceedances were related to the suspect spiking solution.

Field Sample Duplicates (DUP). The relative percent differences (RPD) between duplicate samples were variable depending on the PCB concentrations detected in the samples. Eight sets of sample duplicates were extracted and analyzed as part of this project. There were no DQO exceedances in six of the eight duplicate pairs. Several data points were qualified in the remaining two sets of duplicates. The PCB concentrations were relatively high, and the surrogate recoveries were very similar, in both of these duplicate pairs, suggesting that sample inhomogeneity may have been the cause for the elevated RPDs.

Surrogate Recoveries (SR). Four surrogate compounds (PCB congeners 14, 34, 103, and 112) were added to each quality control and field sample. The surrogate compound recoveries were generally in the 70 to 80% range. Of a total of 408 surrogate data points in field samples, only 32 were outside of the DQOs. The majority of the exceedances were related to a subset of samples with very high PCB concentrations (greater than approximately 35 ppm). In these samples, the surrogate compounds PCB103 and/or PCB34

were over-recovered due to interferences from individual target PCB congeners detected at high concentrations in the samples and that eluted near the surrogate compounds in the instrumental analysis. Acceptable procedural efficiency could then be confirmed using the other surrogate compounds that were not interfered with.

D.4 Other QC Measures

Instrument Calibrations. The final instrument calibration check standard, which bracketed the water sample analysis, had minor DQO exceedances for two of the 107 PCB congeners. The DQO is for the analyte response to be within 25% of the average response in the initial instrument calibration, but for PCB4/10 and PCB18 they response was 27.8% and 25.6% different from the initial calibration. The average percent difference in the response of all PCB congeners was 15.3%; also a slight exceeded of the DQO value of 15%.

Holding Times. One cooler of samples, including 5 samples from the core collected at site T16 and all 11 sections from the core collected at W7, was misplaced by the shipping company during transit. The cooler was shipped from the field on February 17, 2000, but did not arrive at the laboratory until February 29, 2000. These samples were not stored at the required temperature of 4 °C during the days in transit, and, because of the late delivery, they were not extracted within 14 days of collection. However, because of the recognized relative stability of PCB compounds, this holding time DQO deviation is not expected to have significantly impacted the analytical results or the usability of these data. The USEPA WAM and QA officer were notified of the late sample delivery, and approved the analysis of all samples, despite the QAPP violation.

APPENDIX E

LABORATORY-REPORTED SAMPLE DATA BY CORE WITH QA/QC DATA QUALIFIERS

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: T6

Client Reporting Sample ID:		SLN-T6-1	SLN-T6-2	SLN-T6-3	SLN-T6-4	SLN-T6-5	SLN-T6-6
Battelle Sample ID:		X4221	X4222	X4223	X4224	X4225	X4226
Extraction Batch ID:		00-021	00-021	00-021	00-021	00-021	00-021
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		76.71	69.63	66.91	62.60	55.25	35.79
Sample Dry Weight (g):		3.63	5.13	5.11	6.15	6.12	8.86
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		0-5	5-10	10-15	15-20	20-25	25-30
PCB	***LOC***						
PCB1	1	4.38 J	40.95	427.40	1237.55 D	1170.89 Y	129.21
PCB3	1	4.25 J	17.44	210.43	490.37	322.25	5.66
PCB4/10	2	28.41	103.34	1061.75 Y	4753.52 D	4715.17 D	339.49
PCB6	2	2.08 J	11.85	90.71	134.86	141.52	10.21
PCB7/9	2	0.80 J	4.46	32.36	18.93	28.99	4.28
PCB8/5	2	13.92	67.23	416.47 Y	1227.17 D	1090.11 D	37.15
PCB12/13	2	0.51 J	1.37 J	4.77	11.14	14.84	0.29 J
PCB16/32	3	35.33	171.41	665.59 Y	1394.11 D	656.57 D	20.78
PCB17	3	20.72	90.56	481.79 Y	609.81 D	503.36 D	35.32
PCB18	3	8.91	32.76	241.06	242.34 Y	248.73	36.40
PCB19	3	26.75	104.52	360.54 Y	1378.94 D	922.96 D	24.23
PCB21	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB22	3	2.28 J	4.54	5.36	3.68	12.38	3.71
PCB24/27	3	14.01	62.55	143.95	326.15 Y	261.21 Y	4.11
PCB25	3	3.15	11.30	111.23	59.06	74.01	4.05
PCB26	3	6.00	18.99	133.86	132.53	144.11	6.69
PCB28	3	18.58	46.99	39.58	26.53	80.49	15.15
PCB29	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB31	3	10.26	28.09	120.98	145.00	158.62	11.80
PCB33/20	3	4.26	13.41	6.60	4.85	9.72	2.77
PCB40	4	2.84	4.69	4.57	1.89	5.09	1.87
PCB41/64/71	4	26.44	61.52	201.26	235.23 Y	187.05	12.71
PCB42	4	8.93	20.37	34.81	16.44	38.54	5.01
PCB43	4	ND U	ND U	ND U	ND U	ND U	ND U
PCB44	4	17.92	35.32	32.72	12.62	34.32	11.15
PCB45	4	4.01	10.12	15.79	21.51	35.15	3.08
PCB46	4	1.34 J	3.16	4.99	6.11	11.12	1.08
PCB47/75	4	42.62	135.90	507.39 Y	566.27 D	340.81 Y	8.23
PCB48	4	3.58	10.00	ND U	ND U	ND U	2.12
PCB49	4	43.90	131.31	574.87 Y	452.82 D	359.38 Y	18.96
PCB51	4	18.22	67.67	204.47	452.48 D	232.11 Y	2.68
PCB52	4	45.88	128.10	552.08 Y	528.94 D	497.20 Y	26.65
PCB53	4	28.61	103.41	400.46 Y	936.81 D	560.28 Y	8.45
PCB56/60	4	10.65	13.60	8.36	2.99	11.58	8.01
PCB59	4	2.02 J	4.05	5.30	7.19	12.83	0.82 J
PCB63	4	2.10 J	3.63	2.05	0.94 J	2.08	0.55 J
PCB66	4	28.34	51.71	50.76	12.55	68.28	11.24
PCB70/76	4	16.20	27.41	26.95	11.01	49.57	11.55
PCB74	4	17.23	33.66	49.81	14.05	29.97	6.45
PCB82	5	2.31 J	2.27	1.48 J	0.42 J	2.18	1.05
PCB83	5	2.86	3.57	3.55	2.90	5.12	0.56 J
PCB84	5	8.86	19.70	52.59	70.11	68.72	2.62
PCB85	5	4.88	6.85	9.90	5.36	6.96	1.45
PCB87/115	5	7.37	5.83	2.82	1.48 J	4.75	2.38
PCB89	5	ND U	ND U	ND U	ND U	ND U	ND U
PCB91	5	15.58	46.16	135.13	256.71 Y	177.49	2.46
PCB92	5	7.85	17.11	13.87	10.44	16.24	1.41
PCB95	5	34.36	82.29	243.96	458.66 Y	324.91 Y	8.55
PCB97	5	8.31	13.35	15.03	4.14	8.73	2.21
PCB99	5	23.41	59.62	92.22	28.53	56.82	3.85
PCB100	5	2.43	8.17	25.72	59.86	32.73	0.26 J
PCB101/90	5	31.09	67.81	105.20	54.19	59.20	6.62
PCB105	5	5.34	4.39	2.64	1.27 J	4.62	1.60
PCB107	5	2.56	4.66	5.46	3.90	10.42	0.48
PCB110	5	53.23	124.15	253.86	278.64 Y	475.76 Y	10.18
PCB114	5	0.47 J	0.56 J	0.40 J	0.54 J	0.67 J	0.13 J
PCB118	5	27.07	48.64	79.40	29.68	64.05	4.67
PCB119	5	3.42	10.25	21.74	18.21	21.72	0.27 J
PCB124	5	0.55 J	0.48 J	0.41 J	0.26 J	0.44 J	0.22 J
PCB128	6	4.61	6.73	8.19	2.91	11.53	0.86 J

Client Reporting Sample ID:		SLN-T6-1	SLN-T6-2	SLN-T6-3	SLN-T6-4	SLN-T6-5	SLN-T6-6
PCB129	6	0.78 J	0.65 J	0.66 J	0.35 J	0.97 J	0.16 J
PCB130	6	1.85 J	3.52	5.42	2.93	9.77	0.26 J
PCB131	6	0.34 J	0.48 J	0.44 J	0.24 J	0.55 J	ND U
PCB132	6	7.93	15.94	20.47	11.48	40.76	1.65
PCB134	6	1.52 J	2.99	4.18	4.10	10.21	0.22 J
PCB135/144	6	6.47	16.15	23.74	23.81	33.74	0.84 J
PCB136	6	5.33	12.70	33.74	64.96	53.75	0.87 J
PCB137	6	0.99 J	1.20 J	1.04 J	0.44 J	1.77	0.24 J
PCB138/160/163	6	28.03	48.09	72.43	61.21	107.68	4.93
PCB141	6	1.69 J	1.91 J	1.60 J	0.75 J	2.54	0.60 J
PCB146	6	6.59	15.40	24.05	21.50	21.39	0.68 J
PCB149	6	31.68	80.91	174.42	211.30	296.41 Y	4.33
PCB151	6	5.71	13.68	16.83	12.34	26.44	0.89 J
PCB153	6	26.11	62.74	120.67	64.56	65.78	3.47
PCB156	6	1.67 J	2.12	2.63	1.17 J	4.64	0.34 J
PCB158	6	1.58 J	1.76 J	2.38	1.12 J	4.18	0.42 J
PCB167	6	1.03 J	1.54 J	1.76 J	0.69 J	1.90	0.17 J
PCB169	6	ND U	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	2.43	4.58	8.09	4.46	12.23	0.55 J
PCB171	7	1.17 J	2.32	4.20	2.84	5.28	0.27 J
PCB172	7	0.50 J	1.01 J	1.66 J	1.14 J	2.41	0.15 J
PCB173	7	ND U	ND U	ND U	ND U	ND U	ND U
PCB174	7	2.84 J	5.18	7.78	4.44	8.47	0.76 J
PCB175	7	0.20 J	0.31 J	0.57 J	0.24 J	1.06 J	ND U
PCB176	7	0.50 J	1.07 J	2.29	2.44	2.98	0.13 J
PCB177	7	2.81 J	6.59	12.47	14.70	20.02	0.51 J
PCB178	7	1.18 J	2.95	5.96	9.83	8.51	0.18 J
PCB180	7	3.90	7.82	12.61	6.38	17.03	1.11 J
PCB183	7	1.32 J	2.38	4.46	2.21	5.50	0.34 J
PCB184	7	0.44 J	0.38 J	0.48 J	0.38 J	0.32 J	0.17 J
PCB185	7	0.19 J	0.24 J	0.32 J	0.15 J	0.53 J	ND U
PCB187/182	7	5.27	13.33	27.14	36.37	38.18	0.76 J
PCB189	7	0.28 J	ND U	0.65 J	0.37 J	0.64 J	ND U
PCB191	7	ND U	ND U	0.28 J	ND U	0.43 J	ND U
PCB193	7	0.37 J	0.90 J	1.66 J	1.93	2.42	0.13 J
PCB194	8	0.96 J	1.91 J	3.34	3.40	4.73	ND U
PCB195	8	0.55 J	0.84 J	1.71 J	1.83	2.40	ND U
PCB197	8	ND U	ND U	0.38 J	0.53 J	0.41 J	ND U
PCB198	8	ND U	ND U	0.43 J	0.30 J	0.54 J	ND U
PCB199	8	1.37 J	2.70	5.55	7.28	6.81	0.35 J
PCB200	8	ND U	0.47 J	0.72 J	0.66 J	1.09 J	ND U
PCB201	8	0.31 J	0.80 J	1.15 J	1.78	1.52	ND U
PCB203/196	8	0.95 J	2.22	3.78	3.63	5.50	0.31 J
PCB205	8	ND U	ND U	0.33 J	ND U	0.26 J	ND U
PCB206	9	0.97 J	1.62 J	3.19	3.96	5.62	0.38 J
PCB207	9	ND U	0.35 J	0.61 J	0.70 J	0.78 J	ND U
PCB209	10	0.27 J	0.56 J	1.17 J	1.56 J	1.89	0.15 J
Level of Chlorination							
Cl1		8.63	58.40	637.82	1727.92	1493.14	134.87
Cl2		45.71	188.24	1606.05	6145.63	5990.63	391.43
Cl3		150.25	585.11	2310.53	4323.00	3072.19	165.01
Cl4		320.84	845.61	2676.63	3279.82	2475.38	140.61
Cl5		241.94	525.85	1065.38	1285.32	1341.54	50.99
Cl6		133.92	288.51	514.66	485.88	694.00	20.95
Cl7		23.40	49.05	90.62	87.86	126.02	5.06
Cl8		4.13	8.94	17.40	19.40	23.26	0.66
Cl9		0.97	1.97	3.80	4.66	6.39	0.38
Cl10		0.27	0.56	1.17	1.56	1.89	0.15
SUM PCB		930.06	2552.25	8924.07	17361.04	15224.46	910.10
Surrogate Recovery (%)							
PCB103		62	65	96	141 &	89	67
PCB14		56	56	67	62	54	69
PCB34		62	66	77	81	74	71
PCB112		63	61	71	67	57	66

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: T6

Client Reporting Sample ID:		SLN-T6-7	SLN-T6-8	SLN-T6-9	SLN-T6-10
Battelle Sample ID:		X4227	X4228	X4229	X4230
Extraction Batch ID:		00-021	00-021	00-021	00-021
Batch Matrix:		Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667
Sample Moisture Content (%):		35.30	30.51	29.07	30.69
Sample Dry Weight (g):		10.07	10.92	10.86	10.88
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		30-35	35-40	40-45	45-50
PCB	***LOC***				
PCB1	1	1.70 J	1.78 J	1.48 J	0.19 J
PCB3	1	0.39 J	0.50 J	0.42 J	ND U
PCB4/10	2	6.08	6.21	5.63	0.78 J
PCB6	2	0.22 J	0.27 J	0.24 J	ND U
PCB7/9	2	0.07 J	0.08 J	ND U	ND U
PCB8/5	2	1.56	1.87	1.52	0.19 J
PCB12/13	2	ND U	ND U	ND U	ND U
PCB16/32	3	1.80	2.13	1.68	0.16 J
PCB17	3	1.11	1.16	0.97	0.14 J
PCB18	3	1.15	0.64 J	0.52 J	0.09 J
PCB19	3	1.65	1.97	1.62	0.21 J
PCB21	3	ND U	ND U	ND U	ND U
PCB22	3	ND U	ND U	ND U	ND U
PCB24/27	3	0.46 J	0.62 J	0.48 J	ND U
PCB25	3	0.15 J	0.14 J	ND U	ND U
PCB26	3	0.33 J	0.27 J	ND U	ND U
PCB28	3	0.72 J	0.25 J	0.20 J	ND U
PCB29	3	ND U	ND U	ND U	ND U
PCB31	3	0.80 J	0.38 J	0.28 J	ND U
PCB33/20	3	0.27 J	ND U	ND U	ND U
PCB40	4	0.16 J	ND U	1.98	ND U
PCB41/64/71	4	0.84 J	0.60 J	0.25 J	ND U
PCB42	4	0.53 J	0.15 J	ND U	ND U
PCB43	4	ND U	ND U	ND U	ND U
PCB44	4	1.31	0.20 J	0.13 J	ND U
PCB45	4	0.28 J	ND U	ND U	ND U
PCB46	4	ND U	ND U	ND U	ND U
PCB47/75	4	1.21	1.07	0.88	ND U
PCB48	4	0.34 J	ND U	ND U	ND U
PCB49	4	2.09	1.13	0.99	0.17 J
PCB51	4	0.54 J	0.70 J	0.59 J	ND U
PCB52	4	2.67	1.29	1.13	0.18 J
PCB53	4	1.26	1.35	1.15	ND U
PCB56/60	4	1.03 J	0.11 J	ND U	ND U
PCB59	4	0.12 J	0.06 J	ND U	ND U
PCB63	4	0.16 J	0.11 J	0.12 J	ND U
PCB66	4	1.46	0.19 J	0.25 J	ND U
PCB70/76	4	1.53	0.14 J	0.13 J	ND U
PCB74	4	0.76 J	0.18 J	0.14 J	ND U
PCB82	5	0.14 J	ND U	ND U	ND U
PCB83	5	ND U	ND U	ND U	ND U
PCB84	5	0.37 J	0.13 J	0.20 J	ND U
PCB85	5	0.21 J	ND U	ND U	ND U
PCB87/115	5	0.48 J	ND U	ND U	ND U
PCB89	5	ND U	ND U	ND U	ND U
PCB91	5	0.45 J	0.40 J	0.36 J	ND U
PCB92	5	0.27 J	ND U	ND U	ND U
PCB95	5	1.21	0.69 J	0.54 J	ND U
PCB97	5	0.39 J	ND U	ND U	ND U
PCB99	5	0.64 J	ND U	ND U	ND U
PCB100	5	0.10 J	ND U	ND U	ND U
PCB101/90	5	1.02 J	0.26 J	0.24 J	ND U
PCB105	5	0.24 J	ND U	ND U	ND U
PCB107	5	ND U	ND U	ND U	ND U
PCB110	5	1.61	0.72 J	0.55 J	ND U
PCB114	5	ND U	ND U	ND U	ND U
PCB118	5	0.61 J	0.23 J	0.13 J	ND U
PCB119	5	ND U	ND U	ND U	ND U
PCB124	5	ND U	ND U	ND U	ND U
PCB128	6	0.18 J	ND U	ND U	ND U

Client Reporting Sample ID:		SLN-T6-7	SLN-T6-8	SLN-T6-9	SLN-T6-10
PCB129	6	ND U	ND U	ND U	ND U
PCB130	6	ND U	ND U	ND U	ND U
PCB131	6	ND U	ND U	ND U	ND U
PCB132	6	0.34 J	0.13 J	ND U	ND U
PCB134	6	ND U	ND U	ND U	ND U
PCB135/144	6	0.21 J	ND U	ND U	ND U
PCB136	6	0.19 J	0.12 J	0.11 J	ND U
PCB137	6	ND U	ND U	ND U	ND U
PCB138/160/163	6	0.88 J	0.30 J	ND U	ND U
PCB141	6	0.14 J	ND U	ND U	ND U
PCB146	6	0.16 J	ND U	ND U	ND U
PCB149	6	0.96 J	0.52 J	0.43 J	ND U
PCB151	6	0.19 J	ND U	ND U	ND U
PCB153	6	0.72 J	0.28 J	0.21 J	ND U
PCB156	6	0.06 J	ND U	ND U	ND U
PCB158	6	0.11 J	ND U	ND U	ND U
PCB167	6	ND U	ND U	ND U	ND U
PCB169	6	ND U	ND U	ND U	ND U
PCB170/190	7	0.20 J	ND U	ND U	ND U
PCB171	7	0.05 J	ND U	ND U	ND U
PCB172	7	ND U	ND U	ND U	ND U
PCB173	7	ND U	ND U	ND U	ND U
PCB174	7	0.18 J	ND U	ND U	ND U
PCB175	7	ND U	ND U	ND U	ND U
PCB176	7	ND U	ND U	ND U	ND U
PCB177	7	0.12 J	ND U	ND U	ND U
PCB178	7	ND U	ND U	ND U	ND U
PCB180	7	0.27 J	0.09 J	ND U	ND U
PCB183	7	0.09 J	ND U	ND U	ND U
PCB184	7	0.15 J	0.14 J	0.13 J	ND U
PCB185	7	ND U	ND U	ND U	ND U
PCB187/182	7	0.29 J	0.11 J	ND U	ND U
PCB189	7	ND U	ND U	ND U	ND U
PCB191	7	ND U	ND U	ND U	ND U
PCB193	7	ND U	ND U	ND U	ND U
PCB194	8	ND U	ND U	ND U	ND U
PCB195	8	ND U	ND U	ND U	ND U
PCB197	8	ND U	ND U	ND U	ND U
PCB198	8	ND U	ND U	ND U	ND U
PCB199	8	ND U	ND U	ND U	ND U
PCB200	8	ND U	ND U	ND U	ND U
PCB201	8	ND U	ND U	ND U	ND U
PCB203/196	8	ND U	ND U	ND U	ND U
PCB205	8	ND U	ND U	ND U	ND U
PCB206	9	ND U	ND U	ND U	ND U
PCB207	9	ND U	ND U	ND U	ND U
PCB209	10	ND U	ND U	ND U	ND U
Level of Chlorination					
Cl1		2.09	2.27	1.90	0.19
Cl2		7.93	8.43	7.39	0.97
Cl3		8.44	7.57	5.76	0.60
Cl4		16.26	7.27	7.73	0.35
Cl5		7.75	2.43	2.02	0.00
Cl6		4.15	1.35	0.76	0.00
Cl7		1.34	0.34	0.13	0.00
Cl8		0.00	0.00	0.00	0.00
Cl9		0.00	0.00	0.00	0.00
Cl10		0.00	0.00	0.00	0.00
SUM PCB		47.97	29.67	25.69	2.11
Surrogate Recovery (%)					
PCB103		66	65	59	65
PCB14		70	73	66	72
PCB34		71	72	66	71
PCB112		67	66	58	64

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: T16

Client Reporting Sample ID:		SLN-T16-1	SLN-T16-2	SLN-T16-3	SLN-T16-4	SLN-T16-5	SLN-T16-6
Battelle Sample ID:		X4390	X4391	X4392	X4393	X4554	X4555
Extraction Batch ID:		00-049	00-049	00-049	00-049	00-061	00-061
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		36.4	12.9	24.1	20.2	40.55	24.83
Sample Dry Weight (g):		9.72	13.84	12.14	13.71	8.96	11.79
Reporting Units:		ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		0-10	20-30	40-50	55-65	77-87	97-107
PCB	***LOC***						
PCB1	1	0.36 J	2.87	0.79 J	0.53 J	300.18	42.21
PCB3	1	0.10 J	0.70 J	0.28 J	0.17 J	33.56	6.30
PCB4/10	2	2.15 J	12.89	3.90	2.31	1049.79 D	194.77
PCB6	2	0.10 J	0.37 J	0.18 J	0.11 J	20.20	3.05
PCB7/9	2	0.07 J	0.11 J	0.03 J	ND U	5.19	0.54 J
PCB8/5	2	0.41 J	3.84	1.27	0.57 J	129.65	15.20
PCB12/13	2	ND U	0.07 J	ND U	ND U	4.30	0.42 J
PCB16/32	3	0.92	8.65	2.63	1.05	197.93 Y	23.91
PCB17	3	0.41 J	2.33	1.13	0.55 J	108.86	11.14
PCB18	3	0.30 J	1.18	0.68 J	0.27 J	53.90	2.87
PCB19	3	1.10	8.08	2.41	1.28	319.54 D	80.33
PCB21	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB22	3	ND U	0.37 J	ND U	ND U	29.31	0.31 J
PCB24/27	3	0.37 J	2.86	0.88	0.38 J	58.66	17.12
PCB25	3	0.08 J	0.25 J	0.19 J	0.11 J	15.05	0.82
PCB26	3	0.19 J	0.65	0.34 J	0.20 J	31.36	3.46
PCB28	3	0.52 J	1.66	0.60 J	0.09 J	115.75	1.55
PCB29	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB31	3	0.35 J	1.13	0.54 J	0.25 J	70.16	3.72
PCB33/20	3	0.08 J	0.22 J	0.14 J	ND U	9.34	0.17 J
PCB40	4	1.75	0.28 J	ND U	ND U	16.75	0.24 J
PCB41/64/71	4	0.59 J	1.84	0.75 J	0.22 J	91.88	7.22
PCB42	4	0.23 J	0.59 J	0.24 J	0.08 J	34.26	0.99
PCB43	4	ND U	0.12 J	ND U	ND U	4.39	ND U
PCB44	4	0.47 J	1.22	0.36 J	0.09 J	74.03	1.42
PCB45	4	ND U	0.42 J	0.18 J	ND U	18.92	1.19
PCB46	4	ND U	0.17 J	ND U	ND U	7.34	0.29 J
PCB47/75	4	0.59 J	1.91	1.12	0.43 J	74.34	9.18
PCB48	4	0.16 J	0.32 J	0.22 J	ND U	19.51	ND U
PCB49	4	0.77 J	2.41	1.45	0.68 J	91.47	7.03
PCB51	4	0.30 J	1.92	0.81	0.37 J	35.72	15.75
PCB52	4	0.99 J	3.12	1.70	0.76	120.58	9.95
PCB53	4	0.50 J	3.08	1.14	0.47 J	56.08	8.93
PCB56/60	4	0.29 J	0.95	0.31 J	0.08 J	92.16	0.64 J
PCB59	4	0.06 J	0.16 J	0.06 J	ND U	7.08	0.39 J
PCB63	4	0.14 J	0.16 J	0.11 J	0.06 J	7.11	0.21 J
PCB66	4	0.73 J	1.68	0.84	0.15 J	97.20	1.15
PCB70/76	4	0.51 J	1.28	0.51 J	0.11 J	102.41	1.32
PCB74	4	0.42 J	1.12	0.53 J	0.13 J	80.69	1.58
PCB82	5	0.11 J	0.22 J	0.10 J	ND U	12.53	0.33 J
PCB83	5	ND U	ND U	ND U	ND U	5.34	0.51 J
PCB84	5	0.21 J	0.55 J	0.34 J	0.12 J	24.30	2.13
PCB85	5	0.18 J	0.31 J	0.20 J	ND U	17.03	0.61 J
PCB87/115	5	0.34 J	0.60 J	0.31 J	ND U	35.23	0.97
PCB89	5	ND U	ND U	ND U	ND U	1.21	ND U
PCB91	5	0.19 J	0.59	0.46 J	0.17 J	18.00	3.90
PCB92	5	0.16 J	0.37 J	0.24 J	ND U	12.38	0.85 J
PCB95	5	0.61 J	1.85	0.99	0.29 J	56.65	10.60
PCB97	5	0.25 J	0.45 J	0.29 J	ND U	24.58	0.82 J
PCB99	5	0.41 J	0.86	0.73 J	0.16 J	39.14	2.30
PCB100	5	ND U	ND U	ND U	ND U	1.48	1.12
PCB101/90	5	0.66 J	1.48	0.94	0.24 J	59.56	3.16
PCB105	5	0.22 J	0.39 J	0.27 J	0.03 J	29.43	0.59 J
PCB107	5	0.06 J	0.11 J	0.09 J	ND U	5.04	0.24
PCB110	5	0.95 J	2.59	1.78	0.38 J	87.51	12.16
PCB114	5	ND U	ND U	ND U	ND U	2.66	0.10 J
PCB118	5	0.59 J	1.31	1.04	0.19 J	62.08	2.78
PCB119	5	ND U	0.10 J	ND U	ND U	2.68	0.41 J
PCB124	5	ND U	ND U	ND U	ND U	2.18	0.12 J
PCB128	6	0.11 J	0.30 J	0.34 J	ND U	6.43	0.64 J

Client Reporting Sample ID:		SLN-T16-1	SLN-T16-2	SLN-T16-3	SLN-T16-4	SLN-T16-5	SLN-T16-6
PCB129	6	ND U	0.08 J	ND U	ND U	1.86	0.16 J
PCB130	6	ND U	0.11 J	0.15 J	ND U	2.41	0.31 J
PCB131	6	ND U	ND U	ND U	ND U	0.59 J	0.07 J
PCB132	6	0.27 J	0.44 J	0.50 J	0.10 J	11.09	1.58
PCB134	6	ND U	0.12 J	0.10 J	ND U	2.13	0.30 J
PCB135/144	6	0.17 J	0.26 J	0.25 J	ND U	5.76	1.00
PCB136	6	0.11 J	0.25 J	0.22 J	0.06 J	4.53	1.45
PCB137	6	ND U	0.08 J	0.09 J	ND U	2.21	0.18 J
PCB138/160/163	6	0.54 J	1.35	1.50	0.18 J	34.15	4.57
PCB141	6	0.11 J	0.16 J	0.17 J	ND U	4.47	0.30 J
PCB146	6	0.11 J	0.21 J	0.21 J	ND U	4.55	0.55 J
PCB149	6	0.43 J	1.09	1.11	0.20 J	25.00	4.50
PCB151	6	0.12 J	0.21 J	0.19 J	ND U	5.14	0.93
PCB153	6	0.40 J	0.82	0.94	0.20 J	22.73	2.68
PCB156	6	0.06 J	0.12 J	0.17 J	ND U	3.60	0.39 J
PCB158	6	ND U	0.12 J	0.11 J	ND U	3.46	0.30 J
PCB167	6	ND U	0.11 J	0.11 J	ND U	1.75	0.10 J
PCB169	6	ND U	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	0.08 J	0.16 J	0.16 J	ND U	3.04	0.56 J
PCB171	7	ND U	0.05 J	0.04 J	ND U	0.93 J	0.19 J
PCB172	7	ND U	ND U	ND U	ND U	0.49 J	0.08 J
PCB173	7	ND U	ND U	ND U	ND U	0.12 J	ND U
PCB174	7	ND U	0.13 J	0.14 J	ND U	2.30	0.40 J
PCB175	7	ND U	ND U	ND U	ND U	0.15 J	ND U
PCB176	7	ND U	ND U	ND U	ND U	0.40 J	0.06 J
PCB177	7	ND U	0.10 J	0.12 J	ND U	1.84	0.48 J
PCB178	7	ND U	0.04 J	ND U	ND U	0.67 J	0.24 J
PCB180	7	0.09 J	0.16 J	0.21 J	ND U	4.82	0.61 J
PCB183	7	ND U	0.06 J	0.07 J	ND U	1.40	0.17 J
PCB184	7	0.18 J	0.14 J	0.14 J	0.11 J	0.23 J	0.17 J
PCB185	7	ND U	ND U	ND U	ND U	0.24 J	ND U
PCB187/182	7	ND U	0.16 J	0.18 J	0.04 J	2.94	0.66 J
PCB189	7	ND U	ND U	ND U	ND U	0.18 J	0.03 J
PCB191	7	ND U	ND U	ND U	ND U	0.14 J	ND U
PCB193	7	ND U	ND U	ND U	ND U	0.25 J	0.08 J
PCB194	8	ND U	ND U	ND U	ND U	0.60 J	0.12 J
PCB195	8	ND U	ND U	ND U	ND U	0.28 J	ND U
PCB197	8	ND U	ND U	ND U	ND U	0.07 J	ND U
PCB198	8	ND U	ND U	ND U	ND U	0.08 J	ND U
PCB199	8	ND U	ND U	ND U	ND U	0.69 J	0.19 J
PCB200	8	ND U	ND U	ND U	ND U	0.12 J	ND U
PCB201	8	ND U	ND U	ND U	ND U	0.10 J	0.06 J
PCB203/196	8	ND U	ND U	ND U	ND U	0.70 J	0.16 J
PCB205	8	ND U	ND U	ND U	ND U	0.06 J	ND U
PCB206	9	ND U	ND U	ND U	ND U	0.27 J	0.10 J
PCB207	9	ND U	ND U	ND U	ND U	0.05 J	ND U
PCB209	10	ND U	ND U	ND U	ND U	0.09 J	ND U
Level of Chlorination							
Cl1		0.46	3.57	1.07	0.69	333.73	48.51
Cl2		2.73	17.28	5.39	2.99	1209.12	213.98
Cl3		4.32	27.38	9.54	4.18	1009.85	145.40
Cl4		8.51	22.74	10.37	3.62	1031.91	67.49
Cl5		4.93	11.79	7.77	1.57	499.01	43.70
Cl6		2.44	5.83	6.15	0.74	141.85	20.03
Cl7		0.34	1.00	1.06	0.15	20.15	3.73
Cl8		0.00	0.00	0.00	0.00	2.72	0.53
Cl9		0.00	0.00	0.00	0.00	0.32	0.10
Cl10		0.00	0.00	0.00	0.00	0.09	0.00
SUM PCB		23.73	89.60	41.36	13.95	4248.75	543.46
Surrogate Recovery (%)							
PCB103		59	68	64	64	65	83
PCB14		56	63	62	61	64	72
PCB34		58	66	63	63	68	78
PCB112		62	72	68	67	70	81

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: T16

Client Reporting Sample ID:		SLN-T16-7	SLN-T16-8	SLN-T16-9	SLN-T16-10
Battelle Sample ID:		X4556	X4557	X4558	X4559
Extraction Batch ID:		00-061	00-061	00-061	00-061
Batch Matrix:		Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667
Sample Moisture Content (%):		48.72	43.80	20.64	25.96
Sample Dry Weight (g):		7.74	8.60	12.31	12.36
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		110-117	117-124	128-138	138-148
PCB	***LOC***				
PCB1	1	7082.29 D	4191.78 D	10.40	80.75
PCB3	1	2354.10 D	2340.84 D	2.79	7.25
PCB4/10	2	33043.90 D	18420.06 D	48.43	342.54
PCB6	2	327.81 Y	748.58 D	1.17 J	5.84
PCB7/9	2	41.24	262.20 D	0.31 J	1.02
PCB8/5	2	4412.49 D	5092.45 D	6.05	41.54
PCB12/13	2	99.29	261.26 Y	0.19 J	0.30 J
PCB16/32	3	8168.26 D	5598.27 D	8.93	40.79
PCB17	3	3554.25 D	5985.14 D	6.11	30.96
PCB18	3	444.21 D	456.64 D	1.41	17.11
PCB19	3	9638.47 D	6164.44 D	19.55	101.43
PCB21	3	ND U	ND U	ND U	ND U
PCB22	3	22.47	31.68	0.28 J	1.41
PCB24/27	3	3260.10 D	2086.85 D	5.56	19.88
PCB25	3	72.87	544.33 D	0.44 J	1.28
PCB26	3	387.22 D	1567.66 D	1.46	4.88
PCB28	3	90.19	506.91 D	1.46	3.65
PCB29	3	ND U	ND U	ND U	ND U
PCB31	3	445.14 D	2353.23 D	1.94	7.52
PCB33/20	3	9.96	8.81	0.09 J	1.16
PCB40	4	17.56	18.55	0.10 J	0.70
PCB41/64/71	4	837.17 D	1288.89 D	2.72	9.35
PCB42	4	61.20	147.06	0.33 J	2.26
PCB43	4	5.52	ND U	ND U	ND U
PCB44	4	118.74	149.21	0.56 J	4.54
PCB45	4	172.03 Y	242.86 Y	0.64 J	2.12
PCB46	4	47.31	23.16	0.16 J	0.62 J
PCB47/75	4	1499.59 D	3116.85 D	3.73	11.79
PCB48	4	ND U	ND U	ND U	1.40
PCB49	4	1058.89 D	2385.22 D	3.11	15.27
PCB51	4	1883.92 D	1564.35 D	5.37	14.31
PCB52	4	1489.43 D	2069.23 D	4.00	21.06
PCB53	4	2154.78 D	1121.76 D	3.62	18.38
PCB56/60	4	16.28	10.39	0.38 J	1.55
PCB59	4	70.00	113.31	0.16 J	0.40 J
PCB63	4	16.06	19.72	0.11 J	0.22 J
PCB66	4	60.09	97.59	0.79 J	3.10
PCB70/76	4	93.49	84.89	0.53 J	3.68
PCB74	4	68.19	131.87	0.53 J	2.53
PCB82	5	8.08	3.68	0.11 J	0.39 J
PCB83	5	28.68	50.09	0.26 J	0.40 J
PCB84	5	182.62 Y	250.39 Y	0.78 J	3.26
PCB85	5	34.49	58.33	0.18 J	0.61 J
PCB87/115	5	68.76	137.26	0.32 J	1.18
PCB89	5	ND U	ND U	ND U	ND U
PCB91	5	296.03 D	718.79 D	1.63	5.42
PCB92	5	128.71	256.47 Y	0.31 J	0.87
PCB95	5	1145.81 D	1213.68 D	3.75	13.58
PCB97	5	22.61	38.81	0.19 J	1.43
PCB99	5	136.24	422.91 D	0.55 J	3.72
PCB100	5	85.32	139.31 Y	0.46 J	0.94
PCB101/90	5	178.48	412.19 D	0.75 J	5.76
PCB105	5	14.90	4.41	0.14 J	0.79 J
PCB107	5	41.75	76.02	0.12	0.30
PCB110	5	1039.41 D	1769.38 D	3.56	14.62
PCB114	5	2.40	2.80	0.07 J	0.10 J
PCB118	5	186.45	274.44 D	0.74 J	4.14
PCB119	5	68.44	196.18 Y	0.21 J	0.42 J
PCB124	5	1.23	8.91	ND U	0.08 J
PCB128	6	34.21	35.24	0.16 J	0.64 J

Client Reporting Sample ID:		SLN-T16-7	SLN-T16-8	SLN-T16-9	SLN-T16-10
PCB129	6	3.75	1.94	ND U	0.10 J
PCB130	6	30.19	49.77	0.13 J	0.31 J
PCB131	6	0.97 J	60.90	ND U	0.08 J
PCB132	6	91.49	206.36 Y	0.34 J	1.42
PCB134	6	35.95	71.34	0.15 J	0.37 J
PCB135/144	6	106.59	247.94 Y	0.38 J	0.92
PCB136	6	103.43	185.85 Y	0.61 J	1.84
PCB137	6	6.26	5.40	0.06 J	0.17 J
PCB138/160/163	6	314.34 D	609.55 D	1.33	4.20
PCB141	6	10.03	6.15	0.09 J	0.33 J
PCB146	6	79.01	278.11 Y	0.22 J	0.60 J
PCB149	6	319.15 Y	1218.42 D	1.52	5.97
PCB151	6	113.81	210.13 Y	0.34 J	0.87
PCB153	6	249.46 Y	705.85 D	0.92	3.74
PCB156	6	14.84	14.53	0.07 J	0.23 J
PCB158	6	10.62	7.76	0.07 J	0.28 J
PCB167	6	8.12	8.21	ND U	0.15 J
PCB169	6	ND U	ND U	ND U	ND U
PCB170/190	7	34.41	58.49	0.19 J	0.34 J
PCB171	7	11.76	26.08	0.05 J	0.14 J
PCB172	7	5.73	11.90	ND U	0.05 J
PCB173	7	0.69 J	0.80 J	ND U	ND U
PCB174	7	32.20	71.14	0.17 J	0.34 J
PCB175	7	1.52	2.79	ND U	ND U
PCB176	7	6.12	19.49	0.03 J	0.07 J
PCB177	7	38.06	111.74	0.18 J	0.29 J
PCB178	7	20.35	45.92	0.12 J	0.14 J
PCB180	7	50.76	100.06	0.19 J	0.48 J
PCB183	7	13.41	26.85	0.07 J	0.17 J
PCB184	7	0.31 J	0.54 J	0.15 J	0.15 J
PCB185	7	1.42	2.08	ND U	ND U
PCB187/182	7	60.14	203.97 Y	0.31 J	0.55 J
PCB189	7	2.27	4.65	ND U	ND U
PCB191	7	1.33	2.38	ND U	ND U
PCB193	7	5.30	15.62	0.03 J	0.04 J
PCB194	8	8.51	24.61	ND U	ND U
PCB195	8	3.59	9.93	ND U	ND U
PCB197	8	0.59 J	1.79	ND U	ND U
PCB198	8	0.53 J	1.57	ND U	ND U
PCB199	8	12.08	38.75	0.12 J	0.15 J
PCB200	8	1.63	4.56	ND U	ND U
PCB201	8	2.09	6.98	ND U	ND U
PCB203/196	8	9.51	27.43	0.06 J	0.14 J
PCB205	8	0.44 J	1.28	ND U	ND U
PCB206	9	4.39	15.18	0.04 J	0.06 J
PCB207	9	0.62 J	2.13	ND U	ND U
PCB209	10	0.92 J	3.55	ND U	ND U
Level of Chlorination					
Cl1		9436.39	6532.62	13.19	88.00
Cl2		37924.73	24784.56	56.15	391.25
Cl3		26093.15	25303.94	47.24	230.08
Cl4		9670.24	12584.91	26.84	113.27
Cl5		3670.41	6034.05	14.13	58.02
Cl6		1532.23	3923.45	6.38	22.21
Cl7		285.79	704.49	1.48	2.77
Cl8		38.99	116.89	0.18	0.29
Cl9		5.01	17.31	0.04	0.06
Cl10		0.92	3.55	0.00	0.00
SUM PCB		88657.86	80005.76	165.63	905.95
Surrogate Recovery (%)					
PCB103		216 &	254 &	76	77
PCB14		64	68	68	71
PCB34		246 &	255 &	73	76
PCB112		65	72	78	80

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: W7

Client Reporting Sample ID:		SLN-W7-1	SLN-W7-2	SLN-W7-3	SLN-W7-4	SLN-W7-5	SLN-W7-6
Battelle Sample ID:		X4560	X4561	X4562	X4563	X4564	X4565
Extraction Batch ID:		00-061	00-061	00-061	00-061	00-061	00-061
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		40.61	21.21	18.04	12.45	20.23	46.47
Sample Dry Weight (g):		9.08	11.94	12.85	14.38	12.63	8.33
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		0-10	25-35	57-68	68-81	81-91	94-104
PCB	***LOC***						
PCB1	1	12.11	1.70 J	0.82 J	1.51 J	2.56	989.83 D
PCB3	1	1.04 J	0.16 J	0.13 J	0.17 J	0.23 J	315.94
PCB4/10	2	64.38	6.53	3.83	6.28	10.41	3799.04 D
PCB6	2	1.86	0.19 J	0.18 J	0.24 J	0.29 J	192.88
PCB7/9	2	0.74 J	0.06 J	0.10 J	0.09 J	0.06 J	47.72
PCB8/5	2	19.61	1.73	1.27	1.57	1.52	1786.23 D
PCB12/13	2	0.33 J	ND U	ND U	ND U	ND U	30.11
PCB16/32	3	39.17	2.98	1.03	1.26	1.11	2016.05 D
PCB17	3	21.33	1.33	0.63 J	0.88	0.96	1224.06 D
PCB18	3	8.94	0.85	0.49 J	0.66 J	0.73 J	374.69 D
PCB19	3	36.73	3.09	2.08	2.94	4.36	1578.70 D
PCB21	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB22	3	3.06	0.20 J	0.05 J	0.05 J	ND U	17.03
PCB24/27	3	12.17	1.07	0.74	0.98	1.33	829.88 D
PCB25	3	2.50	0.16 J	0.14 J	0.14 J	0.16 J	133.89
PCB26	3	6.63	0.50 J	0.30 J	0.39 J	0.51 J	407.83 D
PCB28	3	18.19	1.22	0.23 J	0.29 J	0.21 J	83.93
PCB29	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB31	3	13.10	0.93	0.33 J	0.39 J	0.49 J	424.49 D
PCB33/20	3	2.48	0.17 J	ND U	ND U	ND U	9.57
PCB40	4	4.40	0.30 J	ND U	ND U	ND U	13.23
PCB41/64/71	4	29.00	2.05	0.31 J	0.56 J	0.72 J	276.49 Y
PCB42	4	10.61	0.72 J	0.13 J	0.14 J	0.21 J	37.18
PCB43	4	1.77	0.14 J	ND U	ND U	ND U	ND U
PCB44	4	24.82	1.74	0.18 J	0.26 J	0.28 J	113.93
PCB45	4	5.40	0.45 J	0.11 J	0.14 J	0.18 J	55.26
PCB46	4	2.01	0.20 J	ND U	ND U	0.07 J	17.28
PCB47/75	4	26.32	1.84	0.62 J	0.93	1.16	744.47 D
PCB48	4	6.66	0.36 J	ND U	0.10 J	ND U	ND U
PCB49	4	31.85	2.27	0.85	1.16	1.43	882.64 D
PCB51	4	10.73	0.95	0.57 J	0.72	1.09	585.02 D
PCB52	4	40.50	3.11	1.10	1.40	1.91	1018.27 D
PCB53	4	16.38	1.38	0.88	1.12	1.45	910.39 D
PCB56/60	4	20.06	1.06	0.10 J	0.26 J	0.22 J	10.51
PCB59	4	2.20	0.14 J	0.04 J	0.06 J	0.08 J	24.17
PCB63	4	2.09	0.17 J	0.10 J	0.09 J	0.11 J	5.73
PCB66	4	33.22	1.91	0.24 J	0.57 J	0.47 J	31.80
PCB70/76	4	29.86	1.80	0.12 J	0.38 J	0.32 J	41.06
PCB74	4	20.26	1.21	0.15 J	0.38 J	0.24 J	19.04
PCB82	5	4.88	0.34 J	ND U	0.20 J	0.14 J	3.47
PCB83	5	2.43	0.31 J	ND U	0.29 J	ND U	12.69
PCB84	5	8.98	0.64 J	0.22 J	0.42 J	0.44 J	73.44
PCB85	5	7.34	0.49 J	0.07 J	0.23 J	0.22 J	16.43
PCB87/115	5	15.16	1.08	0.23 J	0.59 J	0.53 J	16.42
PCB89	5	ND U	ND U	ND U	ND U	ND U	ND U
PCB91	5	8.26	0.68 J	0.25 J	0.39 J	0.51 J	126.86
PCB92	5	7.23	0.58 J	0.14 J	0.25 J	0.27 J	69.54
PCB95	5	28.36	2.15	0.62 J	1.24	1.48	516.84 D
PCB97	5	11.10	0.77 J	0.19 J	0.38 J	0.31 J	7.22
PCB99	5	19.61	1.35	0.27 J	0.61 J	0.58 J	35.64
PCB100	5	0.89 J	0.09 J	ND U	0.05 J	ND U	48.52
PCB101/90	5	34.49	2.23	0.37 J	1.16	0.83	69.99
PCB105	5	12.39	0.54 J	0.09 J	0.37 J	0.29 J	9.43
PCB107	5	2.58	0.16	ND U	ND U	0.10	14.67
PCB110	5	47.36	3.11	0.94	2.12	1.98	479.09 D
PCB114	5	0.75 J	0.07 J	ND U	0.06 J	ND U	1.17
PCB118	5	33.18	1.91	0.34 J	1.10	0.82	79.06
PCB119	5	1.56	0.15 J	ND U	ND U	0.10 J	50.13
PCB124	5	0.93	0.06 J	ND U	ND U	ND U	0.35 J
PCB128	6	6.06	0.39 J	0.09 J	0.24 J	0.23 J	11.38

Client Reporting Sample ID:		SLN-W7-1	SLN-W7-2	SLN-W7-3	SLN-W7-4	SLN-W7-5	SLN-W7-6
PCB129	6	1.39	0.13 J	ND U	0.08 J	ND U	1.31
PCB130	6	1.96	0.17 J	ND U	0.08 J	0.08 J	12.55
PCB131	6	0.32 J	ND U	ND U	ND U	ND U	0.28 J
PCB132	6	9.77	0.76 J	0.25 J	0.41 J	0.46 J	30.09
PCB134	6	1.64	0.15 J	ND U	0.07 J	0.11 J	17.58
PCB135/144	6	4.49	0.39 J	0.09 J	0.21 J	0.26 J	59.07
PCB136	6	3.44	0.30 J	0.09 J	0.20 J	0.22 J	47.58
PCB137	6	1.65	0.15 J	ND U	0.06 J	0.08 J	2.54
PCB138/160/163	6	33.61	2.19	0.44 J	1.07	1.01	207.59 Y
PCB141	6	3.40	0.26 J	0.05 J	0.13 J	0.12 J	3.47
PCB146	6	4.09	0.33 J	0.08 J	0.12 J	0.17 J	49.09
PCB149	6	21.09	1.53	0.45 J	0.89	0.94	132.43
PCB151	6	4.28	0.36 J	0.09 J	0.17 J	0.21 J	61.40
PCB153	6	21.58	1.46	0.34 J	0.63 J	0.64 J	126.35
PCB156	6	2.82	0.21 J	ND U	0.10 J	0.08 J	6.09
PCB158	6	2.83	0.17 J	0.08 J	0.14 J	0.14 J	5.00
PCB167	6	1.59	0.11 J	ND U	0.06 J	0.10 J	3.72
PCB169	6	ND U	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	2.86	0.22 J	ND U	0.05 J	ND U	19.95
PCB171	7	0.85 J	0.08 J	ND U	ND U	ND U	6.63
PCB172	7	0.44 J	ND U	ND U	ND U	ND U	3.72
PCB173	7	0.09 J	ND U	ND U	ND U	ND U	0.34 J
PCB174	7	2.92	0.24 J	ND U	0.08 J	0.09 J	14.61
PCB175	7	0.12 J	ND U	ND U	ND U	ND U	1.06
PCB176	7	0.31 J	ND U	ND U	ND U	ND U	3.21
PCB177	7	1.69	0.16 J	ND U	0.04 J	0.08 J	23.98
PCB178	7	0.51 J	0.05 J	ND U	ND U	ND U	16.92
PCB180	7	4.10	0.30 J	0.07 J	0.07 J	0.10 J	31.73
PCB183	7	1.18	0.12 J	ND U	ND U	ND U	8.78
PCB184	7	0.19 J	0.09 J	0.13 J	0.09 J	0.14 J	0.32 J
PCB185	7	0.19 J	ND U	ND U	ND U	ND U	0.77 J
PCB187/182	7	2.66	0.24 J	0.06 J	0.07 J	0.13 J	45.61
PCB189	7	0.15 J	ND U	ND U	ND U	ND U	1.43
PCB191	7	0.12 J	ND U	ND U	ND U	ND U	0.77 J
PCB193	7	0.26 J	ND U	ND U	ND U	ND U	3.72
PCB194	8	0.41 J	ND U	ND U	ND U	ND U	8.18
PCB195	8	0.21 J	ND U	ND U	ND U	ND U	3.37
PCB197	8	ND U	ND U	ND U	ND U	ND U	0.57 J
PCB198	8	ND U	ND U	ND U	ND U	ND U	0.55 J
PCB199	8	0.58 J	0.07 J	ND U	ND U	ND U	11.38
PCB200	8	0.13 J	ND U	ND U	ND U	ND U	1.30
PCB201	8	0.10 J	ND U	ND U	ND U	ND U	2.09
PCB203/196	8	0.50 J	0.08 J	ND U	ND U	ND U	9.12
PCB205	8	ND U	ND U	ND U	ND U	ND U	0.43 J
PCB206	9	0.28 J	0.05 J	ND U	ND U	ND U	6.44
PCB207	9	ND U	ND U	ND U	ND U	ND U	0.89
PCB209	10	0.07 J	ND U	ND U	ND U	ND U	1.71
Level of Chlorination							
Cl1		13.15	1.85	0.95	1.68	2.79	1305.77
Cl2		86.91	8.51	5.38	8.17	12.28	5855.98
Cl3		164.30	12.50	6.02	7.98	9.87	7100.10
Cl4		318.15	21.79	5.50	8.29	9.93	4786.48
Cl5		247.46	16.69	3.74	9.45	8.60	1630.95
Cl6		126.00	9.06	2.06	4.67	4.86	777.52
Cl7		18.64	1.48	0.27	0.40	0.54	183.54
Cl8		1.94	0.15	0.00	0.00	0.00	36.99
Cl9		0.28	0.05	0.00	0.00	0.00	7.34
Cl10		0.07	0.00	0.00	0.00	0.00	1.71
SUM PCB		976.89	72.11	23.92	40.63	48.86	21686.40
Surrogate Recovery (%)							
PCB103		66	31 &	83	65	77	166 &
PCB14		56	28 &	78	61	72	55
PCB34		63	30 &	82	64	75	107
PCB112		66	30 &	82	65	78	63

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: W7

Client Reporting Sample ID:		SLN-W7-7	SLN-W7-8	SLN-W7-9	SLN-W7-10	SLN-W7-11
Battelle Sample ID:		X4566	X4567	X4568	X4569	X4570
Extraction Batch ID:		00-061	00-061	00-061	00-061	00-061
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		45.61	17.89	40.00	40.68	36.48
Sample Dry Weight (g):		8.56	13.17	9.41	9.16	9.79
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		104-114	124-134	137-147	147-157	162-172
PCB	***LOC***					
PCB1	1	167.76	24.68	62.64	82.17	1658.88 D
PCB3	1	57.63	3.97	24.53	39.09	249.81
PCB4/10	2	984.14 D	154.61	390.25	629.12 Y	6080.78 D
PCB6	2	40.57	5.91	93.64	87.71	229.74
PCB7/9	2	8.85	0.89	30.99	27.55	39.73
PCB8/5	2	558.48 D	43.57	319.29 Y	429.67 D	1774.66 D
PCB12/13	2	6.38	0.51 J	24.21	24.77	58.42
PCB16/32	3	485.39 D	48.44	411.98 D	480.60 D	1712.39 D
PCB17	3	305.93 D	14.91	367.78 D	438.71 D	768.13 D
PCB18	3	112.29	9.10	390.17 D	291.31 Y	249.85 Y
PCB19	3	388.98 D	128.79 Y	237.89 Y	342.18 D	1801.88 D
PCB21	3	ND U	ND U	ND U	ND U	ND U
PCB22	3	15.03	0.20 J	11.40	9.03	15.67
PCB24/27	3	180.38 Y	52.15	97.52	124.18	382.95 D
PCB25	3	49.33	1.17	175.84 Y	147.08	85.01
PCB26	3	112.84	8.30	311.09 D	285.89 Y	391.87 D
PCB28	3	88.66	1.52	44.24	33.09	29.11
PCB29	3	ND U	ND U	ND U	ND U	ND U
PCB31	3	141.25	6.23	279.57 Y	267.23 Y	314.22 Y
PCB33/20	3	14.99	0.33 J	3.74	2.52	3.78
PCB40	4	15.32	1.57	10.89	7.60	8.86
PCB41/64/71	4	119.30	5.70	179.31 Y	173.70	358.12 D
PCB42	4	39.15	0.58 J	41.25	35.38	57.31
PCB43	4	4.64	1.57	ND U	ND U	ND U
PCB44	4	96.39	0.96	60.90	42.13	56.29
PCB45	4	25.29	2.87	21.53	20.05	46.79
PCB46	4	8.17	0.31 J	6.19	5.25	9.87
PCB47/75	4	237.62 Y	17.95	272.02 Y	283.33 Y	418.37 D
PCB48	4	ND U	ND U	ND U	ND U	ND U
PCB49	4	268.88 Y	14.47	519.72 D	465.42 D	550.44 D
PCB51	4	145.11	26.32	107.20	122.97	419.18 D
PCB52	4	299.10 Y	31.47	576.28 D	500.59 D	657.05 D
PCB53	4	229.81 Y	32.91	227.20 Y	242.15 Y	391.45 D
PCB56/60	4	41.01	0.36 J	6.07	3.30	4.99
PCB59	4	10.57	1.18	7.87	6.51	15.89
PCB63	4	7.57	1.31	1.51	0.96	3.78
PCB66	4	84.83	0.91	16.40	12.03	19.34
PCB70/76	4	78.56	1.12	20.87	14.99	23.70
PCB74	4	51.35	1.21	13.99	9.66	20.22
PCB82	5	10.78	0.19 J	3.75	2.00	2.54
PCB83	5	9.63	0.84	5.96	4.10	9.53
PCB84	5	38.42	1.91	48.82	39.44	63.15
PCB85	5	19.73	1.37	7.61	4.72	10.23
PCB87/115	5	34.97	5.98	10.49	4.87	6.36
PCB89	5	ND U	ND U	ND U	ND U	ND U
PCB91	5	50.21	10.84	60.65	58.33	131.02 Y
PCB92	5	37.61	8.69	17.05	11.98	35.78
PCB95	5	173.57	18.99	180.49 Y	160.59	301.22 Y
PCB97	5	25.49	0.47 J	7.87	4.65	10.28
PCB99	5	63.98	5.49	32.50	23.01	61.53
PCB100	5	10.85	5.23	9.98	10.39	26.75
PCB101/90	5	100.30	13.08	40.85	30.05	69.70
PCB105	5	25.87	0.34 J	9.56	4.38	4.31
PCB107	5	11.65	1.46	6.10	3.74	11.16
PCB110	5	226.02 Y	15.89	257.81 Y	211.56 Y	360.21 D
PCB114	5	1.58	0.19 J	0.63 J	0.40 J	0.29 J
PCB118	5	98.81	3.89	53.55	31.43	62.58
PCB119	5	15.74	1.91	12.85	10.83	20.84
PCB124	5	1.81	0.32 J	0.65 J	0.27 J	0.31 J
PCB128	6	17.46	0.51 J	14.27	8.84	13.05

Client Reporting Sample ID:		SLN-W7-7	SLN-W7-8	SLN-W7-9	SLN-W7-10	SLN-W7-11
PCB129	6	3.00	0.10 J	1.64	0.91 J	1.40
PCB130	6	8.25	0.74	7.26	5.40	10.61
PCB131	6	0.88 J	ND U	0.65 J	0.35 J	7.92
PCB132	6	33.92	1.81	36.57	25.44	47.86
PCB134	6	8.38	1.57	6.56	5.29	10.72
PCB135/144	6	26.07	7.73	19.02	16.46	36.46
PCB136	6	18.92	4.37	20.09	17.70	38.25
PCB137	6	4.35	0.22 J	2.30	1.64	2.74
PCB138/160/163	6	126.58	23.74	87.59	63.12	121.89
PCB141	6	8.16	0.25 J	3.73	2.10	3.60
PCB146	6	25.74	9.10	13.60	11.10	28.36
PCB149	6	95.17	17.48	103.90	90.27	183.20 Y
PCB151	6	25.42	9.26	16.09	13.78	28.09
PCB153	6	94.58	20.18	64.17	48.41	102.48
PCB156	6	8.10	0.32 J	6.97	4.22	6.40
PCB158	6	7.58	0.35 J	6.57	3.95	5.16
PCB167	6	4.48	0.22 J	3.63	2.19	3.49
PCB169	6	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	11.91	1.42	10.98	8.15	15.21
PCB171	7	3.76	0.55 J	4.17	3.18	5.73
PCB172	7	1.90	0.36 J	1.68	1.29	2.65
PCB173	7	0.31 J	ND U	0.23 J	0.24 J	0.31 J
PCB174	7	10.55	2.05	7.86	6.23	12.40
PCB175	7	0.52 J	0.08 J	0.58 J	0.48 J	0.76 J
PCB176	7	1.66	0.38 J	1.76	1.53	2.92
PCB177	7	10.38	2.55	9.40	8.26	17.88
PCB178	7	4.71	2.15	3.65	3.39	7.45
PCB180	7	18.10	2.90	15.80	12.03	23.25
PCB183	7	5.08	0.78	5.18	3.94	6.88
PCB184	7	0.24 J	0.15 J	0.19 J	0.19 J	0.23 J
PCB185	7	0.60 J	0.07 J	0.51 J	0.37 J	0.61 J
PCB187/182	7	18.32	7.14	14.72	13.76	28.89
PCB189	7	0.67 J	0.14 J	0.63 J	0.47 J	0.96
PCB191	7	0.39 J	0.10 J	0.43 J	0.33 J	0.52 J
PCB193	7	1.67	0.66	1.12	0.94	2.07
PCB194	8	2.70	0.91	2.38	1.95	4.11
PCB195	8	1.26	0.39 J	1.20	0.97 J	1.87
PCB197	8	0.21 J	0.11 J	0.17 J	0.17 J	0.30 J
PCB198	8	0.18 J	0.08 J	0.19 J	0.15 J	0.29 J
PCB199	8	3.81	1.46	2.98	2.59	5.72
PCB200	8	0.52 J	0.18 J	0.43 J	0.44 J	0.78 J
PCB201	8	0.67 J	0.25 J	0.58 J	0.51 J	1.10
PCB203/196	8	3.12	0.99	2.73	2.26	4.63
PCB205	8	0.15 J	0.05 J	0.17 J	0.13 J	0.25 J
PCB206	9	1.83	0.54 J	1.41	1.22	2.48
PCB207	9	0.25 J	0.09 J	0.20 J	0.18 J	0.35 J
PCB209	10	0.50 J	0.09 J	0.35 J	0.33 J	0.58 J
Level of Chlorination						
Cl1		225.39	28.65	87.18	121.26	1908.69
Cl2		1598.41	205.49	858.38	1198.81	8183.33
Cl3		1895.05	271.14	2331.21	2421.84	5754.85
Cl4		1762.65	142.78	2089.19	1946.01	3061.68
Cl5		957.01	97.08	767.16	616.76	1187.80
Cl6		517.04	97.95	414.59	321.16	651.69
Cl7		90.76	21.47	78.87	64.77	128.71
Cl8		12.62	4.42	10.81	9.18	19.04
Cl9		2.08	0.63	1.62	1.39	2.83
Cl10		0.50	0.09	0.35	0.33	0.58
SUM PCB		7061.52	869.70	6639.37	6701.51	20899.20
Surrogate Recovery (%)						
PCB103		90	78	80	73	111
PCB14		60	60	55	48	59
PCB34		78	77	65	55	99
PCB112		69	77	62	52	62

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: Q

Client Reporting Sample ID:		SLN-Q-1	SLN-Q-2	SLN-Q-3	SLN-Q-4	SNL-Q-5	SNL-Q-6
Battelle Sample ID:		X4394	X4395	X4396	X4397	X4398	X4399
Extraction Batch ID:		00-049	00-049	00-049	00-049	00-050	00-050
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		20.9	28.2	43.6	26.7	20.85	45.42
Sample Dry Weight (g):		12.26	11.27	9.67	11.53	12.58	9.48
Reporting Units:		ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		0-10	15-25	30-40	40-50	55-65	65-75
PCB	***LOC***						
PCB1	1	0.87 J	1.42 J	9.41	13.85	2.98	391.73 Y
PCB3	1	0.18 J	0.23 J	1.50 J	1.11 J	0.40 J	39.00
PCB4/10	2	2.66	6.56	63.91	77.70	9.22	1501.00 D
PCB6	2	0.13 J	0.21 J	1.74	1.86	0.31 J	45.40
PCB7/9	2	ND U	ND U	4.37	0.66 J	0.06 J	10.85
PCB8/5	2	1.15	1.55	13.37	20.64	3.13	536.77 D
PCB12/13	2	ND U	ND U	0.59 J	0.31 J	0.08 J	5.74
PCB16/32	3	3.17	3.37	48.40	35.70	4.39	688.48 D
PCB17	3	0.97	1.32	16.96	15.16	1.57	292.65 D
PCB18	3	0.71 J	1.01	11.94	7.86	0.95	140.17
PCB19	3	2.43	3.63	46.34	38.14	4.54	630.02 D
PCB21	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB22	3	0.19 J	0.32 J	6.43	1.88	0.27 J	14.28
PCB24/27	3	1.14	1.13	14.69	13.95	1.54	259.55 Y
PCB25	3	0.18 J	0.26 J	2.82	1.91	0.23 J	26.10
PCB26	3	0.50 J	0.61 J	8.14	5.67	0.68	84.84
PCB28	3	1.27	1.68	31.05	12.29	1.29	100.57
PCB29	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB31	3	1.05	1.23	20.32	10.63	0.94	146.03
PCB33/20	3	0.14 J	0.25 J	4.52	1.54	0.17 J	12.96
PCB40	4	0.24 J	0.40 J	8.30	2.52	0.22 J	14.00
PCB41/64/71	4	1.79	2.60	55.38	17.93	1.34	114.43
PCB42	4	0.57 J	0.92	19.73	6.67	0.53 J	41.70
PCB43	4	0.14 J	0.17 J	2.91	1.60	0.17 J	17.67
PCB44	4	1.30	2.13	47.18	14.99	1.14	88.49
PCB45	4	0.38 J	0.53 J	9.00	3.74	0.32 J	29.09
PCB46	4	0.14 J	0.22 J	3.49	1.30	0.15 J	7.55
PCB47/75	4	2.68	2.47	45.46	19.65	1.92	241.22 Y
PCB48	4	0.32 J	0.53 J	8.85	3.37	0.27 J	9.88
PCB49	4	2.88	3.09	53.09	21.68	2.22	238.49 Y
PCB51	4	1.46	1.01	15.12	9.70	1.16	175.83 Y
PCB52	4	3.23	4.08	70.96	28.57	2.90	275.76 Y
PCB53	4	2.34	1.62	23.02	15.95	1.86	284.85 D
PCB56/60	4	0.94	1.83	46.66	11.49	0.69 J	46.06
PCB59	4	0.12 J	0.24 J	3.89	1.52	0.15 J	11.69
PCB63	4	0.27 J	0.23 J	3.56	1.43	0.20 J	16.18
PCB66	4	1.87	3.13	71.66	19.15	1.32	90.35
PCB70/76	4	1.38	2.26	51.08	18.10	1.15	88.67
PCB74	4	1.29	1.73	41.67	12.27	0.87	73.93
PCB82	5	0.30 J	0.48 J	10.13	2.18	0.18 J	11.06
PCB83	5	0.31 J	0.35 J	4.51	1.28	0.38 J	12.42
PCB84	5	0.66 J	0.87 J	17.72	4.95	0.60 J	40.08
PCB85	5	0.51 J	0.63 J	15.59	3.38	0.37 J	21.33
PCB87/115	5	0.91	1.64	33.69	7.45	0.65 J	33.83
PCB89	5	ND U	ND U	ND U	ND U	ND U	ND U
PCB91	5	0.98	0.75	14.20	5.14	0.66	72.93
PCB92	5	0.67 J	0.67 J	13.37	4.27	0.47 J	52.03
PCB95	5	2.50	2.79	54.31	17.08	1.88	171.09 Y
PCB97	5	0.71 J	1.08	23.32	5.21	0.52 J	30.77
PCB99	5	1.72	1.84	39.15	10.24	1.10	101.94
PCB100	5	0.14 J	ND U	1.42	ND U	0.12 J	11.34
PCB101/90	5	2.37	3.28	71.57	17.83	1.69	137.03
PCB105	5	0.80 J	1.11	31.72	5.60	0.39 J	27.43
PCB107	5	0.24 J	0.24 J	5.68	1.33	0.15	14.79
PCB110	5	4.23	4.86	100.20	25.53	3.04	256.81 Y
PCB114	5	ND U	ND U	1.71	0.38 J	0.06 J	2.01
PCB118	5	2.58	3.12	77.37	15.88	1.53	115.33
PCB119	5	0.22 J	0.13 J	2.64	0.99	0.13 J	16.68
PCB124	5	ND U	0.11 J	2.38	0.44 J	0.04 J	2.24
PCB128	6	0.62 J	0.61 J	14.19	2.51	0.36 J	20.58

Client Reporting Sample ID:		SLN-Q-1	SLN-Q-2	SLN-Q-3	SLN-Q-4	SNL-Q-5	SNL-Q-6
PCB129	6	0.10 J	0.16 J	3.08	0.53 J	0.09 J	3.55
PCB130	6	0.24 J	0.21 J	4.33	0.87	0.15 J	10.44
PCB131	6	ND U	ND U	0.75 J	0.14 J	ND U	1.01
PCB132	6	1.07	1.00	21.49	4.30	0.70 J	46.15
PCB134	6	0.17 J	0.20 J	3.33	0.82	0.16 J	10.66
PCB135/144	6	0.62 J	0.50 J	8.79	2.48	0.41 J	34.48
PCB136	6	0.44 J	0.36 J	6.67	1.81	0.34 J	22.79
PCB137	6	0.17 J	0.19 J	3.67	0.67 J	0.13 J	5.73
PCB138/160/163	6	3.34	3.28	75.82	14.98	1.95	151.15
PCB141	6	0.33 J	0.39 J	7.88	1.48	0.22 J	10.14
PCB146	6	0.52 J	0.39 J	8.25	2.03	0.36 J	31.33
PCB149	6	2.53	2.05	41.30	10.67	1.62	139.26
PCB151	6	0.54 J	0.44 J	8.04	2.30	0.31 J	33.43
PCB153	6	2.27	2.08	46.83	9.85	1.34	118.74
PCB156	6	0.24 J	0.27 J	7.41	1.26	0.18 J	10.47
PCB158	6	0.26 J	0.28 J	6.28	1.16	0.19 J	9.19
PCB167	6	0.13 J	0.14 J	3.43	0.60 J	0.13 J	5.47
PCB169	6	ND U	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	0.36 J	0.31 J	6.53	1.20	0.21 J	14.87
PCB171	7	0.10 J	0.09 J	1.83	0.35 J	0.08 J	4.83
PCB172	7	ND U	ND U	0.95	0.18 J	0.04 J	2.35
PCB173	7	ND U	ND U	0.16 J	ND U	ND U	0.39 J
PCB174	7	0.28 J	0.25 J	5.74	1.18	0.22 J	12.70
PCB175	7	ND U	ND U	0.23 J	ND U	ND U	0.63 J
PCB176	7	0.05 J	ND U	0.59 J	0.15 J	0.04 J	2.20
PCB177	7	0.23 J	0.17 J	3.32	0.79 J	0.21 J	12.57
PCB178	7	0.08 J	ND U	1.04	0.30 J	0.06 J	4.77
PCB180	7	0.44 J	0.40 J	9.35	1.69	0.30 J	22.45
PCB183	7	0.13 J	0.12 J	2.39	0.51 J	0.12 J	6.43
PCB184	7	0.14 J	0.17 J	0.20 J	0.17 J	0.15 J	0.22 J
PCB185	7	ND U	ND U	0.41 J	0.08 J	ND U	0.79 J
PCB187/182	7	0.35 J	0.31 J	5.56	1.29	0.30 J	21.55
PCB189	7	ND U	ND U	0.31 J	0.08 J	ND U	0.78 J
PCB191	7	ND U	ND U	0.23 J	0.05 J	ND U	0.56 J
PCB193	7	ND U	ND U	0.55 J	0.13 J	ND U	1.88
PCB194	8	ND U	ND U	0.96 J	0.25 J	0.09 J	2.77
PCB195	8	ND U	ND U	0.44 J	0.08 J	0.09 J	1.33
PCB197	8	ND U	ND U	ND U	ND U	ND U	0.21 J
PCB198	8	ND U	ND U	0.20 J	ND U	ND U	0.24 J
PCB199	8	ND U	ND U	1.22	0.25 J	0.10 J	3.93
PCB200	8	ND U	ND U	0.21 J	ND U	ND U	0.58 J
PCB201	8	ND U	ND U	0.18 J	ND U	ND U	0.66 J
PCB203/196	8	ND U	ND U	1.05	0.21 J	0.11 J	3.32
PCB205	8	ND U	ND U	ND U	ND U	ND U	0.16 J
PCB206	9	ND U	ND U	0.62 J	0.08 J	0.08 J	1.54
PCB207	9	ND U	ND U	0.07 J	ND U	ND U	0.20 J
PCB209	10	ND U	ND U	0.18 J	ND U	0.05 J	0.35 J
Level of Chlorination							
Cl1		1.05	1.65	10.90	14.97	3.38	430.73
Cl2		3.94	8.32	83.98	101.18	12.79	2099.75
Cl3		11.74	14.83	211.61	144.73	16.57	2395.68
Cl4		23.32	29.20	581.01	211.62	18.56	1865.86
Cl5		19.87	23.95	520.69	129.16	13.95	1131.15
Cl6		13.60	12.54	271.55	58.48	8.64	664.59
Cl7		2.16	1.82	39.39	8.15	1.72	109.97
Cl8		0.00	0.00	4.28	0.79	0.39	13.20
Cl9		0.00	0.00	0.69	0.08	0.08	1.74
Cl10		0.00	0.00	0.18	0.00	0.05	0.35
SUM PCB		75.69	92.31	1724.28	669.16	76.14	8713.01
Surrogate Recovery (%)							
PCB103		65	68	66	69	65	85
PCB14		59	62	60	64	59	58
PCB34		62	65	66	69	62	84
PCB112		69	71	67	71	68	69

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: Q

Client Reporting Sample ID:		SNL-Q-7	SNL-Q-8	SNL-Q-9	SNL-Q-10
Battelle Sample ID:		X4400	X4401	X4402	X4403
Extraction Batch ID:		00-050	00-050	00-050	00-050
Batch Matrix:		Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667
Sample Moisture Content (%):		18.09	17.21	27.47	26.34
Sample Dry Weight (g):		11.87	12.24	11.37	11.04
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		83-93	93-103	113-123	133-143
PCB	***LOC***				
PCB1	1	7.83	1.13 J	180.30	194.18
PCB3	1	2.00	0.24 J	39.77	16.95
PCB4/10	2	33.88	4.43	477.15 Y	933.45 D
PCB6	2	1.51	0.20 J	27.68	15.22
PCB7/9	2	0.40 J	0.08 J	5.18	1.50
PCB8/5	2	16.89	1.72	184.41 Y	68.72
PCB12/13	2	0.27 J	ND U	4.68	0.92
PCB16/32	3	18.52	1.48	273.71 D	39.88
PCB17	3	9.19	0.82	150.77 Y	28.93
PCB18	3	4.40	0.49 J	74.15	13.54
PCB19	3	28.54	2.91	317.75 D	324.45 D
PCB21	3	ND U	ND U	ND U	ND U
PCB22	3	0.42 J	0.07 J	3.15	0.33 J
PCB24/27	3	12.66	1.03	139.34 Y	64.24
PCB25	3	1.24	0.19 J	12.42	2.03
PCB26	3	3.47	0.34 J	58.07	11.74
PCB28	3	2.59	0.31 J	7.21	2.06
PCB29	3	ND U	ND U	ND U	ND U
PCB31	3	4.15	0.36 J	83.47	10.49
PCB33/20	3	0.36 J	0.08 J	2.17	0.28 J
PCB40	4	0.30 J	ND U	3.28	0.19 J
PCB41/64/71	4	4.71	0.44 J	51.33	8.09
PCB42	4	1.19	0.17 J	13.31	0.86 J
PCB43	4	ND U	ND U	ND U	ND U
PCB44	4	2.12	0.25 J	29.50	1.65
PCB45	4	1.28	0.13 J	14.23	2.66
PCB46	4	0.31 J	ND U	2.67	0.44 J
PCB47/75	4	11.10	0.82	139.22 Y	29.89
PCB48	4	ND U	ND U	ND U	ND U
PCB49	4	11.65	1.08	166.89 Y	24.61
PCB51	4	12.99	0.83	105.04 Y	54.10
PCB52	4	14.57	1.38	178.58 Y	36.11
PCB53	4	16.16	1.18	166.45 Y	45.15
PCB56/60	4	0.92	0.15 J	4.17	0.57 J
PCB59	4	0.62 J	0.07 J	6.85	1.32
PCB63	4	0.34 J	0.11 J	2.46	0.34 J
PCB66	4	2.00	0.29 J	8.41	1.39
PCB70/76	4	1.67	0.20 J	14.72	1.75
PCB74	4	1.76	0.16 J	14.06	2.47
PCB82	5	0.38 J	ND U	1.23	0.26 J
PCB83	5	0.50 J	ND U	3.18	0.63 J
PCB84	5	1.89	0.21 J	19.39	2.86
PCB85	5	0.62 J	0.15 J	4.57	1.17
PCB87/115	5	0.87	0.23 J	4.67	0.91
PCB89	5	ND U	ND U	ND U	ND U
PCB91	5	4.35	0.36 J	43.28	8.90
PCB92	5	1.72	0.17 J	14.56	2.66
PCB95	5	8.84	0.83	107.88	21.91
PCB97	5	0.84	0.12 J	4.47	0.72 J
PCB99	5	2.81	0.29 J	26.77	5.11
PCB100	5	0.75	0.06 J	7.49	3.38
PCB101/90	5	4.18	0.39 J	32.51	8.57
PCB105	5	0.81 J	0.11 J	3.53	0.61 J
PCB107	5	0.34	ND U	4.66	0.57
PCB110	5	11.49	1.19	122.30	17.57
PCB114	5	0.13 J	ND U	0.42 J	0.10 J
PCB118	5	3.41	0.30 J	32.19	4.82
PCB119	5	0.59 J	ND U	5.66	1.00
PCB124	5	0.08 J	ND U	0.31 J	0.08 J
PCB128	6	0.71 J	0.07 J	5.28	0.78 J

Client Reporting Sample ID:		SNL-Q-7	SNL-Q-8	SNL-Q-9	SNL-Q-10
PCB129	6	0.15 J	ND U	0.75	0.12 J
PCB130	6	0.35 J	ND U	4.06	0.53 J
PCB131	6	ND U	ND U	0.21 J	ND U
PCB132	6	1.81	0.22 J	13.88	2.28
PCB134	6	0.48 J	ND U	4.58	0.79
PCB135/144	6	1.61	0.13 J	15.90	3.47
PCB136	6	1.33	0.12 J	12.57	3.38
PCB137	6	0.15 J	ND U	1.63	0.25 J
PCB138/160/163	6	5.87	0.51 J	53.18	12.99
PCB141	6	0.29 J	ND U	2.31	0.37 J
PCB146	6	1.19	0.11 J	13.03	3.80
PCB149	6	6.93	0.56 J	54.27	13.19
PCB151	6	1.47	0.11 J	15.40	3.72
PCB153	6	4.14	0.34 J	48.01	12.88
PCB156	6	0.34 J	0.04 J	3.14	0.43 J
PCB158	6	0.32 J	ND U	2.61	0.44 J
PCB167	6	0.19 J	ND U	1.82	0.26 J
PCB169	6	ND U	ND U	ND U	ND U
PCB170/190	7	0.57 J	0.05 J	6.83	1.37
PCB171	7	0.23 J	ND U	2.26	0.51 J
PCB172	7	0.10 J	ND U	1.22	0.21 J
PCB173	7	ND U	ND U	0.17 J	ND U
PCB174	7	0.54 J	0.06 J	5.56	1.24
PCB175	7	0.04 J	ND U	0.35 J	0.09 J
PCB176	7	0.12 J	ND U	1.09	0.24 J
PCB177	7	0.70 J	0.05 J	6.70	1.73
PCB178	7	0.30 J	ND U	3.07	1.17
PCB180	7	0.89	0.06 J	11.36	2.24
PCB183	7	0.30 J	ND U	3.16	0.69 J
PCB184	7	0.16 J	0.16 J	0.16 J	0.18 J
PCB185	7	0.04 J	ND U	0.35 J	0.07 J
PCB187/182	7	1.23	0.09 J	11.53	4.11
PCB189	7	0.04 J	ND U	0.39 J	0.10 J
PCB191	7	ND U	ND U	0.24 J	0.09 J
PCB193	7	0.09 J	ND U	1.00	0.33 J
PCB194	8	0.15 J	ND U	1.88	0.63 J
PCB195	8	0.12 J	ND U	0.85 J	0.28 J
PCB197	8	ND U	ND U	0.15 J	0.05 J
PCB198	8	ND U	ND U	0.15 J	ND U
PCB199	8	0.26 J	ND U	2.56	0.94
PCB200	8	0.09 J	ND U	0.36 J	0.13 J
PCB201	8	0.11 J	ND U	0.46 J	0.19 J
PCB203/196	8	0.16 J	ND U	2.26	0.72 J
PCB205	8	ND U	ND U	0.12 J	ND U
PCB206	9	0.11 J	ND U	1.26	0.48 J
PCB207	9	ND U	ND U	0.17 J	0.07 J
PCB209	10	0.04 J	ND U	0.30 J	0.11 J
Level of Chlorination					
Cl1		9.83	1.37	220.07	211.13
Cl2		52.94	6.43	699.10	1019.80
Cl3		85.54	8.08	1122.22	497.99
Cl4		83.68	7.23	921.19	211.60
Cl5		44.58	4.40	439.06	81.83
Cl6		27.34	2.22	252.64	59.71
Cl7		5.35	0.46	55.46	14.37
Cl8		0.89	0.00	8.78	2.94
Cl9		0.11	0.00	1.43	0.54
Cl10		0.04	0.00	0.30	0.11
SUM PCB		310.30	30.19	3720.25	2100.02
Surrogate Recovery (%)					
PCB103		77	69	84	78
PCB14		64	64	56	62
PCB34		70	67	73	73
PCB112		77	71	66	74

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: P

Client Reporting Sample ID:		SLN-P-1	SLN-P-2	SLN-P-3	SLN-P-4	SLN-P-5	SLN-P-6
Battelle Sample ID:		X4404	X4405	X4406	X4407	X4408	X4409
Extraction Batch ID:		00-049	00-049	00-049	00-049	00-050	00-050
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		20.5	30.0	24.0	26.2	17.25	26.37
Sample Dry Weight (g):		12.00	10.61	12.45	12.67	12.68	12.03
Reporting Units:		ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		0-10	10-20	20-30	30-40	50-60	70-80
PCB	***LOC***						
PCB1	1	5.86	16.44	3.22	8.19	6.23	25.82
PCB3	1	0.67 J	2.20 J	0.78 J	1.15 J	0.78 J	4.79
PCB4/10	2	20.83	74.74	15.43	37.09	24.67	93.44
PCB6	2	0.30 J	1.99	0.50 J	1.13 J	0.59 J	3.03
PCB7/9	2	0.11 J	0.64 J	0.13 J	0.35 J	0.10 J	0.32 J
PCB8/5	2	2.24	18.81	4.49	12.11	6.90	45.01
PCB12/13	2	ND U	0.50 J	0.15 J	0.26 J	0.12 J	0.78
PCB16/32	3	4.95	35.97	9.20	19.83	12.44	73.82
PCB17	3	1.56	14.17	3.96	7.72	3.77	24.56
PCB18	3	0.65 J	8.28	2.29	3.78	1.86	12.05
PCB19	3	6.66	42.95	9.15	22.49	11.51	69.17
PCB21	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB22	3	0.11 J	2.38	0.76	1.01	0.29 J	1.97
PCB24/27	3	1.58	13.23	3.00	7.23	4.19	24.82
PCB25	3	0.13 J	1.94	0.50 J	0.74	0.34 J	2.31
PCB26	3	0.39 J	5.40	1.39	2.38	1.06	7.58
PCB28	3	0.65 J	15.36	4.63	5.92	1.65	7.77
PCB29	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB31	3	0.61 J	10.94	3.11	4.56	1.76	13.91
PCB33/20	3	0.08 J	1.68	0.69 J	0.73 J	0.28 J	1.20
PCB40	4	0.09 J	2.66	0.81	0.93	0.21 J	1.31
PCB41/64/71	4	0.73 J	21.07	5.69	7.09	2.32	14.57
PCB42	4	0.18 J	6.97	1.96	2.43	0.72 J	4.54
PCB43	4	ND U	0.84	0.28 J	0.45 J	ND U	ND U
PCB44	4	0.49 J	15.56	4.65	5.72	1.43	8.81
PCB45	4	0.14 J	3.76	1.02	1.40	0.53 J	3.34
PCB46	4	ND U	1.28	0.39 J	0.54 J	0.14 J	0.86
PCB47/75	4	1.04	21.73	6.22	8.62	4.94	33.35
PCB48	4	0.15 J	3.56	1.08	1.21	ND U	ND U
PCB49	4	1.16	24.86	6.93	8.85	5.02	34.15
PCB51	4	0.91	10.58	2.91	5.12	3.57	24.56
PCB52	4	1.53	32.39	8.79	11.81	5.60	37.18
PCB53	4	1.20	17.13	4.34	7.98	5.24	37.81
PCB56/60	4	0.34 J	16.10	3.81	4.16	0.63 J	4.59
PCB59	4	0.07 J	1.66	0.47 J	0.63 J	0.21 J	1.14
PCB63	4	0.11 J	1.39	0.44 J	0.51 J	0.24 J	1.02
PCB66	4	0.65 J	25.69	6.65	7.08	1.47	7.76
PCB70/76	4	0.49 J	20.74	5.01	5.55	1.19	9.81
PCB74	4	0.39 J	16.11	3.96	4.66	1.15	7.56
PCB82	5	0.09 J	3.52	0.84	0.96	0.23 J	1.20
PCB83	5	ND U	1.73	0.57 J	0.62 J	0.30 J	1.49
PCB84	5	0.21 J	7.08	1.71	2.09	0.89	5.86
PCB85	5	0.14 J	5.31	1.35	1.36	0.44 J	2.47
PCB87/115	5	0.26 J	12.02	2.99	2.96	0.62 J	3.75
PCB89	5	ND U	ND U	ND U	ND U	ND U	ND U
PCB91	5	0.30 J	6.50	1.94	2.28	1.68	10.91
PCB92	5	0.19 J	5.36	1.41	1.69	0.96	5.83
PCB95	5	0.84	24.12	6.29	7.67	4.00	27.74
PCB97	5	0.18 J	7.94	1.98	2.10	0.56 J	2.94
PCB99	5	0.40 J	15.42	3.74	4.11	1.75	10.77
PCB100	5	ND U	0.84	0.32 J	0.33 J	0.29 J	1.88
PCB101/90	5	0.66 J	27.41	6.47	7.18	2.49	15.57
PCB105	5	0.18 J	10.46	2.25	2.30	0.52 J	4.91
PCB107	5	0.05 J	2.22	0.51 J	0.58 J	0.27	1.97
PCB110	5	1.15	41.24	9.92	11.76	6.36	41.21
PCB114	5	ND U	0.66 J	ND U	0.20 J	ND U	0.34 J
PCB118	5	0.57 J	29.67	6.47	7.02	2.33	20.91
PCB119	5	ND U	1.21	0.39 J	0.41 J	0.30 J	2.09
PCB124	5	ND U	0.82	0.15 J	0.17 J	0.07 J	0.30 J
PCB128	6	0.14 J	4.39	1.20	1.16	0.52 J	3.10

Client Reporting Sample ID:		SLN-P-1	SLN-P-2	SLN-P-3	SLN-P-4	SLN-P-5	SLN-P-6
PCB129	6	ND U	0.99	0.24 J	0.24 J	0.12 J	0.52 J
PCB130	6	ND U	1.43	0.41 J	0.38 J	0.17 J	1.41
PCB131	6	ND U	0.55 J	ND U	0.09 J	ND U	0.22 J
PCB132	6	0.20 J	7.18	1.93	2.02	1.06	6.48
PCB134	6	ND U	1.25	0.33 J	0.41 J	0.23 J	1.63
PCB135/144	6	0.16 J	3.55	0.99	1.11	0.79	5.19
PCB136	6	0.11 J	2.69	0.76 J	0.89	0.62 J	3.66
PCB137	6	ND U	1.22	0.31 J	0.32 J	0.17 J	0.76 J
PCB138/160/163	6	0.72 J	25.52	6.71	6.62	3.36	23.00
PCB141	6	0.04 J	2.63	0.66 J	0.65 J	0.18 J	1.36
PCB146	6	0.13 J	2.92	0.88	0.86	0.61 J	4.88
PCB149	6	0.57 J	15.96	4.23	4.81	3.16	18.56
PCB151	6	0.15 J	3.40	0.92	1.05	0.70 J	4.92
PCB153	6	0.49 J	16.47	4.33	4.45	2.36	17.37
PCB156	6	0.07 J	2.26	0.57 J	0.53 J	0.22 J	1.47
PCB158	6	0.07 J	2.10	0.52 J	0.54 J	0.23 J	1.37
PCB167	6	ND U	1.03	0.31 J	0.25 J	0.13 J	0.72 J
PCB169	6	ND U	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	0.09 J	1.90	0.64 J	0.53 J	0.35 J	1.99
PCB171	7	ND U	0.54 J	0.19 J	0.18 J	0.10 J	0.65 J
PCB172	7	ND U	0.26 J	0.10 J	0.08 J	0.05 J	0.32 J
PCB173	7	ND U	ND U	ND U	ND U	ND U	ND U
PCB174	7	0.08 J	1.67	0.58 J	0.46 J	0.31 J	1.78
PCB175	7	ND U	0.05 J	ND U	ND U	ND U	0.09 J
PCB176	7	ND U	0.20 J	0.07 J	0.06 J	0.05 J	0.25 J
PCB177	7	0.07 J	1.08	0.38 J	0.37 J	0.26 J	1.91
PCB178	7	ND U	0.41 J	0.14 J	0.13 J	0.10 J	0.87
PCB180	7	0.12 J	2.48	0.92	0.77 J	0.41 J	3.05
PCB183	7	ND U	0.74 J	0.26 J	0.23 J	0.14 J	0.89
PCB184	7	0.13 J	0.17 J	0.13 J	0.14 J	0.12 J	0.20 J
PCB185	7	ND U	0.12 J	0.04 J	ND U	ND U	0.12 J
PCB187/182	7	0.11 J	1.77	0.62 J	0.60 J	0.49 J	3.72
PCB189	7	ND U	0.09 J	0.04 J	0.03 J	ND U	0.12 J
PCB191	7	ND U	ND U	ND U	ND U	ND U	0.11 J
PCB193	7	ND U	0.18 J	0.07 J	0.05 J	0.05 J	0.30 J
PCB194	8	ND U	0.24 J	0.16 J	0.11 J	0.06 J	0.46 J
PCB195	8	ND U	0.06 J	ND U	ND U	ND U	0.23 J
PCB197	8	ND U	ND U	ND U	ND U	ND U	0.04 J
PCB198	8	ND U	ND U	ND U	ND U	ND U	ND U
PCB199	8	ND U	0.25 J	0.15 J	0.14 J	0.08 J	0.81
PCB200	8	ND U	ND U	ND U	ND U	ND U	0.14 J
PCB201	8	ND U	ND U	ND U	ND U	ND U	0.14 J
PCB203/196	8	ND U	0.30 J	0.16 J	0.12 J	0.06 J	0.57 J
PCB205	8	ND U	ND U	ND U	ND U	ND U	ND U
PCB206	9	ND U	0.11 J	ND U	0.06 J	0.05 J	0.30 J
PCB207	9	ND U	ND U	ND U	ND U	ND U	0.05 J
PCB209	10	ND U	ND U	ND U	ND U	ND U	0.06 J
Level of Chlorination							
Cl1		6.53	18.64	4.00	9.34	7.01	30.60
Cl2		23.48	96.68	20.69	50.94	32.38	142.57
Cl3		17.36	152.28	38.66	76.38	39.15	239.16
Cl4		9.68	244.08	65.40	84.76	34.61	232.38
Cl5		5.22	203.53	49.33	55.78	24.04	162.15
Cl6		2.84	95.56	25.32	26.38	14.64	96.64
Cl7		0.58	11.65	4.20	3.63	2.42	16.37
Cl8		0.00	0.85	0.47	0.37	0.21	2.41
Cl9		0.00	0.11	0.00	0.06	0.05	0.34
Cl10		0.00	0.00	0.00	0.00	0.00	0.06
SUM PCB		65.69	823.37	208.07	307.65	154.49	922.67
Surrogate Recovery (%)							
PCB103		59	72	64	70	68	83
PCB14		57	63	59	64	61	64
PCB34		58	69	62	68	67	75
PCB112		61	73	66	72	70	78

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: P

Client Reporting Sample ID:		SLN-P-7	SLN-P-8	SLN-P-9	SLN-P-10
Battelle Sample ID:		X4410	X4411	X4412	X4413
Extraction Batch ID:		00-050	00-050	00-050	00-050
Batch Matrix:		Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667
Sample Moisture Content (%):		46.76	41.13	40.70	24.27
Sample Dry Weight (g):		8.27	8.83	8.80	11.19
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		85-95	95-105	105-115	125-135
PCB	***LOC***				
PCB1	1	243.05	12760.31 D	7337.54 D	3.12
PCB3	1	95.71	1715.68 D	1054.84 D	0.44 J
PCB4/10	2	1718.45 D	63440.30 D	36483.26 D	15.71
PCB6	2	55.18	227.46	165.32	0.11 J
PCB7/9	2	12.26	20.39	16.93	ND U
PCB8/5	2	547.41 D	4979.23 D	3147.04 D	1.34
PCB12/13	2	5.17	30.92	23.91	ND U
PCB16/32	3	1359.00 D	13506.80 D	7350.17 D	3.07
PCB17	3	427.36 D	1855.64 D	1213.64 D	0.56 J
PCB18	3	167.49	249.04 Y	227.03 Y	0.17 J
PCB19	3	1098.05 D	15820.46 D	9124.12 D	3.90
PCB21	3	ND U	ND U	ND U	ND U
PCB22	3	22.36	7.10	10.60	ND U
PCB24/27	3	445.16 D	5802.63 D	3280.66 D	1.57
PCB25	3	58.00	10.87	15.74	ND U
PCB26	3	129.58	264.89 D	223.02 Y	0.13 J
PCB28	3	131.86	36.12	40.58	ND U
PCB29	3	ND U	ND U	ND U	ND U
PCB31	3	183.60	292.52 D	291.12 Y	0.15 J
PCB33/20	3	30.18	5.88	6.36	ND U
PCB40	4	24.65	6.53	7.76	ND U
PCB41/64/71	4	172.18	129.27	117.39	ND U
PCB42	4	50.81	22.78	22.87	ND U
PCB43	4	ND U	66.29	25.51	ND U
PCB44	4	151.29	71.30	71.16	0.09 J
PCB45	4	40.56	118.89	85.45	ND U
PCB46	4	13.73	11.73	9.94	ND U
PCB47/75	4	407.68 D	1679.45 D	1083.41 D	0.47 J
PCB48	4	ND U	ND U	ND U	ND U
PCB49	4	441.52 D	611.81 D	412.72 D	0.29 J
PCB51	4	408.02 D	3459.50 D	1902.33 D	0.81
PCB52	4	547.95 D	1357.34 D	904.88 D	0.57 J
PCB53	4	534.20 D	3419.06 D	2028.26 D	0.96
PCB56/60	4	67.51	3.80	6.69	ND U
PCB59	4	16.73	36.59	26.18	ND U
PCB63	4	13.28	21.14	11.23	ND U
PCB66	4	124.99	12.57	17.76	0.15 J
PCB70/76	4	127.26	25.69	31.49	ND U
PCB74	4	77.86	24.68	28.34	ND U
PCB82	5	14.29	0.81 J	2.20	ND U
PCB83	5	15.75	25.98	15.92	ND U
PCB84	5	64.70	82.57	70.80	ND U
PCB85	5	29.80	30.94	28.94	ND U
PCB87/115	5	51.85	103.97	7.00	ND U
PCB89	5	ND U	ND U	ND U	ND U
PCB91	5	86.05	489.14 D	306.71 D	0.16 J
PCB92	5	71.79	308.12 Y	171.34	0.14 J
PCB95	5	309.81 Y	969.86 D	636.63 D	0.31 J
PCB97	5	30.96	6.09	9.53	ND U
PCB99	5	94.86	88.88	79.37	ND U
PCB100	5	21.96	190.91 Y	129.30	ND U
PCB101/90	5	148.14	280.44 D	228.93 Y	0.16 J
PCB105	5	44.56	1.90	5.40	ND U
PCB107	5	22.70	3.81	18.52	ND U
PCB110	5	369.26 Y	603.77 D	434.89 D	0.22 J
PCB114	5	2.49	3.76	2.61	ND U
PCB118	5	157.73	89.99	100.29	ND U
PCB119	5	22.81	85.45	53.56	ND U
PCB124	5	2.39	ND U	0.46 J	ND U
PCB128	6	29.60	3.37	7.26	ND U

Client Reporting Sample ID:		SLN-P-7	SLN-P-8	SLN-P-9	SLN-P-10
PCB129	6	4.47	0.48 J	1.03	ND U
PCB130	6	15.72	5.12	5.33	ND U
PCB131	6	1.41	ND U	ND U	ND U
PCB132	6	54.01	36.62	34.77	ND U
PCB134	6	14.31	36.49	22.59	ND U
PCB135/144	6	48.61	207.66 Y	122.47	ND U
PCB136	6	34.31	133.13	92.35	ND U
PCB137	6	7.06	0.89 J	1.79	ND U
PCB138/160/163	6	232.61 Y	418.56 D	342.41 Y	0.10 J
PCB141	6	12.24	1.20	3.02	ND U
PCB146	6	50.19	219.72 Y	133.57	ND U
PCB149	6	164.33	471.41 D	330.47 Y	0.22 J
PCB151	6	53.55	168.26 Y	96.46	ND U
PCB153	6	172.25	264.90 D	257.48 Y	0.13 J
PCB156	6	14.32	1.87	3.56	ND U
PCB158	6	11.56	1.71	3.85	ND U
PCB167	6	8.19	1.31	2.18	ND U
PCB169	6	ND U	ND U	ND U	ND U
PCB170/190	7	23.59	8.39	8.83	ND U
PCB171	7	7.97	4.66	3.94	ND U
PCB172	7	4.05	3.04	2.40	ND U
PCB173	7	0.47 J	ND U	ND U	ND U
PCB174	7	20.61	15.89	12.42	ND U
PCB175	7	1.00 J	0.42 J	0.43 J	ND U
PCB176	7	3.73	8.92	5.68	ND U
PCB177	7	22.81	72.24	44.66	ND U
PCB178	7	11.17	68.12	40.83	ND U
PCB180	7	37.67	15.03	14.22	ND U
PCB183	7	10.38	3.43	3.60	ND U
PCB184	7	0.32 J	0.57 J	0.45 J	0.13 J
PCB185	7	1.12	0.20 J	0.25 J	ND U
PCB187/182	7	41.25	196.76 Y	117.38	0.07 J
PCB189	7	1.45	1.09	0.95	ND U
PCB191	7	0.85 J	0.42 J	0.37 J	ND U
PCB193	7	3.44	15.94	9.77	ND U
PCB194	8	6.14	13.31	8.67	ND U
PCB195	8	2.64	4.35	2.96	ND U
PCB197	8	0.44 J	1.81	1.15	ND U
PCB198	8	0.35 J	0.60 J	0.42 J	ND U
PCB199	8	8.70	37.07	22.74	ND U
PCB200	8	1.07	2.12	1.35	ND U
PCB201	8	1.49	7.58	4.47	ND U
PCB203/196	8	6.79	11.70	7.71	ND U
PCB205	8	0.30 J	0.73 J	0.50 J	ND U
PCB206	9	3.88	15.83	10.63	0.06 J
PCB207	9	0.51 J	2.43	1.62	ND U
PCB209	10	0.92 J	4.47	3.20	0.09 J
Level of Chlorination					
Cl1		338.76	14475.99	8392.39	3.57
Cl2		2338.48	68698.31	39836.46	17.16
Cl3		4052.63	37851.95	21783.04	9.56
Cl4		3220.20	11078.42	6793.37	3.33
Cl5		1561.91	3366.40	2302.40	0.99
Cl6		928.74	1972.71	1460.58	0.44
Cl7		191.87	415.13	266.18	0.20
Cl8		27.93	79.26	49.96	0.00
Cl9		4.40	18.26	12.25	0.06
Cl10		0.92	4.47	3.20	0.09
SUM PCB		12665.83	137960.90	80899.82	35.41
Surrogate Recovery (%)					
PCB103		116	413 &	309 &	55
PCB14		66	73	72	49
PCB34		110	614 &	389 &	52
PCB112		78	73	78	59

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: N

Client Reporting Sample ID:		SLN-N-1	SLN-N-2	SLN-N-3	SLN-N-4	SLN-N-5	SLN-N-6
Battelle Sample ID:		X4255	X4256	X4257	X4258	X4259	X4260
Extraction Batch ID:		00-035	00-035	00-035	00-035	00-037	00-037
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		63.99	61.86	58.42	57.88	56.42	57.31
Sample Dry Weight (g):		5.40	5.91	6.94	6.61	7.84	7.82
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		0-5	5-10	10-15	15-20	20-25	25-30
PCB	***LOC***						
PCB1	1	4.78	8.67	8.36	24.97	167.29	157.28
PCB3	1	2.08 J	3.18 J	2.35 J	10.09	52.43	64.02
PCB4/10	2	48.59	67.22	60.57	133.94	896.29 Y	894.82 Y
PCB6	2	1.71 J	2.52 J	2.38 J	7.19	39.44	57.91
PCB7/9	2	0.50 J	0.65 J	0.61 J	1.79	9.09	13.96
PCB8/5	2	16.29	23.42	24.54	77.99	492.98 Y	554.77 D
PCB12/13	2	ND U	0.57 J	0.34 J	1.08 J	3.72	4.63
PCB16/32	3	46.28	60.70	57.47	142.29	844.25 D	1073.12 D
PCB17	3	17.80	24.41	22.39	58.02	323.10 Y	438.86 D
PCB18	3	10.77	14.01	11.22	23.21	124.07	209.15
PCB19	3	42.13	53.44	46.93	99.35	598.67 D	672.25 D
PCB21	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB22	3	5.21	6.36	3.96	5.83	13.02	10.78
PCB24/27	3	18.30	23.82	21.97	54.61	311.56 Y	404.91 Y
PCB25	3	2.64	4.05	3.22	6.79	30.72	51.87
PCB26	3	8.28	10.53	8.80	20.59	92.64	133.07
PCB28	3	27.95	33.63	26.34	46.17	119.46	117.69
PCB29	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB31	3	18.33	22.10	17.64	36.68	152.14	222.47
PCB33/20	3	3.85	5.69	4.73	8.19	14.34	13.36
PCB40	4	6.37	7.51	5.36	7.71	12.42	11.83
PCB41/64/71	4	49.24	59.50	43.13	68.81	145.30	164.29
PCB42	4	16.33	20.47	15.07	22.62	44.13	45.61
PCB43	4	2.84	3.48	2.55	6.22	16.99	18.85
PCB44	4	40.24	48.83	34.03	49.61	92.20	92.59
PCB45	4	7.37	9.20	6.96	11.58	30.16	31.29
PCB46	4	2.76	3.48	2.56	3.55	7.29	7.60
PCB47/75	4	45.90	55.01	48.58	98.05	375.49 Y	453.36 D
PCB48	4	7.86	7.93	6.34	10.81	ND U	ND U
PCB49	4	51.30	61.95	50.39	97.20	341.14 Y	497.66 Y
PCB51	4	19.51	24.13	22.53	54.32	257.20 Y	333.53 Y
PCB52	4	66.14	80.39	61.53	112.87	369.71 Y	518.47 Y
PCB53	4	28.81	35.95	32.19	79.78	376.91 Y	499.39 D
PCB56/60	4	35.24	40.94	26.74	34.38	38.57	26.32
PCB59	4	3.78	4.41	3.14	5.31	12.05	13.16
PCB63	4	3.34	3.95	3.27	6.16	15.62	16.03
PCB66	4	60.81	71.03	50.49	72.79	103.91	90.35
PCB70/76	4	43.95	52.12	40.04	59.63	83.17	75.19
PCB74	4	37.55	44.61	32.65	49.04	76.60	68.25
PCB82	5	7.95	9.47	6.34	8.71	9.76	7.09
PCB83	5	4.03	5.31	4.07	6.78	13.94	14.92
PCB84	5	14.41	17.01	12.83	22.08	48.78	56.56
PCB85	5	12.24	14.53	10.35	15.14	21.94	20.50
PCB87/115	5	26.41	30.16	20.30	26.65	33.20	24.76
PCB89	5	ND U	ND U	ND U	ND U	ND U	ND U
PCB91	5	15.26	18.00	15.31	33.61	105.96	123.67
PCB92	5	13.43	16.02	13.16	25.19	67.72	76.99
PCB95	5	53.65	63.13	48.64	89.31	249.43	318.44 Y
PCB97	5	18.34	21.71	14.86	22.27	27.09	20.30
PCB99	5	34.35	41.34	33.01	57.31	115.12	107.89
PCB100	5	1.99	2.39	2.09	5.13	19.05	25.28
PCB101/90	5	58.34	68.26	51.41	83.31	157.41	149.99
PCB105	5	17.50	21.10	12.92	18.01	23.55	18.31
PCB107	5	4.42	5.27	4.10	7.47	20.17	23.19
PCB110	5	92.87	108.77	84.44	152.74	367.95 Y	427.86 Y
PCB114	5	1.04 J	1.31 J	0.84 J	1.31	1.62	1.43
PCB118	5	56.97	66.74	48.11	73.62	140.32	141.57
PCB119	5	2.84	3.53	3.20	7.49	24.45	32.58
PCB124	5	1.09 J	1.48	0.80 J	1.50	1.54	0.93 J
PCB128	6	8.93	9.82	7.83	11.43	22.21	21.02

Client Reporting Sample ID:		SLN-N-1	SLN-N-2	SLN-N-3	SLN-N-4	SLN-N-5	SLN-N-6
PCB129	6	1.98	2.12	1.46	2.08	2.89	2.55
PCB130	6	2.99	3.31	2.77	5.09	12.22	13.82
PCB131	6	ND U	0.71 J	0.48 J	0.69 J	0.95 J	0.75 J
PCB132	6	18.22	20.64	16.30	28.28	55.71	56.64
PCB134	6	2.53	3.23	2.60	5.15	12.89	14.86
PCB135/144	6	8.43	10.34	8.33	17.11	48.01	57.55
PCB136	6	6.24	7.67	5.98	12.21	32.61	38.51
PCB137	6	2.44	2.79	2.01	3.14	5.30	5.00
PCB138/160/163	6	59.43	67.75	50.95	86.50	204.28	214.33
PCB141	6	5.53	6.14	4.25	6.22	9.42	7.67
PCB146	6	8.17	9.39	8.10	16.96	49.83	58.44
PCB149	6	40.09	47.48	38.98	76.97	186.49	198.78
PCB151	6	7.93	9.42	7.97	15.92	46.83	57.10
PCB153	6	39.15	45.14	37.16	68.39	172.78	190.24
PCB156	6	3.76	4.41	3.26	4.71	9.80	8.69
PCB158	6	4.50	5.10	3.58	5.11	9.11	8.44
PCB167	6	2.04	2.69	1.85	3.07	5.80	5.96
PCB169	6	ND U	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	3.92	4.69	3.30	6.28	18.04	19.60
PCB171	7	1.50 J	1.58 J	1.27 J	2.16	6.23	7.20
PCB172	7	0.65 J	0.72 J	0.56 J	1.10 J	2.96	3.70
PCB173	7	ND U	ND U	ND U	ND U	0.29 J	ND U
PCB174	7	4.39	5.00	4.20	6.95	17.35	19.32
PCB175	7	0.27 J	0.19 J	0.13 J	0.28 J	0.81 J	0.96 J
PCB176	7	0.51 J	0.57 J	0.48 J	1.08 J	2.84	3.52
PCB177	7	3.15	3.67	3.43	6.39	19.41	23.50
PCB178	7	1.18 J	1.18 J	1.12 J	2.23	8.02	10.66
PCB180	7	6.47	7.30	5.91	10.18	29.45	34.32
PCB183	7	1.73 J	2.03	1.67	2.87	7.84	9.40
PCB184	7	0.27 J	ND U	0.18 J	0.62 J	0.27 J	0.31 J
PCB185	7	0.24 J	0.29 J	0.25 J	0.48 J	0.83 J	0.94 J
PCB187/182	7	5.01	5.82	5.19	10.23	35.23	43.35
PCB189	7	ND U	ND U	0.15 J	ND U	0.99 J	1.35
PCB191	7	ND U	ND U	ND U	ND U	0.60 J	0.84 J
PCB193	7	0.54 J	0.61 J	0.50 J	0.91 J	2.71	3.36
PCB194	8	0.58 J	0.85 J	0.73 J	1.44 J	3.79	5.65
PCB195	8	ND U	ND U	0.36 J	0.78 J	1.80	2.61
PCB197	8	ND U	ND U	ND U	ND U	0.33 J	0.48 J
PCB198	8	ND U	ND U	ND U	ND U	0.28 J	0.45 J
PCB199	8	1.04 J	1.39 J	1.14 J	1.92	6.53	8.89
PCB200	8	ND U	ND U	ND U	0.32 J	0.74 J	1.13
PCB201	8	ND U	ND U	ND U	0.43 J	1.22	1.60
PCB203/196	8	0.86 J	1.01 J	0.88 J	1.69	5.13	6.77
PCB205	8	0.48 J	ND U	ND U	ND U	0.24 J	0.34 J
PCB206	9	0.49 J	0.47 J	0.45 J	0.76 J	2.43	3.66
PCB207	9	ND U	ND U	ND U	ND U	0.37 J	0.54 J
PCB209	10	ND U	ND U	ND U	0.23 J	0.77 J	1.04 J
Level of Chlorination							
Cl1		6.86	11.84	10.71	35.06	219.71	221.30
Cl2		67.09	94.39	88.44	221.99	1441.53	1526.09
Cl3		201.56	258.74	224.68	501.73	2623.97	3347.52
Cl4		529.34	634.88	487.54	850.44	2398.85	2963.74
Cl5		437.12	515.54	386.79	657.64	1449.00	1592.28
Cl6		222.35	258.14	203.85	369.03	887.12	960.36
Cl7		29.82	33.65	28.34	51.75	153.86	182.33
Cl8		2.96	3.25	3.11	6.57	20.07	27.93
Cl9		0.49	0.47	0.45	0.76	2.81	4.20
Cl10		0.00	0.00	0.00	0.23	0.77	1.04
SUM PCB		1497.59	1810.90	1433.91	2695.21	9197.67	10826.79
Surrogate Recovery (%)							
PCB103		62	71	62	70	104	118
PCB14		48	56	51	58	67	67
PCB34		57	68	60	67	98	101
PCB112		61	70	61	69	77	79

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: N

Client Reporting Sample ID:		SLN-N-7	SLN-N-8	SLN-N-9
Battelle Sample ID:		X4261	X4262	X4263
Extraction Batch ID:		00-037	00-037	00-037
Batch Matrix:		Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667
Sample Moisture Content (%):		51.39	50.44	57.69
Sample Dry Weight (g):		8.53	8.50	7.39
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		30-35	35-40	40-45
PCB	***LOC***			
PCB1	1	696.95	3433.31 D	2221.60 D
PCB3	1	142.69	644.72	769.39 Y
PCB4/10	2	3124.40 D	18829.12 D	16739.42 D
PCB6	2	93.52	395.93	322.71
PCB7/9	2	22.53	78.67	61.72
PCB8/5	2	1004.66 D	4262.64 D	5002.85 D
PCB12/13	2	6.06	46.61	56.47
PCB16/32	3	1270.65 D	3809.66 D	4994.71 D
PCB17	3	484.60 D	774.90 D	1292.75 D
PCB18	3	270.49	625.42 D	812.26 D
PCB19	3	1251.51 D	5489.37 D	5103.75 D
PCB21	3	ND U	ND U	ND U
PCB22	3	8.07	34.64	33.60
PCB24/27	3	521.38 D	1792.80 D	1866.18 D
PCB25	3	48.41	80.56	161.32
PCB26	3	161.11	518.96 Y	405.35 D
PCB28	3	84.11	90.93	103.24
PCB29	3	ND U	ND U	ND U
PCB31	3	232.60	604.79 Y	449.89 D
PCB33/20	3	6.00	14.47	15.84
PCB40	4	8.26	25.21	24.52
PCB41/64/71	4	156.85	396.55 Y	386.15 Y
PCB42	4	27.45	79.64	72.59
PCB43	4	ND U	ND U	ND U
PCB44	4	67.03	160.60	149.92
PCB45	4	29.88	95.33	79.92
PCB46	4	7.68	21.03	19.53
PCB47/75	4	475.71 Y	558.89 D	747.54 D
PCB48	4	ND U	ND U	ND U
PCB49	4	497.25 Y	597.54 D	809.19 D
PCB51	4	404.75 Y	898.76 D	1020.39 D
PCB52	4	561.38 Y	939.27 D	1210.50 D
PCB53	4	562.20 D	1296.34 D	1643.96 D
PCB56/60	4	20.41	50.05	49.86
PCB59	4	12.13	35.53	31.44
PCB63	4	8.08	14.06	13.54
PCB66	4	74.75	116.53	111.63
PCB70/76	4	70.00	105.05	102.59
PCB74	4	40.41	98.26	83.81
PCB82	5	4.58	17.05	14.70
PCB83	5	9.30	20.09	19.14
PCB84	5	45.53	111.99	102.24
PCB85	5	14.49	34.08	32.49
PCB87/115	5	19.00	63.88	57.72
PCB89	5	ND U	ND U	ND U
PCB91	5	85.84	213.43	192.21
PCB92	5	50.08	93.55	91.17
PCB95	5	308.50	602.75 Y	504.78 D
PCB97	5	11.44	36.27	29.97
PCB99	5	58.45	134.53	99.62
PCB100	5	25.75	45.54	56.57
PCB101/90	5	88.63	222.45	180.93
PCB105	5	13.21	41.64	40.61
PCB107	5	15.48	20.69	22.17
PCB110	5	324.60	655.47 Y	378.97 D
PCB114	5	1.05	3.07	2.84
PCB118	5	97.05	191.25	173.35
PCB119	5	22.88	26.54	31.75
PCB124	5	0.68 J	2.34	2.29
PCB128	6	14.44	35.79	30.53

Client Reporting Sample ID:		SLN-N-7	SLN-N-8	SLN-N-9
PCB129	6	1.65	5.15	1.65
PCB130	6	9.16	17.92	17.53
PCB131	6	0.86 J	2.06	1.73
PCB132	6	33.65	86.50	69.09
PCB134	6	10.15	19.91	19.38
PCB135/144	6	39.41	74.58	73.98
PCB136	6	31.12	67.58	64.67
PCB137	6	3.45	8.06	6.73
PCB138/160/163	6	164.31	326.30	333.49 Y
PCB141	6	5.15	15.65	12.92
PCB146	6	38.05	57.06	60.16
PCB149	6	127.56	271.43	231.32
PCB151	6	42.20	78.16	81.20
PCB153	6	125.66	218.49	201.87
PCB156	6	6.33	17.18	14.10
PCB158	6	6.46	18.44	15.62
PCB167	6	3.76	10.00	8.32
PCB169	6	ND U	ND U	ND U
PCB170/190	7	13.32	25.64	25.25
PCB171	7	5.29	9.01	9.17
PCB172	7	2.70	3.94	4.42
PCB173	7	0.32 J	0.47 J	ND U
PCB174	7	13.62	23.99	22.52
PCB175	7	0.67 J	1.13	1.21
PCB176	7	2.67	4.32	4.59
PCB177	7	17.19	27.01	30.09
PCB178	7	9.13	12.90	19.14
PCB180	7	23.32	37.80	38.50
PCB183	7	6.39	11.04	11.19
PCB184	7	0.43 J	0.40 J	0.40 J
PCB185	7	0.60 J	1.16	1.24
PCB187/182	7	31.90	48.67	58.11
PCB189	7	0.93 J	1.28	1.66
PCB191	7	0.52 J	1.02	0.98 J
PCB193	7	2.53	3.69	4.87
PCB194	8	4.35	4.86	6.57
PCB195	8	1.60	2.24	3.17
PCB197	8	0.32 J	0.44 J	0.53 J
PCB198	8	0.29 J	0.47 J	0.51 J
PCB199	8	7.08	8.06	10.77
PCB200	8	0.78 J	1.04	1.28
PCB201	8	1.25	1.69	2.05
PCB203/196	8	4.83	6.00	7.79
PCB205	8	ND U	0.27 J	0.30 J
PCB206	9	2.94	2.84	4.73
PCB207	9	0.44 J	0.45 J	0.69 J
PCB209	10	0.80 J	0.61 J	1.22 J
Level of Chlorination				
Cl1		839.64	4078.03	2990.99
Cl2		4251.16	23612.97	22183.16
Cl3		4338.92	13836.49	15238.89
Cl4		3024.21	5488.66	6557.09
Cl5		1196.56	2536.61	2033.50
Cl6		663.37	1330.27	1244.31
Cl7		131.54	213.47	233.35
Cl8		20.49	25.07	32.97
Cl9		3.38	3.29	5.42
Cl10		0.80	0.61	1.22
SUM PCB		14470.08	51125.46	50520.90
Surrogate Recovery (%)				
PCB103		141 &	163 &	182 &
PCB14		79	76	73
PCB34		112	167 &	145 &
PCB112		91	81	81

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: L

Client Reporting Sample ID:		SLN-L-1	SLN-L-2	SLN-L-3	SLN-L-4	SLN-L-5	SLN-L-6
Battelle Sample ID:		X4198	X4199	X4200	X4201	X4202	X4203
Extraction Batch ID:		00-035	00-035	00-035	00-035	00-036	00-036
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		66.96	63.96	63.11	61.20	59.8	57.1
Sample Dry Weight (g):		5.12	5.49	5.63	7.02	6.16	7.10
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g, dry wt.	ng/g, dry wt.
Depth, cm		0-5	5-10	10-15	15-20	20-25	25-30
PCB	***LOC***						
PCB1	1	6.08	12.87	35.93	99.40	97.46	302.27
PCB3	1	2.82 J	6.76	15.81	72.34	85.20	170.11
PCB4/10	2	56.33	86.62	211.99	639.59 Y	646.84 Y	1931.23 D
PCB6	2	2.25 J	4.03	11.60	46.56	46.74	87.81
PCB7/9	2	0.63 J	1.17 J	3.16	13.02	17.27	30.74
PCB8/5	2	19.38	40.25	132.00	503.89 Y	471.11 Y	1012.70 D
PCB12/13	2	ND U	0.91 J	1.17 J	3.92	3.55	6.68
PCB16/32	3	53.99	83.54	252.53	932.57 D	1024.34 D	1712.73 D
PCB17	3	23.55	37.05	104.22	361.66 D	393.36 D	759.46 D
PCB18	3	12.51	16.85	36.70	182.25	250.45 Y	335.68 Y
PCB19	3	46.51	67.57	165.98	592.76 Y	618.33 D	1169.73 D
PCB21	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB22	3	4.95	5.91	5.97	9.61	3.67	7.36
PCB24/27	3	22.44	34.57	95.63	360.34	335.22 Y	558.61 D
PCB25	3	3.67	5.43	10.56	42.23	39.45	67.46
PCB26	3	8.80	14.16	30.00	109.76	98.97	191.66 Y
PCB28	3	28.87	40.53	52.52	136.86	77.21	82.14
PCB29	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB31	3	19.01	27.80	50.58	194.31	197.43	287.95 Y
PCB33/20	3	5.68	8.01	9.50	13.31	5.32	8.30
PCB40	4	5.99	7.70	6.59	10.23	4.84	8.40
PCB41/64/71	4	49.32	59.73	71.45	172.26	139.66	168.88
PCB42	4	16.66	20.61	22.97	41.34	22.32	20.65
PCB43	4	2.19	3.54	7.19	7.80	ND U	ND U
PCB44	4	39.08	46.93	46.54	72.47	32.61	64.90
PCB45	4	7.37	9.64	12.91	27.73	15.65	28.60
PCB46	4	2.80	3.38	3.55	6.01	3.85	9.35
PCB47/75	4	54.73	74.08	158.75	493.87 Y	411.28 D	587.73 D
PCB48	4	5.66	7.96	ND U	ND U	ND U	ND U
PCB49	4	57.80	76.25	136.71	464.76 Y	440.62 D	634.85 D
PCB51	4	24.59	34.87	93.71	307.61 D	325.79 Y	505.29 D
PCB52	4	70.26	90.22	148.12	470.45 Y	473.32 Y	750.50 D
PCB53	4	35.83	50.91	134.49	481.58 D	529.28 D	868.02 D
PCB56/60	4	30.19	36.65	23.45	31.32	14.21	20.73
PCB59	4	3.61	4.66	5.89	12.46	7.24	13.50
PCB63	4	3.58	4.84	7.35	16.00	7.07	8.43
PCB66	4	60.85	74.05	63.56	114.94	64.30	69.34
PCB70/76	4	42.21	55.98	49.77	88.50	63.57	90.47
PCB74	4	36.71	46.87	47.38	93.15	50.23	26.73
PCB82	5	7.46	8.73	6.00	8.44	3.96	3.32
PCB83	5	4.36	5.60	7.15	15.04	7.72	8.79
PCB84	5	14.95	18.49	23.09	57.06	44.08	47.51
PCB85	5	11.67	14.44	12.58	24.39	6.42	4.74
PCB87/115	5	22.05	27.38	16.48	26.49	13.01	16.01
PCB89	5	ND U	ND U	ND U	ND U	ND U	ND U
PCB91	5	17.48	23.53	47.50	143.15	99.90	84.31
PCB92	5	14.38	18.93	30.48	74.72	41.51	56.83
PCB95	5	56.03	70.35	109.51	309.35 Y	271.03 Y	413.71 Y
PCB97	5	17.47	21.58	18.60	27.23	10.99	7.73
PCB99	5	37.10	47.56	67.14	141.17	68.85	38.21
PCB100	5	2.65	3.40	8.10	28.31	26.21	40.63
PCB101/90	5	58.12	72.81	84.18	176.29	101.97	67.45
PCB105	5	14.59	18.97	11.75	19.26	12.56	14.13
PCB107	5	4.77	6.72	9.14	24.56	14.51	19.51
PCB110	5	96.20	123.26	179.18	334.83 D	275.86 Y	339.51 Y
PCB114	5	1.11 J	1.24 J	1.06 J	2.01	ND U	ND U
PCB118	5	55.66	71.10	70.97	156.06	107.50	86.62
PCB119	5	3.69	5.29	11.60	35.29	24.14	30.39
PCB124	5	1.46 J	1.35 J	0.85 J	1.01 J	0.62 J	0.58 J
PCB128	6	9.08	11.76	11.67	23.08	14.79	12.70

Client Reporting Sample ID:		SLN-L-1	SLN-L-2	SLN-L-3	SLN-L-4	SLN-L-5	SLN-L-6
PCB129	6	1.89	2.15	1.52	2.73	1.54	1.44
PCB130	6	3.08	4.46	5.75	14.91	10.71	10.21
PCB131	6	0.48 J	0.59 J	ND U	ND U	0.67 J	0.44 J
PCB132	6	18.01	23.21	27.60	60.79	30.18	25.57
PCB134	6	3.09	3.52	5.84	15.28	10.48	10.83
PCB135/144	6	9.58	12.67	22.14	63.63	43.52	41.64
PCB136	6	7.21	8.97	15.00	43.12	33.76	32.85
PCB137	6	2.25	2.95	2.85	5.99	3.34	2.76
PCB138/160/163	6	59.50	77.11	93.63	231.91	149.91	176.13
PCB141	6	5.30	6.15	4.86	8.94	4.72	4.04
PCB146	6	9.69	13.11	23.37	68.27	40.24	40.48
PCB149	6	43.71	58.21	95.90	237.02 Y	129.09	97.77
PCB151	6	9.20	12.14	21.05	61.52	43.43	50.71
PCB153	6	41.80	55.63	84.91	218.31	142.13	116.92
PCB156	6	3.90	5.27	4.70	11.10	7.22	6.60
PCB158	6	4.34	5.20	4.78	9.69	5.73	4.88
PCB167	6	2.18	2.77	2.94	6.96	4.40	3.92
PCB169	6	ND U	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	4.94	6.65	8.69	23.16	16.71	17.93
PCB171	7	1.53 J	2.10	3.25	8.20	5.77	5.68
PCB172	7	0.72 J	1.08 J	1.48	4.20	2.97	3.18
PCB173	7	ND U	ND U	ND U	ND U	ND U	ND U
PCB174	7	4.56	6.09	8.44	20.66	13.61	13.32
PCB175	7	0.20 J	0.26 J	0.35 J	1.02 J	0.78 J	0.77 J
PCB176	7	0.60 J	0.85 J	1.47 J	3.83	2.83	2.87
PCB177	7	4.15	5.28	9.44	27.42	20.22	21.13
PCB178	7	1.36 J	1.77	3.68	11.63	10.29	15.00
PCB180	7	7.28	9.89	13.86	37.96	27.65	28.53
PCB183	7	2.02	2.52	3.72	9.74	7.45	7.28
PCB184	7	0.33 J	0.28 J	0.36 J	0.42 J	0.43 J	0.39 J
PCB185	7	0.41 J	0.34 J	0.42 J	1.03 J	0.73 J	0.71 J
PCB187/182	7	6.22	8.19	16.09	46.28	35.39	38.70
PCB189	7	ND U	0.34 J	0.32 J	1.52	1.10 J	1.30
PCB191	7	ND U	0.22 J	0.29 J	0.92 J	0.62 J	0.65 J
PCB193	7	0.68 J	0.78 J	1.44 J	4.24	2.96	3.59
PCB194	8	1.46 J	1.66 J	2.61	7.54	6.02	7.47
PCB195	8	0.76 J	0.48 J	1.38 J	2.87	2.50	3.02
PCB197	8	ND U	ND U	ND U	0.45 J	0.45 J	0.52 J
PCB198	8	ND U	ND U	ND U	0.56 J	0.48 J	0.48 J
PCB199	8	1.61 J	1.89	3.35	10.64	8.29	10.53
PCB200	8	ND U	0.21 J	0.48 J	1.15 J	1.06 J	1.14
PCB201	8	ND U	0.40 J	0.61 J	1.70	1.43	1.88
PCB203/196	8	1.45 J	1.73 J	2.94	8.18	6.39	7.75
PCB205	8	ND U	ND U	ND U	0.31 J	0.36 J	0.36 J
PCB206	9	0.74 J	0.95 J	1.64 J	4.89	4.39	5.93
PCB207	9	ND U	0.15 J	ND U	0.62 J	0.58 J	0.79 J
PCB209	10	ND U	0.30 J	0.65 J	1.47	1.10 J	1.56
Level of Chlorination							
Cl1		8.90	19.63	51.74	171.74	182.66	472.38
Cl2		78.59	132.98	359.92	1206.98	1185.51	3069.16
Cl3		229.97	341.42	814.19	2935.67	3043.77	5181.08
Cl4		549.42	708.87	1040.39	2912.48	2605.84	3876.37
Cl5		441.19	560.73	715.36	1604.68	1130.84	1279.97
Cl6		234.28	305.85	428.50	1083.25	675.85	639.90
Cl7		34.99	46.66	73.30	202.25	149.49	161.05
Cl8		5.28	6.36	11.37	33.39	26.98	33.15
Cl9		0.74	1.09	1.64	5.50	4.96	6.72
Cl10		0.00	0.30	0.65	1.47	1.10	1.56
SUM PCB		1583.36	2123.89	3497.06	10157.41	9007.01	14721.35
Surrogate Recovery (%)							
PCB103		68	66	71	118	104	152 &
PCB14		59	59	56	69	57	66
PCB34		65	66	68	97	71	92
PCB112		68	67	65	83	68	77

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: L

Client Reporting Sample ID:		SLN-L-7	SLN-L-8	SLN-L-9	SLN-L-10	SLN-L-11	SLN-L-12
Battelle Sample ID:		X4204	X4205	X4206	X4207	X4208	X4209
Extraction Batch ID:		00-036	00-036	00-036	00-036	00-036	00-036
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		57.0	55.4	53.6	54.4	54.7	53.9
Sample Dry Weight (g):		7.26	5.97	7.53	7.74	6.92	7.16
Reporting Units:		ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.
Depth, cm		30-35	35-40	40-45	45-50	50-55	55-60
PCB	***LOC***						
PCB1	1	2553.85 D	2331.52 D	981.64 D	1088.85 D	753.71 Y	218.07
PCB3	1	573.73 Y	820.45 Y	478.78 Y	630.61 Y	711.25 Y	105.35
PCB4/10	2	11460.40 D	15691.44 D	8126.27 D	9252.85 D	8045.25 D	1486.80 D
PCB6	2	240.55	304.97	184.32	208.72	187.56	55.47
PCB7/9	2	75.31	103.08	55.95	65.40	53.03	13.07
PCB8/5	2	2431.65 D	3395.99 D	2449.06 D	3003.06 D	3267.66 D	454.56 Y
PCB12/13	2	18.81	23.25	17.51	23.35	23.39	3.62
PCB16/32	3	2425.51 D	4488.65 D	3179.55 D	3849.64 D	3875.05 D	675.03 D
PCB17	3	1254.52 D	1492.97 D	1033.26 D	1343.12 D	1527.95 D	268.50 Y
PCB18	3	437.58 D	758.83 D	488.79 D	581.45 D	531.37 D	100.77
PCB19	3	4618.31 D	5512.78 D	2887.06 D	3394.75 D	3189.85 D	576.64 D
PCB21	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB22	3	3.67	4.30	5.01	6.62	8.21	12.75
PCB24/27	3	1420.84 D	1913.06 D	1046.91 D	1227.21 D	1275.74 D	215.48
PCB25	3	72.14	92.15	92.44	124.83	155.60	61.62
PCB26	3	354.26 D	436.54 D	279.17 D	360.01 D	359.32 D	100.62
PCB28	3	28.12	26.94	28.84	39.05	46.09	101.67
PCB29	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB31	3	312.38 D	444.67 D	313.77 D	397.89 D	410.20 D	108.87
PCB33/20	3	4.02	3.71	1.84	2.56	4.14	19.49
PCB40	4	3.13	3.88	4.88	6.04	8.34	13.24
PCB41/64/71	4	266.61 Y	323.67 Y	228.93 Y	277.09 Y	268.76 Y	112.58
PCB42	4	14.98	21.11	19.03	24.89	23.56	44.32
PCB43	4	ND U	ND U	ND U	ND U	ND U	ND U
PCB44	4	22.82	25.89	29.74	37.01	55.77	92.15
PCB45	4	43.84	48.94	33.54	39.39	44.17	21.24
PCB46	4	7.50	8.00	6.55	7.73	11.00	7.42
PCB47/75	4	872.10 D	976.33 D	623.41 D	798.17 D	872.57 D	281.09 Y
PCB48	4	ND U	ND U	ND U	ND U	ND U	ND U
PCB49	4	835.37 D	1077.56 D	710.71 D	873.88 D	918.34 D	277.24 Y
PCB51	4	1256.44 D	1503.82 D	822.37 D	991.33 D	994.61 D	205.08
PCB52	4	1113.66 D	1458.89 D	918.96 D	1116.53 D	1178.61 D	312.24 Y
PCB53	4	1406.64 D	2051.58 D	1221.38 D	1428.84 D	1474.67 D	272.70 Y
PCB56/60	4	5.87	5.96	6.32	7.85	9.11	25.08
PCB59	4	13.19	18.73	13.57	15.83	19.88	9.68
PCB63	4	3.50	4.86	4.16	5.06	5.82	5.24
PCB66	4	28.80	32.05	28.97	32.59	37.35	83.54
PCB70/76	4	43.59	39.25	33.66	35.54	46.96	53.65
PCB74	4	18.95	26.91	19.35	25.25	19.85	54.92
PCB82	5	2.05	2.50	2.21	3.14	2.75	6.34
PCB83	5	6.31	8.75	7.29	9.20	9.88	6.66
PCB84	5	55.62	72.05	51.90	62.28	64.51	38.80
PCB85	5	18.02	22.14	14.31	16.66	16.55	14.38
PCB87/115	5	7.75	9.14	9.46	12.74	14.58	17.06
PCB89	5	ND U	ND U	ND U	ND U	ND U	ND U
PCB91	5	143.64 Y	183.96 Y	112.31	137.92 Y	128.47	71.50
PCB92	5	42.98	58.10	45.33	54.35	64.40	28.83
PCB95	5	556.07 D	669.25 D	433.11 D	522.36 D	576.27 D	177.36
PCB97	5	4.25	5.49	4.29	6.14	5.00	23.85
PCB99	5	30.38	42.97	25.21	34.62	25.21	79.33
PCB100	5	84.12	94.80	54.88	62.28	67.46	16.49
PCB101/90	5	70.35	102.15	60.77	79.12	63.64	104.35
PCB105	5	7.57	8.85	9.06	11.39	11.87	16.47
PCB107	5	14.56	16.89	12.78	14.55	17.06	8.77
PCB110	5	331.40 D	393.95 D	349.55 Y	341.05 D	367.46 D	238.65
PCB114	5	ND U	ND U	ND U	ND U	ND U	0.96 J
PCB118	5	72.74	93.07	66.45	79.80	74.91	101.15
PCB119	5	30.88	36.92	26.46	31.79	34.24	16.27
PCB124	5	0.27 J	0.24 J	0.33 J	0.42 J	0.25 J	1.07 J
PCB128	6	10.18	13.06	10.03	13.14	11.73	16.00

Client Reporting Sample ID:		SLN-L-7	SLN-L-8	SLN-L-9	SLN-L-10	SLN-L-11	SLN-L-12
PCB129	6	0.95 J	1.12 J	0.95 J	1.29	1.17	1.74
PCB130	6	11.77	14.75	10.23	12.70	12.26	7.20
PCB131	6	0.44 J	0.52 J	0.40 J	0.41 J	0.54 J	0.74 J
PCB132	6	21.42	29.06	19.06	28.75	23.74	28.15
PCB134	6	14.85	18.62	12.29	14.91	14.99	5.96
PCB135/144	6	57.93	75.08	47.37	58.14	56.59	25.62
PCB136	6	56.69	71.08	43.63	51.93	50.09	23.54
PCB137	6	2.09	2.58	1.91	2.49	2.26	3.19
PCB138/160/163	6	244.26 Y	299.49 Y	192.70 Y	228.09 Y	234.67 Y	108.10
PCB141	6	2.68	3.31	2.64	3.54	3.08	5.26
PCB146	6	48.77	66.46	39.86	49.49	46.17	23.98
PCB149	6	112.97	154.55	88.81	122.63	98.05	124.01
PCB151	6	69.84	87.15	57.43	66.63	71.96	22.91
PCB153	6	134.90	179.78	106.18	133.22	114.21	108.40
PCB156	6	5.56	7.21	5.38	6.97	6.30	6.53
PCB158	6	4.32	5.71	4.23	5.53	5.11	5.54
PCB167	6	3.86	5.01	3.48	4.38	3.99	3.88
PCB169	6	ND U	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	21.89	27.01	17.46	21.59	19.28	12.03
PCB171	7	7.32	9.15	5.65	7.22	6.80	3.90
PCB172	7	4.14	5.19	3.24	3.99	3.81	1.88
PCB173	7	0.27 J	0.34 J	0.25 J	0.27 J	0.32 J	0.31 J
PCB174	7	14.02	18.74	11.09	14.27	13.18	9.35
PCB175	7	1.01 J	1.24 J	0.84 J	1.05	1.00 J	0.50 J
PCB176	7	3.96	5.02	2.98	3.76	3.44	1.95
PCB177	7	31.92	38.92	23.38	28.49	27.56	11.79
PCB178	7	28.18	31.97	19.52	22.00	24.16	5.78
PCB180	7	34.32	42.56	27.47	33.19	31.98	17.42
PCB183	7	9.14	11.74	7.37	9.13	8.46	4.93
PCB184	7	0.41 J	0.50 J	0.32 J	0.37 J	0.39 J	0.34 J
PCB185	7	0.75 J	0.94 J	0.65 J	0.77 J	0.71 J	0.53 J
PCB187/182	7	60.72	76.54	44.41	54.64	52.46	23.55
PCB189	7	1.86	2.21	1.41	1.68	1.69	0.66 J
PCB191	7	0.87 J	1.05 J	0.73 J	0.85 J	0.80 J	0.37 J
PCB193	7	5.49	6.55	3.89	4.62	4.55	1.66
PCB194	8	12.57	14.41	8.65	9.80	10.28	3.24
PCB195	8	4.67	5.42	3.24	3.78	3.94	1.33
PCB197	8	0.85 J	1.00 J	0.61 J	0.68 J	0.68 J	ND U
PCB198	8	0.73 J	0.85 J	0.64 J	0.60 J	0.55 J	0.25 J
PCB199	8	17.59	20.55	11.99	13.81	14.45	4.75
PCB200	8	1.81	2.11	1.27	1.45	1.48	0.55 J
PCB201	8	3.12	3.68	2.13	2.49	2.61	0.92 J
PCB203/196	8	12.22	14.20	8.56	9.96	10.16	3.48
PCB205	8	0.64 J	0.76 J	0.44 J	0.53 J	0.58 J	ND U
PCB206	9	10.13	11.35	6.81	7.62	8.39	2.48
PCB207	9	1.37	1.57	0.96	1.01	1.08	0.37 J
PCB209	10	2.55	2.90	1.77	1.92	2.12	0.67 J
Level of Chlorination							
Cl1		3127.59	3151.97	1460.42	1719.46	1464.97	323.42
Cl2		14226.72	19518.73	10833.11	12553.37	11576.88	2013.53
Cl3		10931.34	15174.61	9356.64	11327.13	11383.52	2241.44
Cl4		5957.00	7627.44	4725.52	5723.00	5989.38	1871.42
Cl5		1478.95	1821.24	1285.69	1479.81	1544.52	968.28
Cl6		803.46	1034.54	646.56	804.25	756.91	520.74
Cl7		226.27	279.68	170.66	207.89	200.59	96.95
Cl8		54.19	62.98	37.54	43.09	44.74	14.52
Cl9		11.50	12.92	7.76	8.63	9.47	2.86
Cl10		2.55	2.90	1.77	1.92	2.12	0.67
SUM PCB		36819.57	48687.01	28525.69	33868.56	32973.10	8053.82
Surrogate Recovery (%)							
PCB103		218 &	219 &	181 &	204 &	204 &	98
PCB14		67	68	63	73	67	69
PCB34		105	109	95	109	105	91
PCB112		73	74	70	79	74	76

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: L

Client Reporting Sample ID:		SLN-L-13	SLN-L-14	SLN-L-15	SLN-L-16	SLN-L-17
Battelle Sample ID:		X4210	X4211	X4213	X4214	X4215
Extraction Batch ID:		00-036	00-036	00-036	00-036	00-036
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		52.4	41.1	24.7	22.5	21.2
Sample Dry Weight (g):		8.39	8.62	12.33	12.88	12.95
Reporting Units:		ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.	ng/g, dry wt.
Depth, cm		60-65	65-70	70-75	75-80	80-85
PCB	***LOC***					
PCB1	1	81.95	99.19	26.43	5.51	1.46 J
PCB3	1	59.19	105.20	24.04	0.69 J	0.50 J
PCB4/10	2	496.64 Y	515.70 Y	134.87	31.40	9.42
PCB6	2	62.19	66.55	8.36	0.47 J	0.27 J
PCB7/9	2	16.91	19.67	1.60	ND U	0.05 J
PCB8/5	2	267.86 Y	321.07 Y	62.13	3.80	2.62
PCB12/13	2	3.80	3.57	0.73	ND U	ND U
PCB16/32	3	406.20	457.59	96.29	5.39	4.02
PCB17	3	206.70 Y	261.54 Y	59.67	2.73	1.72
PCB18	3	122.86	169.70	16.37	1.59	0.86
PCB19	3	276.38 Y	275.27 Y	58.68	6.87	3.74
PCB21	3	ND U	ND U	ND U	ND U	ND U
PCB22	3	11.16	4.25	0.56 J	0.04 J	ND U
PCB24/27	3	129.91	120.53	22.77	1.72	1.36
PCB25	3	101.96	83.19	5.04	0.25 J	0.17 J
PCB26	3	141.76	143.99	13.25	0.68	0.51 J
PCB28	3	68.95	17.39	2.85	0.26 J	0.23 J
PCB29	3	ND U	ND U	ND U	ND U	ND U
PCB31	3	117.83	123.00	13.66	0.71 J	0.60 J
PCB33/20	3	15.20	2.13	0.28 J	ND U	ND U
PCB40	4	12.31	4.62	0.54 J	ND U	ND U
PCB41/64/71	4	117.67	113.14	16.31	0.71 J	0.60 J
PCB42	4	43.47	21.68	1.96	0.16 J	0.12 J
PCB43	4	ND U	ND U	ND U	ND U	ND U
PCB44	4	90.65	30.66	2.78	0.29 J	0.19 J
PCB45	4	18.24	10.50	1.50	0.15 J	0.13 J
PCB46	4	7.07	3.46	0.60 J	ND U	ND U
PCB47/75	4	254.74 Y	252.07 Y	43.03	1.77	1.50
PCB48	4	ND U	ND U	ND U	ND U	ND U
PCB49	4	308.83 Y	316.31 Y	36.86	1.97	1.73
PCB51	4	154.95 Y	155.18 Y	32.03	1.68	1.40
PCB52	4	348.24 Y	353.74 Y	41.76	2.43	2.14
PCB53	4	211.87 Y	231.31 Y	43.53	2.44	2.02
PCB56/60	4	10.61	2.47	0.53 J	0.07 J	0.08 J
PCB59	4	9.15	4.78	0.63 J	0.06 J	0.07 J
PCB63	4	3.44	1.11	0.20 J	0.09 J	0.07 J
PCB66	4	35.20	8.36	1.05	0.23 J	0.23 J
PCB70/76	4	23.79	6.99	1.05	0.16 J	0.15 J
PCB74	4	32.00	13.00	1.54	0.13 J	0.10 J
PCB82	5	4.25	1.65	0.27 J	ND U	ND U
PCB83	5	5.74	2.87	0.46 J	ND U	ND U
PCB84	5	38.41	27.46	3.61	0.25 J	0.21 J
PCB85	5	10.26	4.99	0.58 J	ND U	ND U
PCB87/115	5	10.74	4.33	0.63 J	ND U	ND U
PCB89	5	ND U	ND U	ND U	ND U	ND U
PCB91	5	67.20	59.52	9.04	0.43 J	0.39 J
PCB92	5	23.52	11.15	1.22	0.15 J	0.15 J
PCB95	5	161.92	133.97	21.28	1.21	1.09
PCB97	5	15.51	5.20	0.59 J	ND U	ND U
PCB99	5	57.24	26.58	2.55	0.25 J	0.17 J
PCB100	5	14.42	14.01	2.58	0.14 J	ND U
PCB101/90	5	69.86	32.17	3.50	0.34 J	0.30 J
PCB105	5	9.96	3.72	0.45 J	ND U	ND U
PCB107	5	6.20	2.86	0.22 J	ND U	ND U
PCB110	5	227.42 Y	161.36	18.42	1.20	0.99
PCB114	5	ND U	ND U	ND U	ND U	ND U
PCB118	5	72.14	31.19	2.57	0.21 J	0.20 J
PCB119	5	15.70	9.56	1.20	ND U	ND U
PCB124	5	0.69 J	0.18 J	ND U	ND U	ND U
PCB128	6	14.03	7.41	0.69 J	ND U	ND U

Client Reporting Sample ID:		SLN-L-13	SLN-L-14	SLN-L-15	SLN-L-16	SLN-L-17
PCB129	6	1.43	0.69 J	ND U	ND U	ND U
PCB130	6	6.64	4.15	0.38 J	ND U	ND U
PCB131	6	0.71 J	0.35 J	ND U	ND U	ND U
PCB132	6	27.57	18.20	1.95	0.15 J	0.14 J
PCB134	6	5.08	3.16	0.40 J	ND U	ND U
PCB135/144	6	23.17	15.23	1.84	0.15 J	0.14 J
PCB136	6	21.80	18.06	2.68	0.16 J	0.15 J
PCB137	6	2.61	1.32	0.15 J	ND U	ND U
PCB138/160/163	6	89.94	55.35	6.71	0.52 J	0.48 J
PCB141	6	3.98	1.75	0.23 J	ND U	ND U
PCB146	6	19.47	12.32	1.26	0.11 J	0.12 J
PCB149	6	121.45	96.86	12.38	0.59 J	0.55 J
PCB151	6	19.63	11.70	1.41	0.14 J	0.14 J
PCB153	6	93.48	59.68	5.43	0.44 J	0.39 J
PCB156	6	5.78	3.23	0.24 J	ND U	ND U
PCB158	6	5.10	3.07	0.30 J	ND U	ND U
PCB167	6	3.53	2.00	0.15 J	ND U	ND U
PCB169	6	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	11.00	6.97	0.68 J	ND U	ND U
PCB171	7	3.99	3.07	0.35 J	ND U	ND U
PCB172	7	1.81	1.31	0.13 J	ND U	ND U
PCB173	7	ND U	ND U	ND U	ND U	ND U
PCB174	7	8.67	5.50	0.53 J	ND U	ND U
PCB175	7	0.54 J	0.40 J	ND U	ND U	ND U
PCB176	7	1.88	1.58	0.24 J	ND U	ND U
PCB177	7	11.20	8.87	1.08	0.08 J	ND U
PCB178	7	5.04	3.93	0.63 J	ND U	ND U
PCB180	7	16.66	11.41	1.03	0.09 J	0.09 J
PCB183	7	5.13	3.81	0.41 J	ND U	ND U
PCB184	7	0.27 J	0.24 J	0.15 J	0.13 J	0.13 J
PCB185	7	0.47 J	0.30 J	ND U	ND U	ND U
PCB187/182	7	21.85	17.68	2.40	0.16 J	0.14 J
PCB189	7	0.68 J	0.49 J	0.04 J	ND U	ND U
PCB191	7	0.34 J	0.24 J	ND U	ND U	ND U
PCB193	7	1.45	1.02	0.14 J	ND U	ND U
PCB194	8	3.17	2.79	0.32 J	ND U	ND U
PCB195	8	1.41	1.10	0.13 J	ND U	ND U
PCB197	8	0.26 J	0.24 J	ND U	ND U	ND U
PCB198	8	0.20 J	0.21 J	ND U	ND U	ND U
PCB199	8	4.34	3.43	0.44 J	ND U	ND U
PCB200	8	0.50 J	0.49 J	0.06 J	ND U	ND U
PCB201	8	0.85 J	0.72 J	ND U	ND U	ND U
PCB203/196	8	3.40	2.76	0.31 J	ND U	ND U
PCB205	8	0.21 J	0.16 J	ND U	ND U	ND U
PCB206	9	2.29	1.90	0.27 J	ND U	ND U
PCB207	9	0.30 J	0.27 J	ND U	ND U	ND U
PCB209	10	0.62 J	0.65 J	0.07 J	ND U	ND U
Level of Chlorination						
Cl1		141.14	204.39	50.47	6.21	1.96
Cl2		847.40	926.56	207.70	35.67	12.37
Cl3		1598.91	1658.58	289.43	20.24	13.21
Cl4		1682.24	1529.38	225.91	12.35	10.53
Cl5		811.18	532.77	69.20	4.18	3.50
Cl6		465.42	314.53	36.19	2.27	2.13
Cl7		90.99	66.84	7.80	0.46	0.37
Cl8		14.35	11.90	1.25	0.00	0.00
Cl9		2.59	2.17	0.27	0.00	0.00
Cl10		0.62	0.65	0.07	0.00	0.00
SUM PCB		5654.84	5247.76	888.27	81.37	44.07
Surrogate Recovery (%)						
PCB103		100	88	75	71	71
PCB14		68	64	67	62	68
PCB34		86	73	71	69	71
PCB112		74	61	68	70	72

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: J

Client Reporting Sample ID:		SLN-J-1	SLN-J-2	SLN-J-3	SLN-J-4	SLN-J-5
Battelle Sample ID:		X4216	X4217	X4218	X4219	X4220
Extraction Batch ID:		00-035	00-035	00-035	00-035	00-036
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		72.39	69.06	68.26	66.67	65.6
Sample Dry Weight (g):		4.51	4.62	5.02	5.22	5.34
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g, dry wt.
Depth, cm		0-6	6-11	11-16	16-21	21-27
PCB	***LOC***					
PCB1	1	5.82	4.35 J	5.16	5.34	7.95
PCB3	1	3.24 J	2.28 J	2.39 J	2.88 J	3.69 J
PCB4/10	2	52.53	39.23	49.13	44.52	50.14
PCB6	2	1.92 J	1.53 J	1.87 J	1.93 J	2.55 J
PCB7/9	2	0.57 J	0.48 J	0.56 J	0.59 J	0.75 J
PCB8/5	2	17.21	13.54	16.92	16.86	22.50
PCB12/13	2	ND U	ND U	ND U	ND U	0.56 J
PCB16/32	3	47.09	37.50	47.08	46.46	51.71
PCB17	3	20.89	16.69	20.24	20.53	23.49
PCB18	3	11.64	8.67	10.88	10.87	10.87
PCB19	3	44.65	32.68	41.18	39.16	39.63
PCB21	3	ND U	ND U	ND U	ND U	ND U
PCB22	3	4.30	3.05	4.09	3.79	3.41
PCB24/27	3	20.53	15.72	19.68	19.08	19.55
PCB25	3	2.90	2.27	2.81	3.37	3.43
PCB26	3	8.83	6.45	8.06	7.85	8.23
PCB28	3	27.53	20.20	25.03	26.57	27.37
PCB29	3	ND U	ND U	ND U	ND U	ND U
PCB31	3	17.40	13.01	15.73	15.89	15.69
PCB33/20	3	4.41	3.78	4.63	4.63	6.80
PCB40	4	5.70	4.12	5.36	5.72	4.78
PCB41/64/71	4	45.78	33.25	42.81	42.91	35.43
PCB42	4	14.47	11.77	15.11	14.41	13.37
PCB43	4	2.88	1.79 J	2.16	2.12	ND U
PCB44	4	35.67	26.39	34.79	34.28	29.07
PCB45	4	6.81	4.96	6.43	6.55	5.97
PCB46	4	2.56	1.89	2.46	2.48	1.98
PCB47/75	4	48.25	37.94	47.68	46.72	48.58
PCB48	4	8.11	5.69	6.85	7.32	5.23
PCB49	4	53.30	41.36	51.09	52.03	54.62
PCB51	4	23.25	17.43	21.38	21.27	21.74
PCB52	4	66.36	49.85	62.54	62.28	59.69
PCB53	4	34.08	25.95	31.76	32.19	31.72
PCB56/60	4	29.02	19.82	25.93	26.02	20.77
PCB59	4	3.27	2.41	3.30	3.19	2.69
PCB63	4	3.14	2.38	2.99	2.81	3.10
PCB66	4	54.58	41.78	52.78	52.34	47.71
PCB70/76	4	37.74	27.73	36.67	36.61	33.04
PCB74	4	33.81	25.13	32.10	32.36	27.76
PCB82	5	6.89	4.82	6.19	6.16	4.85
PCB83	5	4.08	3.18	4.09	3.76	3.39
PCB84	5	13.49	10.15	13.28	13.31	11.88
PCB85	5	10.76	7.72	10.16	9.99	8.76
PCB87/115	5	21.47	14.72	18.62	18.75	14.25
PCB89	5	ND U	ND U	ND U	ND U	ND U
PCB91	5	16.17	12.60	15.52	16.17	16.10
PCB92	5	12.68	9.68	12.65	12.42	11.89
PCB95	5	52.35	39.52	50.23	50.62	44.86
PCB97	5	16.13	11.97	15.52	15.89	13.38
PCB99	5	32.42	24.86	32.10	32.88	32.17
PCB100	5	2.56	2.04	2.30	2.39	2.52
PCB101/90	5	52.74	39.65	51.49	52.41	49.27
PCB105	5	13.25	9.22	11.66	11.05	11.61
PCB107	5	4.28	3.34	4.01	4.24	3.99
PCB110	5	87.81	67.59	84.90	86.09	77.71
PCB114	5	ND U	ND U	ND U	0.81 J	0.68 J
PCB118	5	50.61	38.09	48.34	48.36	46.98
PCB119	5	3.34	2.68	3.14	3.43	3.86
PCB124	5	1.22 J	0.77 J	1.00 J	0.98 J	0.88 J
PCB128	6	8.56	6.31	7.85	7.61	7.96

Client Reporting Sample ID:		SLN-J-1	SLN-J-2	SLN-J-3	SLN-J-4	SLN-J-5
PCB129	6	1.72 J	1.10 J	1.53 J	1.48 J	1.14 J
PCB130	6	2.99	2.27	2.98	2.97	2.91
PCB131	6	ND U	ND U	ND U	ND U	0.53 J
PCB132	6	15.73	12.30	16.02	16.30	13.21
PCB134	6	2.56	1.91	2.64	2.68	2.54
PCB135/144	6	8.43	6.39	8.19	8.07	8.25
PCB136	6	6.36	4.94	6.19	6.22	6.13
PCB137	6	2.21 J	1.61 J	2.09	1.99	1.68 J
PCB138/160/163	6	54.67	41.22	51.61	50.85	47.89
PCB141	6	4.44	3.34	4.32	4.29	3.31
PCB146	6	8.28	6.31	8.10	8.25	8.38
PCB149	6	38.79	29.97	38.53	38.91	37.78
PCB151	6	7.85	5.87	7.92	7.79	7.65
PCB153	6	36.42	28.16	36.65	36.31	38.18
PCB156	6	3.67	2.54	3.38	3.01	3.24
PCB158	6	4.14	2.88	3.76	3.69	3.06
PCB167	6	2.15 J	1.41 J	1.74 J	1.85 J	1.76 J
PCB169	6	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	4.19	3.04	3.62	3.57	4.56
PCB171	7	1.48 J	1.22 J	1.38 J	1.38 J	1.48 J
PCB172	7	0.61 J	0.47 J	0.59 J	0.55 J	0.68 J
PCB173	7	ND U	ND U	ND U	ND U	ND U
PCB174	7	4.03	3.29	4.04	3.97	4.02
PCB175	7	ND U	0.12 J	ND U	ND U	0.18 J
PCB176	7	0.50 J	0.39 J	0.48 J	0.47 J	0.59 J
PCB177	7	3.55	2.88	3.33	3.26	3.70
PCB178	7	1.43 J	1.12 J	1.13 J	1.32 J	1.28 J
PCB180	7	6.41	4.90	6.11	6.05	6.80
PCB183	7	1.75 J	1.34 J	1.80 J	1.58 J	1.89
PCB184	7	0.32 J	0.27 J	ND U	0.28 J	0.43 J
PCB185	7	0.25 J	0.17 J	ND U	0.31 J	0.33 J
PCB187/182	7	5.84	4.59	5.63	5.25	6.38
PCB189	7	ND U	ND U	ND U	ND U	0.21 J
PCB191	7	ND U	ND U	ND U	ND U	ND U
PCB193	7	0.58 J	0.36 J	0.51 J	0.50 J	0.46 J
PCB194	8	0.97 J	0.76 J	1.04 J	1.06 J	1.07 J
PCB195	8	ND U	ND U	ND U	ND U	0.44 J
PCB197	8	ND U	ND U	ND U	ND U	ND U
PCB198	8	ND U	ND U	ND U	ND U	ND U
PCB199	8	1.43 J	1.25 J	1.30 J	1.27 J	1.31 J
PCB200	8	ND U	ND U	ND U	ND U	ND U
PCB201	8	ND U	ND U	ND U	ND U	0.24 J
PCB203/196	8	1.26 J	0.90 J	0.99 J	1.05 J	1.14 J
PCB205	8	ND U	ND U	ND U	ND U	ND U
PCB206	9	0.74 J	0.53 J	0.61 J	0.51 J	0.73 J
PCB207	9	ND U	ND U	ND U	ND U	ND U
PCB209	10	ND U	0.14 J	ND U	ND U	0.25 J
Level of Chlorination						
Cl1		9.05	6.63	7.55	8.23	11.63
Cl2		72.24	54.78	68.47	63.91	76.50
Cl3		210.17	160.02	199.41	198.20	210.18
Cl4		508.79	381.63	484.21	483.60	447.26
Cl5		402.25	302.60	385.20	389.73	359.00
Cl6		208.97	158.52	203.47	202.28	195.60
Cl7		30.95	24.19	28.61	28.49	32.99
Cl8		3.66	2.91	3.33	3.38	4.19
Cl9		0.74	0.53	0.61	0.51	0.73
Cl10		0.00	0.14	0.00	0.00	0.25
SUM PCB		1446.81	1091.94	1380.86	1378.32	1338.34
Surrogate Recovery (%)						
PCB103		67	62	59	72	64
PCB14		56	52	49	57	57
PCB34		64	59	56	67	63
PCB112		67	63	59	70	61

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: I

Client Reporting Sample ID:		SLN-I-1	SLN-I-2	SLN-I-3	SLN-I-4	SLN-I-5	SLN-I-6
Battelle Sample ID:		X4231	X4232	X4233	X4234	X4235	X4236
Extraction Batch ID:		00-035	00-035	00-035	00-035	00-037	00-037
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		70.60	67.29	67.29	65.43	63.84	63.94
Sample Dry Weight (g):		4.41	5.82	5.28	5.17	5.72	5.50
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		0-10	10-15	15-20	20-25	25-30	30-35
PCB	***LOC***						
PCB1	1	3.90 J	6.15	13.26	18.52	28.73	56.41
PCB3	1	2.10 J	5.16	10.54	23.63	27.68	40.09
PCB4/10	2	29.68	51.68	109.41	174.03	257.50	407.54
PCB6	2	1.24 J	3.30	7.93	18.28	22.30	46.91
PCB7/9	2	0.45 J	0.97 J	2.49	5.27	6.16	11.25
PCB8/5	2	10.39	29.11	72.36	158.64	201.30	246.71
PCB12/13	2	ND U	0.66 J	0.94 J	1.75	1.42 J	1.52
PCB16/32	3	26.60	67.18	170.63	439.16	506.08 Y	432.49 Y
PCB17	3	12.59	32.92	76.87	202.58 Y	228.22	209.07
PCB18	3	6.67	13.32	27.06	64.36	80.08	88.79
PCB19	3	25.12	48.17	113.96	264.77	314.63 Y	306.90 Y
PCB21	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB22	3	2.44	3.98	4.17	6.80	5.06	6.57
PCB24/27	3	11.70	27.14	66.98	168.55	182.30	149.65
PCB25	3	1.71 J	5.14	8.51	19.64	19.22	44.48
PCB26	3	5.02	11.08	20.05	44.37	43.68	60.08
PCB28	3	16.23	33.50	46.16	84.06	63.38	62.29
PCB29	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB31	3	9.46	19.70	32.02	73.37	72.83	62.97
PCB33/20	3	2.90	7.98	10.48	14.53	11.03	14.71
PCB40	4	3.42	4.92	4.29	6.13	4.82	8.00
PCB41/64/71	4	26.26	44.87	56.74	93.12	78.93	105.56
PCB42	4	9.24	16.87	20.13	32.43	23.38	37.10
PCB43	4	1.15 J	3.00	3.86	4.38	ND U	ND U
PCB44	4	21.51	34.30	36.89	58.60	49.32	72.78
PCB45	4	4.27	7.25	10.22	19.35	15.98	17.63
PCB46	4	1.59 J	2.43	2.90	5.10	4.60	6.51
PCB47/75	4	32.19	70.92	132.49	280.02	277.15	270.35
PCB48	4	4.03	7.39	11.93	10.55	ND U	ND U
PCB49	4	34.65	72.51	124.40	250.32	254.02	281.34
PCB51	4	14.30	32.74	73.31	168.22	173.11	152.70
PCB52	4	41.10	77.23	124.24	248.91	255.21	293.82
PCB53	4	21.86	48.67	108.11	251.13 Y	258.37 Y	220.06
PCB56/60	4	14.08	20.10	14.06	17.80	13.02	15.93
PCB59	4	1.95	3.60	4.66	7.73	6.68	7.62
PCB63	4	2.11	3.71	4.64	6.61	4.27	2.99
PCB66	4	31.46	58.44	59.58	81.27	61.00	78.74
PCB70/76	4	20.56	38.55	35.70	51.92	43.54	41.71
PCB74	4	19.84	35.75	38.92	57.32	37.62	49.13
PCB82	5	3.41	4.61	2.88	2.83	1.98	2.56
PCB83	5	2.94	4.14	4.62	6.41	4.73	4.19
PCB84	5	8.15	15.12	20.23	33.74	27.40	35.76
PCB85	5	5.59	8.81	7.58	10.66	8.22	9.24
PCB87/115	5	10.40	13.57	6.47	6.46	5.11	6.47
PCB89	5	ND U	ND U	ND U	ND U	ND U	ND U
PCB91	5	11.18	25.76	48.36	91.24	67.15	72.10
PCB92	5	7.67	15.33	21.14	34.76	26.54	22.09
PCB95	5	32.51	61.36	93.27	169.42	155.64	165.68
PCB97	5	9.01	15.22	13.62	18.31	11.53	19.63
PCB99	5	20.71	45.00	66.99	103.50	65.86	86.95
PCB100	5	1.75 J	4.09	7.91	16.44	14.91	14.59
PCB101/90	5	31.23	58.91	72.04	109.69	78.48	97.37
PCB105	5	6.60	8.69	4.22	4.77	4.18	4.63
PCB107	5	2.53	4.92	5.25	8.69	6.53	5.74
PCB110	5	53.49	110.57	159.01	264.81 Y	204.98	230.31
PCB114	5	0.51 J	0.69 J	0.51 J	0.73 J	0.55 J	ND U
PCB118	5	28.08	52.96	54.27	83.06	67.27	87.52
PCB119	5	2.37	6.15	11.54	21.73	16.45	16.31
PCB124	5	0.62 J	0.74 J	0.44 J	0.41 J	0.41 J	0.43 J
PCB128	6	4.61	7.96	7.54	10.33	7.82	10.39

Client Reporting Sample ID:		SLN-I-1	SLN-I-2	SLN-I-3	SLN-I-4	SLN-I-5	SLN-I-6
PCB129	6	0.79 J	0.92 J	0.44 J	0.86 J	0.79 J	0.92 J
PCB130	6	1.61 J	3.39	4.00	6.44	4.73	5.21
PCB131	6	ND U	0.42 J	ND U	ND U	ND U	0.72 J
PCB132	6	9.32	16.62	17.78	27.07	17.88	20.42
PCB134	6	1.60 J	2.96	3.63	5.52	4.05	4.09
PCB135/144	6	5.38	11.91	18.83	33.98	25.86	22.65
PCB136	6	4.00	8.52	13.57	24.21	19.14	20.73
PCB137	6	1.13 J	1.78	1.38 J	2.04	1.50 J	1.85
PCB138/160/163	6	29.87	54.91	57.15	93.51	78.01	80.60
PCB141	6	2.44	3.23	1.94	3.16	2.30	2.56
PCB146	6	5.34	12.01	18.12	33.56	24.99	21.11
PCB149	6	25.53	56.44	90.57	153.94	108.86	119.16
PCB151	6	5.08	10.82	16.86	29.98	23.45	20.52
PCB153	6	22.74	50.50	75.77	129.86	99.19	105.33
PCB156	6	1.75 J	2.84	2.10	3.42	2.85	3.50
PCB158	6	2.23 J	2.97	2.67	3.63	2.85	3.31
PCB167	6	1.14 J	1.95	1.50 J	2.68	2.20	2.29
PCB169	6	ND U	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	2.12	4.51	4.68	7.76	7.67	8.06
PCB171	7	0.73 J	1.56 J	2.15	3.90	3.18	3.28
PCB172	7	0.47 J	0.81 J	0.83 J	1.69	1.42 J	1.25 J
PCB173	7	ND U	ND U	ND U	ND U	ND U	ND U
PCB174	7	2.37	4.61	5.92	9.54	7.97	7.96
PCB175	7	0.23 J	0.19 J	0.29 J	0.44 J	0.41 J	0.36 J
PCB176	7	0.36 J	0.72 J	1.09 J	1.98	1.72	1.72
PCB177	7	2.11 J	4.89	7.14	13.06	10.92	10.06
PCB178	7	0.74 J	1.86	3.13	6.09	5.02	4.49
PCB180	7	3.52	6.81	8.51	14.61	12.97	13.18
PCB183	7	1.21 J	2.07	2.88	4.60	3.73	3.90
PCB184	7	0.47 J	0.30 J	0.33 J	0.34 J	0.41 J	0.39 J
PCB185	7	0.10 J	0.23 J	0.20 J	0.36 J	ND U	ND U
PCB187/182	7	3.82	8.70	14.11	26.25	22.47	20.15
PCB189	7	ND U	0.22 J	0.25 J	0.50 J	0.38 J	0.35 J
PCB191	7	ND U	ND U	ND U	ND U	ND U	ND U
PCB193	7	0.28 J	0.66 J	0.96 J	1.79	1.52	1.46 J
PCB194	8	0.52 J	1.16 J	1.53 J	3.11	2.67	2.36
PCB195	8	ND U	0.44 J	0.55 J	1.18 J	1.04 J	1.11 J
PCB197	8	ND U	ND U	ND U	0.21 J	0.39 J	0.33 J
PCB198	8	ND U	ND U	ND U	ND U	ND U	ND U
PCB199	8	0.83 J	1.71	2.76	4.99	4.71	4.43
PCB200	8	ND U	0.19 J	0.35 J	0.51 J	0.56 J	0.56 J
PCB201	8	ND U	0.30 J	0.52 J	0.97 J	0.87 J	0.81 J
PCB203/196	8	0.65 J	1.31 J	2.05	3.80	3.02	3.26
PCB205	8	ND U	ND U	ND U	ND U	ND U	ND U
PCB206	9	0.46 J	0.85 J	1.17 J	2.57	2.05	1.80 J
PCB207	9	ND U	ND U	0.20 J	0.31 J	0.38 J	0.25 J
PCB209	10	0.21 J	0.26 J	0.51 J	0.88 J	0.73 J	0.67 J
Level of Chlorination							
Cl1		6.00	11.31	23.80	42.15	56.41	96.51
Cl2		41.75	85.71	193.12	357.97	488.67	713.94
Cl3		120.44	270.10	576.88	1382.21	1526.51	1438.00
Cl4		305.57	583.25	867.07	1650.91	1561.03	1661.98
Cl5		238.76	456.63	600.37	987.66	767.93	881.57
Cl6		124.55	250.15	333.86	564.17	426.46	445.37
Cl7		18.52	38.15	52.47	92.91	79.79	76.62
Cl8		2.00	5.12	7.75	14.77	13.26	12.86
Cl9		0.46	0.85	1.37	2.88	2.43	2.05
Cl10		0.21	0.26	0.51	0.88	0.73	0.67
SUM PCB		858.25	1701.53	2657.21	5096.51	4923.20	5329.55
Surrogate Recovery (%)							
PCB103		72	70	73	78	98	96
PCB14		60	57	56	54	73	73
PCB34		69	68	69	73	90	89
PCB112		71	70	70	67	81	81

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: I

Client Reporting Sample ID:		SLN-I-7	SLN-I-8	SLN-I-9	SLN-I-10	SLN-I-11
Battelle Sample ID:		X4237	X4238	X4239	X4240	X4241
Extraction Batch ID:		00-037	00-037	00-037	00-037	00-037
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		61.76	61.18	60.49	61.58	60.00
Sample Dry Weight (g):		6.12	6.45	6.68	6.18	6.37
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		35-40	40-45	45-50	50-55	55-60
PCB	***LOC***					
PCB1	1	76.00	410.64	793.07	1453.66 D	1767.16 D
PCB3	1	37.73	273.24	507.97	1521.42 Y	1497.27 Y
PCB4/10	2	198.27	826.54 Y	2424.04 D	12368.82 D	15220.39 D
PCB6	2	53.03	129.48	121.63	195.34	166.61
PCB7/9	2	20.57	39.74	15.25	13.54	14.33
PCB8/5	2	149.27	542.14 Y	717.26 D	2668.41 D	4326.18 D
PCB12/13	2	1.10 J	3.39	3.27	8.53	5.72
PCB16/32	3	241.28	788.38 D	1115.84 D	4415.19 D	4190.34 D
PCB17	3	149.09	586.28 D	768.17 D	1875.47 D	1578.34 D
PCB18	3	127.05	289.50 Y	175.24	222.36	181.81
PCB19	3	125.86	375.47 Y	617.47 D	3619.95 D	4623.74 D
PCB21	3	ND U	ND U	ND U	ND U	ND U
PCB22	3	2.70	3.93	2.84	3.37	3.03
PCB24/27	3	61.93	193.78	263.79	911.00 D	1231.14 D
PCB25	3	64.95	164.95	90.31	63.31	13.90
PCB26	3	80.54	215.15	151.64	201.30	128.80
PCB28	3	14.71	30.35	22.42	28.48	21.71
PCB29	3	ND U	ND U	ND U	ND U	ND U
PCB31	3	55.46	156.61	113.52	249.97	237.59
PCB33/20	3	2.29	3.22	2.56	4.26	4.96
PCB40	4	3.28	4.43	2.93	2.46	2.04
PCB41/64/71	4	96.24	270.23	272.37	377.18 Y	142.41
PCB42	4	22.88	37.45	30.92	24.99	11.42
PCB43	4	ND U	ND U	ND U	ND U	ND U
PCB44	4	29.03	32.97	19.67	21.48	21.85
PCB45	4	9.25	18.92	16.95	35.40	41.20
PCB46	4	3.20	7.02	4.88	6.91	4.71
PCB47/75	4	208.62	617.47 D	661.50 D	1360.67 D	1190.79 D
PCB48	4	ND U	ND U	ND U	ND U	ND U
PCB49	4	267.87	671.01 D	617.26 Y	693.79 D	502.87 D
PCB51	4	86.87	283.97 Y	348.85 Y	1083.22 D	1346.09 D
PCB52	4	273.45	700.70 D	645.94 Y	771.70 D	587.01 D
PCB53	4	141.28	479.61 D	551.31 D	1601.83 D	2076.73 D
PCB56/60	4	3.25	2.83	1.30 J	1.90	2.54
PCB59	4	3.36	7.04	5.93	14.34	15.15
PCB63	4	0.85 J	1.32	0.91 J	1.28 J	1.18 J
PCB66	4	19.51	26.12	17.37	35.11	36.94
PCB70/76	4	10.24	11.10	4.05	6.11	15.04
PCB74	4	23.64	34.99	15.24	9.79	13.23
PCB82	5	0.86 J	1.97	0.81 J	ND U	ND U
PCB83	5	2.19	3.98	4.41	5.06	2.91
PCB84	5	25.73	62.21	62.95	95.93	50.05
PCB85	5	4.56	10.62	6.44	6.27	11.61
PCB87/115	5	2.11	4.09	2.14	ND U	ND U
PCB89	5	ND U	ND U	ND U	ND U	ND U
PCB91	5	58.74	161.95	208.37	465.09 Y	397.68 Y
PCB92	5	8.01	17.34	15.46	28.82	29.81
PCB95	5	109.77	307.20 Y	337.55	643.20 D	558.15 D
PCB97	5	8.67	10.85	5.17	3.36	2.80
PCB99	5	48.34	80.03	41.44	24.38	51.56
PCB100	5	10.52	34.24	41.71	114.09	122.30
PCB101/90	5	50.36	87.35	58.09	84.19	116.03
PCB105	5	1.18 J	2.34	1.65	0.76 J	0.63 J
PCB107	5	ND U	4.69	2.73	4.72	6.21
PCB110	5	150.81	346.67 Y	301.09	503.70 Y	644.85 Y
PCB114	5	ND U	0.55 J	ND U	1.14 J	1.21 J
PCB118	5	43.27	69.39	24.96	18.55	38.38
PCB119	5	9.58	28.34	24.57	41.24	30.42
PCB124	5	ND U	0.30 J	ND U	ND U	ND U
PCB128	6	5.54	11.80	5.37	1.70	0.91 J

Client Reporting Sample ID:		SLN-I-7	SLN-I-8	SLN-I-9	SLN-I-10	SLN-I-11
PCB129	6	0.37 J	0.98 J	1.05 J	ND U	ND U
PCB130	6	2.98	8.10	5.37	2.26	1.42
PCB131	6	2.05	0.68 J	ND U	ND U	ND U
PCB132	6	12.15	31.72	19.67	8.95	7.76
PCB134	6	2.03	6.10	6.03	8.52	6.71
PCB135/144	6	13.06	32.89	32.03	61.00	63.49
PCB136	6	15.70	42.11	46.94	101.65	93.67
PCB137	6	0.79 J	1.90	1.08 J	0.47 J	ND U
PCB138/160/163	6	40.91	112.00	92.95	145.91	120.54
PCB141	6	1.12 J	2.35	1.07 J	0.50 J	0.28 J
PCB146	6	11.19	30.23	28.35	50.31	64.93
PCB149	6	92.01	237.41	224.40	278.33	319.09 Y
PCB151	6	9.80	22.59	18.84	27.79	31.09
PCB153	6	68.51	155.40	103.08	92.72	172.72
PCB156	6	1.49 J	3.80	1.87	0.78 J	2.36
PCB158	6	1.70	4.89	2.67	1.02 J	0.74 J
PCB167	6	1.13 J	3.24	1.75	0.43 J	0.32 J
PCB169	6	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	4.88	12.35	7.82	2.67	2.60
PCB171	7	2.34	6.54	5.53	2.73	1.72
PCB172	7	0.79 J	2.56	2.20	1.35	0.84 J
PCB173	7	ND U	ND U	ND U	ND U	ND U
PCB174	7	4.54	11.61	7.87	5.02	6.37
PCB175	7	0.29 J	0.80 J	0.67 J	0.31 J	ND U
PCB176	7	1.23 J	3.50	3.29	3.04	3.32
PCB177	7	6.56	19.13	17.55	21.47	24.36
PCB178	7	3.15	9.22	10.35	23.61	24.70
PCB180	7	7.68	20.73	14.63	5.57	3.19
PCB183	7	2.69	7.24	5.82	2.17	0.89 J
PCB184	7	0.33 J	0.44 J	0.50 J	0.58 J	0.61 J
PCB185	7	0.19 J	0.54 J	0.35 J	ND U	ND U
PCB187/182	7	14.05	42.13	43.75	72.79	82.96
PCB189	7	ND U	0.77 J	0.51 J	ND U	ND U
PCB191	7	ND U	0.38 J	ND U	ND U	ND U
PCB193	7	0.82 J	2.36	2.14	3.06	5.07
PCB194	8	1.94	4.61	4.54	4.27	3.31
PCB195	8	0.79 J	2.18	2.41	1.80	1.28 J
PCB197	8	0.25 J	0.41 J	0.59 J	0.74 J	0.89 J
PCB198	8	ND U	0.40 J	0.46 J	ND U	ND U
PCB199	8	3.19	8.09	7.87	12.37	14.91
PCB200	8	0.39 J	0.95 J	1.12 J	1.01 J	0.98 J
PCB201	8	0.53 J	1.64	1.70	2.96	3.37
PCB203/196	8	2.07	5.90	5.54	4.72	3.94
PCB205	8	ND U	ND U	ND U	ND U	ND U
PCB206	9	1.26 J	3.57	3.46	5.31	5.33
PCB207	9	0.20 J	0.50 J	0.54 J	0.99 J	0.88 J
PCB209	10	0.42 J	1.27 J	1.03 J	1.77	2.22
Level of Chlorination						
Cl1		113.73	683.87	1301.04	2975.08	3264.43
Cl2		422.22	1541.29	3281.45	15254.64	19733.24
Cl3		925.86	2807.62	3323.80	11594.65	12215.35
Cl4		1202.81	3207.16	3217.37	6048.17	6011.20
Cl5		534.71	1234.10	1139.55	2040.50	2064.59
Cl6		282.54	708.17	592.50	782.33	886.03
Cl7		49.55	140.29	122.98	144.36	156.63
Cl8		9.17	24.17	24.22	27.86	28.68
Cl9		1.45	4.06	4.00	6.30	6.21
Cl10		0.42	1.27	1.03	1.77	2.22
SUM PCB		3542.46	10352.01	13007.93	38875.66	44368.59
Surrogate Recovery (%)						
PCB103		88	129 &	129 &	239 &	246 &
PCB14		73	78	62	74	74
PCB34		80	92	79	128 &	171 &
PCB112		75	87	70	82	77

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: O

Client Reporting Sample ID:		SLN-O-1	SLN-O-2	SLN-O-3	SLN-O-4	SLN-O-5	SLN-O-6
Battelle Sample ID:		X4246	X4247	X4248	X4249	X4250	X4251
Extraction Batch ID:		00-021	00-021	00-021	00-021	00-021	00-021
Batch Matrix:		Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667	1.667	1.667	1.667
Sample Moisture Content (%):		61.80	51.90	53.24	36.48	51.49	51.15
Sample Dry Weight (g):		5.49	6.83	7.79	9.88	7.85	7.43
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		0-5	5-10	10-15	15-20	20-25	25-30
PCB	***LOC***						
PCB1	1	9.03	11.28	21.00	70.45	132.90	129.83
PCB3	1	6.22	5.99	9.74	30.72	60.86	99.81
PCB4/10	2	53.87	61.33	106.93	316.77 Y	690.73 Y	684.98 Y
PCB6	2	2.61 J	3.40	6.49	18.11	40.84	48.03
PCB7/9	2	0.72 J	0.93 J	1.72	4.53	10.02	12.74
PCB8/5	2	26.96	32.58	68.29	203.57 Y	473.94 Y	498.17 D
PCB12/13	2	0.83 J	0.90 J	1.24	2.05	3.51	5.16
PCB16/32	3	49.81	62.59	118.48	316.71 Y	603.84 D	791.77 D
PCB17	3	23.51	28.54	52.52	137.39 Y	245.42 D	368.99 D
PCB18	3	11.98	14.17	21.23	49.65	129.93	168.80 Y
PCB19	3	42.87	49.92	84.84	219.73 Y	455.53 Y	520.55 D
PCB21	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB22	3	4.57	5.46	5.49	6.55	7.93	9.53
PCB24/27	3	21.04	25.03	47.17	125.71 Y	223.71 D	278.53 D
PCB25	3	3.40	4.25	5.96	13.20	29.13	37.32
PCB26	3	9.17	10.98	16.53	36.91	79.68	89.61
PCB28	3	26.37	31.20	38.16	55.23	63.59	75.46
PCB29	3	ND U	ND U	ND U	ND U	ND U	ND U
PCB31	3	18.85	22.59	30.33	59.46	130.67	162.51 Y
PCB33/20	3	4.69	6.50	9.15	10.27	9.64	12.68
PCB40	4	5.19	6.49	6.75	6.37	8.21	10.18
PCB41/64/71	4	38.48	45.63	52.09	62.13	96.98	116.53
PCB42	4	13.55	16.27	18.78	21.67	28.93	31.62
PCB43	4	ND U	ND U	ND U	ND U	ND U	ND U
PCB44	4	31.01	37.39	41.31	43.08	57.69	72.83
PCB45	4	6.19	7.79	9.74	13.78	21.24	24.45
PCB46	4	2.18	2.78	2.99	3.42	4.90	6.97
PCB47/75	4	44.15	53.00	80.67	155.71 Y	287.10 Y	318.23 D
PCB48	4	7.39	8.14	8.38	8.53	ND U	ND U
PCB49	4	49.66	58.94	84.51	151.09 Y	298.39 Y	323.08 D
PCB51	4	20.58	24.24	43.65	104.58	201.27 Y	247.23 Y
PCB52	4	58.95	69.85	93.56	157.44 Y	309.69 Y	340.51 D
PCB53	4	31.08	36.87	64.88	154.87 Y	293.32 D	384.36 D
PCB56/60	4	27.80	31.68	29.06	20.80	18.65	25.37
PCB59	4	3.04	3.69	4.40	5.72	8.33	10.75
PCB63	4	3.08	3.63	5.06	7.54	9.80	10.20
PCB66	4	47.91	55.08	58.20	52.21	56.54	71.60
PCB70/76	4	33.08	38.14	42.41	39.11	48.17	66.45
PCB74	4	29.83	34.21	38.60	40.20	45.12	52.51
PCB82	5	6.48	7.25	7.05	5.33	4.99	5.30
PCB83	5	3.51	4.03	5.14	6.47	8.87	9.97
PCB84	5	12.10	14.44	17.39	22.21	35.24	41.20
PCB85	5	10.21	11.51	12.45	11.59	13.52	15.76
PCB87/115	5	19.90	23.81	21.72	15.29	15.46	17.68
PCB89	5	ND U	ND U	ND U	ND U	ND U	ND U
PCB91	5	14.00	16.44	25.87	46.64	76.98	79.67
PCB92	5	11.29	13.41	19.01	30.09	45.36	49.10
PCB95	5	44.28	52.28	68.75	106.35	189.56 Y	229.37 Y
PCB97	5	14.66	17.08	18.10	15.30	14.39	16.33
PCB99	5	28.82	34.21	45.77	59.74	69.50	79.89
PCB100	5	2.11	2.37	4.06	8.35	15.09	18.48
PCB101/90	5	49.07	57.27	68.89	79.18	95.76	102.64
PCB105	5	17.75	19.45	17.67	12.42	12.74	15.90
PCB107	5	4.22	4.85	6.81	9.61	13.96	16.83
PCB110	5	76.46	88.51	115.47	163.85 Y	249.53 Y	291.87 Y
PCB114	5	1.18 J	1.28 J	1.22	1.01	1.13	1.35
PCB118	5	51.29	57.90	64.07	67.17	89.05	107.43
PCB119	5	3.04	3.56	6.16	11.58	18.68	22.10
PCB124	5	1.27 J	1.44	1.35	0.95	0.94 J	1.07 J
PCB128	6	9.20	10.34	11.07	11.01	13.22	15.71

Client Reporting Sample ID:		SLN-O-1	SLN-O-2	SLN-O-3	SLN-O-4	SLN-O-5	SLN-O-6
PCB129	6	1.92	1.93	1.88	1.31	1.68	2.26
PCB130	6	3.12	3.74	4.49	5.84	8.76	9.56
PCB131	6	0.45 J	0.53 J	0.49 J	0.51 J	0.59 J	0.74 J
PCB132	6	14.71	16.96	20.87	24.48	33.40	37.41
PCB134	6	2.56	3.04	4.11	5.98	9.67	10.47
PCB135/144	6	7.88	8.98	13.20	21.88	34.60	38.09
PCB136	6	5.65	6.63	9.17	14.49	23.15	26.53
PCB137	6	2.32	2.61	2.69	2.42	3.24	3.93
PCB138/160/163	6	55.30	62.09	74.22	90.28	124.92	146.84
PCB141	6	4.93	5.57	5.24	4.36	4.89	6.64
PCB146	6	7.87	9.20	13.71	23.34	34.83	40.70
PCB149	6	34.94	40.86	58.21	88.67	118.55	138.87
PCB151	6	7.26	8.59	12.50	21.01	34.01	37.68
PCB153	6	35.34	40.58	54.35	78.63	109.37	131.05
PCB156	6	4.44	5.05	4.97	4.80	5.86	7.57
PCB158	6	4.05	4.66	4.50	4.19	5.31	6.25
PCB167	6	2.27	2.64	2.80	2.99	3.62	4.64
PCB169	6	ND U	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	5.16	5.67	7.09	8.75	13.69	15.33
PCB171	7	1.61 J	1.74	2.17	2.90	4.25	5.19
PCB172	7	0.85 J	0.77 J	1.02 J	1.39	2.10	2.74
PCB173	7	0.10 J	0.20 J	0.13 J	ND U	ND U	0.29 J
PCB174	7	4.48	5.08	5.98	8.17	11.32	13.48
PCB175	7	0.21 J	0.25 J	0.30 J	0.39 J	0.67 J	0.77 J
PCB176	7	0.53 J	0.65 J	0.90 J	1.40	2.10	2.53
PCB177	7	3.44	3.78	5.49	8.79	13.68	16.33
PCB178	7	1.16 J	1.32	2.06	3.67	6.22	7.64
PCB180	7	7.09	7.97	10.10	13.84	20.59	25.18
PCB183	7	1.90 J	2.27	2.73	3.66	5.33	6.46
PCB184	7	0.25 J	0.26 J	0.21 J	0.17 J	0.19 J	0.24 J
PCB185	7	0.29 J	0.37 J	0.35 J	0.44 J	0.54 J	0.71 J
PCB187/182	7	5.54	6.28	9.35	15.92	24.63	29.77
PCB189	7	0.30 J	0.40 J	0.43 J	0.60 J	0.78 J	1.03 J
PCB191	7	0.21 J	0.28 J	0.28 J	0.30 J	0.55 J	0.50 J
PCB193	7	0.47 J	0.58 J	0.83 J	1.33	1.94	2.44
PCB194	8	1.04 J	1.08 J	1.56	2.38	3.92	4.86
PCB195	8	0.78 J	0.72 J	0.77 J	1.23	1.71	1.93
PCB197	8	ND U	0.09 J	0.08 J	0.15 J	0.26 J	0.34 J
PCB198	8	ND U	ND U	ND U	0.23 J	0.25 J	0.32 J
PCB199	8	1.19 J	1.45	1.95	3.29	5.23	6.30
PCB200	8	ND U	0.23 J	0.32 J	0.44 J	0.68 J	0.65 J
PCB201	8	0.34 J	0.30 J	0.41 J	0.60 J	0.96 J	1.09 J
PCB203/196	8	1.12 J	1.32 J	1.54	2.68	4.22	4.88
PCB205	8	ND U	ND U	ND U	ND U	0.25 J	0.38 J
PCB206	9	0.65 J	0.79 J	1.01 J	1.52	2.36	3.12
PCB207	9	ND U	0.17 J	0.12 J	0.18 J	0.40 J	0.40 J
PCB209	10	0.34 J	0.29 J	0.51 J	0.46 J	0.72 J	0.98 J
Level of Chlorination							
Cl1		15.25	17.27	30.74	101.17	193.76	229.65
Cl2		84.99	99.15	184.68	545.03	1219.04	1249.09
Cl3		216.26	261.23	429.84	1030.81	1979.06	2515.76
Cl4		453.13	533.84	685.05	1048.25	1794.32	2112.89
Cl5		371.65	431.10	526.95	673.13	970.73	1121.93
Cl6		204.20	234.00	298.47	406.19	569.67	664.93
Cl7		33.59	37.86	49.42	71.73	108.61	130.63
Cl8		4.47	5.20	6.63	11.00	17.47	20.76
Cl9		0.65	0.96	1.13	1.70	2.76	3.51
Cl10		0.34	0.29	0.51	0.46	0.72	0.98
SUM PCB		1384.53	1620.90	2213.43	3889.46	6856.13	8050.13
Surrogate Recovery (%)							
PCB103		50	57	60	71	69	80
PCB14		47	53	54	53	41	48
PCB34		51	59	61	71	62	71
PCB112		51	58	58	57	46	52

U = Analyte not detected, "ND" reported.
& = QC value outside the accuracy or precision criteria goal.
NA = Not Applicable.
J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

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Project Name: WA4-30
Project Number: G335430-EPA33

Core/Site: O

Client Reporting Sample ID:		SLN-O-7	SLN-O-8	SLN-O-9
Battelle Sample ID:		X4252	X4253	X4254
Extraction Batch ID:		00-021	00-021	00-021
Batch Matrix:		Sediment	Sediment	Sediment
Sample Dilution Factor:		1.667	1.667	1.667
Sample Moisture Content (%):		39.76	48.54	51.81
Sample Dry Weight (g):		9.93	7.95	7.93
Reporting Units:		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
Depth, cm		30-35	35-40	40-45
PCB	***LOC***			
PCB1	1	190.71	1721.74 D	883.83 D
PCB3	1	84.06	731.57 Y	391.31 Y
PCB4/10	2	1190.40 D	9875.74 D	4166.33 D
PCB6	2	37.53	195.23	113.31
PCB7/9	2	11.05	55.76	32.02
PCB8/5	2	523.95 D	1934.88 D	920.04 D
PCB12/13	2	3.51	20.85	7.87
PCB16/32	3	590.26 Y	3187.58 D	1521.17 D
PCB17	3	321.52 Y	995.75 D	570.47 D
PCB18	3	128.89	484.69 D	287.01 Y
PCB19	3	613.68 D	3475.34 D	1296.88 D
PCB21	3	ND U	ND U	ND U
PCB22	3	4.59	10.59	13.76
PCB24/27	3	248.60 Y	1217.22 D	504.38 D
PCB25	3	32.76	142.06 Y	104.37
PCB26	3	79.05	259.33 D	202.86 Y
PCB28	3	40.06	54.85	109.82
PCB29	3	ND U	ND U	ND U
PCB31	3	114.63	273.07 D	224.67 Y
PCB33/20	3	4.96	6.46	17.88
PCB40	4	4.59	10.73	14.48
PCB41/64/71	4	73.10	267.61 Y	192.94 Y
PCB42	4	12.19	37.25	45.50
PCB43	4	ND U	ND U	ND U
PCB44	4	32.28	67.53	87.10
PCB45	4	13.78	47.36	30.12
PCB46	4	3.83	10.45	9.20
PCB47/75	4	243.06 Y	562.12 D	400.37 D
PCB48	4	ND U	ND U	ND U
PCB49	4	255.47 Y	628.36 D	421.09 D
PCB51	4	203.82 Y	814.25 D	404.88 D
PCB52	4	288.09 Y	854.26 D	542.30 D
PCB53	4	371.66 D	1200.30 D	600.41 D
PCB56/60	4	11.52	18.84	32.97
PCB59	4	5.92	18.35	12.84
PCB63	4	3.68	6.19	6.83
PCB66	4	36.94	54.96	96.85
PCB70/76	4	33.28	61.24	66.16
PCB74	4	18.59	48.24	65.83
PCB82	5	2.52	6.05	9.51
PCB83	5	4.35	10.24	8.94
PCB84	5	21.21	68.77	51.05
PCB85	5	7.59	20.19	20.92
PCB87/115	5	8.98	22.74	27.97
PCB89	5	ND U	ND U	ND U
PCB91	5	39.01	137.60 Y	91.77
PCB92	5	23.72	55.63	39.43
PCB95	5	153.20 Y	506.51 Y	300.90 Y
PCB97	5	5.98	13.29	25.86
PCB99	5	25.59	58.41	79.10
PCB100	5	14.04	47.96	28.40
PCB101/90	5	40.14	108.37	115.78
PCB105	5	8.01	18.94	22.63
PCB107	5	7.60	16.39	12.92
PCB110	5	150.61 Y	243.27 D	323.68 Y
PCB114	5	0.76 J	1.66	1.76
PCB118	5	44.35	109.63	111.52
PCB119	5	11.40	25.40	20.31
PCB124	5	0.40 J	1.18	1.41
PCB128	6	6.85	17.98	19.58

Client Reporting Sample ID:		SLN-O-7	SLN-O-8	SLN-O-9
PCB129	6	0.92	2.30	2.54
PCB130	6	4.45	12.80	9.96
PCB131	6	0.35 J	0.83 J	1.09 J
PCB132	6	15.87	40.09	40.09
PCB134	6	4.97	14.61	9.57
PCB135/144	6	18.58	55.21	34.86
PCB136	6	14.33	49.01	30.26
PCB137	6	1.59	3.76	4.38
PCB138/160/163	6	78.02	228.36 Y	169.33
PCB141	6	2.68	6.19	7.26
PCB146	6	19.00	49.14	32.91
PCB149	6	57.50	151.06	139.76
PCB151	6	20.08	61.50	37.06
PCB153	6	56.39	145.26	120.09
PCB156	6	3.37	8.79	8.86
PCB158	6	2.85	8.48	7.77
PCB167	6	1.99	5.71	5.59
PCB169	6	ND U	ND U	ND U
PCB170/190	7	7.53	20.80	15.39
PCB171	7	2.61	7.21	5.54
PCB172	7	1.36	3.61	2.50
PCB173	7	ND U	0.40 J	0.30 J
PCB174	7	6.43	16.82	12.55
PCB175	7	0.28 J	0.97 J	0.74 J
PCB176	7	1.26	3.67	2.60
PCB177	7	8.75	24.51	16.77
PCB178	7	4.98	16.52	10.34
PCB180	7	11.79	31.20	22.96
PCB183	7	2.96	8.49	6.70
PCB184	7	0.19 J	0.29 J	0.27 J
PCB185	7	0.32 J	0.83 J	0.68 J
PCB187/182	7	16.11	48.15	32.43
PCB189	7	0.51 J	1.56	1.10 J
PCB191	7	0.28 J	0.87 J	0.59 J
PCB193	7	1.40	3.98	2.59
PCB194	8	2.83	7.53	5.05
PCB195	8	1.26	3.26	2.32
PCB197	8	0.21 J	0.56 J	0.44 J
PCB198	8	ND U	0.57 J	0.31 J
PCB199	8	3.79	10.51	7.06
PCB200	8	0.40 J	1.21	0.80 J
PCB201	8	0.68 J	1.95	1.30
PCB203/196	8	2.70	7.62	4.97
PCB205	8	0.22 J	0.52 J	0.40 J
PCB206	9	2.03	5.81	4.01
PCB207	9	0.27 J	0.75 J	0.48 J
PCB209	10	0.59 J	1.59	1.17 J
Level of Chlorination				
Cl1		274.76	2453.31	1275.14
Cl2		1766.45	12082.46	5239.57
Cl3		2179.00	10106.94	4853.27
Cl4		1611.78	4708.03	3029.86
Cl5		569.43	1472.22	1293.85
Cl6		309.80	861.09	680.95
Cl7		66.76	189.88	134.03
Cl8		12.09	33.73	22.64
Cl9		2.30	6.56	4.49
Cl10		0.59	1.59	1.17
SUM PCB		6792.95	31915.82	16534.98
Surrogate Recovery (%)				
PCB103		84	170 &	112
PCB14		47	68	54
PCB34		65	114	81
PCB112		52	76	59

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J = Detected, but below the sample specific MDL.
Y = Peak area higher than the highest calibration standard.
D = Diluted sample concentration reported for this anayte.

WA 4-30, Sangamo-Weston
Procedural Blank Data

Battelle Sample ID		XM52PB	XM65PB	XN69PB	XN77PB	XN81PB
Battelle Batch ID		00-021	00-024	00-035	00-036	00-037
Batch Matrix		Sediment	Water	Sediment	Sediment	Sediment
Dilution Factor		1.67	1.67	1.67	1.67	1.67
Sample Weight (g)/Volume (L)		7.83	1.00	5.51	8.00	6.92
Reporting Units		ng/g dry wt.	ng/L	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
	Cl#					
PCB1	1	ND U	0.16 J	ND U	0.04 J	ND U
PCB3	1	ND U	ND U	ND U	ND U	ND U
PCB4/10	2	ND U	0.90 J	ND U	0.24 J	ND U
PCB6	2	ND U	ND U	ND U	ND U	ND U
PCB7/9	2	ND U	ND U	ND U	ND U	ND U
PCB8/5	2	ND U	ND U	ND U	0.16 J	ND U
PCB12/13	2	ND U	ND U	ND U	ND U	ND U
PCB16/32	3	ND U	ND U	ND U	0.28 J	ND U
PCB17	3	ND U	ND U	ND U	0.12 J	ND U
PCB18	3	ND U	ND U	ND U	0.05 J	ND U
PCB19	3	ND U	ND U	ND U	0.17 J	ND U
PCB21	3	ND U	ND U	ND U	ND U	ND U
PCB22	3	ND U	ND U	ND U	ND U	ND U
PCB24/27	3	ND U	ND U	ND U	0.12 J	ND U
PCB25	3	ND U	ND U	ND U	ND U	ND U
PCB26	3	ND U	ND U	ND U	ND U	ND U
PCB28	3	ND U	ND U	ND U	ND U	ND U
PCB29	3	ND U	ND U	ND U	ND U	ND U
PCB31	3	ND U	ND U	ND U	0.12 J	ND U
PCB33/20	3	ND U	ND U	ND U	ND U	ND U
PCB40	4	ND U	ND U	ND U	ND U	ND U
PCB41/64/71	4	ND U	ND U	ND U	ND U	ND U
PCB42	4	ND U	ND U	ND U	ND U	ND U
PCB43	4	ND U	ND U	ND U	ND U	ND U
PCB44	4	ND U	ND U	ND U	ND U	ND U
PCB45	4	ND U	ND U	ND U	ND U	ND U
PCB46	4	ND U	ND U	ND U	ND U	ND U
PCB47/75	4	ND U	ND U	ND U	0.23 J	ND U
PCB48	4	ND U	ND U	ND U	ND U	ND U
PCB49	4	ND U	0.95 J	ND U	0.32 J	ND U
PCB51	4	ND U	ND U	ND U	0.11 J	ND U
PCB52	4	ND U	ND U	ND U	0.33 J	ND U
PCB53	4	ND U	ND U	ND U	0.16 J	ND U
PCB56/60	4	ND U	ND U	ND U	ND U	ND U
PCB59	4	ND U	ND U	ND U	ND U	ND U
PCB63	4	ND U	ND U	ND U	0.13 J	ND U
PCB66	4	ND U	ND U	ND U	0.15 J	ND U
PCB70/76	4	ND U	ND U	ND U	ND U	ND U
PCB74	4	ND U	ND U	ND U	ND U	ND U
PCB82	5	ND U	ND U	ND U	ND U	ND U
PCB83	5	ND U	ND U	ND U	ND U	ND U
PCB84	5	ND U	ND U	ND U	ND U	ND U
PCB85	5	ND U	ND U	ND U	ND U	ND U
PCB87/115	5	ND U	ND U	ND U	ND U	ND U
PCB89	5	ND U	ND U	ND U	ND U	ND U
PCB91	5	ND U	ND U	ND U	ND U	ND U
PCB92	5	ND U	ND U	ND U	ND U	ND U
PCB95	5	ND U	ND U	ND U	0.20 J	ND U
PCB97	5	ND U	ND U	ND U	ND U	ND U
PCB99	5	ND U	ND U	ND U	ND U	ND U
PCB100	5	ND U	ND U	ND U	ND U	ND U
PCB101/90	5	ND U	ND U	ND U	ND U	ND U
PCB105	5	ND U	ND U	ND U	ND U	ND U
PCB107	5	ND U	ND U	ND U	ND U	ND U
PCB110	5	ND U	ND U	ND U	0.25 J	ND U
PCB114	5	ND U	ND U	ND U	ND U	ND U
PCB118	5	ND U	ND U	ND U	ND U	ND U
PCB119	5	ND U	ND U	ND U	ND U	ND U
PCB124	5	ND U	ND U	ND U	ND U	ND U
PCB128	6	ND U	ND U	ND U	ND U	ND U
PCB129	6	ND U	ND U	ND U	ND U	ND U
PCB130	6	ND U	ND U	ND U	ND U	ND U

WA 4-30, Sangamo-Weston
Procedural Blank Data

Battelle Sample ID		XM52PB	XM65PB	XN69PB	XN77PB	XN81PB
Battelle Batch ID		00-021	00-024	00-035	00-036	00-037
Batch Matrix		Sediment	Water	Sediment	Sediment	Sediment
Dilution Factor		1.67	1.67	1.67	1.67	1.67
Sample Weight (g)/Volume (L)		7.83	1.00	5.51	8.00	6.92
Reporting Units		ng/g dry wt.	ng/L	ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
	Cl#					
PCB131	6	ND U	ND U	ND U	ND U	ND U
PCB132	6	ND U	ND U	ND U	ND U	ND U
PCB134	6	ND U	ND U	ND U	ND U	ND U
PCB135/144	6	ND U	ND U	ND U	ND U	ND U
PCB136	6	ND U	ND U	ND U	ND U	ND U
PCB137	6	ND U	ND U	ND U	ND U	ND U
PCB138/160/163	6	ND U	ND U	ND U	ND U	ND U
PCB141	6	ND U	ND U	ND U	ND U	ND U
PCB146	6	ND U	ND U	ND U	ND U	ND U
PCB149	6	ND U	ND U	ND U	0.14 J	ND U
PCB151	6	ND U	ND U	ND U	ND U	ND U
PCB153	6	ND U	ND U	ND U	0.14 J	ND U
PCB156	6	ND U	ND U	ND U	ND U	ND U
PCB158	6	ND U	ND U	ND U	ND U	ND U
PCB167	6	ND U	ND U	ND U	ND U	ND U
PCB169	6	ND U	ND U	ND U	ND U	ND U
PCB170/190	7	ND U	ND U	ND U	ND U	ND U
PCB171	7	ND U	ND U	ND U	ND U	ND U
PCB172	7	ND U	ND U	ND U	ND U	ND U
PCB173	7	ND U	ND U	ND U	ND U	ND U
PCB174	7	ND U	ND U	ND U	ND U	ND U
PCB175	7	ND U	ND U	ND U	ND U	ND U
PCB176	7	ND U	ND U	ND U	ND U	ND U
PCB177	7	ND U	ND U	ND U	ND U	ND U
PCB178	7	ND U	ND U	ND U	ND U	ND U
PCB180	7	ND U	ND U	ND U	ND U	ND U
PCB183	7	ND U	ND U	ND U	ND U	ND U
PCB184	7	ND U	1.51 J	ND U	0.22 J	ND U
PCB185	7	ND U	ND U	ND U	ND U	ND U
PCB187/182	7	ND U	ND U	ND U	0.05 J	ND U
PCB189	7	ND U	ND U	ND U	ND U	ND U
PCB191	7	ND U	ND U	ND U	ND U	ND U
PCB193	7	ND U	ND U	ND U	ND U	ND U
PCB194	8	ND U	ND U	ND U	ND U	ND U
PCB195	8	ND U	ND U	ND U	ND U	ND U
PCB197	8	ND U	ND U	ND U	ND U	ND U
PCB198	8	ND U	ND U	ND U	ND U	ND U
PCB199	8	ND U	ND U	ND U	ND U	ND U
PCB200	8	ND U	ND U	ND U	ND U	ND U
PCB201	8	ND U	ND U	ND U	ND U	ND U
PCB203/196	8	ND U	ND U	ND U	ND U	ND U
PCB205	8	ND U	ND U	ND U	ND U	ND U
PCB206	9	ND U	ND U	ND U	ND U	ND U
PCB207	9	ND U	ND U	ND U	ND U	ND U
PCB209	10	ND U	ND U	ND U	ND U	ND U
Surrogate Recoveries						
SIS PCB103 % Rec		56	65	72	73	88
SIS PCB14 % Rec		62	70	69	69	86
SIS PCB34 % Rec		61	71	71	70	88
SIS PCB112 % Rec		60	71	74	76	87

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Procedural Blank Data

Battelle Sample ID		XQ56PB-PCB	XO85PB	XP33PB
Battelle Batch ID		00-049	00-050	00-061
Batch Matrix		Sediment	Sediment	Sediment
Dilution Factor		1.67	1.67	1.67
Sample Weight (g)/Volume (L)		12.00	11.00	11.00
Reporting Units		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
	Cl#			
PCB1	1	0.04 J	ND U	ND U
PCB3	1	0.02 J	ND U	ND U
PCB4/10	2	0.10 J	0.09 J	0.09 J
PCB6	2	ND U	ND U	ND U
PCB7/9	2	ND U	ND U	ND U
PCB8/5	2	ND U	ND U	ND U
PCB12/13	2	ND U	ND U	ND U
PCB16/32	3	ND U	ND U	ND U
PCB17	3	ND U	ND U	ND U
PCB18	3	ND U	ND U	ND U
PCB19	3	ND U	ND U	ND U
PCB21	3	ND U	ND U	ND U
PCB22	3	ND U	ND U	ND U
PCB24/27	3	ND U	ND U	ND U
PCB25	3	ND U	ND U	ND U
PCB26	3	ND U	ND U	ND U
PCB28	3	0.05 J	ND U	ND U
PCB29	3	ND U	ND U	ND U
PCB31	3	0.07 J	ND U	ND U
PCB33/20	3	ND U	ND U	ND U
PCB40	4	ND U	ND U	ND U
PCB41/64/71	4	ND U	ND U	ND U
PCB42	4	ND U	ND U	ND U
PCB43	4	ND U	ND U	ND U
PCB44	4	ND U	ND U	ND U
PCB45	4	ND U	ND U	ND U
PCB46	4	ND U	ND U	ND U
PCB47/75	4	0.11 J	ND U	ND U
PCB48	4	ND U	ND U	ND U
PCB49	4	0.14 J	0.09 J	0.10 J
PCB51	4	ND U	ND U	ND U
PCB52	4	0.17 J	ND U	0.09 J
PCB53	4	ND U	ND U	ND U
PCB56/60	4	ND U	ND U	ND U
PCB59	4	ND U	ND U	ND U
PCB63	4	ND U	0.08 J	0.09 J
PCB66	4	0.14 J	0.06 J	0.09 J
PCB70/76	4	ND U	ND U	ND U
PCB74	4	ND U	ND U	ND U
PCB82	5	ND U	ND U	ND U
PCB83	5	ND U	ND U	ND U
PCB84	5	ND U	ND U	ND U
PCB85	5	ND U	ND U	ND U
PCB87/115	5	ND U	ND U	ND U
PCB89	5	ND U	ND U	ND U
PCB91	5	ND U	ND U	ND U
PCB92	5	ND U	ND U	ND U
PCB95	5	ND U	ND U	ND U
PCB97	5	ND U	ND U	ND U
PCB99	5	ND U	ND U	ND U
PCB100	5	ND U	ND U	ND U
PCB101/90	5	ND U	ND U	ND U
PCB105	5	ND U	ND U	ND U
PCB107	5	ND U	ND U	ND U
PCB110	5	0.12 J	ND U	ND U
PCB114	5	ND U	ND U	ND U
PCB118	5	ND U	ND U	ND U
PCB119	5	ND U	ND U	ND U
PCB124	5	ND U	ND U	ND U
PCB128	6	ND U	ND U	ND U
PCB129	6	ND U	ND U	ND U
PCB130	6	ND U	ND U	ND U

WA 4-30, Sangamo-Weston
Procedural Blank Data

Battelle Sample ID		XQ56PB-PCB	XO85PB	XP33PB
Battelle Batch ID		00-049	00-050	00-061
Batch Matrix		Sediment	Sediment	Sediment
Dilution Factor		1.67	1.67	1.67
Sample Weight (g)/Volume (L)		12.00	11.00	11.00
Reporting Units		ng/g dry wt.	ng/g dry wt.	ng/g dry wt.
	Cl#			
PCB131	6	ND U	ND U	ND U
PCB132	6	ND U	ND U	ND U
PCB134	6	ND U	ND U	ND U
PCB135/144	6	ND U	ND U	ND U
PCB136	6	ND U	ND U	ND U
PCB137	6	ND U	ND U	ND U
PCB138/160/163	6	ND U	ND U	ND U
PCB141	6	ND U	ND U	ND U
PCB146	6	ND U	ND U	ND U
PCB149	6	ND U	ND U	ND U
PCB151	6	ND U	ND U	ND U
PCB153	6	ND U	ND U	ND U
PCB156	6	ND U	ND U	ND U
PCB158	6	ND U	ND U	ND U
PCB167	6	ND U	ND U	ND U
PCB169	6	ND U	ND U	ND U
PCB170/190	7	ND U	ND U	ND U
PCB171	7	ND U	ND U	ND U
PCB172	7	ND U	ND U	ND U
PCB173	7	ND U	ND U	ND U
PCB174	7	ND U	ND U	ND U
PCB175	7	ND U	ND U	ND U
PCB176	7	ND U	ND U	ND U
PCB177	7	ND U	ND U	ND U
PCB178	7	ND U	ND U	ND U
PCB180	7	ND U	ND U	ND U
PCB183	7	ND U	ND U	ND U
PCB184	7	0.15 J	0.15 J	0.14 J
PCB185	7	ND U	ND U	ND U
PCB187/182	7	ND U	ND U	ND U
PCB189	7	ND U	ND U	ND U
PCB191	7	ND U	ND U	ND U
PCB193	7	ND U	ND U	ND U
PCB194	8	ND U	ND U	ND U
PCB195	8	ND U	ND U	ND U
PCB197	8	ND U	ND U	ND U
PCB198	8	ND U	ND U	ND U
PCB199	8	ND U	ND U	ND U
PCB200	8	ND U	ND U	ND U
PCB201	8	ND U	ND U	ND U
PCB203/196	8	ND U	ND U	ND U
PCB205	8	ND U	ND U	ND U
PCB206	9	ND U	ND U	ND U
PCB207	9	ND U	ND U	ND U
PCB209	10	ND U	ND U	ND U
Surrogate Recoveries				
SIS PCB103 % Rec		63	65	65
SIS PCB14 % Rec		63	65	60
SIS PCB34 % Rec		64	65	63
SIS PCB112 % Rec		67	68	66

J - Detected, but below the sample-specific reporting limit (F
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Laboratory Control Sample Data

Battelle Sample ID		XM53LCS	XM66LCS	XN70LCS	XN78LCS	XN82LCS
Battelle Batch ID		00-021	00-024	00-035	00-036	00-037
Batch Matrix		Sediment	Water	Sediment	Sediment	Sediment
Dilution Factor		1.67	1.67	1.67	1.67	1.67
Reporting Units		% Recovery	% Recovery	% Recovery	% Recovery	% Recovery
	Cl#					
PCB1	1	69	68	57	69	68
PCB3	1	71	69	58	70	70
PCB4/10	2	70	68	58	71	71
PCB6	2	72	68	59	72	72
PCB7/9	2	70	67	56	67	67
PCB8/5	2	71	66	85	99	103
PCB12/13	2	73	66	59	70	70
PCB16/32	3	72	68	60	74	72
PCB17	3	76	71	63	76	77
PCB18	3	72	66	87	103	107
PCB19	3	70	67	57	71	70
PCB21	3	71	65	52	67	81
PCB22	3	75	69	64	78	75
PCB24/27	3	71	66	57	70	69
PCB25	3	75	70	64	75	75
PCB26	3	74	67	62	74	73
PCB28	3	83	74	106	120	115
PCB29	3	73	67	61	72	71
PCB31	3	74	68	93	105	112
PCB33/20	3	77	70	101	111	104
PCB40	4	75	68	65	76	74
PCB41/64/71	4	76	68	95	110	112
PCB42	4	78	73	101	116	108
PCB43	4	70	67	60	66	69
PCB44	4	74	67	93	106	111
PCB45	4	72	68	62	73	73
PCB46	4	72	68	62	74	74
PCB47/75	4	79	72	68	79	82
PCB48	4	75	72	66	78	79
PCB49	4	76	69	95	109	116
PCB51	4	74	69	63	75	76
PCB52	4	75	68	93	109	112
PCB53	4	75	71	66	78	79
PCB56/60	4	78	66	102	112	117
PCB59	4	77	70	64	76	76
PCB63	4	74	67	63	74	72
PCB66	4	78	70	103	115	113
PCB70/76	4	76	68	104	116	116
PCB74	4	78	70	101	113	117
PCB82	5	75	66	64	74	74
PCB83	5	77	68	67	79	78
PCB84	5	77	69	100	113	111
PCB85	5	80	68	102	114	113
PCB87/115	5	77	67	102	111	115
PCB89	5	64	61	56	71	78
PCB91	5	76	68	67	77	77
PCB92	5	77	68	101	112	118
PCB95	5	78	70	101	114	121
PCB97	5	78	68	99	111	115
PCB99	5	80	69	103	115	120
PCB100	5	75	68	66	76	77
PCB101/90	5	86	74	107	123	114
PCB105	5	86	72	114	124	121
PCB107	5	79	69	69	78	77
PCB110	5	80	68	102	113	116
PCB114	5	78	66	66	77	72
PCB118	5	83	71	108	120	120
PCB119	5	76	67	65	77	74
PCB124	5	83	73	72	84	81
PCB128	6	80	66	98	112	110
PCB129	6	80	67	66	75	73
PCB130	6	84	72	73	84	82

WA 4-30, Sangamo-Weston
Laboratory Control Sample Data

Battelle Sample ID		XM53LCS	XM66LCS	XN70LCS	XN78LCS	XN82LCS
Battelle Batch ID		00-021	00-024	00-035	00-036	00-037
Batch Matrix		Sediment	Water	Sediment	Sediment	Sediment
Dilution Factor		1.67	1.67	1.67	1.67	1.67
Reporting Units		% Recovery	% Recovery	% Recovery	% Recovery	% Recovery
	Cl#					
PCB131	6	80	70	68	80	77
PCB132	6	82	73	109	120	118
PCB134	6	76	65	63	75	72
PCB135/144	6	77	67	99	112	115
PCB136	6	78	69	104	115	119
PCB137	6	81	67	101	111	112
PCB138/160/163	6	80	68	102	112	114
PCB141	6	78	65	99	108	111
PCB146	6	81	70	103	113	117
PCB149	6	80	69	102	114	117
PCB151	6	71	61	91	102	106
PCB153	6	81	71	106	115	117
PCB156	6	81	69	102	113	111
PCB158	6	85	71	106	117 &	117 &
PCB167	6	107	90	128 &	147	145
PCB169	6	75	57	61	65	66
PCB170/190	7	76	64	98	105	106
PCB171	7	78	71	65	77	72
PCB172	7	78	68	64	76	69
PCB173	7	79	71	67	77	72
PCB174	7	83	72	105	108	116
PCB175	7	78	69	66	78	75
PCB176	7	82	74	74	85	84
PCB177	7	77	68	96	110	109
PCB178	7	80	71	66	79	76
PCB180	7	77	66	97	109	106
PCB183	7	76	63	96	113	108
PCB184	7	76	67	100	111	115
PCB185	7	76	70	68	79	76
PCB187/182	7	83	73	104	115	118
PCB189	7	74	63	61	69	65
PCB191	7	77	65	65	76	70
PCB193	7	78	69	67	79	74
PCB194	8	84	72	101	116	109
PCB195	8	75	64	96	104	105
PCB197	8	73	66	67	79	74
PCB198	8	73	66	64	73	70
PCB199	8	72	61	64	73	69
PCB200	8	74	68	66	79	72
PCB201	8	78	73	68	82	76
PCB203/196	8	75	65	100	109	109
PCB205	8	76	61	62	72	67
PCB206	9	78	61	90	106	99
PCB207	9	74	66	64	75	68
PCB209	10	77	61	86	106	97
Surrogate Recoveries						
SIS PCB103 % Rec		64	64	64	72	74
SIS PCB14 % Rec		63	61	57	66	68
SIS PCB34 % Rec		64	64	60	68	70
SIS PCB112 % Rec		68	67	66	75	75

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Laboratory Control Sample Data

Battelle Sample ID		XQ62LCS-PCB	XO86LCS	XP34LCS
Battelle Batch ID		00-049	00-050	00-061
Batch Matrix		Sediment	Sediment	Sediment
Dilution Factor		1.67	1.67	1.67
Reporting Units		% Recovery	% Recovery	% Recovery
	Cl#			
PCB1	1	60	65	75
PCB3	1	64	65	72
PCB4/10	2	62	68	77
PCB6	2	65	68	74
PCB7/9	2	62	64	68
PCB8/5	2	129 &	134 &	81
PCB12/13	2	69	65	66
PCB16/32	3	68	71	74
PCB17	3	69	73	77
PCB18	3	133 &	141 &	84
PCB19	3	64	68	75
PCB21	3	53	58	69
PCB22	3	72	72	74
PCB24/27	3	65	66	70
PCB25	3	70	70	74
PCB26	3	70	70	72
PCB28	3	156 &	163 &	96
PCB29	3	68	68	71
PCB31	3	142 &	143 &	80
PCB33/20	3	141 &	148 &	85
PCB40	4	73	73	72
PCB41/64/71	4	149 &	151 &	85
PCB42	4	150 &	157 &	87
PCB43	4	68	64	70
PCB44	4	143 &	145 &	82
PCB45	4	68	70	74
PCB46	4	69	71	75
PCB47/75	4	75	74	76
PCB48	4	66	58	80
PCB49	4	141 &	145 &	85
PCB51	4	70	72	75
PCB52	4	143 &	148 &	85
PCB53	4	70	74	79
PCB56/60	4	157 &	151 &	82
PCB59	4	67	71	75
PCB63	4	72	69	70
PCB66	4	155 &	154 &	84
PCB70/76	4	157 &	156 &	85
PCB74	4	153 &	151 &	83
PCB82	5	74	70	69
PCB83	5	75	75	76
PCB84	5	149 &	154 &	87
PCB85	5	154 &	154 &	84
PCB87/115	5	151 &	150 &	83
PCB89	5	68	66	69
PCB91	5	73	73	74
PCB92	5	150 &	152 &	85
PCB95	5	147 &	153 &	88
PCB97	5	152 &	151 &	83
PCB99	5	156 &	156 &	86
PCB100	5	72	72	74
PCB101/90	5	155 &	154 &	92
PCB105	5	169 &	164 &	87
PCB107	5	78	73	71
PCB110	5	155 &	155 &	84
PCB114	5	77	71	69
PCB118	5	164 &	160 &	85
PCB119	5	75	73	72
PCB124	5	81	78	76
PCB128	6	153 &	151 &	81
PCB129	6	74	70	70
PCB130	6	80	79	79

WA 4-30, Sangamo-Weston
Laboratory Control Sample Data

Battelle Sample ID		XQ62LCS-PCB	XO86LCS	XP34LCS
Battelle Batch ID		00-049	00-050	00-061
Batch Matrix		Sediment	Sediment	Sediment
Dilution Factor		1.67	1.67	1.67
Reporting Units		% Recovery	% Recovery	% Recovery
	Cl#			
PCB131	6	76	74	75
PCB132	6	156 &	161 &	88
PCB134	6	74	72	70
PCB135/144	6	151 &	153 &	86
PCB136	6	152 &	155 &	88
PCB137	6	154 &	151 &	80
PCB138/160/163	6	154 &	151 &	81
PCB141	6	149 &	145 &	78
PCB146	6	154 &	152 &	83
PCB149	6	153 &	154 &	85
PCB151	6	137 &	138 &	77
PCB153	6	154 &	157 &	86
PCB156	6	155 &	149 &	79
PCB158	6	157 &	157 &	85
PCB167	6	201 &	198 &	105
PCB169	6	74	62	53
PCB170/190	7	146 &	141 &	74
PCB171	7	75	73	72
PCB172	7	74	70	69
PCB173	7	74	73	74
PCB174	7	152 &	143 &	91
PCB175	7	75	74	74
PCB176	7	80	80	80
PCB177	7	149 &	150 &	81
PCB178	7	75	75	77
PCB180	7	149 &	146 &	78
PCB183	7	152 &	153 &	83
PCB184	7	147 &	148 &	83
PCB185	7	76	74	74
PCB187/182	7	157 &	159 &	87
PCB189	7	72	62	57
PCB191	7	74	72	71
PCB193	7	76	76	74
PCB194	8	163 &	155 &	79
PCB195	8	146 &	141 &	72
PCB197	8	73	73	74
PCB198	8	71	68	67
PCB199	8	69	68	67
PCB200	8	74	73	73
PCB201	8	76	76	77
PCB203/196	8	148 &	146 &	79
PCB205	8	72	67	62
PCB206	9	148 &	143 &	72
PCB207	9	72	70	68
PCB209	10	144 &	142 &	74
Surrogate Recoveries				
SIS PCB103 % Rec		64	66	69
SIS PCB14 % Rec		60	60	65
SIS PCB34 % Rec		62	63	67
SIS PCB112 % Rec		68	69	71

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-T6-2	SLN-T6-2		
Battelle Sample ID		X4222	XM54MS		
Battelle Batch ID		00-021	00-021		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		5.13	3.45		
Reporting Units		ng/g,dry weight	ng/g,dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB1	1	40.95	180.40	961.92	50
PCB3	1	17.44	171.01	960.00	55
PCB4/10	2	103.34	237.41	963.84	48
PCB6	2	11.85	119.45	642.56	58
PCB7/9	2	4.46	56.75	321.28	56
PCB8/5	2	67.23	157.41	591.75	53
PCB12/13	2	1.37 J	58.51	320.00	62
PCB16/32	3	171.41	193.30	321.28	24
PCB17	3	90.56	135.10	321.28	48
PCB18	3	32.76	132.07	590.59	58
PCB19	3	104.52	137.98	321.28	36
PCB21	3	ND U	52.47	321.28	56
PCB22	3	4.54	63.84	321.28	64
PCB24/27	3	62.55	107.85	321.28	49
PCB25	3	11.30	68.96	320.00	62
PCB26	3	18.99	76.10	321.28	61
PCB28	3	46.99	160.83	590.59	67
PCB29	3	ND U	58.23	321.28	63
PCB31	3	28.09	134.19	590.59	62
PCB33/20	3	13.41	129.03	590.59	68
PCB40	4	4.69	64.88	321.92	65
PCB41/64/71	4	61.52	169.77	588.24	64
PCB42	4	20.37	134.02	590.59	66
PCB43	4	ND U	54.40	320.00	59
PCB44	4	35.32	144.23	590.59	64
PCB45	4	10.12	66.50	321.60	61
PCB46	4	3.16	60.97	321.28	62
PCB47/75	4	135.90	183.50	321.28	51
PCB48	4	10.00	61.62	321.28	55
PCB49	4	131.31	224.92	588.24	55
PCB51	4	67.67	114.22	320.32	50
PCB52	4	128.10	218.11	590.59	53
PCB53	4	103.41	144.80	321.28	44
PCB56/60	4	13.60	129.74	590.59	68
PCB59	4	4.05	63.64	320.00	64
PCB63	4	3.63	62.75	320.00	64
PCB66	4	51.71	163.05	590.59	65
PCB70/76	4	27.41	138.22	590.59	65
PCB74	4	33.66	151.07	590.59	69
PCB82	5	2.27	65.51	321.28	68
PCB83	5	3.57	63.64	320.00	65
PCB84	5	19.70	129.99	590.59	64
PCB85	5	6.85	123.91	588.24	69
PCB87/115	5	5.83	124.54	588.24	70
PCB89	5	ND U	63.70	320.00	69
PCB91	5	46.16	100.90	320.00	59
PCB92	5	17.11	128.17	590.59	65
PCB95	5	82.29	184.95	590.59	60
PCB97	5	13.35	129.10	590.59	68
PCB99	5	59.62	167.99	558.82	67
PCB100	5	8.17	67.45	321.28	64
PCB101/90	5	67.81	177.51	589.41	64
PCB105	5	4.39	119.41	590.59	67
PCB107	5	4.66	69.52	321.28	70
PCB110	5	124.15	233.53	590.59	64
PCB114	5	0.56 J	63.19	321.60	67
PCB118	5	48.64	172.04	588.24	72
PCB119	5	10.25	71.66	321.28	66
PCB124	5	0.48 J	65.25	321.28	70
PCB128	6	6.73	124.97	590.59	69
PCB129	6	0.65 J	64.62	321.28	69

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-T6-2	SLN-T6-2		
Battelle Sample ID		X4222	XM54MS		
Battelle Batch ID		00-021	00-021		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		5.13	3.45		
Reporting Units		ng/g,dry weight	ng/g,dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB130	6	3.52	68.40	320.00	70
PCB131	6	0.48 J	62.89	321.28	67
PCB132	6	15.94	132.40	590.59	68
PCB134	6	2.99	64.32	320.00	66
PCB135/144	6	16.15	128.17	590.59	65
PCB136	6	12.70	124.90	590.59	66
PCB137	6	1.20 J	119.72	588.24	70
PCB138/160/163	6	48.09	167.47	590.59	70
PCB141	6	1.91 J	119.48	590.59	69
PCB146	6	15.40	134.07	588.24	70
PCB149	6	80.91	191.95	587.65	65
PCB151	6	13.68	117.90	590.59	61
PCB153	6	62.74	178.15	588.24	68
PCB156	6	2.12	121.37	590.59	70
PCB158	6	1.76 J	123.85	590.59	71
PCB167	6	1.54 J	159.11	591.18	92
PCB169	6	ND U	61.69	321.60	66
PCB170/190	7	4.58	117.40	590.59	66
PCB171	7	2.32	65.63	321.28	68
PCB172	7	1.01 J	63.49	320.32	67
PCB173	7	ND U	63.65	321.28	68
PCB174	7	5.18	129.74	588.24	73
PCB175	7	0.31 J	62.62	321.28	67
PCB176	7	1.07 J	64.83	320.32	69
PCB177	7	6.59	120.75	588.24	67
PCB178	7	2.95	65.15	321.28	67
PCB180	7	7.82	120.86	590.59	66
PCB183	7	2.38	113.75	588.24	65
PCB184	7	0.38 J	109.89	590.70	64
PCB185	7	0.24 J	60.54	321.28	65
PCB187/182	7	13.33	128.57	561.06	71
PCB189	7	ND U	61.90	321.28	67
PCB191	7	ND U	61.74	321.28	66
PCB193	7	0.90 J	62.82	320.00	67
PCB194	8	1.91 J	120.19	589.41	69
PCB195	8	0.84 J	108.62	590.59	63
PCB197	8	ND U	56.99	320.00	61
PCB198	8	ND U	58.06	320.96	62
PCB199	8	2.70	58.43	320.32	60
PCB200	8	0.47 J	58.64	321.28	63
PCB201	8	0.80 J	60.93	320.00	65
PCB203/196	8	2.22	109.56	588.24	63
PCB205	8	ND U	44.54	240.96	64
PCB206	9	1.62 J	112.51	589.41	65
PCB207	9	0.35 J	43.47	240.96	62
PCB209	10	1 J	131	589	77

Surrogate Recoveries

SIS PCB103 % Rec	65	57
SIS PCB14 % Rec	56	51
SIS PCB34 % Rec	66	56
SIS PCB112 % Rec	61	57

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-O-Lake Water	SLN-O-Lake Water		
Battelle Sample ID		X4197	XM67MS		
Battelle Batch ID		00-024	00-024		
Batch Matrix		Water	Water		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		0.95	0.95		
Reporting Units		ng/L	ng/L	ng MS Spike Amount	% Recovery
	Cl#				
PCB1	1	3.59 J	534.98	962.00	52
PCB3	1	0.41 J	548.07	960.00	54
PCB4/10	2	11.45 J	548.27	963.80	53
PCB6	2	0.56 J	364.41	642.60	54
PCB7/9	2	ND U	177.64	321.20	53
PCB8/5	2	1.19 J	324.08	591.60	52
PCB12/13	2	ND U	179.93	320.00	53
PCB16/32	3	1.98 J	180.29	321.20	53
PCB17	3	0.81 J	186.52	321.20	55
PCB18	3	1.06 J	324.78	590.70	52
PCB19	3	3.46 J	177.19	321.20	51
PCB21	3	ND U	177.58	321.20	53
PCB22	3	ND U	185.81	321.20	55
PCB24/27	3	0.79 J	173.90	321.20	51
PCB25	3	ND U	188.76	320.00	56
PCB26	3	ND U	181.36	321.20	54
PCB28	3	0.57 J	360.24	590.70	58
PCB29	3	ND U	181.95	321.20	54
PCB31	3	0.69 J	340.51	590.70	55
PCB33/20	3	ND U	342.08	590.70	55
PCB40	4	ND U	178.43	322.00	53
PCB41/64/71	4	ND U	329.84	588.30	53
PCB42	4	ND U	353.70	590.70	57
PCB43	4	ND U	173.90	320.00	52
PCB44	4	ND U	325.34	590.70	52
PCB45	4	ND U	177.41	321.60	52
PCB46	4	ND U	177.24	321.20	52
PCB47/75	4	0.58 J	196.10	321.20	58
PCB48	4	ND U	179.61	321.20	53
PCB49	4	1.37 J	329.95	588.30	53
PCB51	4	ND U	179.91	320.40	53
PCB52	4	1.59 J	328.01	590.70	52
PCB53	4	0.70 J	185.40	321.20	55
PCB56/60	4	ND U	341.65	590.70	55
PCB59	4	ND U	185.54	320.00	55
PCB63	4	0.69 J	179.93	320.00	53
PCB66	4	1.05 J	348.74	590.70	56
PCB70/76	4	ND U	339.04	590.70	55
PCB74	4	ND U	345.66	590.70	56
PCB82	5	ND U	184.49	321.20	55
PCB83	5	ND U	190.66	320.00	57
PCB84	5	ND U	342.87	590.70	55
PCB85	5	ND U	346.88	588.30	56
PCB87/115	5	ND U	342.41	588.30	55
PCB89	5	ND U	164.65	320.00	49
PCB91	5	ND U	180.56	320.00	54
PCB92	5	ND U	339.63	590.70	55
PCB95	5	ND U	341.46	590.70	55
PCB97	5	ND U	347.57	590.70	56
PCB99	5	ND U	332.74	558.90	57
PCB100	5	ND U	178.75	321.20	53
PCB101/90	5	ND U	371.91	589.50	60
PCB105	5	ND U	373.14	590.70	60
PCB107	5	ND U	196.82	321.20	58
PCB110	5	ND U	361.00	590.70	58
PCB114	5	ND U	188.60	321.60	56
PCB118	5	ND U	379.99	588.30	61
PCB119	5	ND U	184.91	321.20	55
PCB124	5	ND U	202.57	321.20	60
PCB128	6	ND U	343.38	590.70	55
PCB129	6	ND U	187.10	321.20	55

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-O-Lake Water	SLN-O-Lake Water		
Battelle Sample ID		X4197	XM67MS		
Battelle Batch ID		00-024	00-024		
Batch Matrix		Water	Water		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		0.95	0.95		
Reporting Units		ng/L	ng/L	ng MS Spike Amount	% Recovery
	Cl#				
PCB130	6	ND U	199.49	320.00	59
PCB131	6	ND U	194.23	321.20	57
PCB132	6	ND U	361.16	590.70	58
PCB134	6	ND U	180.66	320.00	54
PCB135/144	6	ND U	344.91	590.70	55
PCB136	6	ND U	345.25	590.70	56
PCB137	6	ND U	339.01	588.30	55
PCB138/160/163	6	ND U	346.44	590.70	56
PCB141	6	ND U	334.10	590.70	54
PCB146	6	ND U	356.20	588.30	58
PCB149	6	ND U	348.71	587.70	56
PCB151	6	ND U	315.22	590.70	51
PCB153	6	ND U	361.14	588.30	58
PCB156	6	ND U	357.62	590.70	58
PCB158	6	ND U	359.27	590.70	58
PCB167	6	ND U	471.00	591.30	76
PCB169	6	ND U	169.95	321.60	50
PCB170/190	7	ND U	333.40	590.70	54
PCB171	7	ND U	190.18	321.20	56
PCB172	7	ND U	185.58	320.40	55
PCB173	7	ND U	191.63	321.20	57
PCB174	7	ND U	367.27	588.30	59
PCB175	7	ND U	189.67	321.20	56
PCB176	7	ND U	197.43	320.40	59
PCB177	7	ND U	339.19	588.30	55
PCB178	7	ND U	191.91	321.20	57
PCB180	7	ND U	334.70	590.70	54
PCB183	7	ND U	323.25	588.30	52
PCB184	7	1.47 J	337.88	590.70	54
PCB185	7	ND U	191.80	321.20	57
PCB187/182	7	ND U	357.31	561.00	61
PCB189	7	ND U	173.71	321.20	51
PCB191	7	ND U	182.61	321.20	54
PCB193	7	ND U	193.61	320.00	57
PCB194	8	ND U	365.06	589.50	59
PCB195	8	ND U	329.45	590.70	53
PCB197	8	ND U	177.06	320.00	53
PCB198	8	ND U	181.82	321.00	54
PCB199	8	ND U	170.39	320.40	51
PCB200	8	ND U	186.07	321.20	55
PCB201	8	ND U	194.42	320.00	58
PCB203/196	8	ND U	329.40	588.30	53
PCB205	8	ND U	131.03	241.00	52
PCB206	9	ND U	313.58	589.50	51
PCB207	9	ND U	133.02	241.00	52
PCB209	10	ND U	303.57	589.50	49

Surrogate Recoveries

SIS PCB103 % Rec	59	50
SIS PCB14 % Rec	59	51
SIS PCB34 % Rec	61	51
SIS PCB112 % Rec	63	55

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-L-1	SLN-L-1		
Battelle Sample ID		X4198	XN71MS		
Battelle Batch ID		00-035	00-035		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		5.12	2.79		
Reporting Units		ng/g,dry weight	ng/g,dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB1	1	6.08	189.71	961.92	53
PCB3	1	2.82 J	202.00	960.00	58
PCB4/10	2	56.33	293.82	963.84	69
PCB6	2	2.25 J	151.14	642.56	65
PCB7/9	2	0.63 J	71.30	321.28	61
PCB8/5	2	19.38	234.48	591.75	101
PCB12/13	2	ND U	79.71	320.00	70
PCB16/32	3	53.99	156.77	321.28	89
PCB17	3	23.55	118.56	321.28	83
PCB18	3	12.51	233.03	590.59	104
PCB19	3	46.51	140.57	321.28	82
PCB21	3	ND U	73.52	321.28	64
PCB22	3	4.95	94.26	321.28	78
PCB24/27	3	22.44	110.31	321.28	76
PCB25	3	3.67	91.19	320.00	76
PCB26	3	8.80	99.74	321.28	79
PCB28	3	28.87	293.99	590.59	125 &
PCB29	3	ND U	83.25	321.28	72
PCB31	3	19.01	265.71	590.59	117
PCB33/20	3	5.68	256.98	590.59	119
PCB40	4	5.99	97.84	321.92	80
PCB41/64/71	4	49.32	303.45	588.24	121
PCB42	4	16.66	266.13	590.59	118
PCB43	4	2.19	78.37	320.00	66
PCB44	4	39.08	292.05	590.59	120
PCB45	4	7.37	95.04	321.60	76
PCB46	4	2.80	89.37	321.28	75
PCB47/75	4	54.73	167.01	321.28	98
PCB48	4	5.66	99.56	321.28	82
PCB49	4	57.80	307.87	588.24	119
PCB51	4	24.59	118.73	320.32	82
PCB52	4	70.26	331.03	590.59	123
PCB53	4	35.83	136.67	321.28	88
PCB56/60	4	30.19	294.84	590.59	125 &
PCB59	4	3.61	95.84	320.00	80
PCB63	4	3.58	93.59	320.00	79
PCB66	4	60.85	338.05	590.59	131 &
PCB70/76	4	42.21	319.17	590.59	131 &
PCB74	4	36.71	305.98	590.59	127 &
PCB82	5	7.46	103.01	321.28	83
PCB83	5	4.36	98.88	320.00	82
PCB84	5	14.95	266.66	590.59	119
PCB85	5	11.67	248.08	588.24	112
PCB87/115	5	22.05	279.25	588.24	122
PCB89	5	ND U	86.77	320.00	76
PCB91	5	17.48	113.69	320.00	84
PCB92	5	14.38	267.78	590.59	120
PCB95	5	56.03	310.92	590.59	120
PCB97	5	17.47	273.72	590.59	121
PCB99	5	37.10	287.13	558.82	125
PCB100	5	2.65	96.31	321.28	81
PCB101/90	5	58.12	326.68	589.41	127 &
PCB105	5	14.59	287.59	590.59	129 &
PCB107	5	4.77	107.09	321.28	89
PCB110	5	96.20	377.36	590.59	133
PCB114	5	1.11 J	92.67	321.60	79
PCB118	5	55.66	359.70	588.24	144 &
PCB119	5	3.69	97.04	321.28	81
PCB124	5	1.46 J	99.30	321.28	85
PCB128	6	9.08	248.78	590.59	113
PCB129	6	1.89	89.91	321.28	76

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-L-1	SLN-L-1		
Battelle Sample ID		X4198	XN71MS		
Battelle Batch ID		00-035	00-035		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		5.12	2.79		
Reporting Units		ng/g,dry weight	ng/g,dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB130	6	3.08	97.11	320.00	82
PCB131	6	0.48 J	91.43	321.28	79
PCB132	6	18.01	273.90	590.59	121
PCB134	6	3.09	90.40	320.00	76
PCB135/144	6	9.58	258.32	590.59	118
PCB136	6	7.21	257.12	590.59	118
PCB137	6	2.25	240.79	588.24	113
PCB138/160/163	6	59.50	326.69	590.59	126 &
PCB141	6	5.30	245.58	590.59	114
PCB146	6	9.69	261.98	588.24	120
PCB149	6	43.71	307.10	587.65	125 &
PCB151	6	9.20	235.34	590.59	107
PCB153	6	41.80	309.20	588.24	127 &
PCB156	6	3.90	247.57	590.59	115
PCB158	6	4.34	254.28	590.59	118
PCB167	6	2.18	314.95	591.18	148 &
PCB169	6	ND U	77.91	321.60	68
PCB170/190	7	4.94	232.35	590.59	108
PCB171	7	1.53 J	87.86	321.28	75
PCB172	7	0.72 J	84.17	320.32	73
PCB173	7	ND U	85.26	321.28	74
PCB174	7	4.56	259.43	588.24	121
PCB175	7	0.20 J	88.12	321.28	76
PCB176	7	0.60 J	94.59	320.32	82
PCB177	7	4.15	240.35	588.24	112
PCB178	7	1.36 J	88.38	321.28	76
PCB180	7	7.28	235.30	590.59	108
PCB183	7	2.02	229.28	588.24	108
PCB184	7	0.33 J	237.93	590.70	112
PCB185	7	0.41 J	87.65	321.28	76
PCB187/182	7	6.22	243.71	561.06	118
PCB189	7	ND U	86.19	321.28	75
PCB191	7	ND U	82.03	321.28	71
PCB193	7	0.68 J	86.72	320.00	75
PCB194	8	1.46 J	236.61	589.41	111
PCB195	8	0.76 J	220.63	590.59	104
PCB197	8	ND U	83.28	320.00	73
PCB198	8	ND U	78.68	320.96	68
PCB199	8	1.61 J	81.58	320.32	70
PCB200	8	ND U	83.39	321.28	72
PCB201	8	ND U	87.13	320.00	76
PCB203/196	8	1.45 J	226.33	588.24	107
PCB205	8	ND U	59.25	240.96	69
PCB206	9	0.74 J	208.45	589.41	98
PCB207	9	ND U	60.03	240.96	70
PCB209	10	ND U	222	589	105

Surrogate Recoveries

SIS PCB103 % Rec	68	73
SIS PCB14 % Rec	59	64
SIS PCB34 % Rec	65	68
SIS PCB112 % Rec	68	73

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-L-16	Matrix Spike		
Battelle Sample ID		X4214	XN79MS		
Battelle Batch ID		00-036	00-036		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		12.88	8.38		
Reporting Units		ng/g, dry weight	ng/g, dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB1	1	5.51	57.11	961.92	45
PCB3	1	0.69 J	54.74	960.00	47
PCB4/10	2	31.40	78.98	963.84	41
PCB6	2	0.47 J	37.79	642.56	49
PCB7/9	2	ND U	17.48	321.28	46
PCB8/5	2	3.80	51.32	591.60	67
PCB12/13	2	ND U	18.12	320.00	47
PCB16/32	3	5.39	24.27	321.28	49
PCB17	3	2.73	22.60	321.28	52
PCB18	3	1.59	52.15	590.70	72
PCB19	3	6.87	24.17	321.28	45
PCB21	3	ND U	18.25	321.28	48
PCB22	3	0.04 J	20.83	321.28	54
PCB24/27	3	1.72	19.85	321.28	47
PCB25	3	0.25 J	20.51	320.00	53
PCB26	3	0.68	20.47	321.28	52
PCB28	3	0.26 J	60.34	590.70	85
PCB29	3	ND U	19.38	321.28	51
PCB31	3	0.71 J	53.35	590.70	75
PCB33/20	3	ND U	55.50	590.70	79
PCB40	4	ND U	21.67	321.92	56
PCB41/64/71	4	0.71 J	58.06	588.30	82
PCB42	4	0.16 J	59.59	590.70	84
PCB43	4	ND U	19.54	320.00	51
PCB44	4	0.29 J	54.94	590.70	78
PCB45	4	0.15 J	20.31	321.60	53
PCB46	4	ND U	20.50	321.28	53
PCB47/75	4	1.77	23.69	321.28	57
PCB48	4	ND U	22.02	321.28	57
PCB49	4	1.97	57.64	588.30	79
PCB51	4	1.68	22.12	320.32	53
PCB52	4	2.43	57.63	590.70	78
PCB53	4	2.44	23.65	321.28	55
PCB56/60	4	0.07 J	59.49	590.70	84
PCB59	4	0.06 J	21.15	320.00	55
PCB63	4	0.09 J	20.87	320.00	54
PCB66	4	0.23 J	58.86	590.70	83
PCB70/76	4	0.16 J	60.06	590.70	85
PCB74	4	0.13 J	58.87	590.70	83
PCB82	5	ND U	22.24	321.28	58
PCB83	5	ND U	22.58	320.00	59
PCB84	5	0.25 J	59.54	590.70	84
PCB85	5	ND U	59.35	588.30	85
PCB87/115	5	ND U	58.21	588.30	83
PCB89	5	ND U	18.01	320.00	47
PCB91	5	0.43 J	22.20	320.00	57
PCB92	5	0.15 J	58.96	590.70	83
PCB95	5	1.21	60.61	590.70	84
PCB97	5	ND U	58.05	590.70	82
PCB99	5	0.25 J	57.11	558.90	85
PCB100	5	0.14 J	21.70	321.28	56
PCB101/90	5	0.34 J	65.15	589.50	92
PCB105	5	ND U	64.79	590.70	92
PCB107	5	ND U	22.36	321.28	58
PCB110	5	1.20	60.40	590.70	84
PCB114	5	ND U	21.94	321.60	57
PCB118	5	0.21 J	62.16	588.30	88
PCB119	5	ND U	21.04	321.28	55
PCB124	5	ND U	23.88	321.28	62
PCB128	6	ND U	59.27	590.70	84
PCB129	6	ND U	21.64	321.28	56

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-L-16	Matrix Spike		
Battelle Sample ID		X4214	XN79MS		
Battelle Batch ID		00-036	00-036		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		12.88	8.38		
Reporting Units		ng/g, dry weight	ng/g, dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB130	6	ND U	23.75	320.00	62
PCB131	6	ND U	22.80	321.28	59
PCB132	6	0.15 J	62.97	590.70	89
PCB134	6	ND U	21.22	320.00	56
PCB135/144	6	0.15 J	59.70	590.70	84
PCB136	6	0.16 J	60.88	590.70	86
PCB137	6	ND U	58.30	588.30	83
PCB138/160/163	6	0.52 J	59.52	590.70	84
PCB141	6	ND U	56.68	590.70	80
PCB146	6	0.11 J	59.18	588.30	84
PCB149	6	0.59 J	60.60	587.70	86
PCB151	6	0.14 J	54.92	590.70	78
PCB153	6	0.44 J	61.64	588.30	87
PCB156	6	ND U	59.88	590.70	85
PCB158	6	ND U	61.18	590.70	87
PCB167	6	ND U	79.06	591.30	112
PCB169	6	ND U	20.35	321.60	53
PCB170/190	7	ND U	55.56	590.70	79
PCB171	7	ND U	21.97	321.28	57
PCB172	7	ND U	21.60	320.32	57
PCB173	7	ND U	21.91	321.28	57
PCB174	7	ND U	57.62	588.30	82
PCB175	7	ND U	22.61	321.28	59
PCB176	7	ND U	24.20	320.32	63
PCB177	7	0.08 J	58.22	588.30	83
PCB178	7	ND U	22.90	321.28	60
PCB180	7	0.09 J	57.93	590.70	82
PCB183	7	ND U	59.42	588.30	85
PCB184	7	0.13 J	58.67	590.70	83
PCB185	7	ND U	22.69	321.28	59
PCB187/182	7	0.16 J	58.18	561.00	87
PCB189	7	ND U	19.73	321.28	51
PCB191	7	ND U	22.15	321.28	58
PCB193	7	ND U	22.73	320.00	60
PCB194	8	ND U	61.69	589.50	88
PCB195	8	ND U	55.43	590.70	79
PCB197	8	ND U	22.41	320.00	59
PCB198	8	ND U	20.79	320.96	54
PCB199	8	ND U	20.66	320.32	54
PCB200	8	ND U	22.34	321.28	58
PCB201	8	ND U	23.30	320.00	61
PCB203/196	8	ND U	57.28	588.30	82
PCB205	8	ND U	15.54	240.96	54
PCB206	9	ND U	56.29	589.50	80
PCB207	9	ND U	16.05	240.96	56
PCB209	10	ND U	55.84	589.50	79

Surrogate Recoveries

SIS PCB103 % Rec	71	51
SIS PCB14 % Rec	62	43
SIS PCB34 % Rec	69	45
SIS PCB112 % Rec	70	52

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-N-5	SLN-N-5		
Battelle Sample ID		X4259	XN83MS		
Battelle Batch ID		00-037	00-037		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		7.84	6.52		
Reporting Units		ng/g,dry weight	ng/g,dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB1	1	167.29	190.11	961.92	15
PCB3	1	52.43	121.26	960.00	47
PCB4/10	2	896.29 Y	646.33	963.84	0
PCB6	2	39.44	85.61	642.56	47
PCB7/9	2	9.09	34.30	321.28	51
PCB8/5	2	492.98 Y	381.66 Y	591.75	0
PCB12/13	2	3.72	33.92	320.00	62
PCB16/32	3	844.25 D	536.15 Y	321.28	0
PCB17	3	323.10 Y	225.69	321.28	0
PCB18	3	124.07	159.12	590.59	39
PCB19	3	598.67 D	374.03 Y	321.28	0
PCB21	3	ND U	32.20	321.28	65
PCB22	3	13.02	39.80	321.28	54
PCB24/27	3	311.56 Y	218.12	321.28	0
PCB25	3	30.72	51.34	320.00	42
PCB26	3	92.64	89.92	321.28	0
PCB28	3	119.46	169.31	590.59	55
PCB29	3	ND U	31.17	321.28	63
PCB31	3	152.14	182.26	590.59	33
PCB33/20	3	14.34	91.34	590.59	85
PCB40	4	12.42	40.55	321.92	57
PCB41/64/71	4	145.30	178.11	588.24	36
PCB42	4	44.13	112.40	590.59	75
PCB43	4	16.99	42.42	320.00	52
PCB44	4	92.20	144.42	590.59	58
PCB45	4	30.16	49.89	321.60	40
PCB46	4	7.29	35.44	321.28	57
PCB47/75	4	375.49 Y	261.96 Y	321.28	0
PCB48	4	ND U	53.33	321.28	108
PCB49	4	341.14 Y	298.04 Y	588.24	0
PCB51	4	257.20 Y	189.26	320.32	0
PCB52	4	369.71 Y	311.99 Y	590.59	0
PCB53	4	376.91 Y	264.57 Y	321.28	0
PCB56/60	4	38.57	114.24	590.59	84
PCB59	4	12.05	40.35	320.00	58
PCB63	4	15.62	41.53	320.00	53
PCB66	4	103.91	157.91	590.59	60
PCB70/76	4	83.17	147.23	590.59	71
PCB74	4	76.60	142.52	590.59	73
PCB82	5	9.76	38.98	321.28	59
PCB83	5	13.94	40.59	320.00	54
PCB84	5	48.78	115.53	590.59	74
PCB85	5	21.94	100.24	588.24	87
PCB87/115	5	33.20	109.03	588.24	84
PCB89	5	ND U	42.63	320.00	87
PCB91	5	105.96	98.64	320.00	0
PCB92	5	67.72	130.17	590.59	69
PCB95	5	249.43	244.04	590.59	0
PCB97	5	27.09	102.70	590.59	84
PCB99	5	115.12	157.90	558.82	50
PCB100	5	19.05	45.32	321.28	53
PCB101/90	5	157.41	181.73	589.41	27
PCB105	5	23.55	108.72	590.59	94
PCB107	5	20.17	46.72	321.28	54
PCB110	5	367.95 Y	317.01 Y	590.59	0
PCB114	5	1.62	33.56	321.60	65
PCB118	5	140.32	183.70	588.24	48
PCB119	5	24.45	48.30	321.28	48
PCB124	5	1.54	34.29	321.28	66
PCB128	6	22.21	98.99	590.59	85
PCB129	6	2.89	34.08	321.28	63

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-N-5	SLN-N-5		
Battelle Sample ID		X4259	XN83MS		
Battelle Batch ID		00-037	00-037		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		7.84	6.52		
Reporting Units		ng/g,dry weight	ng/g,dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB130	6	12.22	42.23	320.00	61
PCB131	6	0.95 J	33.20	321.28	66
PCB132	6	55.71	125.63	590.59	77
PCB134	6	12.89	38.64	320.00	52
PCB135/144	6	48.01	116.54	590.59	76
PCB136	6	32.61	106.70	590.59	82
PCB137	6	5.30	88.90	588.24	93
PCB138/160/163	6	204.28	215.50	590.59	12
PCB141	6	9.42	92.11	590.59	91
PCB146	6	49.83	120.80	588.24	79
PCB149	6	186.49	204.44	587.65	20
PCB151	6	46.83	108.66	590.59	68
PCB153	6	172.78	200.40	588.24	31
PCB156	6	9.80	95.20	590.59	94
PCB158	6	9.11	94.64	590.59	94
PCB167	6	5.80	113.10	591.18	118
PCB169	6	ND U	29.18	321.60	59
PCB170/190	7	18.04	94.72	590.59	85
PCB171	7	6.23	37.35	321.28	63
PCB172	7	2.96	33.14	320.32	61
PCB173	7	0.29 J	32.46	321.28	65
PCB174	7	17.35	104.39	588.24	97
PCB175	7	0.81 J	32.59	321.28	65
PCB176	7	2.84	35.53	320.32	67
PCB177	7	19.41	97.86	588.24	87
PCB178	7	8.02	37.04	321.28	59
PCB180	7	29.45	101.90	590.59	80
PCB183	7	7.84	86.27	588.24	87
PCB184	7	0.27 J	82.97	590.70	91
PCB185	7	0.83 J	32.86	321.28	65
PCB187/182	7	35.23	106.50	561.06	83
PCB189	7	0.99 J	30.92	321.28	61
PCB191	7	0.60 J	31.75	321.28	63
PCB193	7	2.71	33.28	320.00	62
PCB194	8	3.79	84.95	589.41	90
PCB195	8	1.80	78.74	590.59	85
PCB197	8	0.33 J	30.49	320.00	61
PCB198	8	0.28 J	29.12	320.96	59
PCB199	8	6.53	33.00	320.32	54
PCB200	8	0.74 J	31.02	321.28	61
PCB201	8	1.22	32.43	320.00	64
PCB203/196	8	5.13	81.07	588.24	84
PCB205	8	0.24 J	21.13	240.96	57
PCB206	9	2.43	75.17	589.41	81
PCB207	9	0.37 J	22.12	240.96	59
PCB209	10	1 J	79	589	86

Surrogate Recoveries

SIS PCB103 % Rec	104	77
SIS PCB14 % Rec	67	57
SIS PCB34 % Rec	98	72
SIS PCB112 % Rec	77	63

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-P-4	SLN-P-4		
Battelle Sample ID		X4407	XO83MS		
Battelle Batch ID		00-049	00-049		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		12.67	6.85		
Reporting Units		ng/g, dry weight	ng/g, dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB1	1	8.19	94.58	961.92	62
PCB3	1	1.15 J	91.37	960.00	64
PCB4/10	2	37.09	121.64	963.84	60
PCB6	2	1.13 J	63.42	642.56	66
PCB7/9	2	0.35 J	30.22	321.28	64
PCB8/5	2	12.11	127.02	591.60	133 &
PCB12/13	2	0.26 J	32.83	320.00	70
PCB16/32	3	19.83	51.21	321.28	67
PCB17	3	7.72	40.49	321.28	70
PCB18	3	3.78	123.74	590.70	139 &
PCB19	3	22.49	48.75	321.28	56
PCB21	3	ND U	27.29	321.28	58
PCB22	3	1.01	35.65	321.28	74
PCB24/27	3	7.23	37.07	321.28	64
PCB25	3	0.74	34.91	320.00	73
PCB26	3	2.38	35.97	321.28	72
PCB28	3	5.92	143.76	590.70	160 &
PCB29	3	ND U	32.62	321.28	70
PCB31	3	4.56	131.84	590.70	148 &
PCB33/20	3	0.73 J	126.65	590.70	146 &
PCB40	4	0.93	35.40	321.92	73
PCB41/64/71	4	7.09	143.32	588.30	159 &
PCB42	4	2.43	136.37	590.70	155 &
PCB43	4	0.45 J	30.61	320.00	65
PCB44	4	5.72	133.04	590.70	148 &
PCB45	4	1.40	33.99	321.60	69
PCB46	4	0.54 J	33.81	321.28	71
PCB47/75	4	8.62	45.44	321.28	79
PCB48	4	1.21	31.56	321.28	65
PCB49	4	8.85	134.50	588.30	146 &
PCB51	4	5.12	38.41	320.32	71
PCB52	4	11.81	138.83	590.70	147 &
PCB53	4	7.98	41.58	321.28	72
PCB56/60	4	4.16	142.26	590.70	160 &
PCB59	4	0.63 J	35.14	320.00	74
PCB63	4	0.51 J	34.21	320.00	72
PCB66	4	7.08	144.54	590.70	159 &
PCB70/76	4	5.55	144.40	590.70	161 &
PCB74	4	4.66	140.46	590.70	157 &
PCB82	5	0.96	35.72	321.28	74
PCB83	5	0.62 J	35.67	320.00	75
PCB84	5	2.09	133.47	590.70	152 &
PCB85	5	1.36	135.45	588.30	156 &
PCB87/115	5	2.96	134.75	588.30	153 &
PCB89	5	ND U	28.79	320.00	62
PCB91	5	2.28	36.55	320.00	73
PCB92	5	1.69	133.98	590.70	153 &
PCB95	5	7.67	137.19	590.70	150 &
PCB97	5	2.10	134.11	590.70	153 &
PCB99	5	4.11	133.75	558.90	159 &
PCB100	5	0.33 J	34.53	321.28	73
PCB101/90	5	7.18	155.16	589.50	172 &
PCB105	5	2.30	149.61	590.70	171 &
PCB107	5	0.58 J	36.83	321.28	77
PCB110	5	11.76	145.37	590.70	155 &
PCB114	5	0.20 J	35.94	321.60	76
PCB118	5	7.02	150.91	588.30	168 &
PCB119	5	0.41 J	35.53	321.28	75
PCB124	5	0.17 J	37.83	321.28	80
PCB128	6	1.16	135.36	590.70	156 &
PCB129	6	0.24 J	34.79	321.28	74

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-P-4	SLN-P-4		
Battelle Sample ID		X4407	XO83MS		
Battelle Batch ID		00-049	00-049		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		12.67	6.85		
Reporting Units		ng/g, dry weight	ng/g, dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB130	6	0.38 J	37.83	320.00	80
PCB131	6	0.09 J	35.08	321.28	75
PCB132	6	2.02	138.11	590.70	158 &
PCB134	6	0.41 J	34.45	320.00	73
PCB135/144	6	1.11	133.68	590.70	154 &
PCB136	6	0.89	134.34	590.70	155 &
PCB137	6	0.32 J	134.14	588.30	156 &
PCB138/160/163	6	6.62	141.22	590.70	156 &
PCB141	6	0.65 J	130.65	590.70	151 &
PCB146	6	0.86	134.92	588.30	156 &
PCB149	6	4.81	136.93	587.70	154 &
PCB151	6	1.05	121.11	590.70	139 &
PCB153	6	4.45	140.90	588.30	159 &
PCB156	6	0.53 J	135.90	590.70	157 &
PCB158	6	0.54 J	137.87	590.70	159 &
PCB167	6	0.25 J	175.88	591.30	203 &
PCB169	6	ND U	34.51	321.60	74
PCB170/190	7	0.53 J	129.09	590.70	149 &
PCB171	7	0.18 J	35.22	321.28	75
PCB172	7	0.08 J	34.56	320.32	74
PCB173	7	ND U	35.05	321.28	75
PCB174	7	0.46 J	131.76	588.30	153 &
PCB175	7	ND U	35.27	321.28	75
PCB176	7	0.06 J	37.44	320.32	80
PCB177	7	0.37 J	130.79	588.30	152 &
PCB178	7	0.13 J	35.23	321.28	75
PCB180	7	0.77 J	131.10	590.70	151 &
PCB183	7	0.23 J	133.27	588.30	155 &
PCB184	7	0.14 J	128.85	590.70	149 &
PCB185	7	ND U	35.46	321.28	76
PCB187/182	7	0.60 J	129.66	561.00	158 &
PCB189	7	0.03 J	36.95	321.28	79
PCB191	7	ND U	34.97	321.28	75
PCB193	7	0.05 J	35.78	320.00	76
PCB194	8	0.11 J	142.58	589.50	166 &
PCB195	8	ND U	126.87	590.70	147 &
PCB197	8	ND U	34.34	320.00	74
PCB198	8	ND U	33.87	320.96	72
PCB199	8	0.14 J	32.76	320.32	70
PCB200	8	ND U	34.61	321.28	74
PCB201	8	ND U	35.41	320.00	76
PCB203/196	8	0.12 J	129.42	588.30	151 &
PCB205	8	ND U	25.14	240.96	71
PCB206	9	0.06 J	128.67	589.50	149 &
PCB207	9	ND U	25.64	240.96	73
PCB209	10	ND U	126.12	589.50	147 &

Surrogate Recoveries

SIS PCB103 % Rec	70	66
SIS PCB14 % Rec	64	60
SIS PCB34 % Rec	68	64
SIS PCB112 % Rec	72	69

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SNL-Q-9	SNL-Q-9		
Battelle Sample ID		X4402	XO87MS		
Battelle Batch ID		00-050	00-050		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		11.37	8.67		
Reporting Units		ng/g,dry weight	ng/g,dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB1	1	180.30	222.09	961.92	38
PCB3	1	39.77	102.72	960.00	57
PCB4/10	2	477.15	504.68 Y	963.84	25
PCB6	2	27.68	73.16	642.56	61
PCB7/9	2	5.18	26.85	321.28	58
PCB8/5	2	184.41	253.62 Y	591.75	101
PCB12/13	2	4.68	29.66	320.00	68
PCB16/32	3	273.71 D	267.04 Y	321.28	-18
PCB17	3	150.77 Y	158.27 Y	321.28	20
PCB18	3	74.15	161.52	590.59	128
PCB19	3	317.75 D	299.40 Y	321.28	-50
PCB21	3	ND U	23.78	321.28	64
PCB22	3	3.15	30.60	321.28	74
PCB24/27	3	139.34 Y	152.53 Y	321.28	36
PCB25	3	12.42	38.75	320.00	71
PCB26	3	58.07	79.48	321.28	58
PCB28	3	7.21	117.38	590.59	162 &
PCB29	3	ND U	26.44	321.28	71
PCB31	3	83.47	176.74	590.59	137
PCB33/20	3	2.17	102.78	590.59	148 &
PCB40	4	3.28	31.42	321.92	76
PCB41/64/71	4	51.33	148.73	588.24	144
PCB42	4	13.31	117.39	590.59	153 &
PCB43	4	ND U	25.83	320.00	70
PCB44	4	29.50	130.60	590.59	148
PCB45	4	14.23	39.98	321.60	69
PCB46	4	2.67	29.34	321.28	72
PCB47/75	4	139.22 Y	157.93 Y	321.28	50
PCB48	4	ND U	24.68	321.28	67
PCB49	4	166.89 Y	250.38 Y	588.24	123
PCB51	4	105.04 Y	121.78	320.32	45
PCB52	4	178.58 Y	262.20 Y	590.59	123
PCB53	4	166.45 Y	175.82 Y	321.28	25
PCB56/60	4	4.17	111.81	590.59	158 &
PCB59	4	6.85	33.64	320.00	73
PCB63	4	2.46	29.70	320.00	74
PCB66	4	8.41	118.28	590.59	161 &
PCB70/76	4	14.72	123.59	590.59	160 &
PCB74	4	14.06	122.26	590.59	159 &
PCB82	5	1.23	29.87	321.28	77
PCB83	5	3.18	31.21	320.00	76
PCB84	5	19.39	123.44	590.59	153 &
PCB85	5	4.57	111.80	588.24	158 &
PCB87/115	5	4.67	113.78	588.24	161 &
PCB89	5	ND U	23.87	320.00	65
PCB91	5	43.28	67.89	320.00	67
PCB92	5	14.56	118.68	590.59	153 &
PCB95	5	107.88	200.13 Y	590.59	135
PCB97	5	4.47	110.88	590.59	156 &
PCB99	5	26.77	129.54	558.82	159
PCB100	5	7.49	35.16	321.28	75
PCB101/90	5	32.51	141.18	589.41	160
PCB105	5	3.53	117.68	590.59	168 &
PCB107	5	4.66	33.74	321.28	78
PCB110	5	122.30	219.69 Y	590.59	143
PCB114	5	0.42 J	29.21	321.60	78
PCB118	5	32.19	143.27	588.24	164
PCB119	5	5.66	34.90	321.28	79
PCB124	5	0.31 J	30.23	321.28	81
PCB128	6	5.28	110.84	590.59	155 &
PCB129	6	0.75	29.19	321.28	77

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-W7-2	SLN-W7-2		
Battelle Sample ID		X4561	XP35MS		
Battelle Batch ID		00-061	00-061		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		11.94	7.00		
Reporting Units		ng/g,dry weight	ng/g,dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB130	6	0.17 J	36.55	320.00	80
PCB131	6	ND U	34.74	321.28	76
PCB132	6	0.76 J	78.99	590.59	93
PCB134	6	0.15 J	35.17	320.00	77
PCB135/144	6	0.39 J	77.27	590.59	91
PCB136	6	0.30 J	77.02	590.59	91
PCB137	6	0.15 J	69.64	588.24	83
PCB138/160/163	6	2.19	88.39	590.59	102
PCB141	6	0.26 J	68.11	590.59	80
PCB146	6	0.33 J	77.04	588.24	91
PCB149	6	1.53	100.27	587.65	118
PCB151	6	0.36 J	70.82	590.59	83
PCB153	6	1.46	90.11	588.24	105
PCB156	6	0.21 J	69.06	590.59	82
PCB158	6	0.17 J	71.97	590.59	85
PCB167	6	0.11 J	88.34	591.18	104
PCB169	6	ND U	28.05	321.60	61
PCB170/190	7	0.22 J	66.68	590.59	79
PCB171	7	0.08 J	34.08	321.28	74
PCB172	7	ND U	32.81	320.32	72
PCB173	7	ND U	34.43	321.28	75
PCB174	7	0.24 J	79.80	588.24	95
PCB175	7	ND U	34.00	321.28	74
PCB176	7	ND U	36.08	320.32	79
PCB177	7	0.16 J	71.77	588.24	85
PCB178	7	0.05 J	35.43	321.28	77
PCB180	7	0.30 J	69.32	590.59	82
PCB183	7	0.12 J	71.05	588.24	84
PCB184	7	0.09 J	69.02	590.70	82
PCB185	7	ND U	34.48	321.28	75
PCB187/182	7	0.24 J	74.01	561.06	92
PCB189	7	ND U	32.60	321.28	71
PCB191	7	ND U	33.19	321.28	72
PCB193	7	ND U	34.32	320.00	75
PCB194	8	ND U	68.67	589.41	82
PCB195	8	ND U	63.74	590.59	76
PCB197	8	ND U	33.54	320.00	73
PCB198	8	ND U	31.22	320.96	68
PCB199	8	0.07 J	31.67	320.32	69
PCB200	8	ND U	33.45	321.28	73
PCB201	8	ND U	34.38	320.00	75
PCB203/196	8	0.08 J	66.88	588.24	79
PCB205	8	ND U	21.56	240.96	63
PCB206	9	0.05 J	61.46	589.41	73
PCB207	9	ND U	23.56	240.96	68
PCB209	10	ND U	60	589	71

Surrogate Recoveries

SIS PCB103 % Rec	31 &	74
SIS PCB14 % Rec	28 &	63
SIS PCB34 % Rec	30 &	70
SIS PCB112 % Rec	30 &	72

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-W7-2	SLN-W7-2		
Battelle Sample ID		X4561	XP35MS		
Battelle Batch ID		00-061	00-061		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		11.94	7.00		
Reporting Units		ng/g,dry weight	ng/g,dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB1	1	1.70 J	167.61	961.92	121
PCB3	1	0.16 J	132.75	960.00	97
PCB4/10	2	6.53	422.86	963.84	302 &
PCB6	2	0.19 J	78.17	642.56	85
PCB7/9	2	0.06 J	34.50	321.28	75
PCB8/5	2	1.73	158.50	591.75	185 &
PCB12/13	2	ND U	34.02	320.00	74
PCB16/32	3	2.98	138.65	321.28	295 &
PCB17	3	1.33	144.50	321.28	312 &
PCB18	3	0.85	78.94	590.59	93
PCB19	3	3.09	145.61	321.28	310 &
PCB21	3	ND U	29.83	321.28	65
PCB22	3	0.20 J	34.43	321.28	75
PCB24/27	3	1.07	70.47	321.28	151 &
PCB25	3	0.16 J	45.84	320.00	100
PCB26	3	0.50 J	64.70	321.28	140 &
PCB28	3	1.22	88.75	590.59	104
PCB29	3	ND U	32.52	321.28	71
PCB31	3	0.93	116.70	590.59	137 &
PCB33/20	3	0.17 J	69.38	590.59	82
PCB40	4	0.30 J	33.97	321.92	73
PCB41/64/71	4	2.05	21.42	588.24	23 &
PCB42	4	0.72 J	77.03	590.59	90
PCB43	4	0.14 J	30.89	320.00	67
PCB44	4	1.74	75.89	590.59	88
PCB45	4	0.45 J	38.98	321.60	84
PCB46	4	0.20 J	34.42	321.28	75
PCB47/75	4	1.84	98.61	321.28	211 &
PCB48	4	0.36 J	32.04	321.28	69
PCB49	4	2.27	118.01	588.24	138 &
PCB51	4	0.95	64.65	320.32	139 &
PCB52	4	3.11	115.86	590.59	134 &
PCB53	4	1.38	57.93	321.28	123
PCB56/60	4	1.06	72.56	590.59	85
PCB59	4	0.14 J	36.41	320.00	79
PCB63	4	0.17 J	33.12	320.00	72
PCB66	4	1.91	76.69	590.59	89
PCB70/76	4	1.80	77.17	590.59	89
PCB74	4	1.21	75.51	590.59	88
PCB82	5	0.34 J	35.40	321.28	76
PCB83	5	0.31 J	35.68	320.00	77
PCB84	5	0.64 J	77.75	590.59	91
PCB85	5	0.49 J	72.33	588.24	85
PCB87/115	5	1.08	74.33	588.24	87
PCB89	5	ND U	31.49	320.00	69
PCB91	5	0.68 J	49.57	320.00	107
PCB92	5	0.58 J	76.85	590.59	90
PCB95	5	2.15	100.09	590.59	116
PCB97	5	0.77 J	72.83	590.59	85
PCB99	5	1.35	80.52	558.82	99
PCB100	5	0.09 J	37.09	321.28	81
PCB101/90	5	2.23	86.15	589.41	100
PCB105	5	0.54 J	75.59	590.59	89
PCB107	5	0.16	35.31	321.28	77
PCB110	5	3.11	115.53	590.59	133 &
PCB114	5	0.07 J	33.18	321.60	72
PCB118	5	1.91	84.13	588.24	98
PCB119	5	0.15 J	39.61	321.28	86
PCB124	5	0.06 J	34.86	321.28	76
PCB128	6	0.39 J	70.76	590.59	83
PCB129	6	0.13 J	33.01	321.28	72

WA 4-30, Sangamo-Weston
Matrix Spike Sample Data

Client Sample ID		SLN-W7-2	SLN-W7-2		
Battelle Sample ID		X4561	XP35MS		
Battelle Batch ID		00-061	00-061		
Batch Matrix		Sediment	Sediment		
Dilution Factor		1.67	1.67		
Sample Weight (g)/Volume (L)		11.94	7.00		
Reporting Units		ng/g,dry weight	ng/g,dry weight	ng MS Spike Amount	% Recovery
	Cl#				
PCB130	6	0.17 J	36.55	320.00	80
PCB131	6	ND U	34.74	321.28	76
PCB132	6	0.76 J	78.99	590.59	93
PCB134	6	0.15 J	35.17	320.00	77
PCB135/144	6	0.39 J	77.27	590.59	91
PCB136	6	0.30 J	77.02	590.59	91
PCB137	6	0.15 J	69.64	588.24	83
PCB138/160/163	6	2.19	88.39	590.59	102
PCB141	6	0.26 J	68.11	590.59	80
PCB146	6	0.33 J	77.04	588.24	91
PCB149	6	1.53	100.27	587.65	118
PCB151	6	0.36 J	70.82	590.59	83
PCB153	6	1.46	90.11	588.24	105
PCB156	6	0.21 J	69.06	590.59	82
PCB158	6	0.17 J	71.97	590.59	85
PCB167	6	0.11 J	88.34	591.18	104
PCB169	6	ND U	28.05	321.60	61
PCB170/190	7	0.22 J	66.68	590.59	79
PCB171	7	0.08 J	34.08	321.28	74
PCB172	7	ND U	32.81	320.32	72
PCB173	7	ND U	34.43	321.28	75
PCB174	7	0.24 J	79.80	588.24	95
PCB175	7	ND U	34.00	321.28	74
PCB176	7	ND U	36.08	320.32	79
PCB177	7	0.16 J	71.77	588.24	85
PCB178	7	0.05 J	35.43	321.28	77
PCB180	7	0.30 J	69.32	590.59	82
PCB183	7	0.12 J	71.05	588.24	84
PCB184	7	0.09 J	69.02	590.70	82
PCB185	7	ND U	34.48	321.28	75
PCB187/182	7	0.24 J	74.01	561.06	92
PCB189	7	ND U	32.60	321.28	71
PCB191	7	ND U	33.19	321.28	72
PCB193	7	ND U	34.32	320.00	75
PCB194	8	ND U	68.67	589.41	82
PCB195	8	ND U	63.74	590.59	76
PCB197	8	ND U	33.54	320.00	73
PCB198	8	ND U	31.22	320.96	68
PCB199	8	0.07 J	31.67	320.32	69
PCB200	8	ND U	33.45	321.28	73
PCB201	8	ND U	34.38	320.00	75
PCB203/196	8	0.08 J	66.88	588.24	79
PCB205	8	ND U	21.56	240.96	63
PCB206	9	0.05 J	61.46	589.41	73
PCB207	9	ND U	23.56	240.96	68
PCB209	10	ND U	60	589	71

Surrogate Recoveries

SIS PCB103 % Rec	31 &	74
SIS PCB14 % Rec	28 &	63
SIS PCB34 % Rec	30 &	70
SIS PCB112 % Rec	30 &	72

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Field Sample Duplicate Data

Client Sample ID		SLN-O-1	SLN-O-1		SLN-O-Lake Water	SLN-O-Lake Water	
Battelle Sample ID		X4246	X4246DUP		X4197	X4197DUP-R	
Battelle Batch ID		00-021	00-021		00-024	00-024	
Batch Matrix		Sediment	Sediment		Water	Water	
Dilution Factor		1.667	1.667		1.67	4.17	
Sample Weight (g)/Volume (L)		5.49	4.76		0.95	0.95	
Reporting Units		ng/g, dry wt.	ng/g, dry wt.	RPD	ng/L	ng/L	RPD
	Cl#						
PCB1	1	9.03	13.10	36.7	3.59 J	4.93 J	31
PCB3	1	6.22	6.51	4.5	0.41 J	ND U	NA
PCB4/10	2	53.87	90.22	50.5 &	11.45 J	15.81 J	32
PCB6	2	2.61 J	3.82	37.6	0.56 J	ND U	NA
PCB7/9	2	0.72 J	1.09 J	41.1	ND U	ND U	NA
PCB8/5	2	26.96	37.31	32.2	1.19 J	ND U	NA
PCB12/13	2	0.83 J	1.04 J	22.4	ND U	ND U	NA
PCB16/32	3	49.81	78.92	45.2 &	1.98 J	1.78 J	11
PCB17	3	23.51	36.93	44.4 &	0.81 J	ND U	NA
PCB18	3	11.98	19.04	45.5 &	1.06 J	ND U	NA
PCB19	3	42.87	71.23	49.7 &	3.46 J	4.05 J	16
PCB21	3	ND U	ND U	NA	ND U	ND U	NA
PCB22	3	4.57	6.43	33.8	ND U	ND U	NA
PCB24/27	3	21.04	32.11	41.6 &	0.79 J	ND U	NA
PCB25	3	3.40	4.78	33.8	ND U	ND U	NA
PCB26	3	9.17	12.99	34.5	ND U	ND U	NA
PCB28	3	26.37	35.62	29.8	0.57 J	ND U	NA
PCB29	3	ND U	ND U	NA	ND U	ND U	NA
PCB31	3	18.85	26.89	35.1 &	0.69 J	ND U	NA
PCB33/20	3	4.69	6.63	34.3	ND U	ND U	NA
PCB40	4	5.19	7.16	31.9	ND U	ND U	NA
PCB41/64/71	4	38.48	52.35	30.6	ND U	ND U	NA
PCB42	4	13.55	18.32	30.0	ND U	ND U	NA
PCB43	4	ND U	ND U	NA	ND U	ND U	NA
PCB44	4	31.01	44.56	35.9 &	ND U	ND U	NA
PCB45	4	6.19	9.27	39.9	ND U	ND U	NA
PCB46	4	2.18	3.27	40.0	ND U	ND U	NA
PCB47/75	4	44.15	64.26	37.1 &	0.58 J	ND U	NA
PCB48	4	7.39	8.82	17.6	ND U	ND U	NA
PCB49	4	49.66	71.58	36.2 &	1.37 J	1.18 J	15
PCB51	4	20.58	30.99	40.4 &	ND U	ND U	NA
PCB52	4	58.95	86.30	37.7 &	1.59 J	1.49 J	7
PCB53	4	31.08	47.32	41.4 &	0.70 J	ND U	NA
PCB56/60	4	27.80	36.43	26.9	ND U	ND U	NA
PCB59	4	3.04	4.15	30.9	ND U	ND U	NA
PCB63	4	3.08	3.93	24.3	0.69 J	1.42 J	70
PCB66	4	47.91	63.19	27.5	1.05 J	1.45 J	32
PCB70/76	4	33.08	43.69	27.6	ND U	ND U	NA
PCB74	4	29.83	39.30	27.4	ND U	ND U	NA
PCB82	5	6.48	8.51	27.2	ND U	ND U	NA
PCB83	5	3.51	4.68	28.7	ND U	ND U	NA
PCB84	5	12.10	16.44	30.4	ND U	ND U	NA
PCB85	5	10.21	13.19	25.5	ND U	ND U	NA
PCB87/115	5	19.90	30.92	43.4 &	ND U	ND U	NA
PCB89	5	ND U	ND U	NA	ND U	ND U	NA
PCB91	5	14.00	19.45	32.6	ND U	ND U	NA
PCB92	5	11.29	15.51	31.5	ND U	ND U	NA
PCB95	5	44.28	62.71	34.4	ND U	ND U	NA
PCB97	5	14.66	19.40	27.8	ND U	ND U	NA
PCB99	5	28.82	38.58	29.0	ND U	ND U	NA
PCB100	5	2.11	2.92	32.1	ND U	ND U	NA
PCB101/90	5	49.07	66.69	30.4	ND U	ND U	NA
PCB105	5	17.75	21.91	21.0	ND U	ND U	NA
PCB107	5	4.22	5.39	24.3	ND U	ND U	NA
PCB110	5	76.46	103.23	29.8	ND U	ND U	NA
PCB114	5	1.18 J	1.40 J	16.8	ND U	ND U	NA
PCB118	5	51.29	65.14	23.8	ND U	ND U	NA
PCB119	5	3.04	3.90	24.7	ND U	ND U	NA
PCB124	5	1.27 J	1.59 J	22.3	ND U	ND U	NA
PCB128	6	9.20	11.50	22.3	ND U	ND U	NA
PCB129	6	1.92	2.36	20.5	ND U	ND U	NA

WA 4-30, Sangamo-Weston
Field Sample Duplicate Data

Client Sample ID		SLN-O-1	SLN-O-1		SLN-O-Lake Water	SLN-O-Lake Water	
Battelle Sample ID		X4246	X4246DUP		X4197	X4197DUP-R	
Battelle Batch ID		00-021	00-021		00-024	00-024	
Batch Matrix		Sediment	Sediment		Water	Water	
Dilution Factor		1.667	1.667		1.67	4.17	
Sample Weight (g)/Volume (L)		5.49	4.76		0.95	0.95	
Reporting Units		ng/g, dry wt.	ng/g, dry wt.	RPD	ng/L	ng/L	RPD
	Cl#						
PCB130	6	3.12	3.96	23.7	ND U	ND U	NA
PCB131	6	0.45 J	0.69 J	43.4	ND U	ND U	NA
PCB132	6	14.71	18.86	24.7	ND U	ND U	NA
PCB134	6	2.56	3.34	26.4	ND U	ND U	NA
PCB135/144	6	7.88	10.35	27.2	ND U	ND U	NA
PCB136	6	5.65	7.79	31.9	ND U	ND U	NA
PCB137	6	2.32	2.80	19.0	ND U	ND U	NA
PCB138/160/163	6	55.30	72.05	26.3	ND U	ND U	NA
PCB141	6	4.93	6.37	25.5	ND U	ND U	NA
PCB146	6	7.87	10.42	27.9	ND U	ND U	NA
PCB149	6	34.94	47.19	29.8	ND U	ND U	NA
PCB151	6	7.26	9.88	30.6	ND U	ND U	NA
PCB153	6	35.34	46.26	26.8	ND U	ND U	NA
PCB156	6	4.44	5.30	17.8	ND U	ND U	NA
PCB158	6	4.05	5.01	21.1	ND U	ND U	NA
PCB167	6	2.27	2.83	21.7	ND U	ND U	NA
PCB169	6	ND U	ND U	NA	ND U	ND U	NA
PCB170/190	7	5.16	6.46	22.5	ND U	ND U	NA
PCB171	7	1.61 J	1.92 J	17.6	ND U	ND U	NA
PCB172	7	0.85 J	1.14 J	28.6	ND U	ND U	NA
PCB173	7	0.10 J	ND U	NA	ND U	ND U	NA
PCB174	7	4.48	5.73	24.4	ND U	ND U	NA
PCB175	7	0.21 J	0.30 J	34.4	ND U	ND U	NA
PCB176	7	0.53 J	0.79 J	38.8	ND U	ND U	NA
PCB177	7	3.44	4.31	22.4	ND U	ND U	NA
PCB178	7	1.16 J	1.58 J	30.9	ND U	ND U	NA
PCB180	7	7.09	8.73	20.7	ND U	ND U	NA
PCB183	7	1.90 J	2.31	19.3	ND U	ND U	NA
PCB184	7	0.25 J	0.19 J	26.2	1.47 J	ND U	NA
PCB185	7	0.29 J	0.41 J	32.6	ND U	ND U	NA
PCB187/182	7	5.54	7.04	23.8	ND U	ND U	NA
PCB189	7	0.30 J	0.43 J	35.9	ND U	ND U	NA
PCB191	7	0.21 J	0.30 J	34.4	ND U	ND U	NA
PCB193	7	0.47 J	0.68 J	36.4	ND U	ND U	NA
PCB194	8	1.04 J	0.93 J	12.0	ND U	ND U	NA
PCB195	8	0.78 J	0.60 J	24.8	ND U	ND U	NA
PCB197	8	ND U	ND U	NA	ND U	ND U	NA
PCB198	8	ND U	ND U	NA	ND U	ND U	NA
PCB199	8	1.19 J	1.72 J	36.8	ND U	ND U	NA
PCB200	8	ND U	ND U	NA	ND U	ND U	NA
PCB201	8	0.34 J	0.27 J	21.1	ND U	ND U	NA
PCB203/196	8	1.12 J	1.09 J	3.2	ND U	ND U	NA
PCB205	8	ND U	ND U	NA	ND U	ND U	NA
PCB206	9	0.65 J	0.58 J	11.5	ND U	ND U	NA
PCB207	9	ND U	ND U	NA	ND U	ND U	NA
PCB209	10	0.34 J	0.33 J	3.0	ND U	ND U	NA
SIS PCB103 % Rec		50	67		59	70	
SIS PCB14 % Rec		47	68		59	77	
SIS PCB34 % Rec		51	72		61	77	
SIS PCB112 % Rec		51	67		63	73	

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Field Sample Duplicate Data

Client Sample ID		SLN-N-4	SLN-N-4		SLN-L-5	SLN-L-5	
Battelle Sample ID		X4258	X4258DUP		X4202	X4202DUP	
Battelle Batch ID		00-035	00-035		00-036	00-036	
Batch Matrix		Sediment	Sediment		Sediment	Sediment	
Dilution Factor		1.67	1.67		1.67	1.67	
Sample Weight (g)/Volume (L)		6.61	6.28		6.16	6.47	
Reporting Units		ng/g, dry wt.	ng/g, dry wt.	RPD	ng/g, dry wt.	ng/g, dry wt.	RPD
	Cl#						
PCB1	1	24.97	24.90	0	97.46	89.10	9
PCB3	1	10.09	8.42	18	85.20	78.84	8
PCB4/10	2	133.94	136.57	2	646.84 Y	585.54 Y	10
PCB6	2	7.19	6.69	7	46.74	44.78	4
PCB7/9	2	1.79	1.66	7	17.27	17.77	3
PCB8/5	2	77.99	74.57	4	471.11 Y	413.62 D	13
PCB12/13	2	1.08 J	0.74 J	36	3.55	3.57	1
PCB16/32	3	142.29	139.04	2	1024.34 D	992.49 D	3
PCB17	3	58.02	55.15	5	393.36 D	379.98 D	3
PCB18	3	23.21	22.34	4	250.45 Y	233.83 Y	7
PCB19	3	99.35	98.15	1	618.33 D	587.92 D	5
PCB21	3	ND U	ND U	NA	ND U	ND U	NA
PCB22	3	5.83	5.31	9	3.67	3.33	10
PCB24/27	3	54.61	52.59	4	335.22 Y	312.34 Y	7
PCB25	3	6.79	6.60	3	39.45	37.53	5
PCB26	3	20.59	18.99	8	98.97	92.96	6
PCB28	3	46.17	43.98	5	77.21	72.07	7
PCB29	3	ND U	ND U	NA	ND U	ND U	NA
PCB31	3	36.68	32.95	11	197.43	185.01	6
PCB33/20	3	8.19	7.51	9	5.32	5.05	5
PCB40	4	7.71	7.21	7	4.84	4.33	11
PCB41/64/71	4	68.81	63.97	7	139.66	128.42	8
PCB42	4	22.62	21.65	4	22.32	20.22	10
PCB43	4	6.22	6.24	0	ND U	ND U	NA
PCB44	4	49.61	46.26	7	32.61	29.15	11
PCB45	4	11.58	10.99	5	15.65	14.33	9
PCB46	4	3.55	3.45	3	3.85	3.39	13
PCB47/75	4	98.05	92.72	6	411.28 D	397.17 D	3
PCB48	4	10.81	11.48	6	ND U	ND U	NA
PCB49	4	97.20	92.36	5	440.62 D	425.42 D	4
PCB51	4	54.32	52.40	4	325.79 Y	302.67 Y	7
PCB52	4	112.87	106.75	6	473.32 Y	427.52 D	10
PCB53	4	79.78	75.71	5	529.28 D	507.73 D	4
PCB56/60	4	34.38	30.75	11	14.21	12.26	15
PCB59	4	5.31	4.96	7	7.24	6.76	7
PCB63	4	6.16	5.64	9	7.07	6.39	10
PCB66	4	72.79	65.83	10	64.30	61.12	5
PCB70/76	4	59.63	54.87	8	63.57	58.59	8
PCB74	4	49.04	45.75	7	50.23	46.09	9
PCB82	5	8.71	7.74	12	3.96	3.48	13
PCB83	5	6.78	7.09	4	7.72	7.14	8
PCB84	5	22.08	20.37	8	44.08	40.33	9
PCB85	5	15.14	13.69	10	6.42	6.06	6
PCB87/115	5	26.65	25.48	4	13.01	11.84	9
PCB89	5	ND U	ND U	NA	ND U	ND U	NA
PCB91	5	33.61	31.75	6	99.90	91.85	8
PCB92	5	25.19	23.65	6	41.51	37.82	9
PCB95	5	89.31	83.85	6	271.03 Y	250.14 Y	8
PCB97	5	22.27	20.35	9	10.99	9.50	15
PCB99	5	57.31	52.90	8	68.85	61.53	11
PCB100	5	5.13	4.69	9	26.21	24.58	6
PCB101/90	5	83.31	77.26	8	101.97	91.55	11
PCB105	5	18.01	15.53	15	12.56	11.39	10
PCB107	5	7.47	6.72	11	14.51	12.62	14
PCB110	5	152.74	142.71	7	275.86 Y	252.47 Y	9
PCB114	5	1.31	0.99 J	28	ND U	ND U	NA
PCB118	5	73.62	67.69	8	107.50	97.99	9
PCB119	5	7.49	7.01	7	24.14	23.30	4
PCB124	5	1.50	1.27 J	17	0.62 J	0.60 J	3
PCB128	6	11.43	10.78	6	14.79	13.31	11
PCB129	6	2.08	1.84	12	1.54	1.36	13

WA 4-30, Sangamo-Weston
Field Sample Duplicate Data

Client Sample ID		SLN-N-4	SLN-N-4		SLN-L-5	SLN-L-5	
Battelle Sample ID		X4258	X4258DUP		X4202	X4202DUP	
Battelle Batch ID		00-035	00-035		00-036	00-036	
Batch Matrix		Sediment	Sediment		Sediment	Sediment	
Dilution Factor		1.67	1.67		1.67	1.67	
Sample Weight (g)/Volume (L)		6.61	6.28		6.16	6.47	
Reporting Units		ng/g, dry wt.	ng/g, dry wt.	RPD	ng/g, dry wt.	ng/g, dry wt.	RPD
	Cl#						
PCB130	6	5.09	4.48	13	10.71	9.81	9
PCB131	6	0.69 J	0.51 J	31	0.67 J	0.45 J	40 &
PCB132	6	28.28	25.67	10	30.18	29.16	3
PCB134	6	5.15	4.37	16	10.48	9.80	7
PCB135/144	6	17.11	15.80	8	43.52	39.78	9
PCB136	6	12.21	11.13	9	33.76	31.17	8
PCB137	6	3.14	2.70	15	3.34	3.01	10
PCB138/160/163	6	86.50	79.43	9	149.91	136.62	9
PCB141	6	6.22	5.77	8	4.72	4.04	16
PCB146	6	16.96	15.63	8	40.24	36.94	9
PCB149	6	76.97	71.06	8	129.09	116.82	10
PCB151	6	15.92	14.64	8	43.43	40.16	8
PCB153	6	68.39	63.31	8	142.13	130.46	9
PCB156	6	4.71	4.12	13	7.22	6.55	10
PCB158	6	5.11	4.74	8	5.73	5.14	11
PCB167	6	3.07	2.63	15	4.40	4.11	7
PCB169	6	ND U	ND U	NA	ND U	ND U	NA
PCB170/190	7	6.28	5.63	11	16.71	15.57	7
PCB171	7	2.16	2.21	2	5.77	5.24	10
PCB172	7	1.10 J	1.12 J	2	2.97	2.80	6
PCB173	7	ND U	ND U	NA	ND U	0.28 J	NA
PCB174	7	6.95	6.54	6	13.61	12.27	10
PCB175	7	0.28 J	0.26 J	6	0.78 J	0.72 J	7
PCB176	7	1.08 J	0.91 J	17	2.83	2.63	7
PCB177	7	6.39	5.90	8	20.22	18.44	9
PCB178	7	2.23	2.01	10	10.29	9.65	6
PCB180	7	10.18	9.11	11	27.65	25.47	8
PCB183	7	2.87	2.73	5	7.45	6.93	7
PCB184	7	0.62 J	0.72 J	16	0.43 J	0.39 J	11
PCB185	7	0.48 J	0.32 J	40	0.73 J	0.67 J	9
PCB187/182	7	10.23	9.90	3	35.39	33.08	7
PCB189	7	ND U	0.34 J	NA	1.10 J	1.09 J	1
PCB191	7	ND U	ND U	NA	0.62 J	0.62 J	0
PCB193	7	0.91 J	0.84 J	8	2.96	2.77	7
PCB194	8	1.44 J	1.24 J	15	6.02	5.59	7
PCB195	8	0.78 J	0.64 J	20	2.50	2.27	10
PCB197	8	ND U	ND U	NA	0.45 J	0.46 J	2
PCB198	8	ND U	ND U	NA	0.48 J	0.37 J	26
PCB199	8	1.92	1.94	1	8.29	7.85	6
PCB200	8	0.32 J	ND U	NA	1.06 J	0.95 J	10
PCB201	8	0.43 J	0.28 J	42	1.43	1.43	0
PCB203/196	8	1.69	1.58 J	7	6.39	6.05	5
PCB205	8	ND U	ND U	NA	0.36 J	0.29 J	22
PCB206	9	0.76 J	0.65 J	17	4.39	3.87	12
PCB207	9	ND U	ND U	NA	0.58 J	0.55 J	5
PCB209	10	0.23 J	ND U	NA	1.10 J	1.04 J	6
SIS PCB103 % Rec		70	78		104	104	
SIS PCB14 % Rec		58	71		57	60	
SIS PCB34 % Rec		67	79		71	72	
SIS PCB112 % Rec		69	78		68	69	

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B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Field Sample Duplicate Data

Client Sample ID		SLN-I-5	SLN-I-5		SLN-T16-1	SLN-T16-1	
Battelle Sample ID		X4235	X4235DUP		X4390	X4390DUP	
Battelle Batch ID		00-037	00-037		00-049	00-049	
Batch Matrix		Sediment	Sediment		Sediment	Sediment	
Dilution Factor		1.67	1.67		1.67	1.67	
Sample Weight (g)/Volume (L)		5.72	5.36		9.72	10.80	
Reporting Units		ng/g, dry wt.	ng/g, dry wt.	RPD	ng/g, dry wt.	ng/g, dry wt.	RPD
	Cl#						
PCB1	1	28.73	40.96	35 &	0.36 J	0.35 J	4
PCB3	1	27.68	35.57	25	0.10 J	0.11 J	14
PCB4/10	2	257.50	387.31	40 &	2.15 J	1.83 J	16
PCB6	2	22.30	32.73	38 &	0.10 J	0.07 J	25
PCB7/9	2	6.16	8.74	35	0.07 J	ND U	NA
PCB8/5	2	201.30	296.65	38 &	0.41 J	0.54 J	27
PCB12/13	2	1.42 J	2.10	39	ND U	ND U	NA
PCB16/32	3	506.08 Y	765.20 Y	41 &	0.92	1.01	9
PCB17	3	228.22	335.13	38 &	0.41 J	0.48 J	16
PCB18	3	80.08	122.13	42 &	0.30 J	0.23 J	24
PCB19	3	314.63 Y	476.74 Y	41 &	1.10	0.99	10
PCB21	3	ND U	ND U	NA	ND U	ND U	NA
PCB22	3	5.06	6.90	31	ND U	ND U	NA
PCB24/27	3	182.30	278.89	42 &	0.37 J	0.37 J	1
PCB25	3	19.22	28.76	40 &	0.08 J	0.09 J	11
PCB26	3	43.68	65.25	40 &	0.19 J	0.18 J	6
PCB28	3	63.38	91.47	36 &	0.52 J	0.43 J	19
PCB29	3	ND U	ND U	NA	ND U	ND U	NA
PCB31	3	72.83	106.67	38 &	0.35 J	0.31 J	11
PCB33/20	3	11.03	15.18	32	0.08 J	ND U	NA
PCB40	4	4.82	7.32	41	1.75	ND U	NA
PCB41/64/71	4	78.93	120.11	41 &	0.59 J	0.47 J	22
PCB42	4	23.38	35.24	40 &	0.23 J	0.14 J	51
PCB43	4	ND U	ND U	NA	ND U	ND U	NA
PCB44	4	49.32	74.53	41 &	0.47 J	0.36 J	27
PCB45	4	15.98	24.41	42 &	ND U	0.10 J	NA
PCB46	4	4.60	6.85	39	ND U	ND U	NA
PCB47/75	4	277.15	416.03	40 &	0.59 J	0.63 J	6
PCB48	4	ND U	ND U	NA	0.16 J	0.11 J	35
PCB49	4	254.02	386.70	41 &	0.77 J	0.78 J	1
PCB51	4	173.11	264.90	42 &	0.30 J	0.37 J	19
PCB52	4	255.21	387.69	41 &	0.99 J	0.94	5
PCB53	4	258.37 Y	393.30	41 &	0.50 J	0.49 J	3
PCB56/60	4	13.02	19.01	37 &	0.29 J	0.26 J	12
PCB59	4	6.68	10.07	40	0.06 J	0.07 J	3
PCB63	4	4.27	6.34	39	0.14 J	0.10 J	28
PCB66	4	61.00	89.27	38 &	0.73 J	0.67 J	9
PCB70/76	4	43.54	62.47	36 &	0.51 J	0.40 J	24
PCB74	4	37.62	55.36	38 &	0.42 J	0.37 J	12
PCB82	5	1.98	3.00	41	0.11 J	ND U	NA
PCB83	5	4.73	6.78	36	ND U	ND U	NA
PCB84	5	27.40	42.09	42 &	0.21 J	0.19 J	13
PCB85	5	8.22	11.23	31	0.18 J	0.14 J	23
PCB87/115	5	5.11	5.87	14	0.34 J	0.28 J	18
PCB89	5	ND U	ND U	NA	ND U	ND U	NA
PCB91	5	67.15	101.73	41 &	0.19 J	0.21 J	10
PCB92	5	26.54	40.04	41 &	0.16 J	0.16 J	1
PCB95	5	155.64	236.04	41 &	0.61 J	0.57 J	7
PCB97	5	11.53	17.20	39 &	0.25 J	0.20 J	21
PCB99	5	65.86	99.98	41 &	0.41 J	0.36 J	12
PCB100	5	14.91	23.21	44 &	ND U	ND U	NA
PCB101/90	5	78.48	117.16	40 &	0.66 J	0.60 J	10
PCB105	5	4.18	5.45	26	0.22 J	0.18 J	21
PCB107	5	6.53	8.70	28	0.06 J	ND U	NA
PCB110	5	204.98	310.67	41 &	0.95 J	0.98	3
PCB114	5	0.55 J	0.91 J	49	ND U	ND U	NA
PCB118	5	67.27	98.59	38 &	0.59 J	0.61 J	3
PCB119	5	16.45	24.89	41 &	ND U	ND U	NA
PCB124	5	0.41 J	0.55 J	29	ND U	ND U	NA
PCB128	6	7.82	12.45	46	0.11 J	0.15 J	26
PCB129	6	0.79 J	ND U	NA	ND U	ND U	NA

WA 4-30, Sangamo-Weston
Field Sample Duplicate Data

Client Sample ID		SLN-I-5	SLN-I-5		SLN-T16-1	SLN-T16-1	
Battelle Sample ID		X4235	X4235DUP		X4390	X4390DUP	
Battelle Batch ID		00-037	00-037		00-049	00-049	
Batch Matrix		Sediment	Sediment		Sediment	Sediment	
Dilution Factor		1.67	1.67		1.67	1.67	
Sample Weight (g)/Volume (L)		5.72	5.36		9.72	10.80	
Reporting Units		ng/g, dry wt.	ng/g, dry wt.	RPD	ng/g, dry wt.	ng/g, dry wt.	RPD
	Cl#						
PCB130	6	4.73	7.46	45	ND U	ND U	NA
PCB131	6	ND U	ND U	NA	ND U	ND U	NA
PCB132	6	17.88	25.82	36 &	0.27 J	0.23 J	16
PCB134	6	4.05	5.65	33	ND U	ND U	NA
PCB135/144	6	25.86	39.64	42 &	0.17 J	0.15 J	9
PCB136	6	19.14	28.90	41 &	0.11 J	0.09 J	22
PCB137	6	1.50 J	2.37	45	ND U	ND U	NA
PCB138/160/163	6	78.01	115.90	39 &	0.54 J	0.63 J	16
PCB141	6	2.30	3.37	38	0.11 J	0.09 J	22
PCB146	6	24.99	37.23	39 &	0.11 J	0.11 J	7
PCB149	6	108.86	163.35	40 &	0.43 J	0.44 J	2
PCB151	6	23.45	36.02	42 &	0.12 J	0.11 J	12
PCB153	6	99.19	146.79	39 &	0.40 J	0.45 J	12
PCB156	6	2.85	4.58	47	0.06 J	0.06 J	14
PCB158	6	2.85	4.51	45	ND U	ND U	NA
PCB167	6	2.20	3.24	38	ND U	0.05 J	NA
PCB169	6	ND U	ND U	NA	ND U	ND U	NA
PCB170/190	7	7.67	11.59	41 &	0.08 J	ND U	NA
PCB171	7	3.18	4.80	41	ND U	ND U	NA
PCB172	7	1.42 J	2.36	50	ND U	ND U	NA
PCB173	7	ND U	ND U	NA	ND U	ND U	NA
PCB174	7	7.97	12.42	44	ND U	0.08 J	NA
PCB175	7	0.41 J	0.76 J	60	ND U	ND U	NA
PCB176	7	1.72	2.54	38	ND U	ND U	NA
PCB177	7	10.92	16.61	41 &	ND U	ND U	NA
PCB178	7	5.02	8.71	54	ND U	ND U	NA
PCB180	7	12.97	19.37	40 &	0.09 J	0.09 J	4
PCB183	7	3.73	5.99	47	ND U	ND U	NA
PCB184	7	0.41 J	0.37 J	10	0.18 J	0.17 J	6
PCB185	7	ND U	0.68 J	NA	ND U	ND U	NA
PCB187/182	7	22.47	35.72	46 &	ND U	0.08 J	NA
PCB189	7	0.38 J	0.63 J	49	ND U	ND U	NA
PCB191	7	ND U	ND U	NA	ND U	ND U	NA
PCB193	7	1.52	2.66	55	ND U	ND U	NA
PCB194	8	2.67	4.12	43	ND U	ND U	NA
PCB195	8	1.04 J	1.90	58	ND U	ND U	NA
PCB197	8	0:39 J	0.43 J	12	ND U	ND U	NA
PCB198	8	ND U	ND U	NA	ND U	ND U	NA
PCB199	8	4.71	6.85	37	ND U	ND U	NA
PCB200	8	0.56 J	0.89 J	44	ND U	ND U	NA
PCB201	8	0.87 J	1.15 J	28	ND U	ND U	NA
PCB203/196	8	3.02	4.77	45	ND U	ND U	NA
PCB205	8	ND U	ND U	NA	ND U	ND U	NA
PCB206	9	2.05	2.82	32	ND U	ND U	NA
PCB207	9	0.38 J	0.51 J	29	ND U	ND U	NA
PCB209	10	0.73 J	1.06 J	37	ND U	ND U	NA
SIS PCB103 % Rec		98	105		59	70	
SIS PCB14 % Rec		73	70		56	65	
SIS PCB34 % Rec		90	95		58	68	
SIS PCB112 % Rec		81	82		62	72	

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

WA 4-30, Sangamo-Weston
Field Sample Duplicate Data

Client Sample ID		SNL-Q-5	SNL-Q-5		SLN-W7-1	SLN-W7-1	
Battelle Sample ID		X4398	X4398DUP		X4560	X4560DUP	
Battelle Batch ID		00-050	00-050		00-061	00-061	
Batch Matrix		Sediment	Sediment		Sediment	Sediment	
Dilution Factor		1.67	1.67		1.67	1.67	
Sample Weight (g)/Volume (L)		12.58	12.47		9.08	9.19	
Reporting Units		ng/g, dry wt.	ng/g, dry wt.	RPD	ng/g, dry wt.	ng/g, dry wt.	RPD
	Cl#						
PCB1	1	2.98	2.70	10	12.11	14.31	17
PCB3	1	0.40 J	0.32 J	23	1.04 J	1.05 J	1
PCB4/10	2	9.22	9.96	8	64.38	67.42	5
PCB6	2	0.31 J	0.21 J	36	1.86	1.83	2
PCB7/9	2	0.06 J	0.05 J	12	0.74 J	0.72 J	2
PCB8/5	2	3.13	2.60	18	19.61	19.38	1
PCB12/13	2	0.08 J	ND U	NA	0.33 J	0.33 J	1
PCB16/32	3	4.39	4.91	11	39.17	35.51	10
PCB17	3	1.57	1.40	12	21.33	18.54	14
PCB18	3	0.95	0.76 J	21	8.94	8.41	6
PCB19	3	4.54	4.68	3	36.73	35.42	4
PCB21	3	ND U	ND U	NA	ND U	ND U	NA
PCB22	3	0.27 J	0.15 J	54	3.06	2.85	7
PCB24/27	3	1.54	1.74	12	12.17	11.63	5
PCB25	3	0.23 J	0.19 J	17	2.50	2.22	12
PCB26	3	0.68	0.54 J	24	6.63	5.96	10
PCB28	3	1.29	0.95	31	18.19	16.89	7
PCB29	3	ND U	ND U	NA	ND U	ND U	NA
PCB31	3	0.94	0.73 J	25	13.10	12.06	8
PCB33/20	3	0.17 J	0.11 J	46	2.48	2.34	6
PCB40	4	0.22 J	0.20 J	7	4.40	3.84	13
PCB41/64/71	4	1.34	1.12	17	29.00	25.89	11
PCB42	4	0.53 J	0.42 J	24	10.61	9.51	11
PCB43	4	0.17 J	0.08 J	69	1.77	1.77	0
PCB44	4	1.14	0.98	14	24.82	21.63	14
PCB45	4	0.32 J	0.32 J	1	5.40	4.94	9
PCB46	4	0.15 J	0.13 J	9	2.01	1.89	6
PCB47/75	4	1.92	1.78	7	26.32	24.66	6
PCB48	4	0.27 J	0.30 J	9	6.66	5.33	22
PCB49	4	2.22	1.89	16	31.85	28.12	12
PCB51	4	1.16	1.48	24	10.73	9.89	8
PCB52	4	2.90	2.70	7	40.50	36.04	12
PCB53	4	1.86	2.03	9	16.38	14.94	9
PCB56/60	4	0.69 J	0.46 J	39	20.06	17.34	15
PCB59	4	0.15 J	0.11 J	27	2.20	2.06	6
PCB63	4	0.20 J	0.14 J	35	2.09	1.84	13
PCB66	4	1.32	1.02	26	33.22	29.43	12
PCB70/76	4	1.15	0.83	33	29.86	26.18	13
PCB74	4	0.87	0.62 J	33	20.26	17.41	15
PCB82	5	0.18 J	0.18 J	1	4.88	4.05	18
PCB83	5	0.38 J	0.38 J	1	2.43	2.18	11
PCB84	5	0.60 J	0.47 J	24	8.98	7.68	16
PCB85	5	0.37 J	0.25 J	39	7.34	6.24	16
PCB87/115	5	0.65 J	0.54 J	17	15.16	13.55	11
PCB89	5	ND U	ND U	NA	ND U	ND U	NA
PCB91	5	0.66	0.67 J	0	8.26	7.29	12
PCB92	5	0.47 J	0.46 J	2	7.23	6.27	14
PCB95	5	1.88	1.69	10	28.36	24.42	15
PCB97	5	0.52 J	0.37 J	35	11.10	9.50	16
PCB99	5	1.10	0.83	27	19.61	16.78	16
PCB100	5	0.12 J	0.13 J	9	0.89 J	0.75 J	18
PCB101/90	5	1.69	1.31	25	34.49	29.60	15
PCB105	5	0.39 J	0.22 J	53	12.39	9.93	22
PCB107	5	0.15	ND U	NA	2.58	2.24	14
PCB110	5	3.04	2.32	27	47.36	40.01	17
PCB114	5	0.06 J	ND U	NA	0.75 J	0.63 J	19
PCB118	5	1.53	1.04	38	33.18	27.69	18
PCB119	5	0.13 J	0.11 J	15	1.56	1.36	14
PCB124	5	0.04 J	ND U	NA	0.93	0.80 J	15
PCB128	6	0.36 J	0.21 J	53	6.06	4.98	19
PCB129	6	0.09 J	ND U	NA	1.39	1.04	29

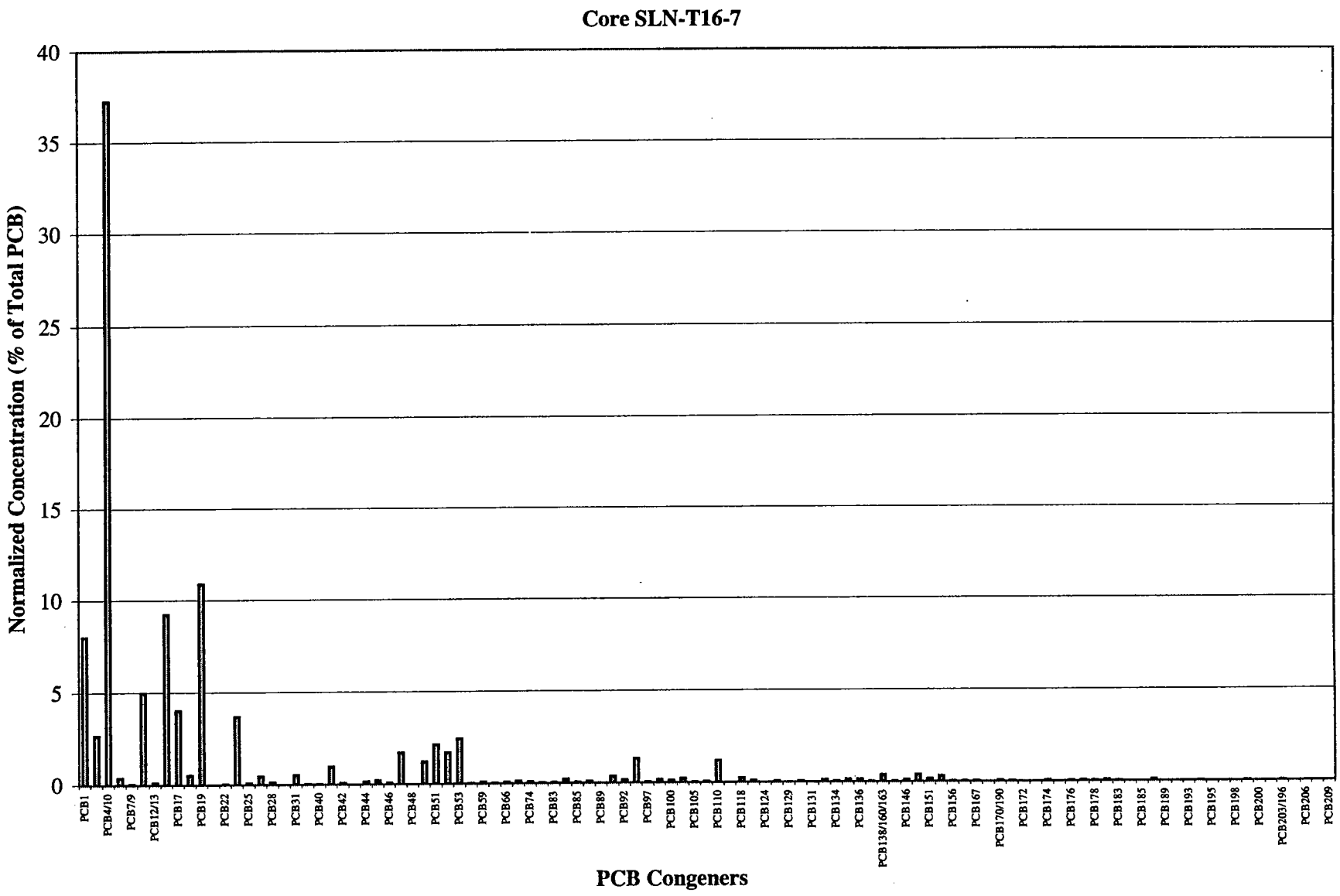
WA 4-30, Sangamo-Weston
Field Sample Duplicate Data

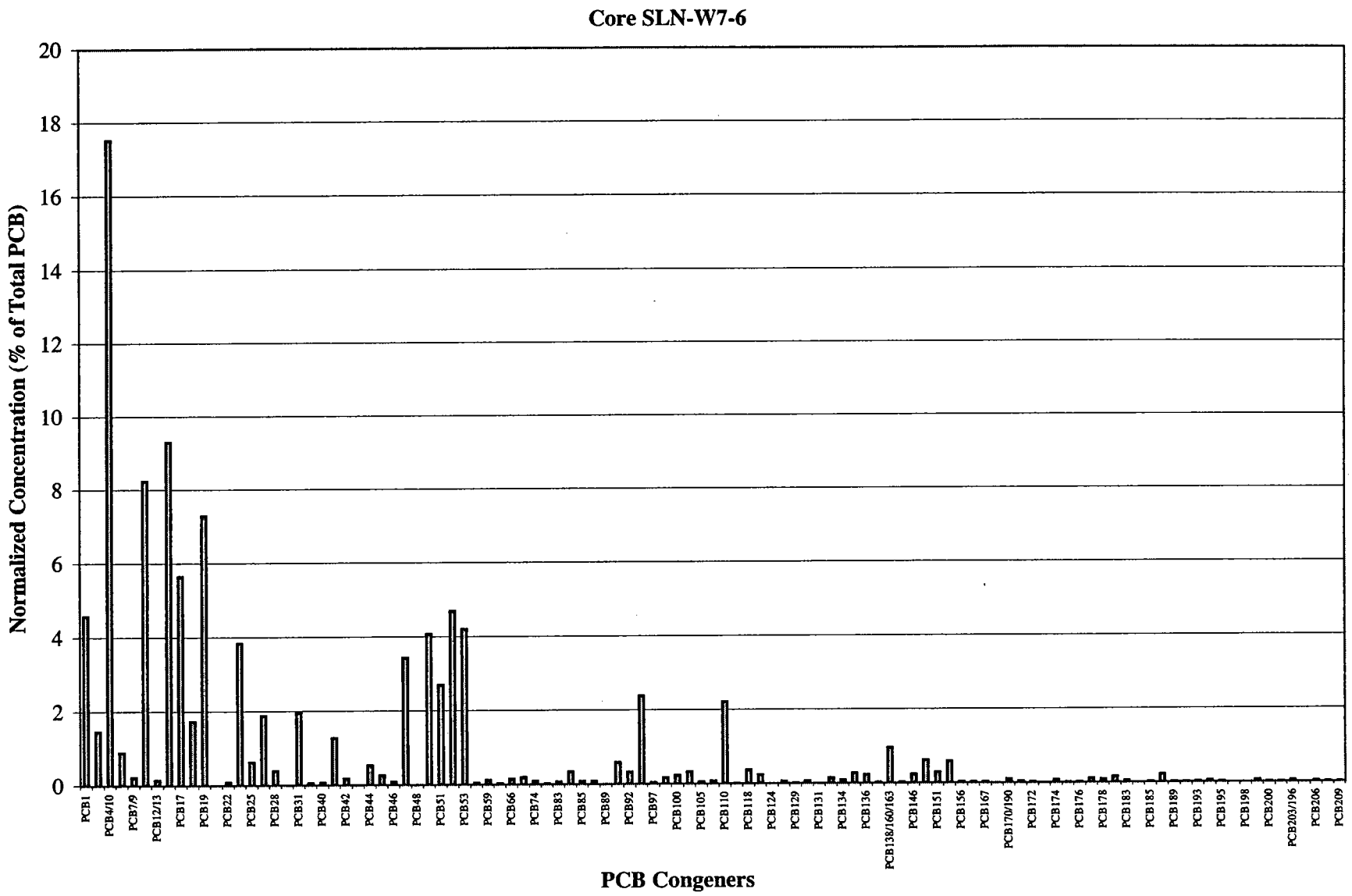
Client Sample ID		SNL-Q-5	SNL-Q-5		SLN-W7-1	SLN-W7-1	
Battelle Sample ID		X4398	X4398DUP		X4560	X4560DUP	
Battelle Batch ID		00-050	00-050		00-061	00-061	
Batch Matrix		Sediment	Sediment		Sediment	Sediment	
Dilution Factor		1.67	1.67		1.67	1.67	
Sample Weight (g)/Volume (L)		12.58	12.47		9.08	9.19	
Reporting Units		ng/g, dry wt.	ng/g, dry wt.	RPD	ng/g, dry wt.	ng/g, dry wt.	RPD
	Cl#						
PCB130	6	0.15 J	0.10 J	43	1.96	1.63	18
PCB131	6	ND U	ND U	NA	0.32 J	0.29 J	10
PCB132	6	0.70 J	0.45 J	43	9.77	8.38	15
PCB134	6	0.16 J	0.12 J	27	1.64	1.44	13
PCB135/144	6	0.41 J	0.34 J	18	4.49	4.01	11
PCB136	6	0.34 J	0.25 J	33	3.44	2.99	14
PCB137	6	0.13 J	0.08 J	46	1.65	1.35	20
PCB138/160/163	6	1.95	1.50	26	33.61	27.85	19
PCB141	6	0.22 J	0.14 J	44	3.40	2.81	19
PCB146	6	0.36 J	0.25 J	37	4.09	3.42	18
PCB149	6	1.62	1.26	25	21.09	17.96	16
PCB151	6	0.31 J	0.28 J	10	4.28	3.70	14
PCB153	6	1.34	1.01	27	21.58	18.15	17
PCB156	6	0.18 J	0.08 J	75	2.82	2.51	12
PCB158	6	0.19 J	0.11 J	55	2.83	2.25	23
PCB167	6	0.13 J	0.10 J	29	1.59	1.21	27
PCB169	6	ND U	ND U	NA	ND U	ND U	NA
PCB170/190	7	0.21 J	0.12 J	51	2.86	2.43	16
PCB171	7	0.08 J	ND U	NA	0.85 J	0.72 J	16
PCB172	7	0.04 J	ND U	NA	0.44 J	0.35 J	22
PCB173	7	ND U	ND U	NA	0.09 J	0.08 J	8
PCB174	7	0.22 J	0.19 J	13	2.92	2.20	28
PCB175	7	ND U	ND U	NA	0.12 J	0.09 J	33
PCB176	7	0.04 J	ND U	NA	0.31 J	0.25 J	19
PCB177	7	0.21 J	0.16 J	27	1.69	1.37	21
PCB178	7	0.06 J	0.06 J	5	0.51 J	0.42 J	19
PCB180	7	0.30 J	0.19 J	46	4.10	3.35	20
PCB183	7	0.12 J	0.06 J	61	1.18	0.96 J	21
PCB184	7	0.15 J	0.10 J	44	0.19 J	0.18 J	4
PCB185	7	ND U	ND U	NA	0.19 J	0.16 J	19
PCB187/182	7	0.30 J	0.20 J	39	2.66	2.30	15
PCB189	7	ND U	ND U	NA	0.15 J	0.13 J	14
PCB191	7	ND U	ND U	NA	0.12 J	0.10 J	17
PCB193	7	ND U	ND U	NA	0.26 J	0.22 J	15
PCB194	8	0.09 J	ND U	NA	0.41 J	0.34 J	19
PCB195	8	0.09 J	ND U	NA	0.21 J	0.15 J	32
PCB197	8	ND U	ND U	NA	ND U	0.03 J	NA
PCB198	8	ND U	ND U	NA	ND U	ND U	NA
PCB199	8	0.10 J	ND U	NA	0.58 J	0.47 J	21
PCB200	8	ND U	ND U	NA	0.13 J	0.08 J	53
PCB201	8	ND U	ND U	NA	0.10 J	0.11 J	8
PCB203/196	8	0.11 J	ND U	NA	0.50 J	0.44 J	13
PCB205	8	ND U	ND U	NA	ND U	ND U	NA
PCB206	9	0.08 J	ND U	NA	0.28 J	0.20 J	35
PCB207	9	ND U	ND U	NA	ND U	ND U	NA
PCB209	10	0.05 J	ND U	NA	0.07 J	0.09 J	17
SIS PCB103 % Rec		65	63		66	66	
SIS PCB14 % Rec		59	55		56	62	
SIS PCB34 % Rec		62	58		63	67	
SIS PCB112 % Rec		68	66		66	68	

J - Detected, but below the sample-specific reporting limit (RL)
ME - Estimate; significant matrix interference
MI - Significant matrix interference - value could not be determined or estimated
B - Analyte detected at level greater than 3 x RL in the PB
U - Analyte not detected. ND put in value field
& - QC value outside the accuracy or precision data quality objective.
Y - Peak area of target analyte was higher than that of the highest calibration standard

APPENDIX F

PCB COMPOSITION PLOTS FOR INDIVIDUAL CONGENERS FOR ALL SEDIMENT SAMPLES AND NINE AROCLOR FORMULATIONS


Core SLN-T16-7
Normalized Concentration (% of Total PCB)
40
35
30
25
20
15
10
5
0
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners


Core SLN-W7-6
Normalized Concentration (% of Total PCB)
0
2
4
6
8
10
12
14
16
18
20
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
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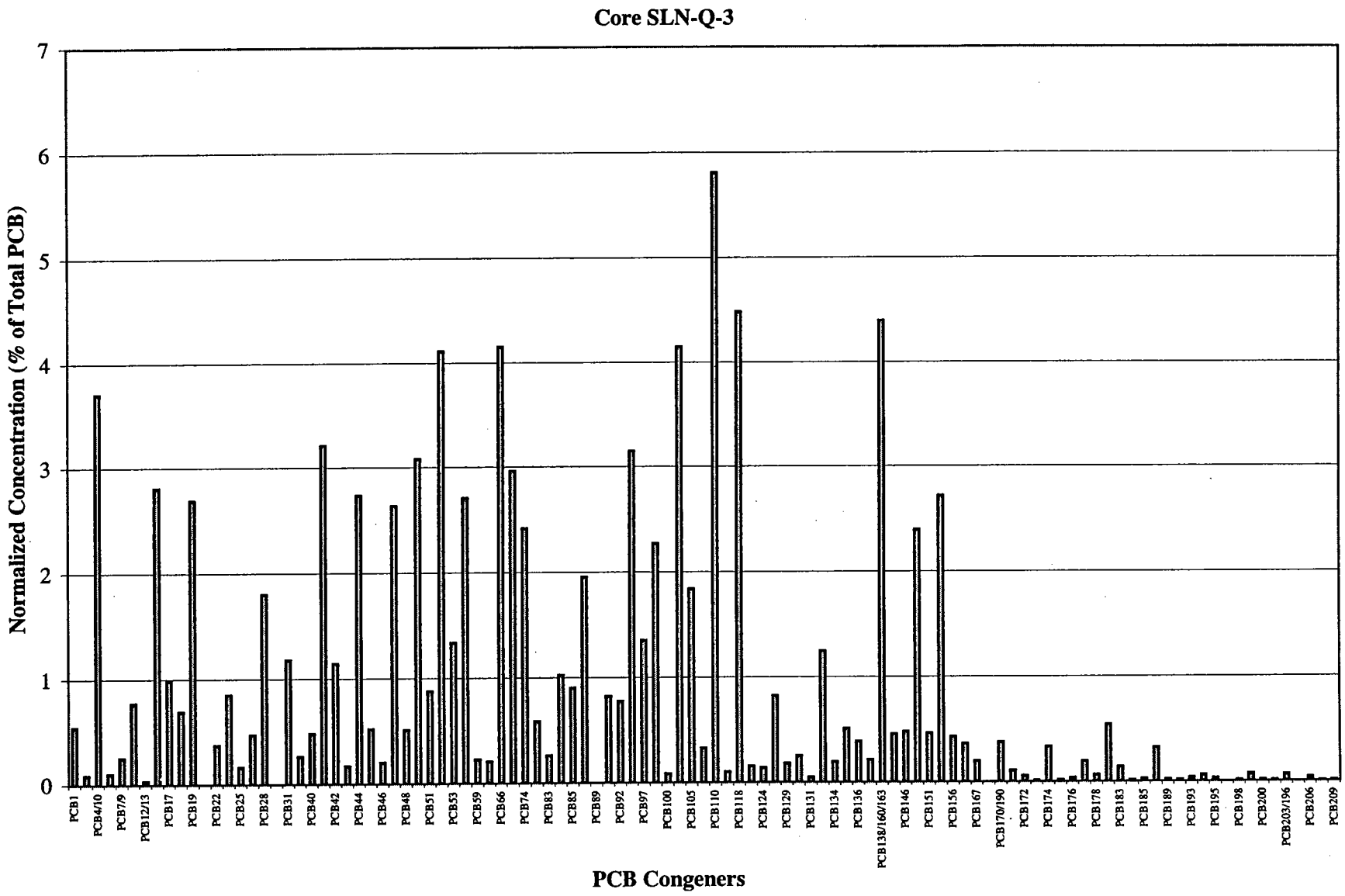
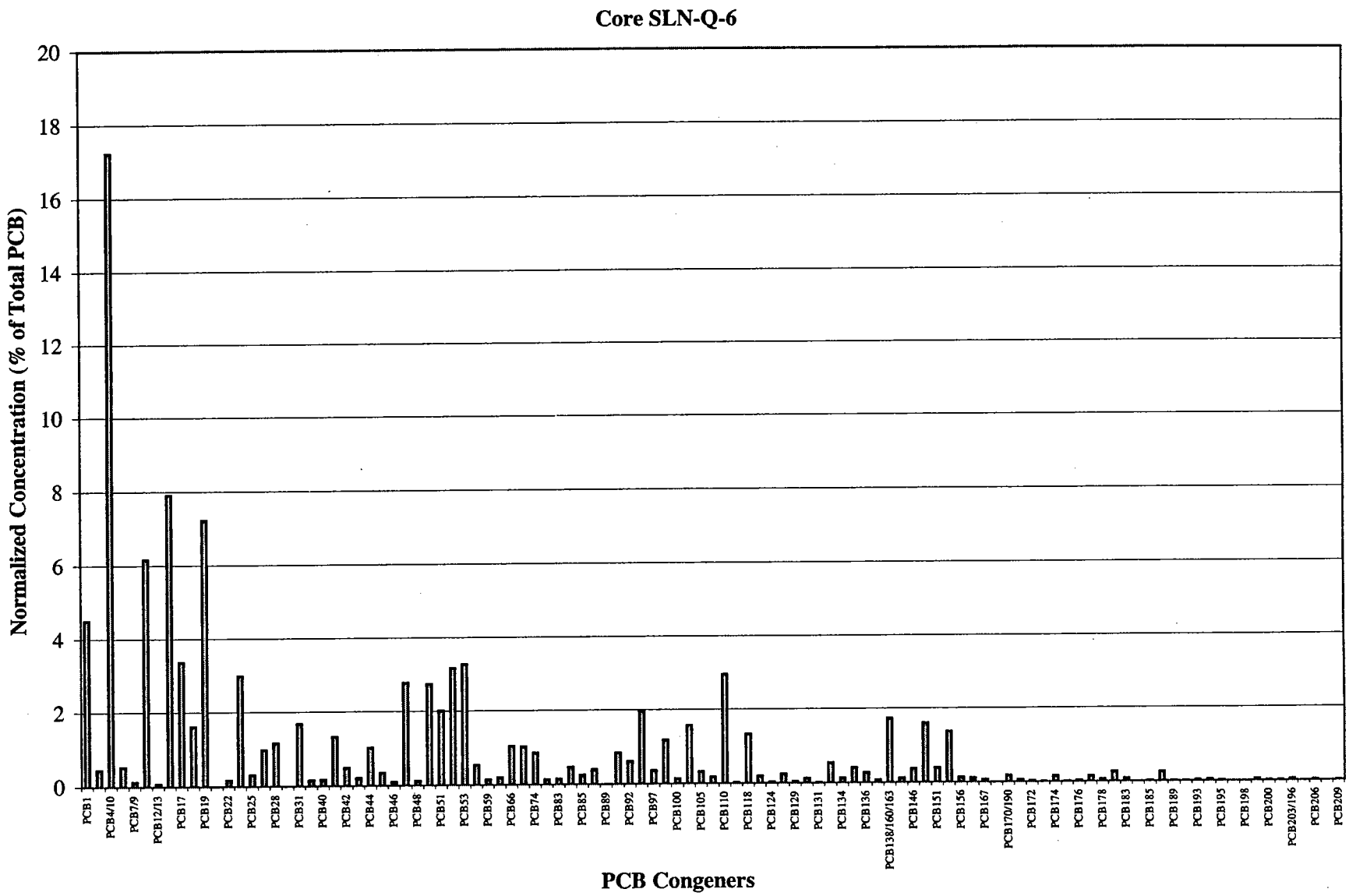
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners


Core SLN-Q-3
Normalized Concentration (% of Total PCB)
0
1
2
3
4
5
6
7
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners


Core SLN-Q-6
Normalized Concentration (% of Total PCB)
20
18
16
14
12
10
8
6
4
2
0
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
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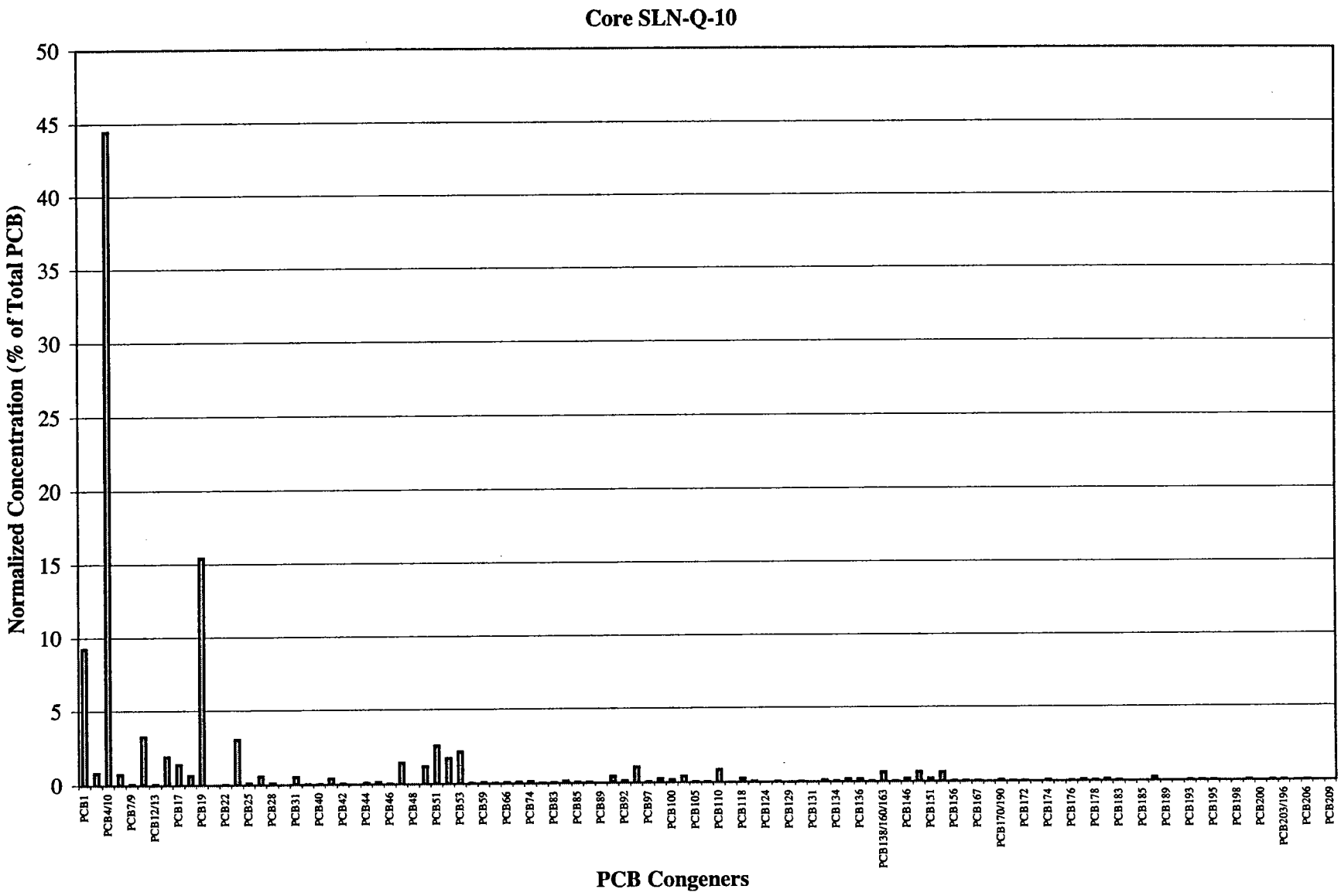
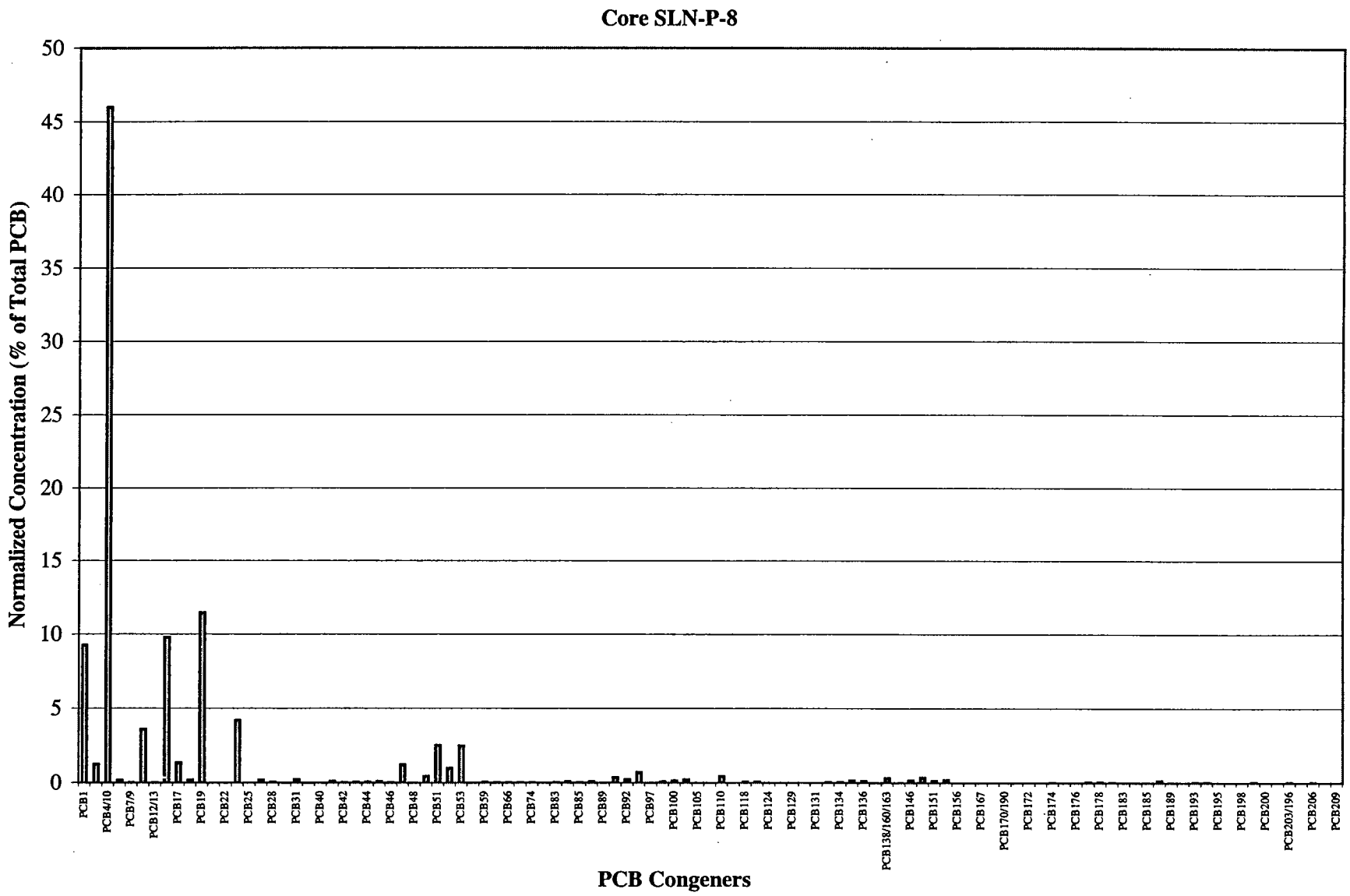
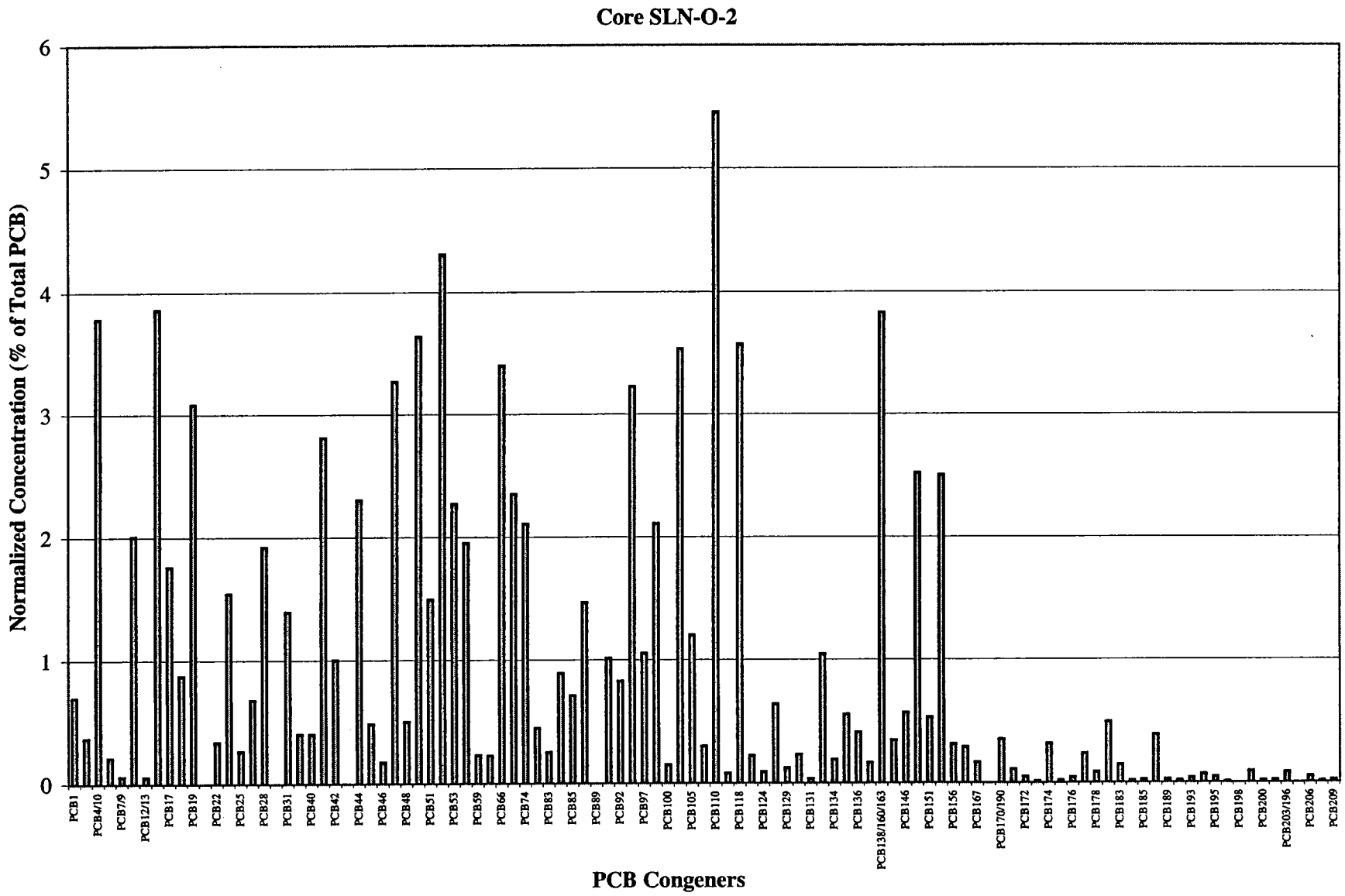
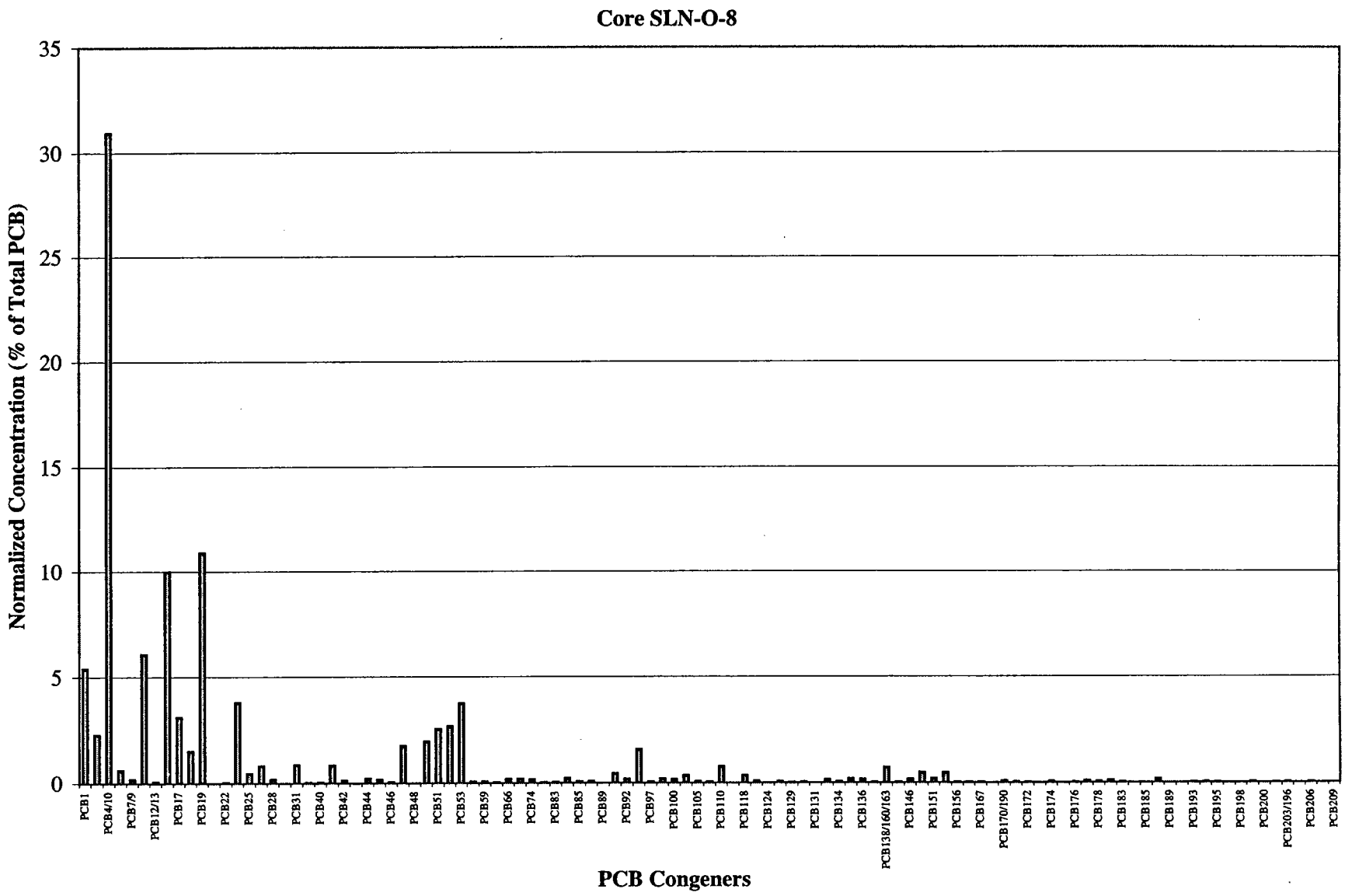
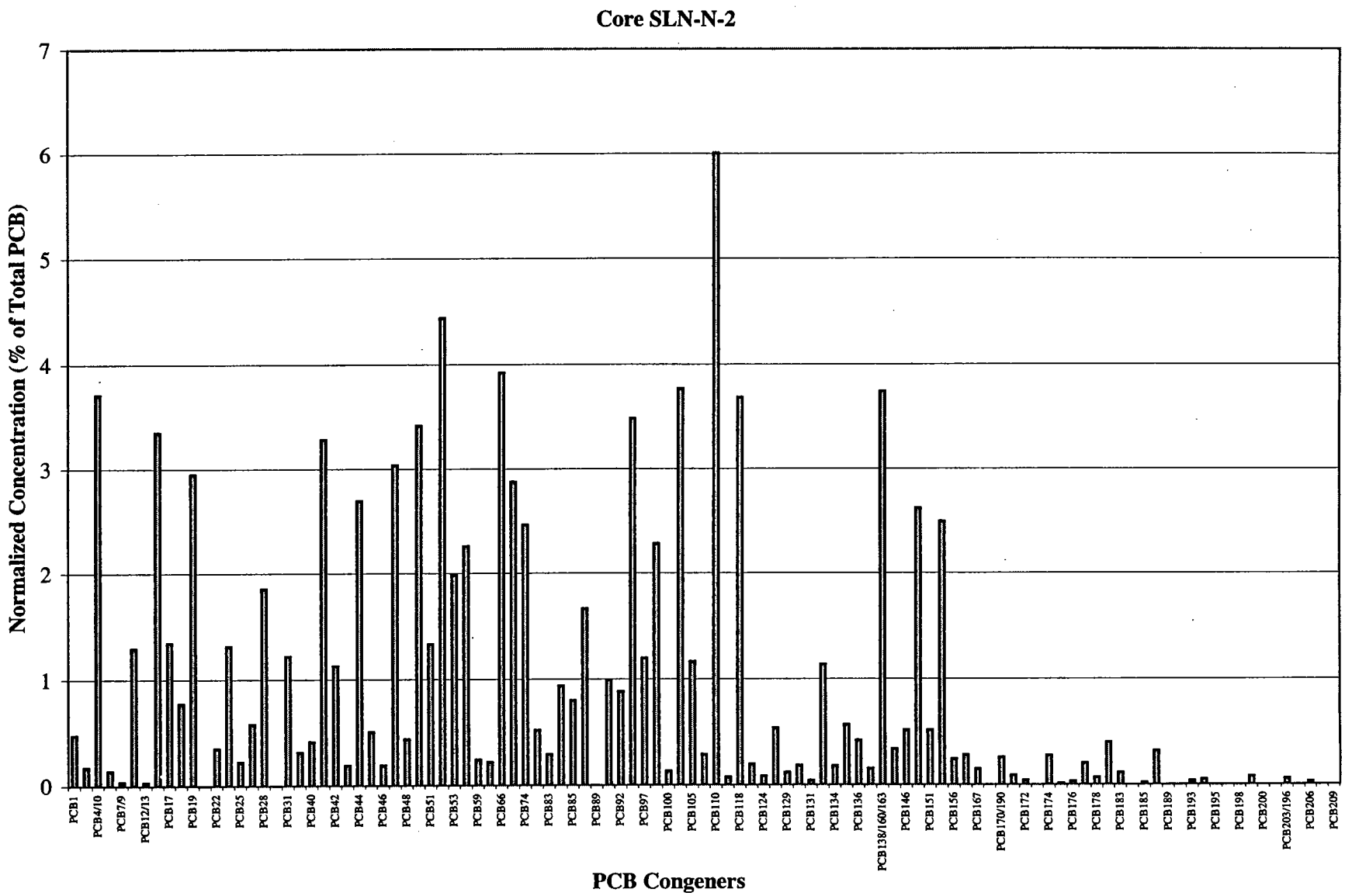
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

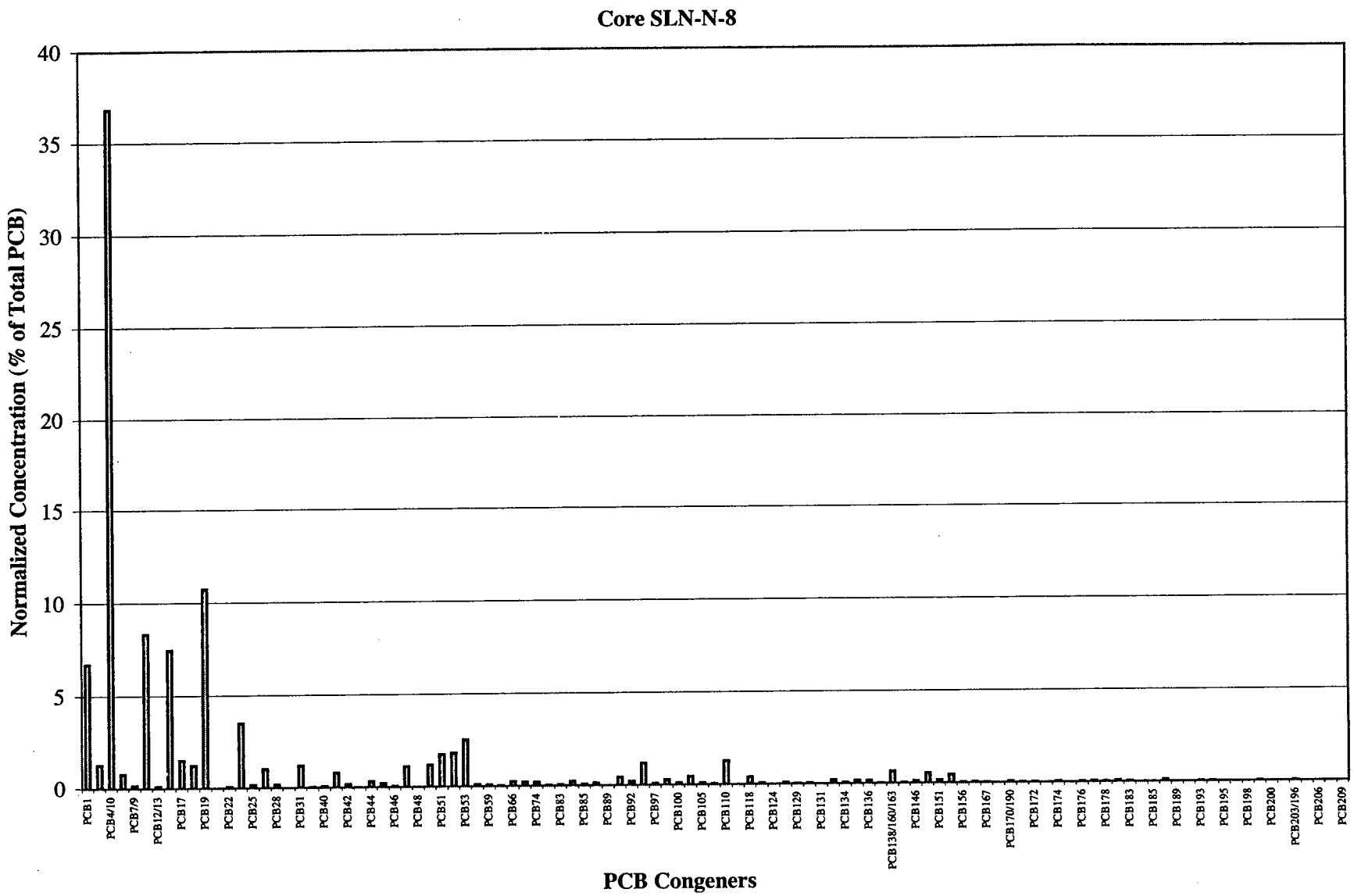

Core SLN-Q-10
Normalized Concentration (% of Total PCB)
50
45
40
35
30
25
20
15
10
5
0
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

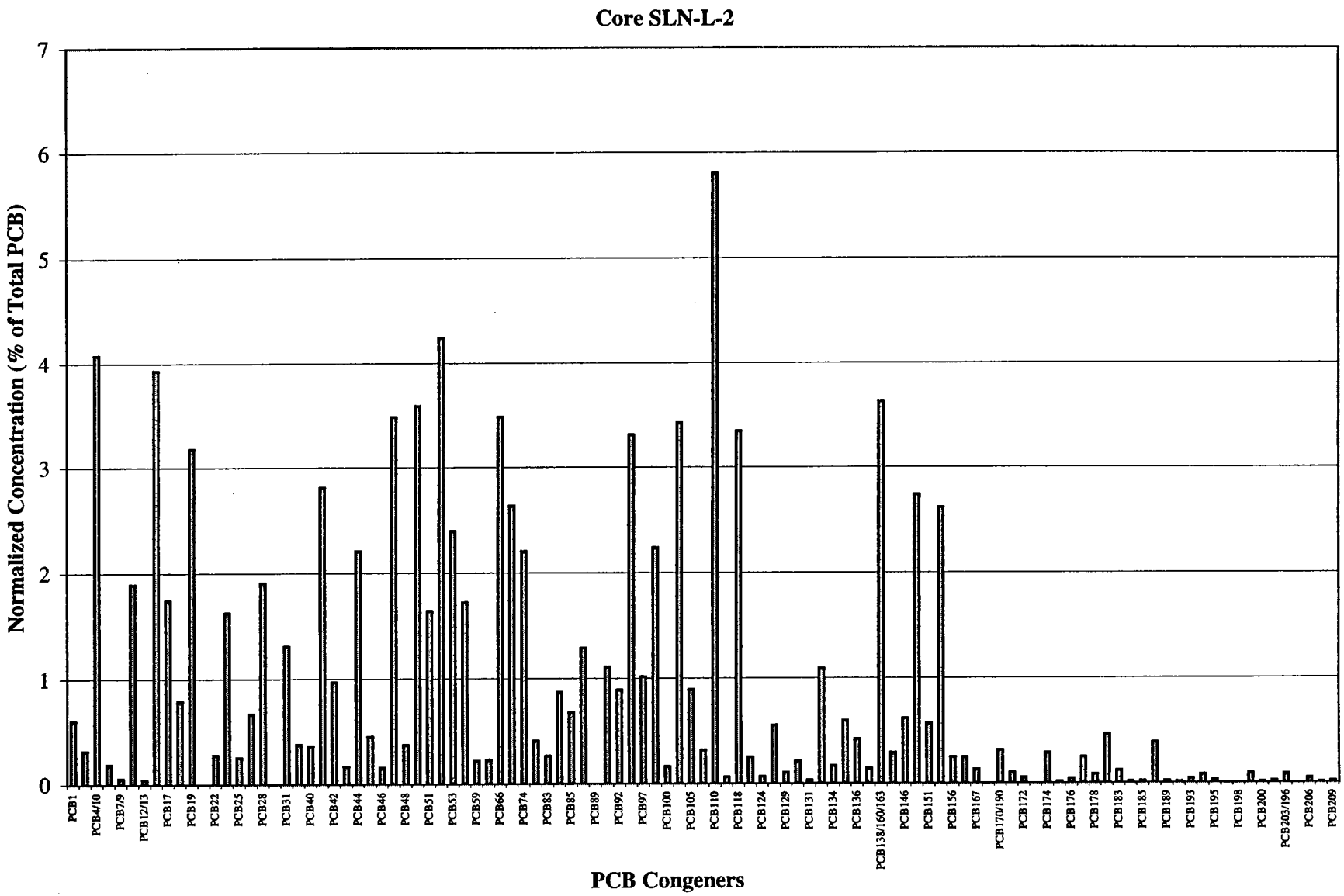

Core SLN-P-8
Normalized Concentration (% of Total PCB)
50
45
40
35
30
25
20
15
10
5
0
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

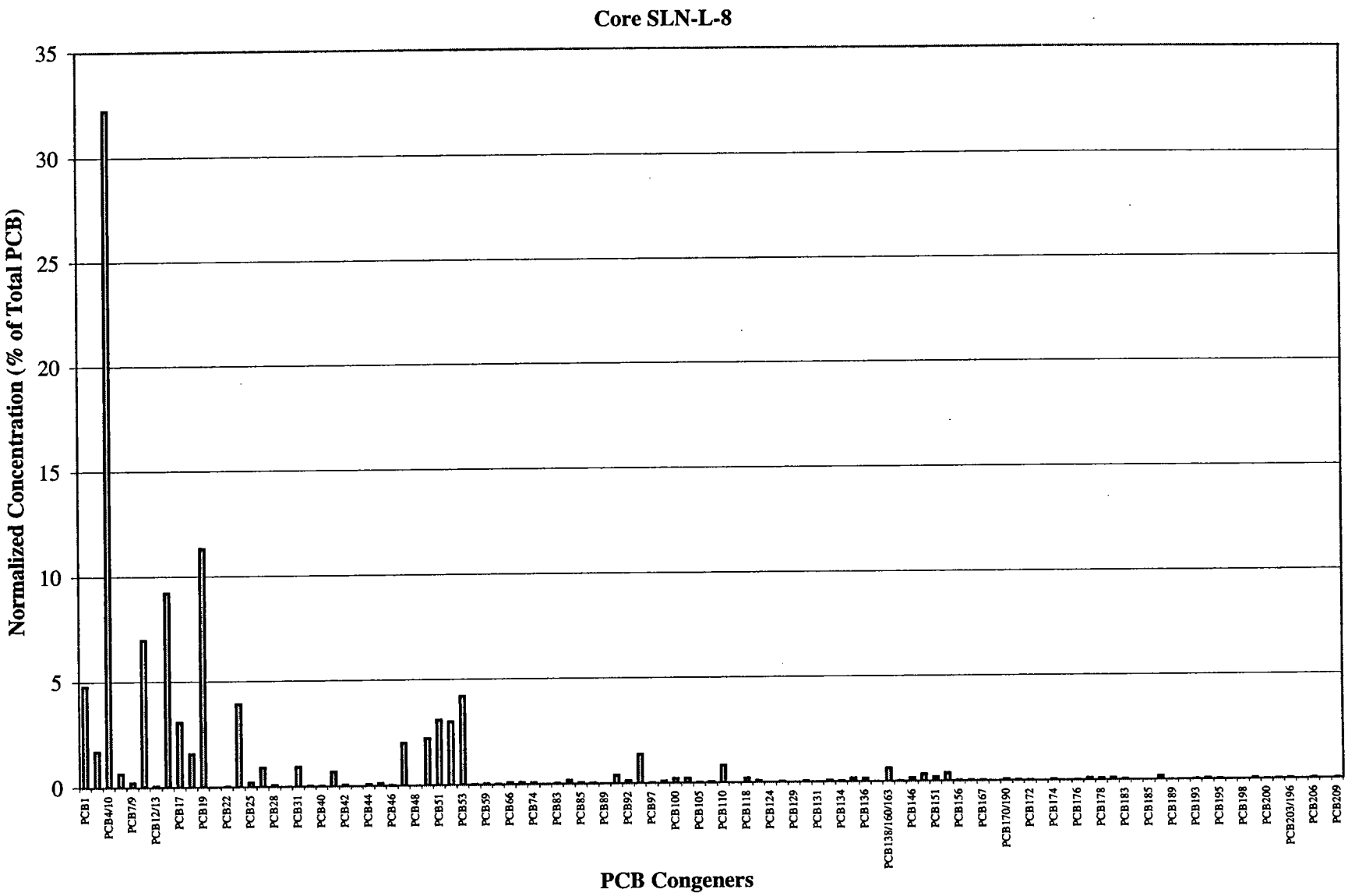

Core SLN-O-2
Normalized Concentration (% of Total PCB)
0
1
2
3
4
5
6
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

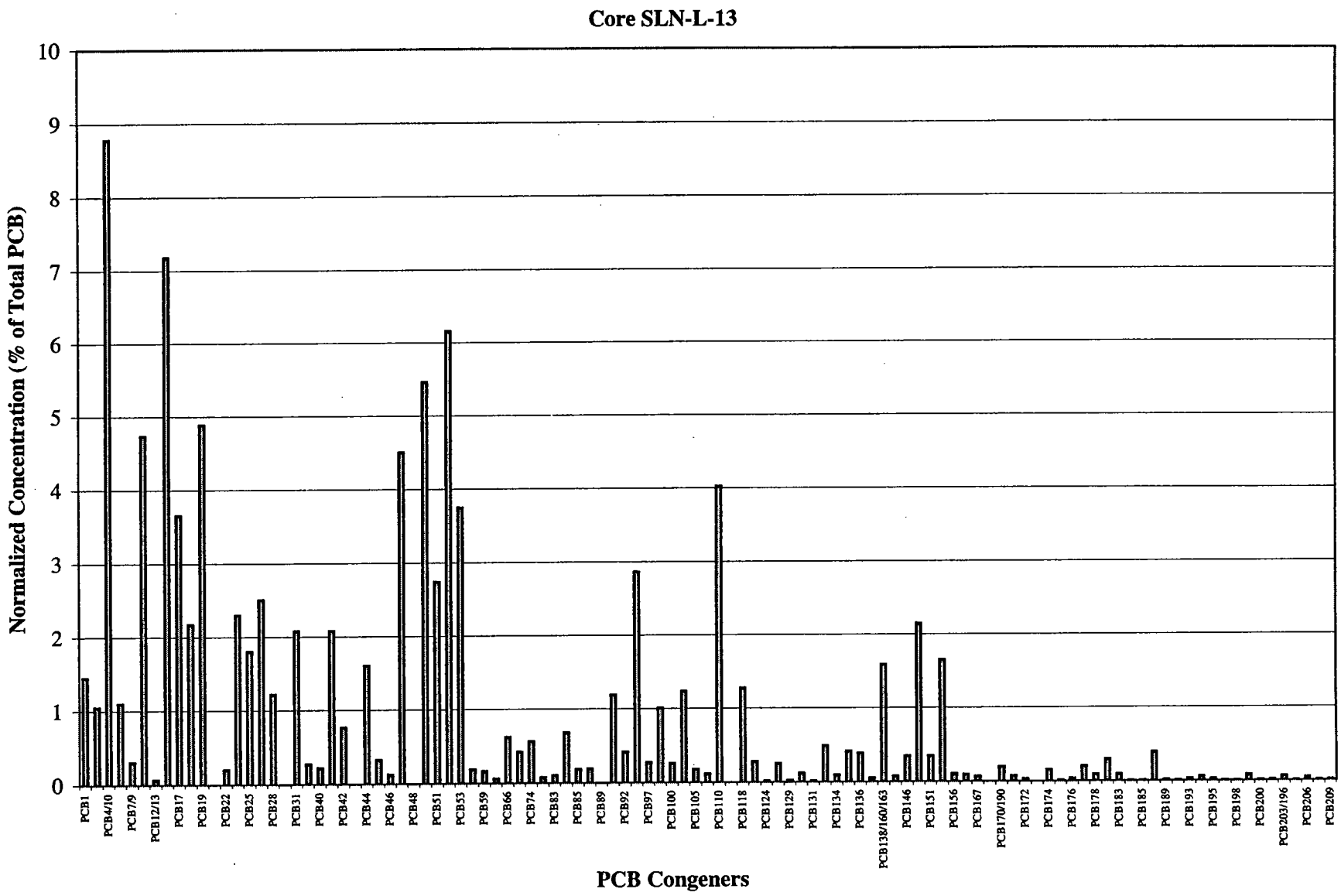

Core SLN-O-8
Normalized Concentration (% of Total PCB)
35
30
25
20
15
10
5
0
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

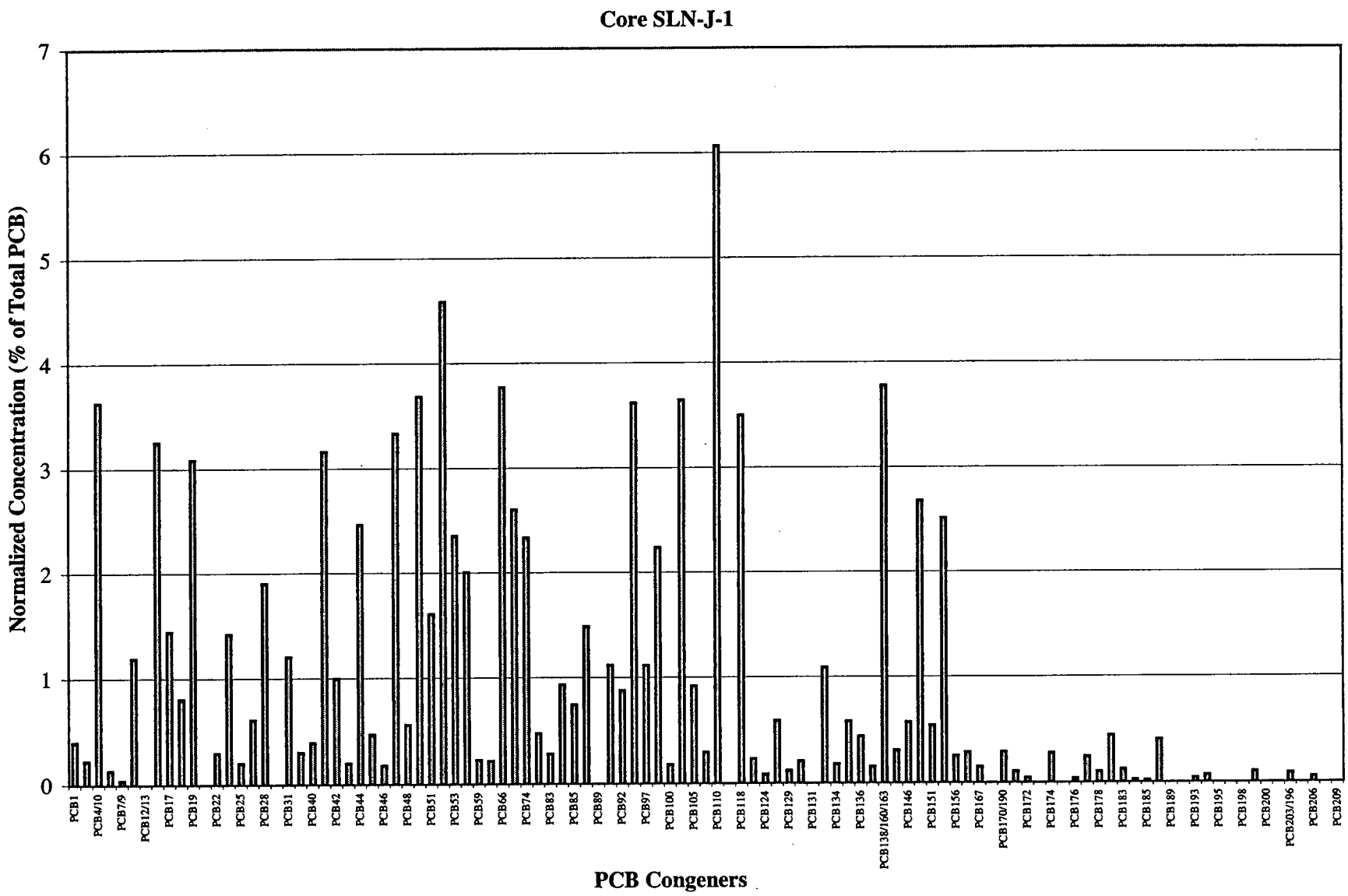

Core SLN-N-2
Normalized Concentration (% of Total PCB)
0
1
2
3
4
5
6
7
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

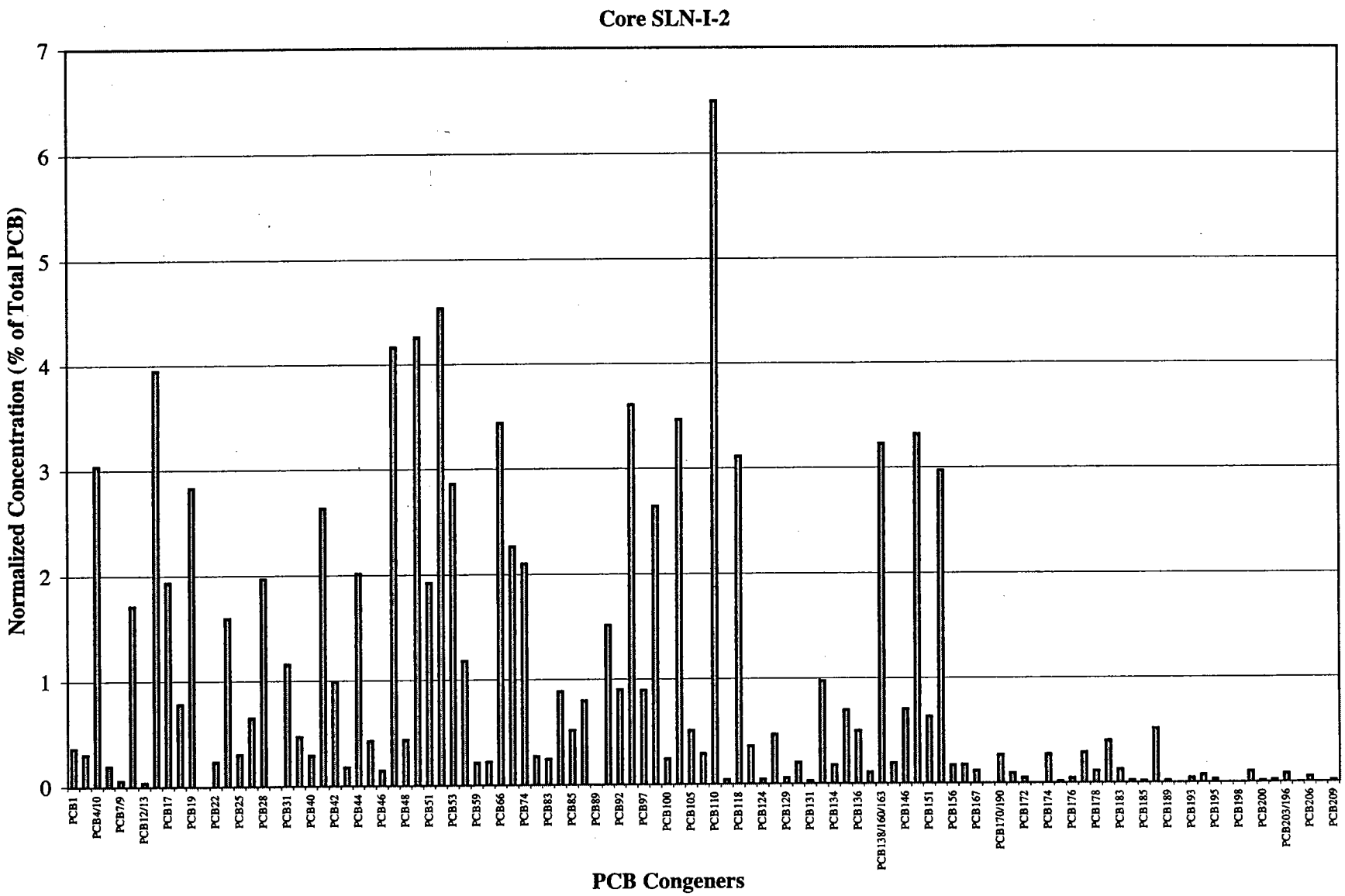

Core SLN-N-8
Normalized Concentration (% of Total PCB)
40
35
30
25
20
15
10
5
0
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

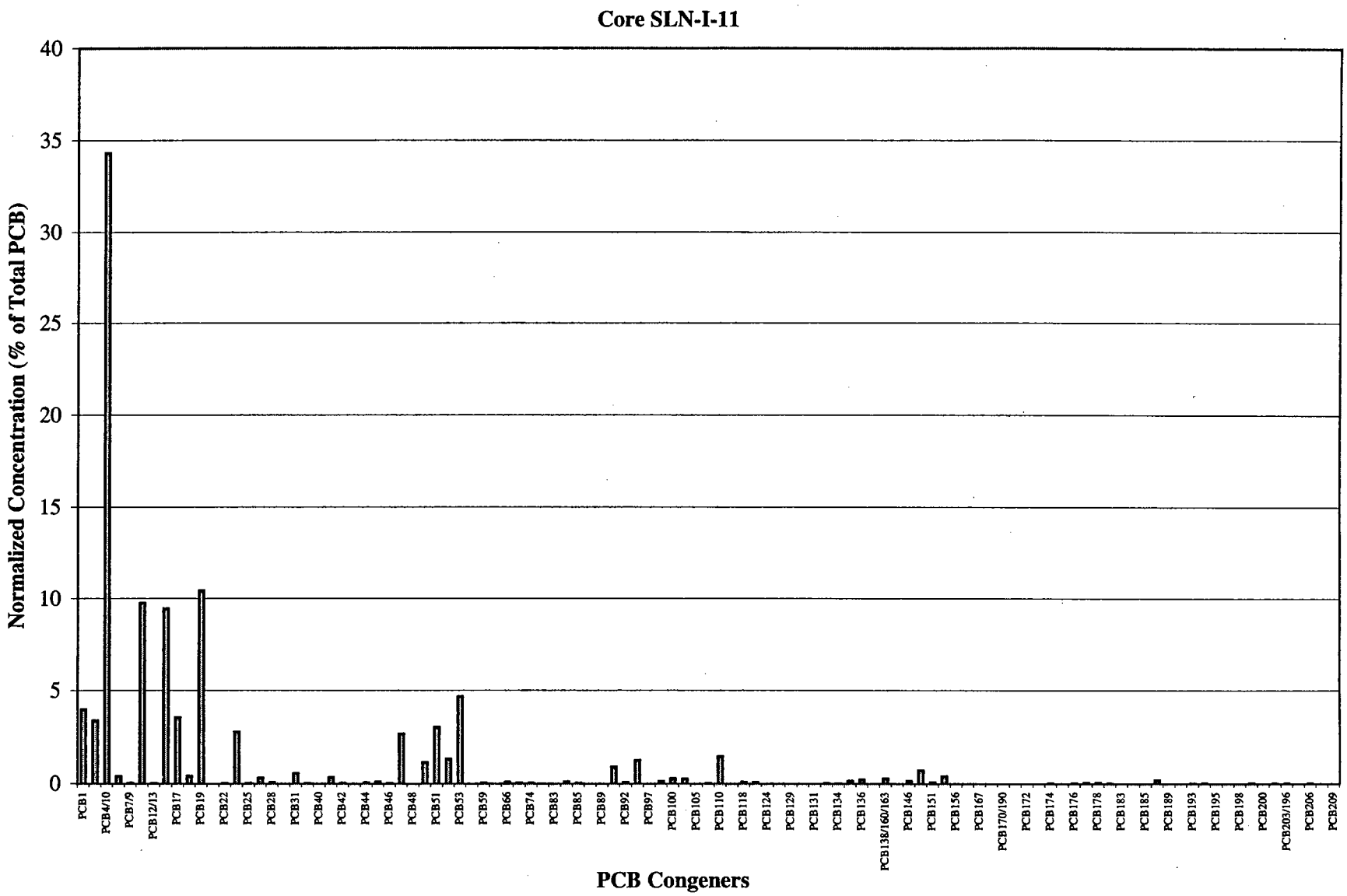

Core SLN-L-2
Normalized Concentration (% of Total PCB)
0
1
2
3
4
5
6
7
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

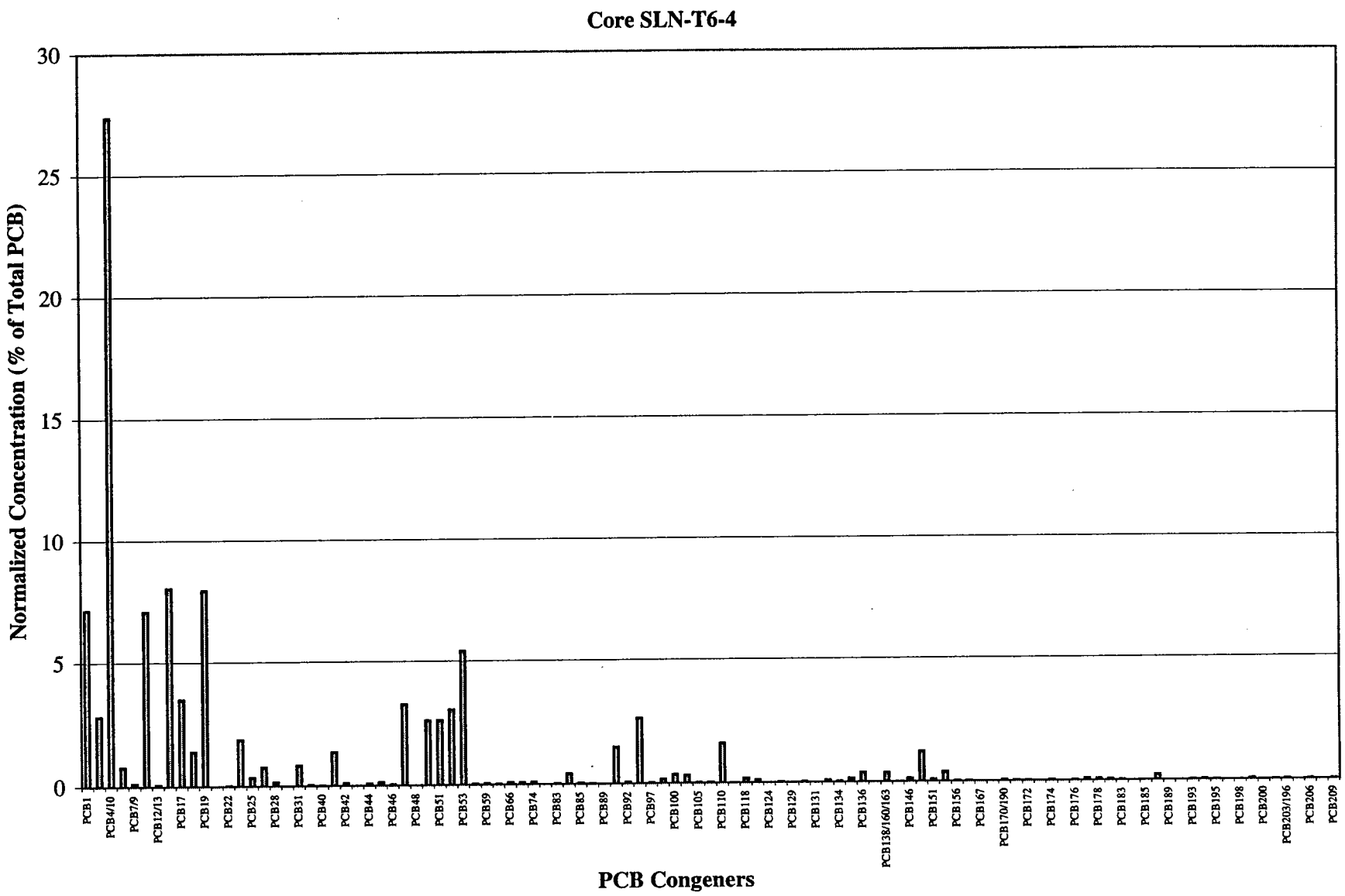

Core SLN-L-8
Normalized Concentration (% of Total PCB)
35
30
25
20
15
10
5
0
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

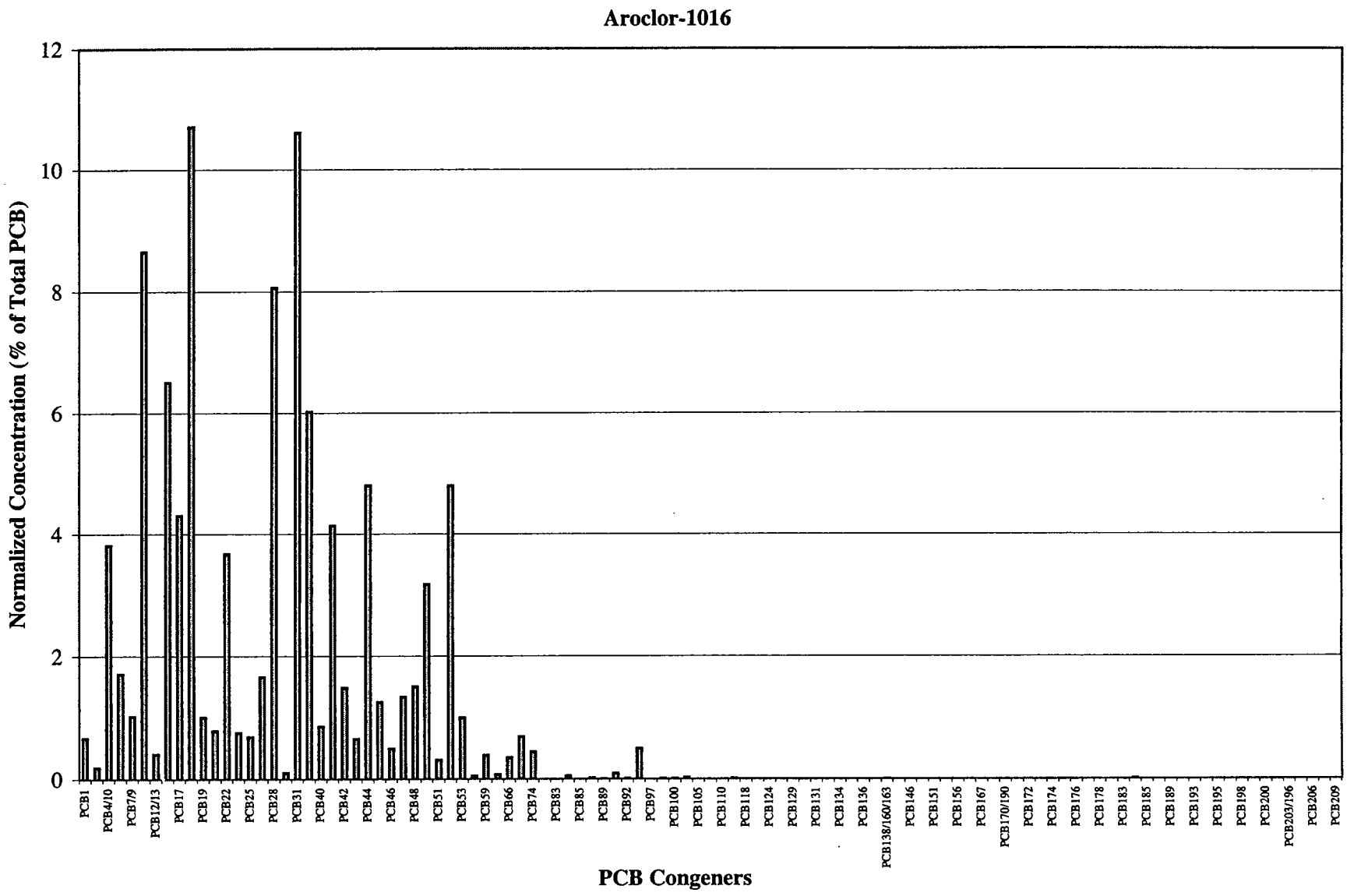

Core SLN-L-13
Normalized Concentration (% of Total PCB)
0
1
2
3
4
5
6
7
8
9
10
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

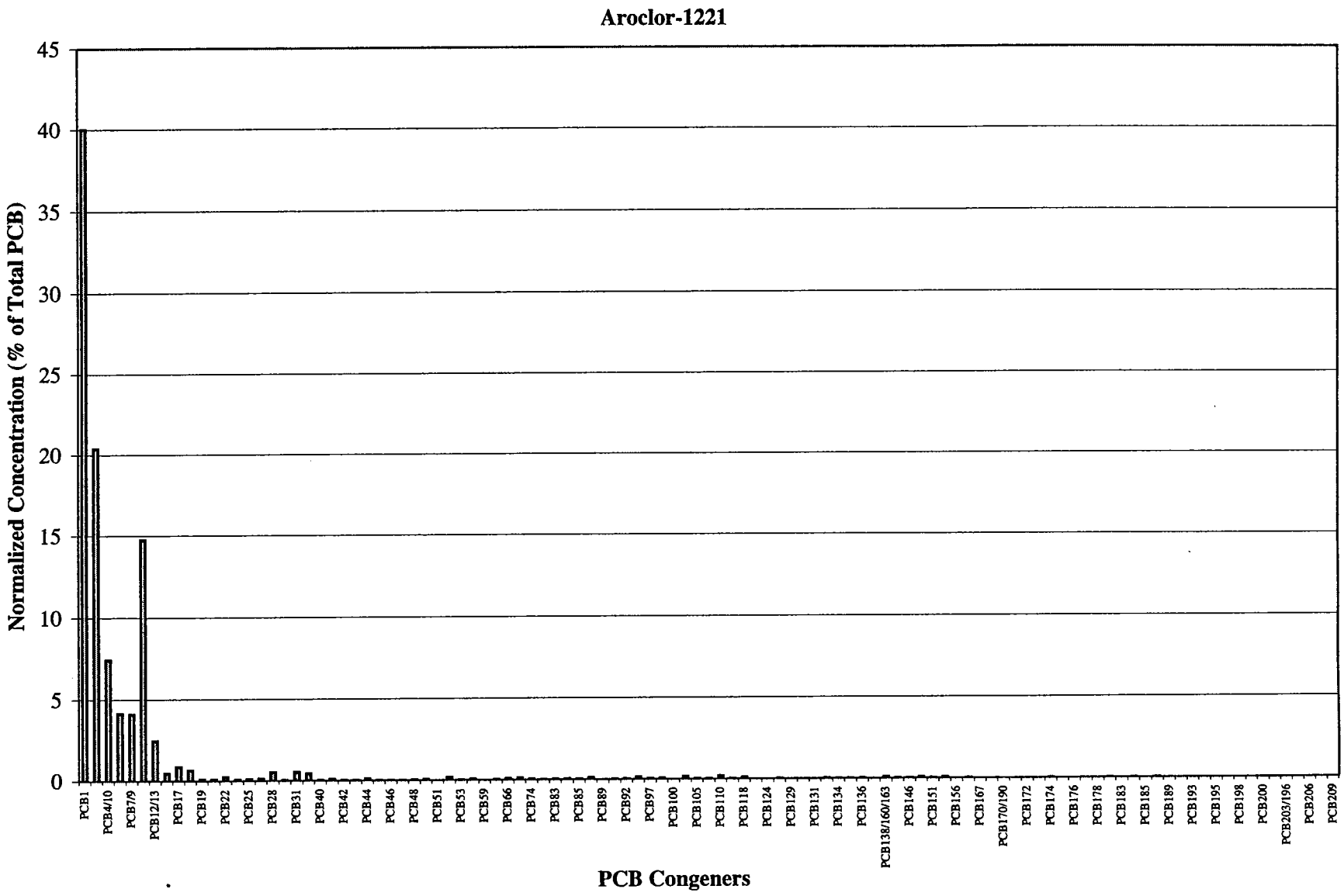

Core SLN-J-1
Normalized Concentration (% of Total PCB)
0
1
2
3
4
5
6
7
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

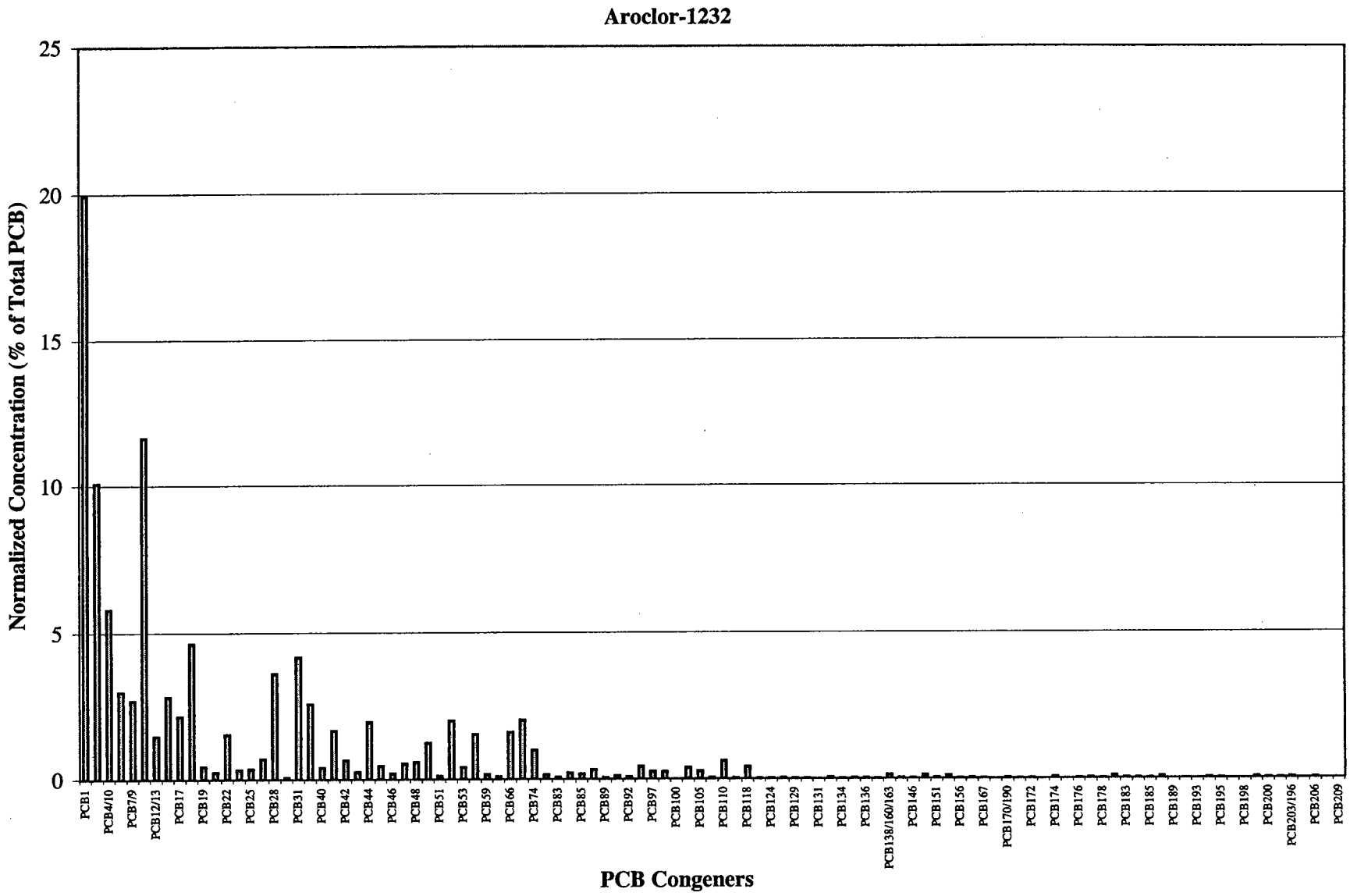

Core SLN-I-2
Normalized Concentration (% of Total PCB)
0
1
2
3
4
5
6
7
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

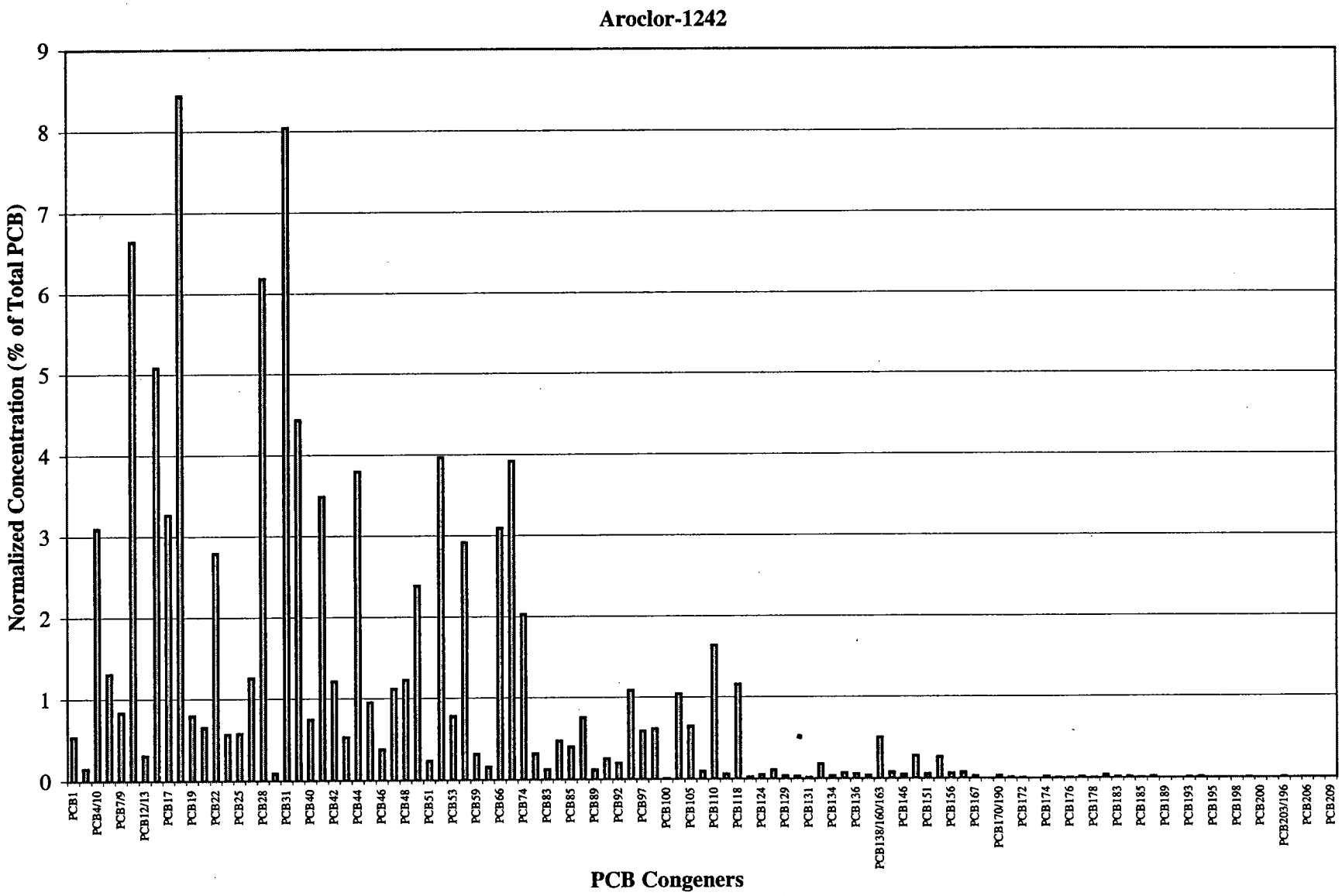

Core SLN-I-11
Normalized Concentration (% of Total PCB)
40
35
30
25
20
15
10
5
0
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners


Core SLN-T6-4
Normalized Concentration (% of Total PCB)
30
25
20
15
10
5
0
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners


Aroclor-1016
Normalized Concentration (% of Total PCB)
0
2
4
6
8
10
12
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners


Aroclor-1221
Normalized Concentration (% of Total PCB)
45
40
35
30
25
20
15
10
5
0
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners


Aroclor-1232
Normalized Concentration (% of Total PCB)
25
20
15
10
5
0
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners


Aroclor-1242
Normalized Concentration (% of Total PCB)
0
1
2
3
4
5
6
7
8
9
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
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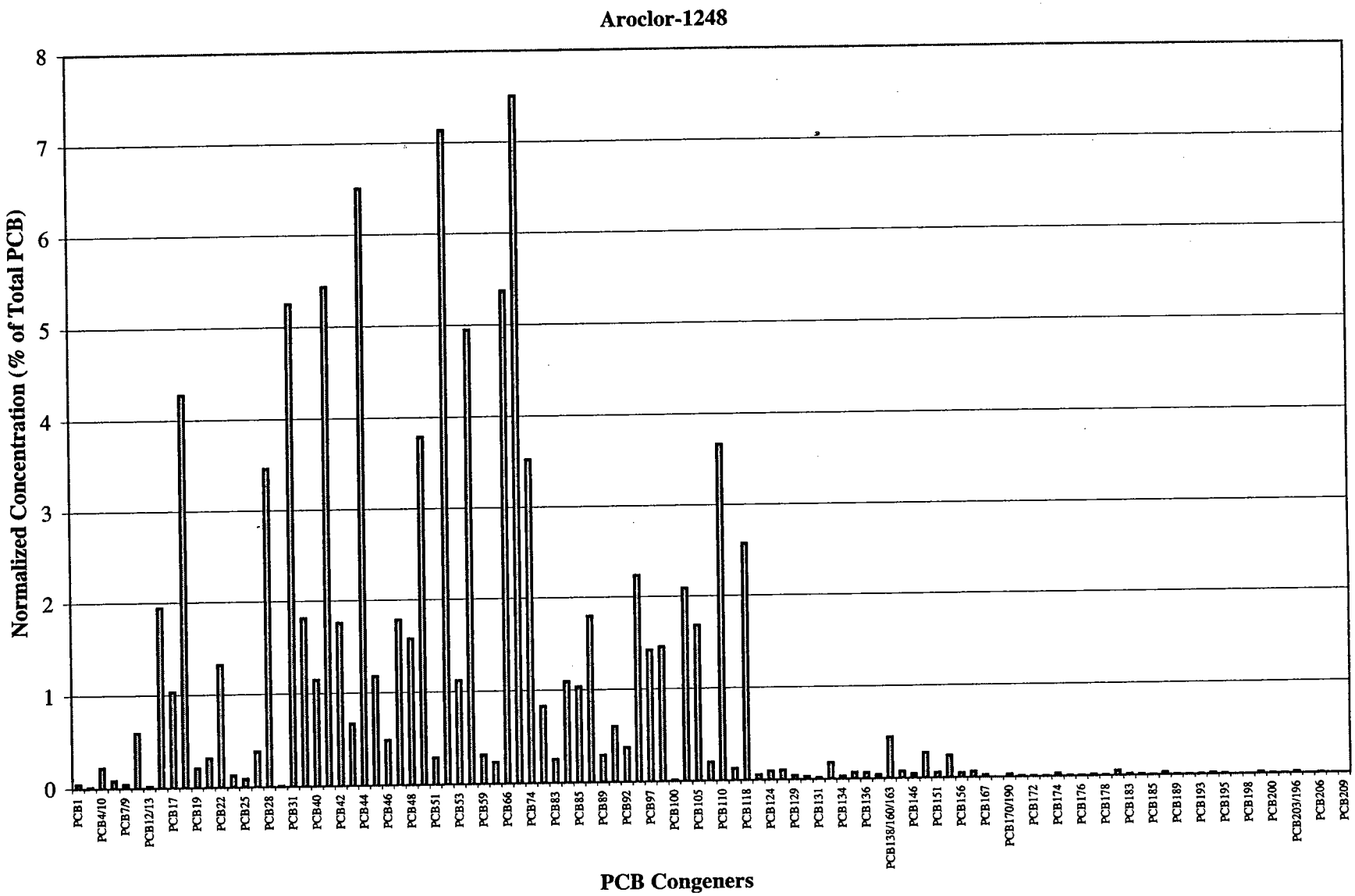
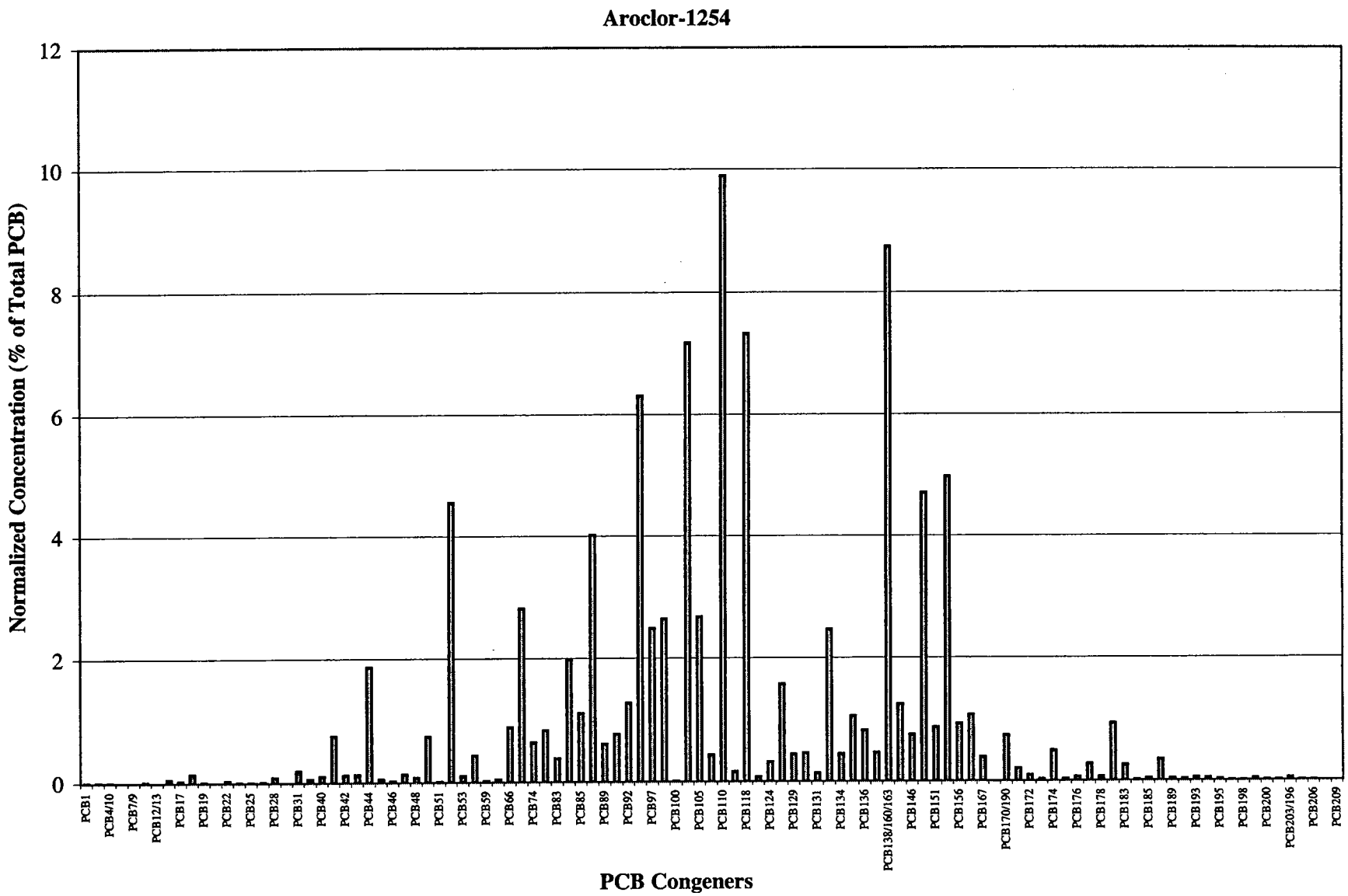
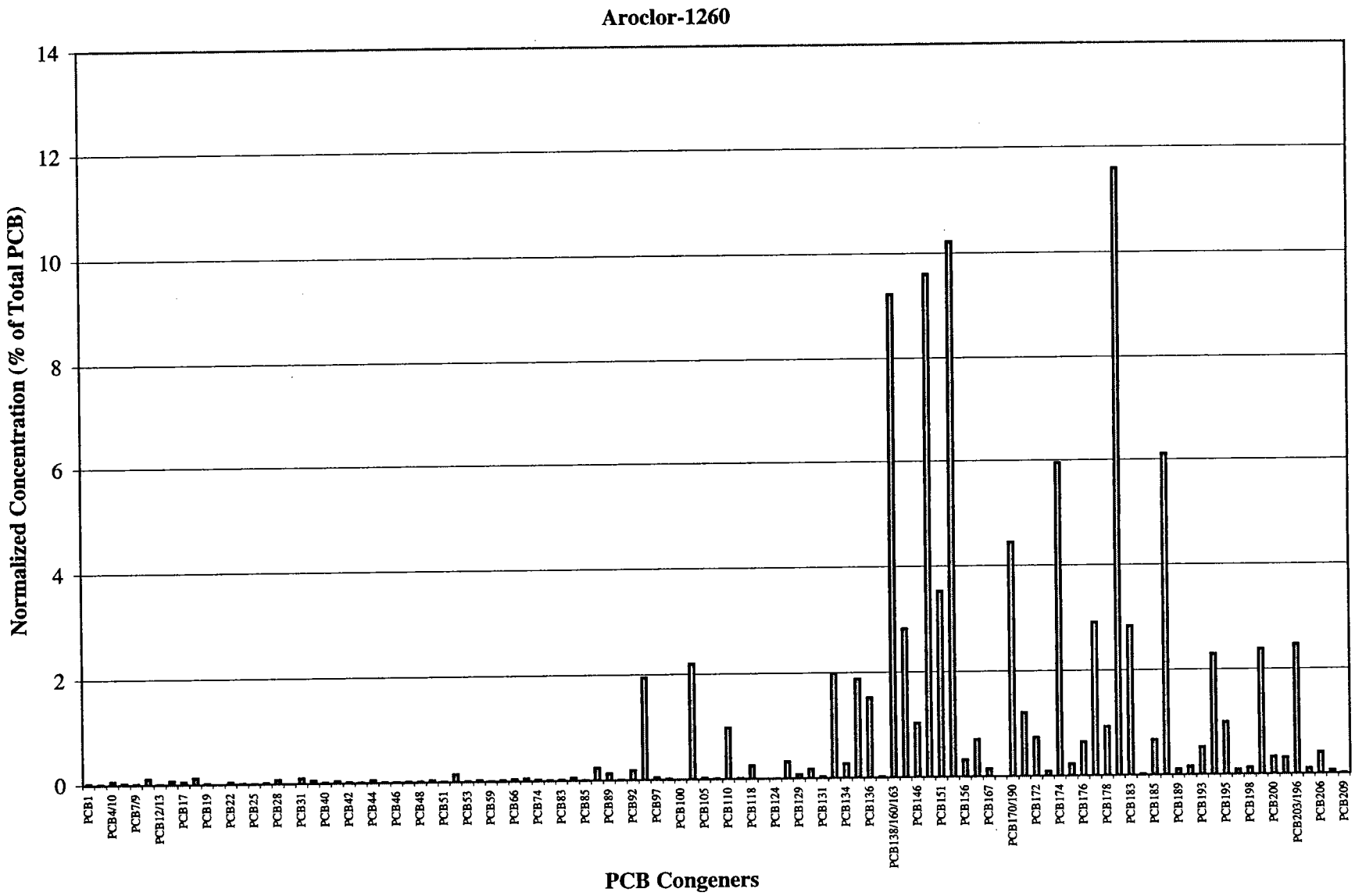
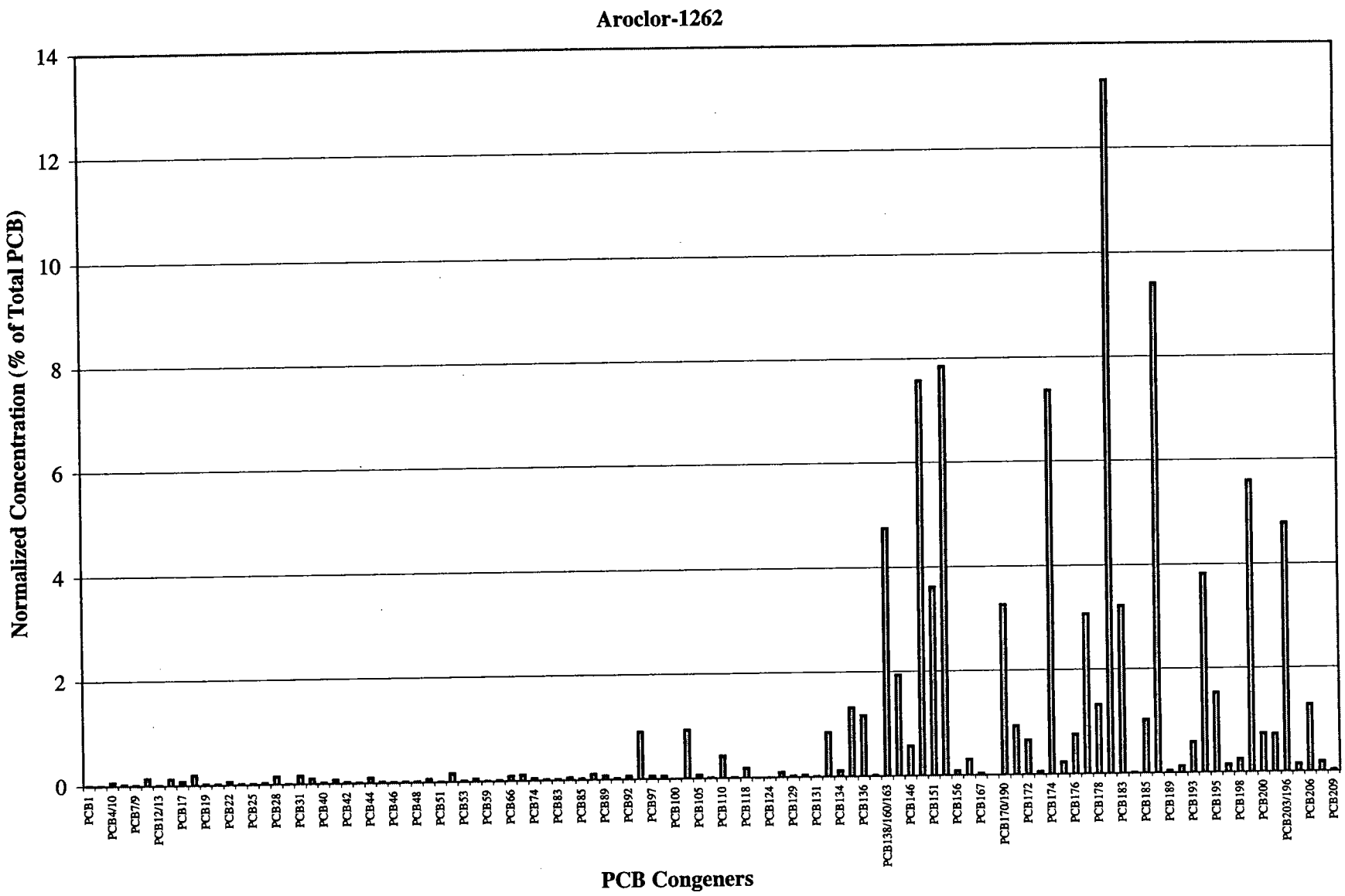
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners


Aroclor-1248
Normalized Concentration (% of Total PCB)
0
1
2
3
4
5
6
7
8
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners


Aroclor-1254
Normalized Concentration (% of Total PCB)
0
2
4
6
8
10
12
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners


Aroclor-1260
Normalized Concentration (% of Total PCB)
0
2
4
6
8
10
12
14
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners


Aroclor-1262
Normalized Concentration (% of Total PCB)
0
2
4
6
8
10
12
14
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
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PCB198
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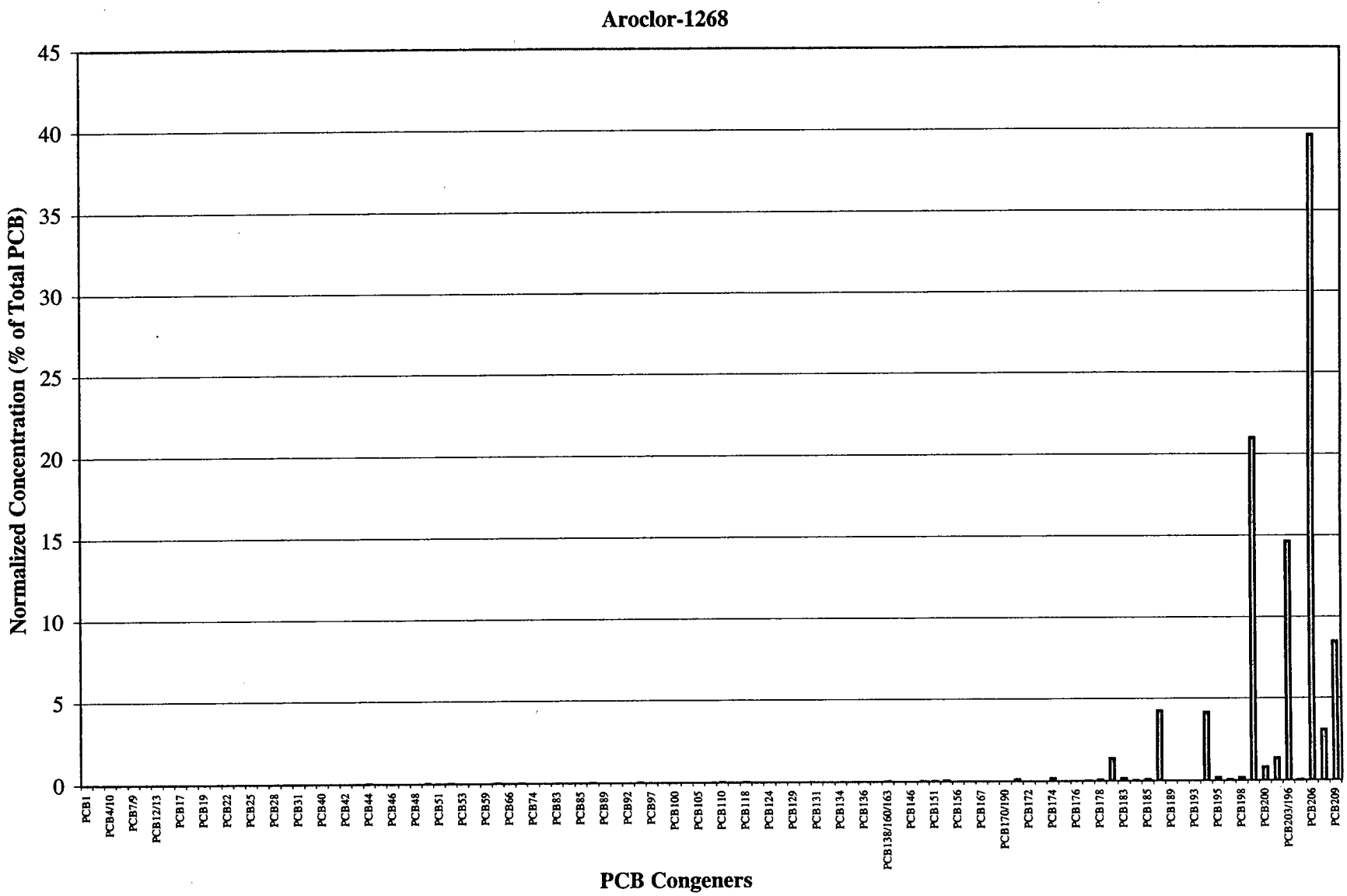
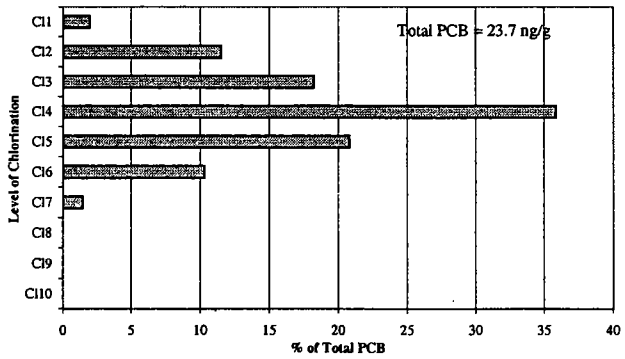
PCB203/196
PCB206
PCB209
PCB Congeners


Aroclor-1268
Normalized Concentration (% of Total PCB)
45
40
35
30
25
20
15
10
5
0
PCB1
PCB4/10
PCB7/9
PCB12/13
PCB17
PCB19
PCB22
PCB25
PCB28
PCB31
PCB40
PCB42
PCB44
PCB46
PCB48
PCB51
PCB53
PCB59
PCB66
PCB74
PCB83
PCB85
PCB89
PCB92
PCB97
PCB100
PCB105
PCB110
PCB118
PCB124
PCB129
PCB131
PCB134
PCB136
PCB138/160/163
PCB146
PCB151
PCB156
PCB167
PCB170/190
PCB172
PCB174
PCB176
PCB178
PCB183
PCB185
PCB189
PCB193
PCB195
PCB198
PCB200
PCB203/196
PCB206
PCB209
PCB Congeners

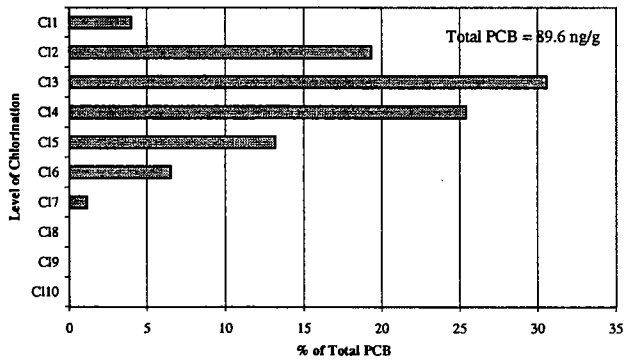
APPENDIX G

PCB COMPOSITION PLOTS FOR HOMOLOGUES FOR ALL SEDIMENT SAMPLES AND NINE AROCLOR FORMULATIONS

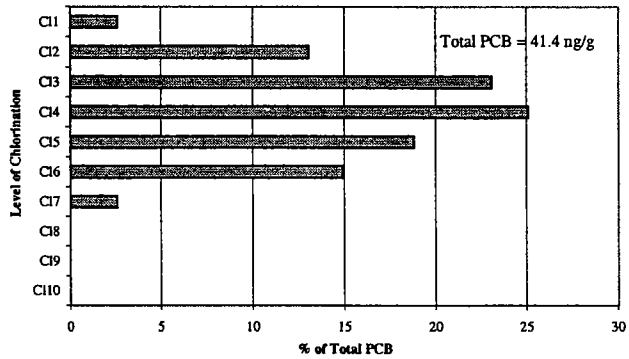
SLN-T16-1



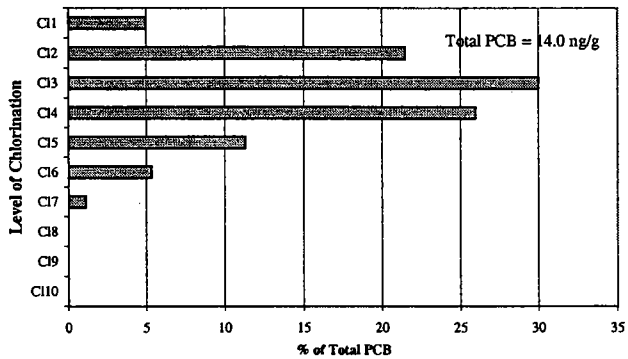
SLN-T16-2



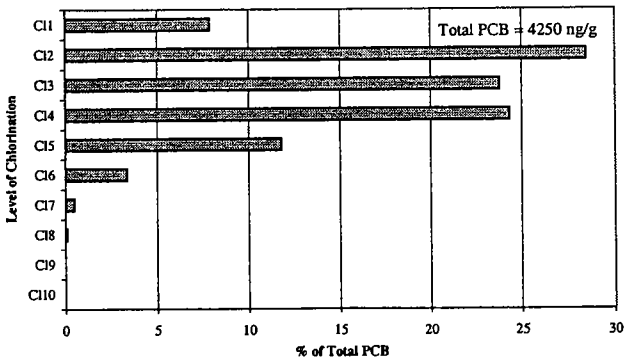
SLN-T16-3



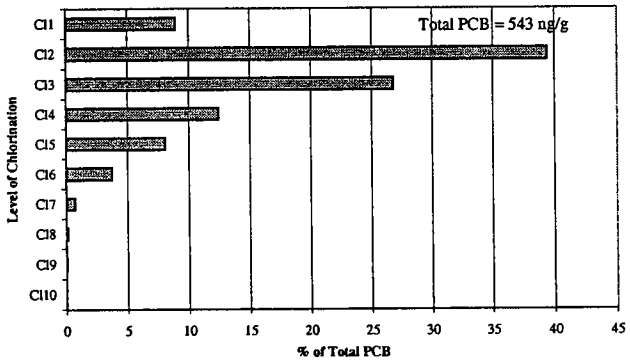
SLN-T16-4



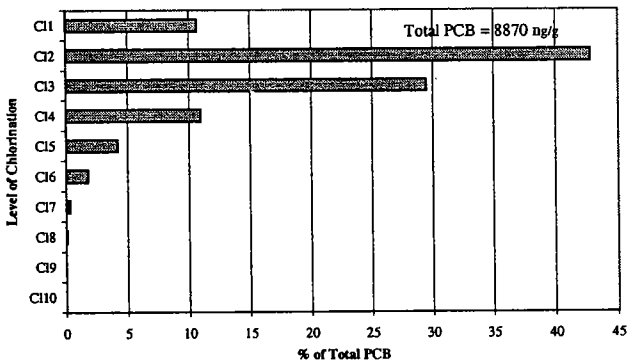
SLN-T16-5



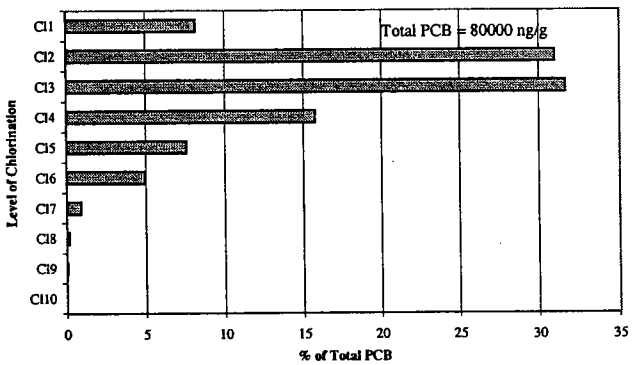
SLN-T16-6

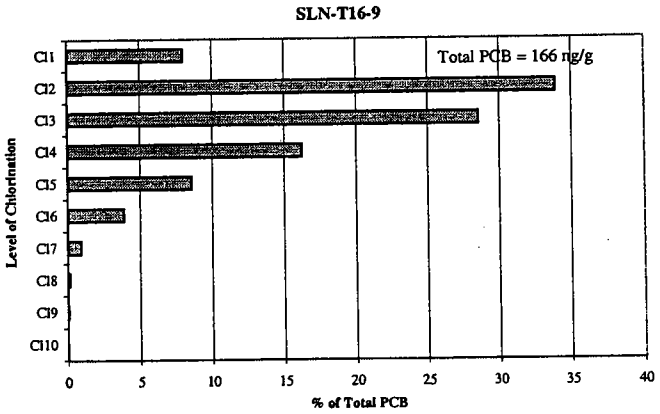


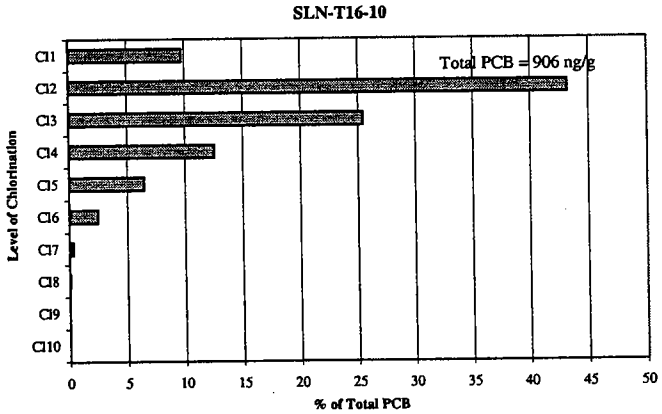
SLN-T16-7



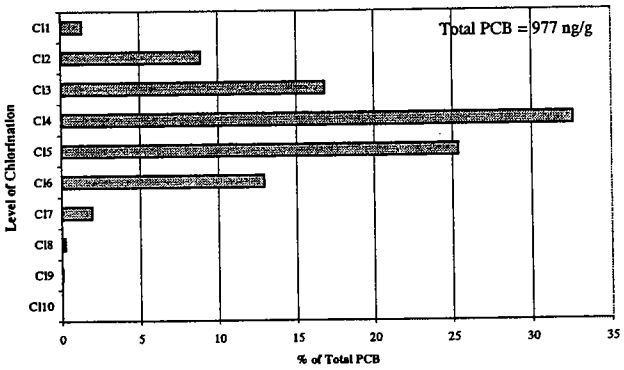
SLN-T16-8



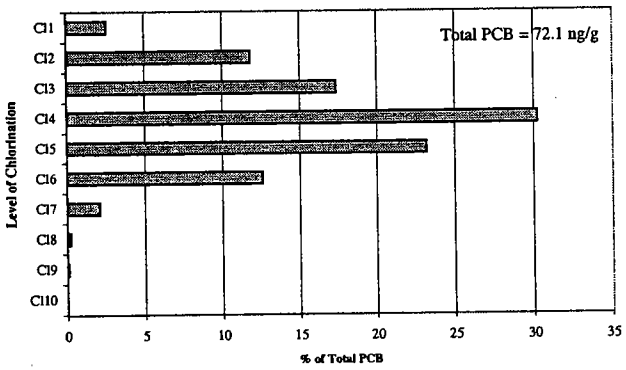

SLN-T16-9
Total PCB = 166 ng/g
Level of Chlorination
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
0
5
10
15
20
25
30
35
40
% of Total PCB


SLN-T16-10
Total PCB = 906 ng/g
Level of Chlorination
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
0
5
10
15
20
25
30
35
40
45
50
% of Total PCB

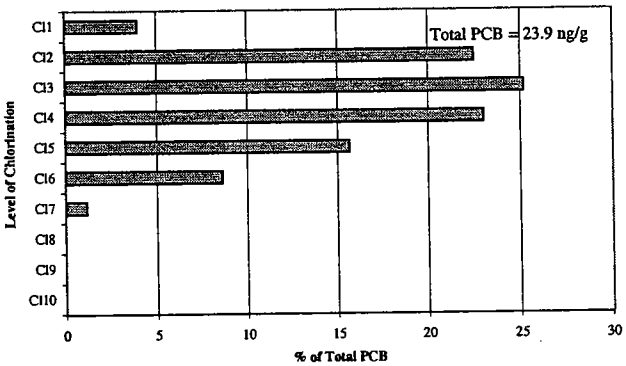
SLN-W7-1



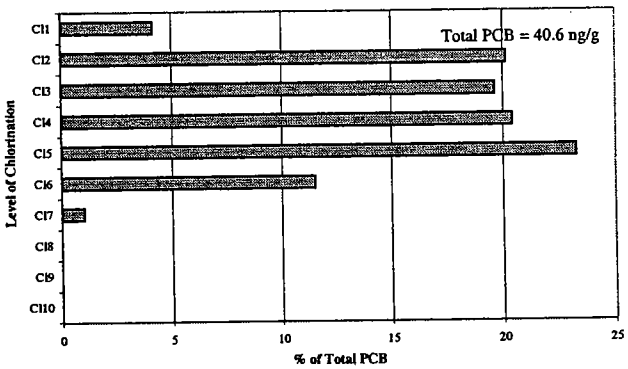
SLN-W7-2



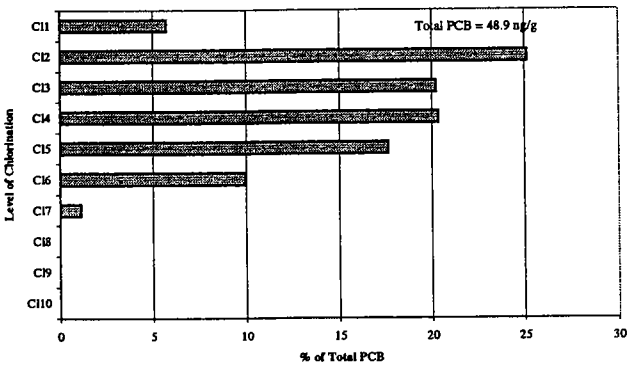
SLN-W7-3



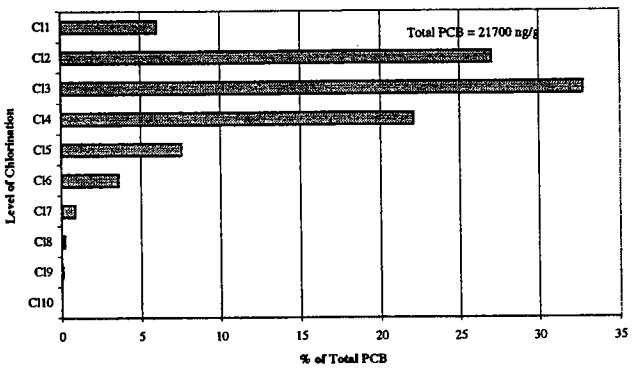
SLN-W7-4



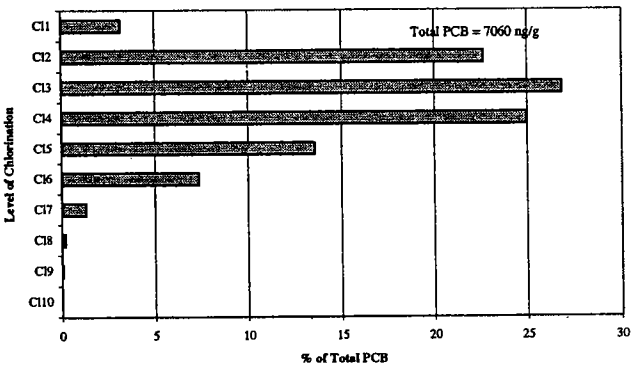
SLN-W7-5



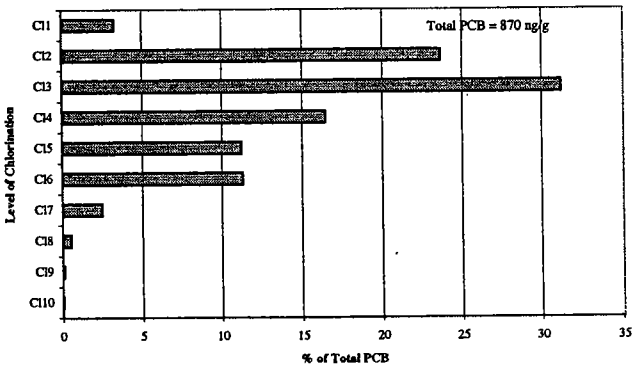
SLN-W7-6



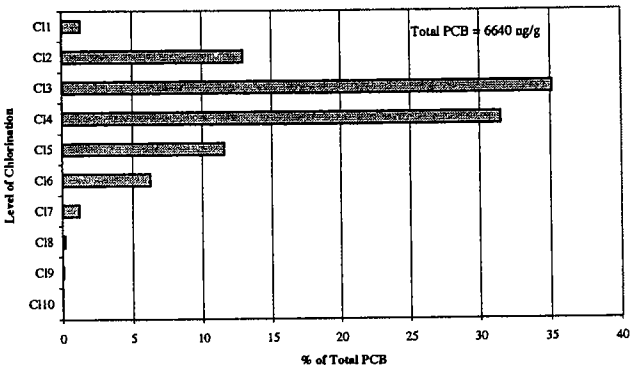
SLN-W7-7



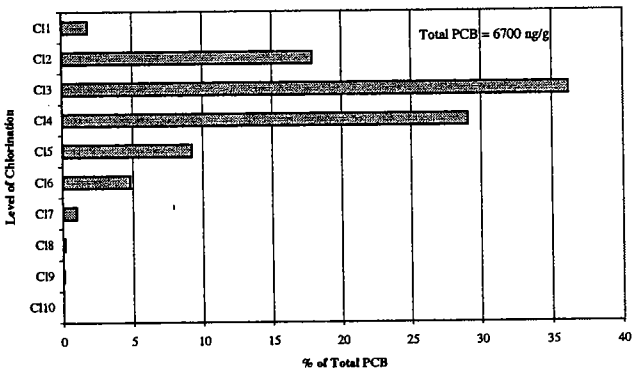
SLN-W7-8



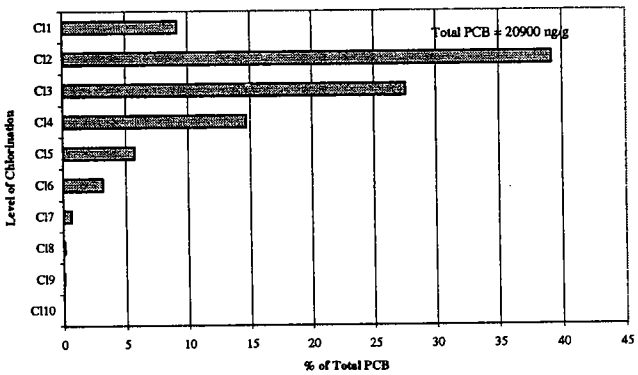
SLN-W7-9



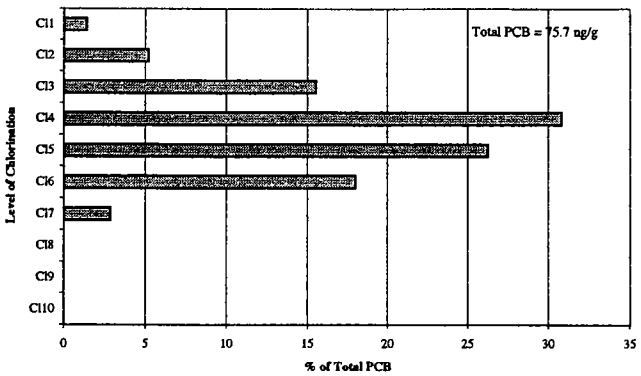
SLN-W7-10



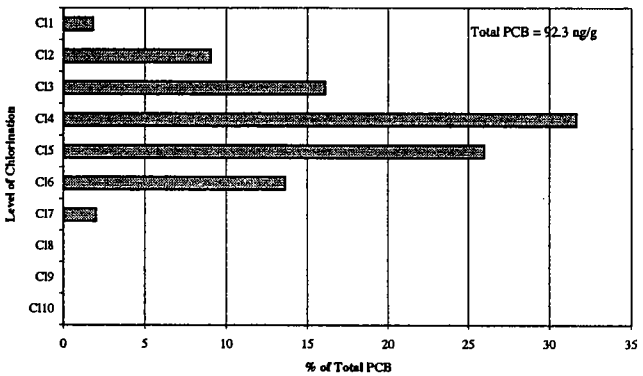
SLN-W7-11



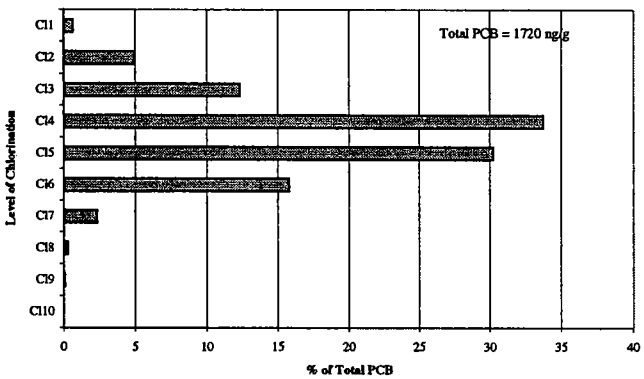
SLN-Q-1



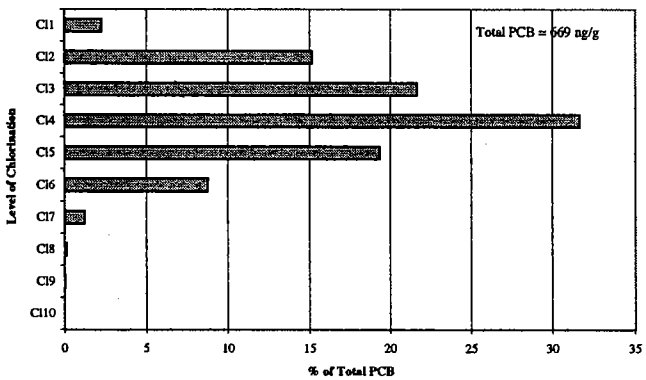
SLN-Q-2



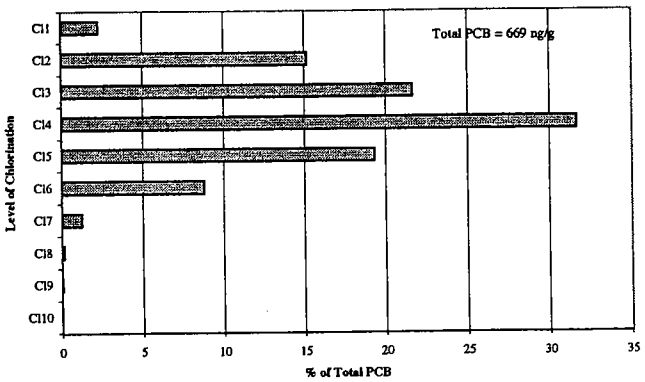
SLN-Q-3



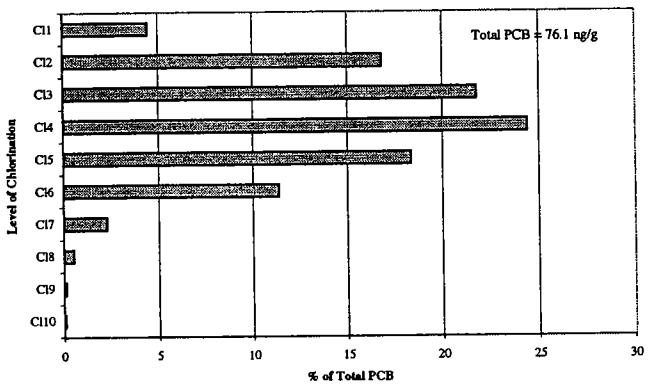
SLN-Q-4



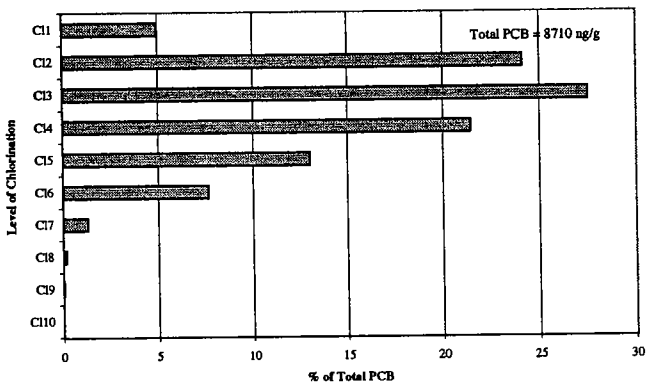
SLN-Q-4



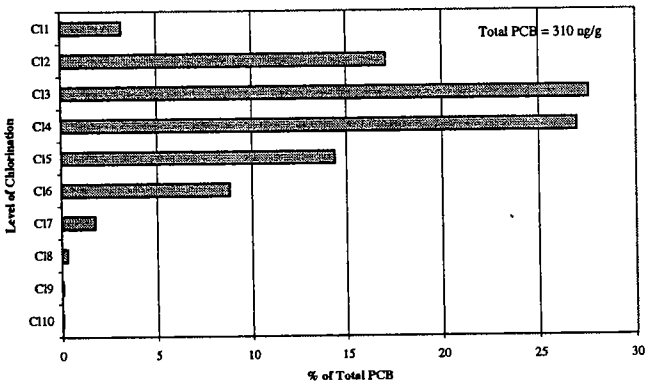
SLN-Q-5



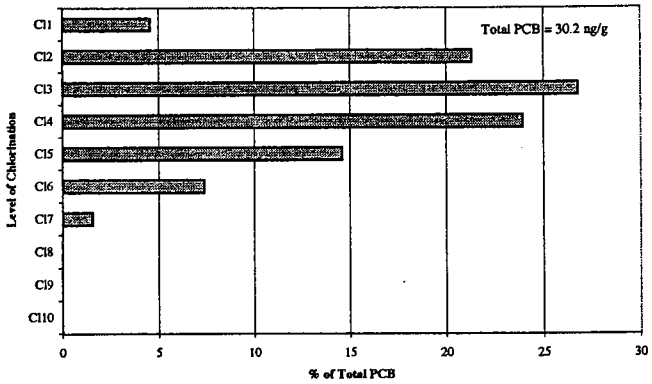
SLN-Q-6



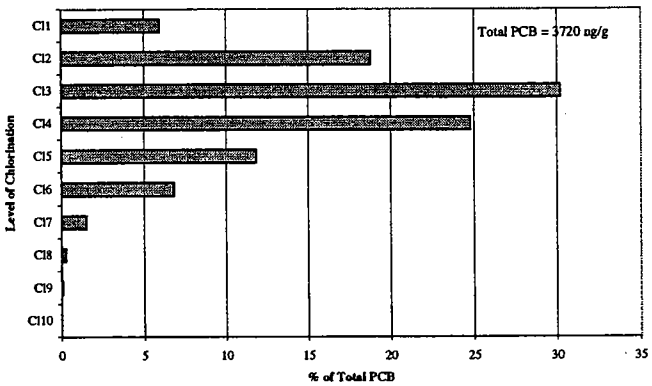
SLN-Q-7



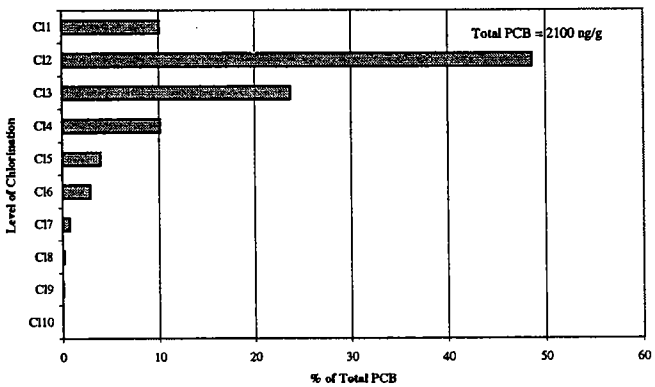
SLN-Q-8



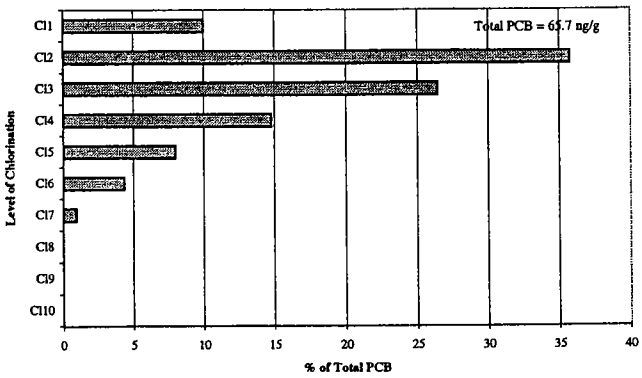
SLN-Q-9



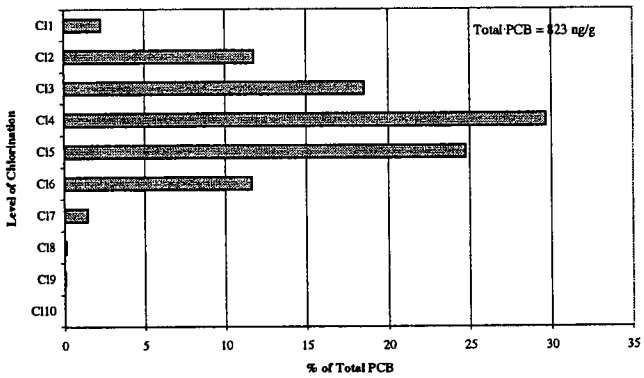
SLN-Q-10



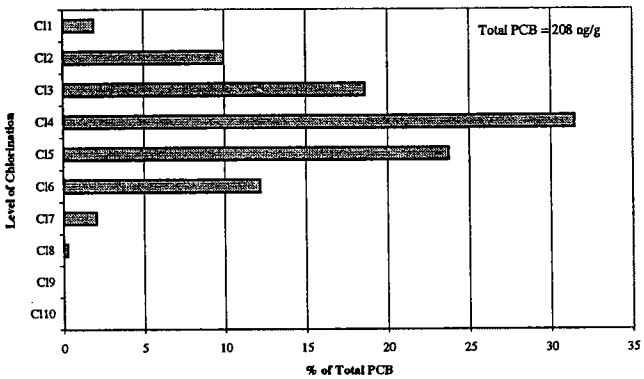
SLN-P-1



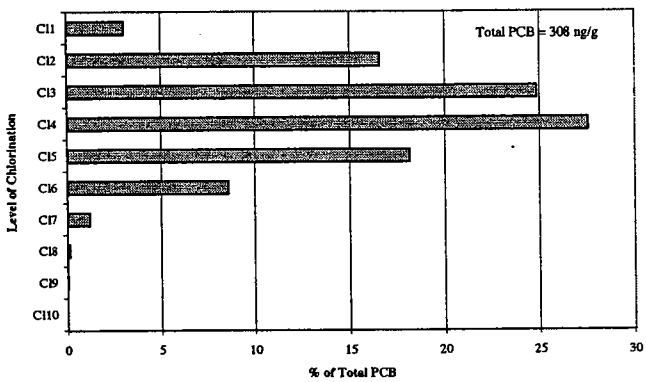
SLN-P-2



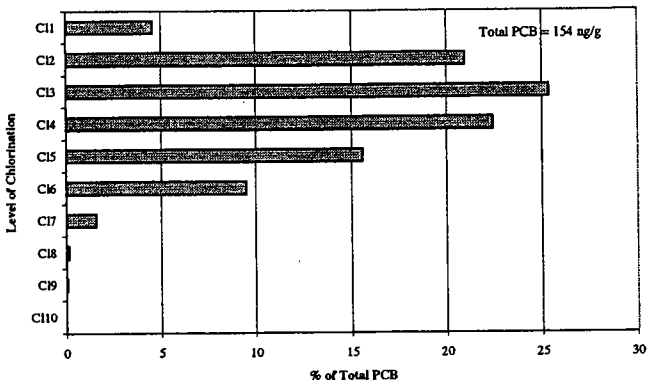
SLN-P-3



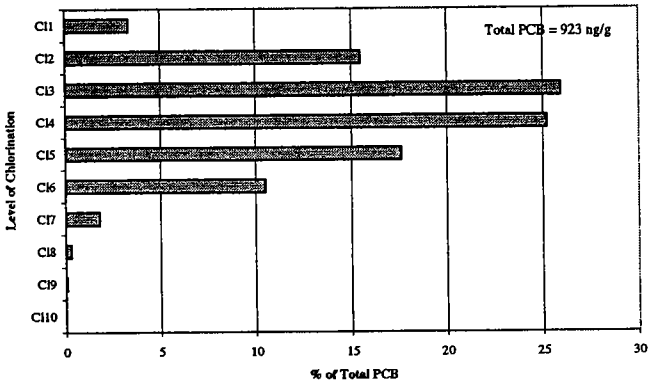
SLN-P-4



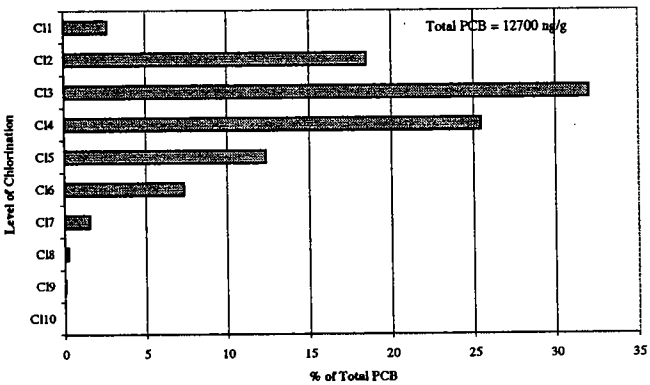
SLN-P-5



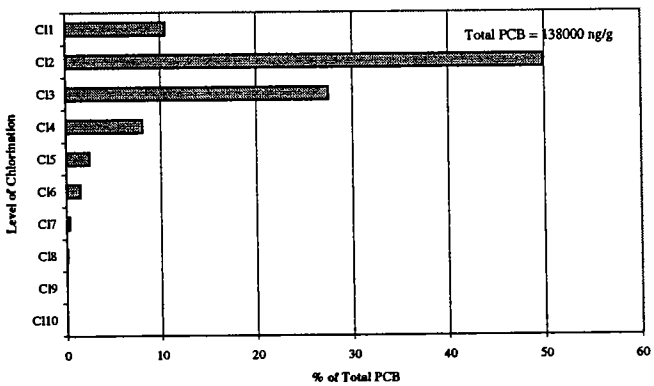
SLN-P-6

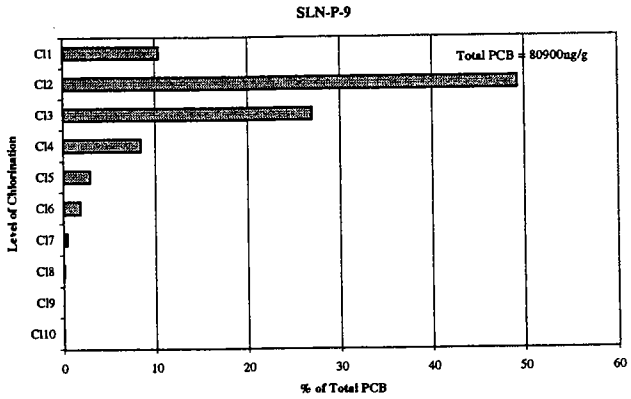


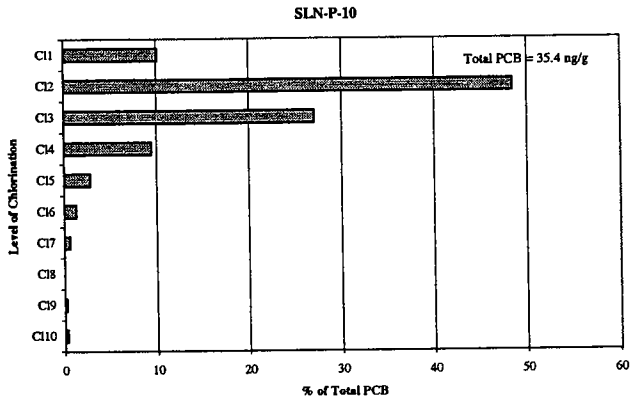
SLN-P-7



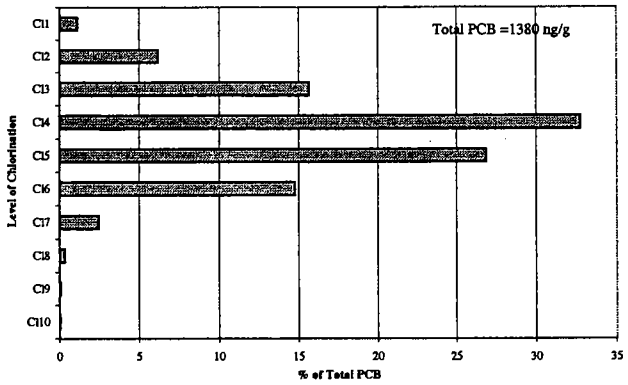
SLN-P-8



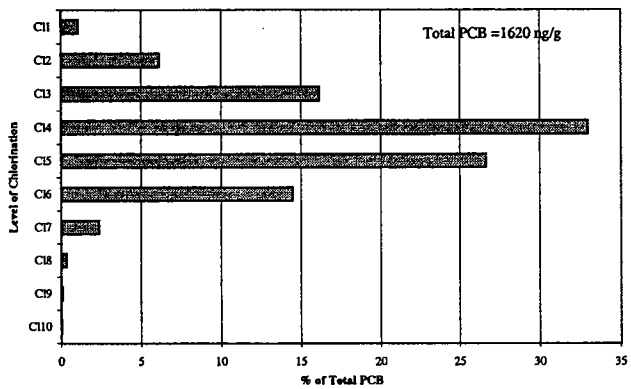

SLN-P-9
Total PCB = 80900ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
10
20
30
40
50
60
% of Total PCB


SLN-P-10
Total PCB = 35.4 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
10
20
30
40
50
60
% of Total PCB

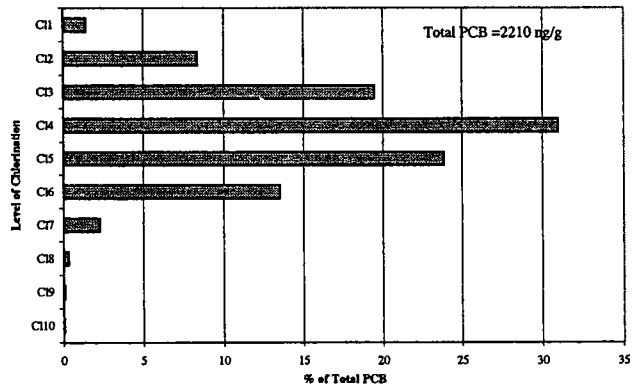
SLN-O-1



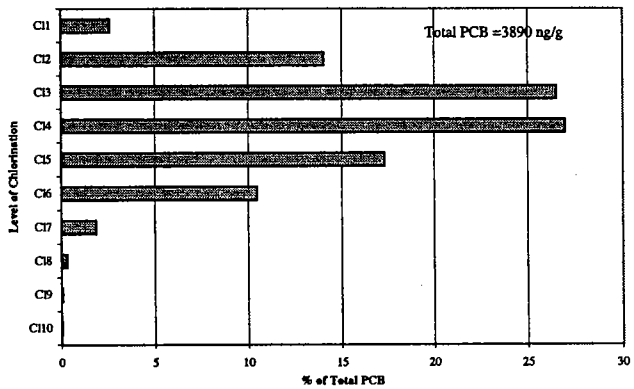
SLN-O-2

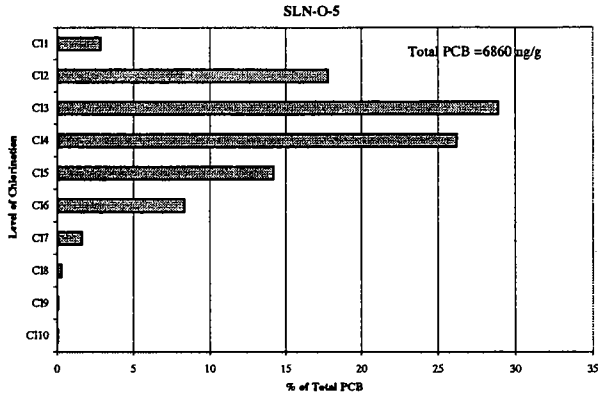


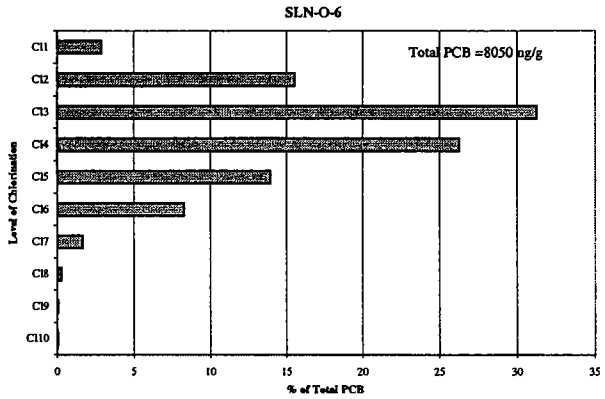
SLN-O-3

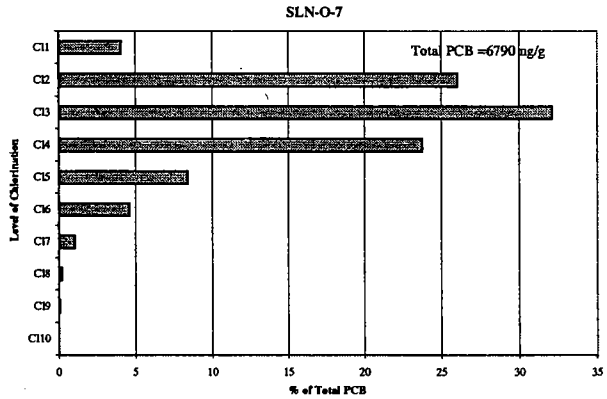


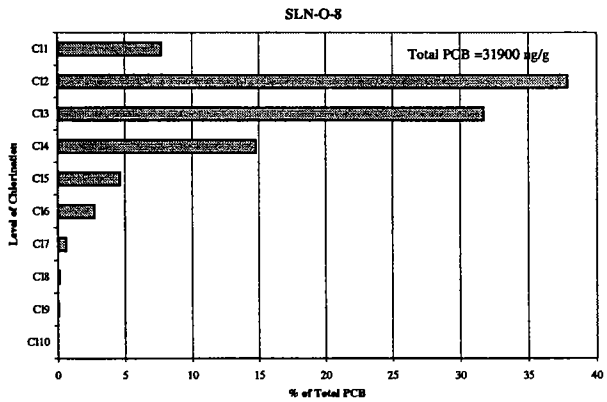
SLN-O-4

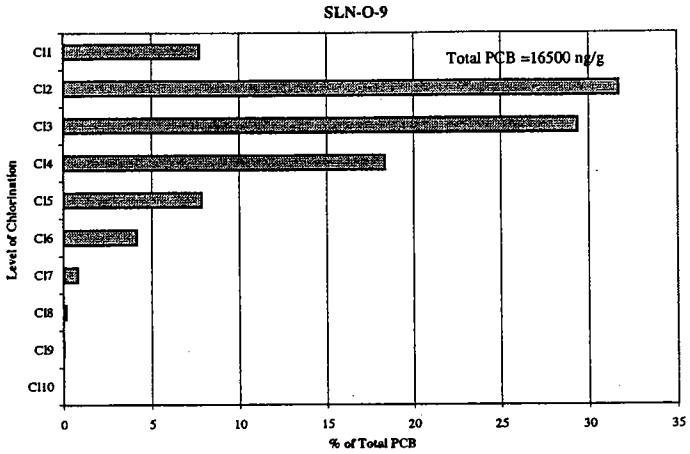



SLN-O-5
Total PCB =6860 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB

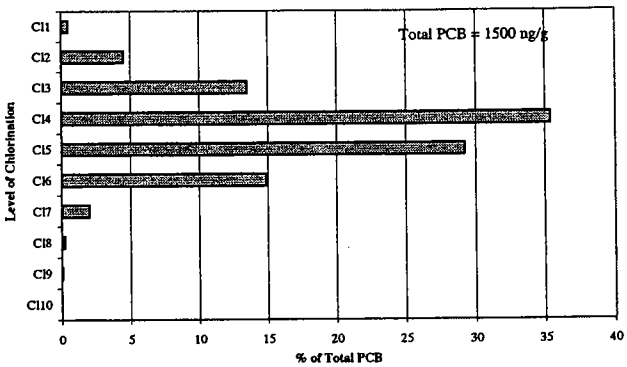

SLN-O-6
Total PCB =8050 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB


SLN-O-7
Total PCB =6790 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB

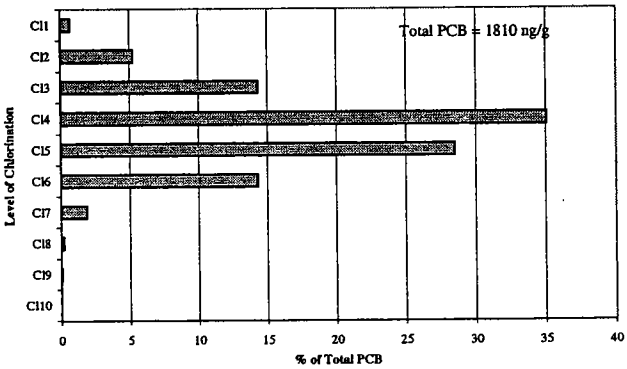

SLN-O-8
Total PCB =31900 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
% of Total PCB


SLN-O-9
Total PCB =16500 ng/g
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
Level of Chlorination
0
5
10
15
20
25
30
35
% of Total PCB

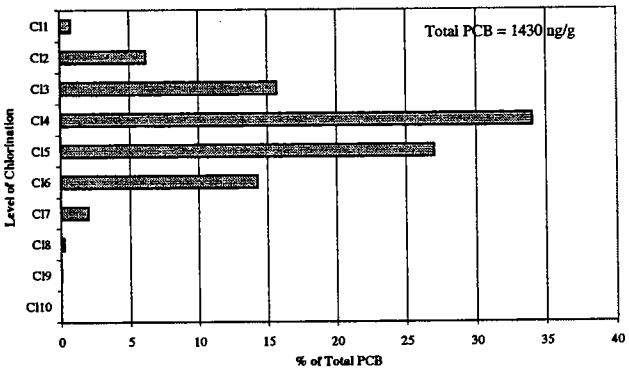
SLN-N-1



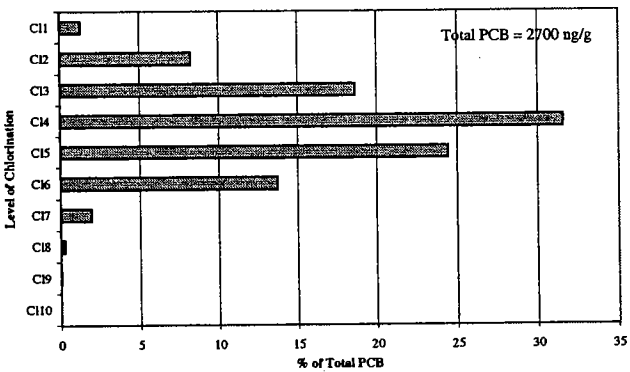
SLN-N-2

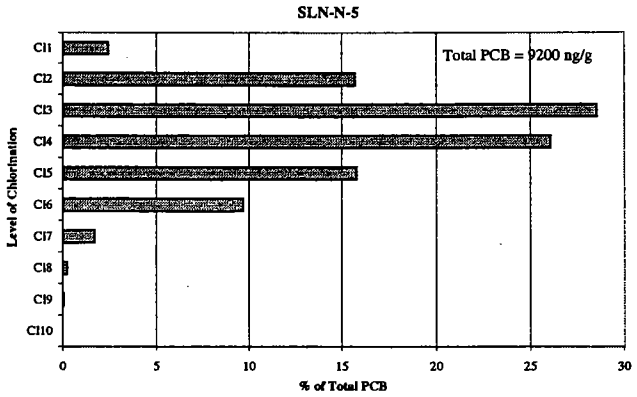


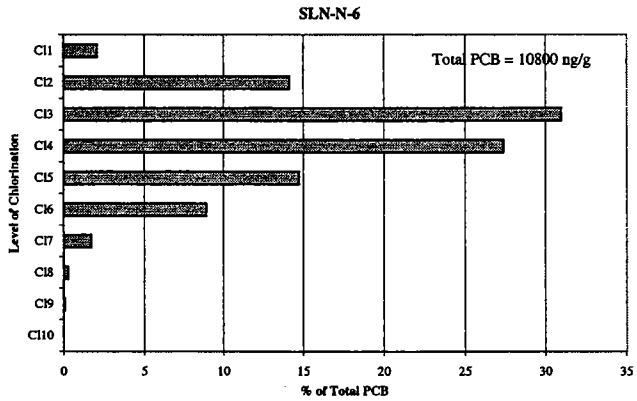
SLN-N-3

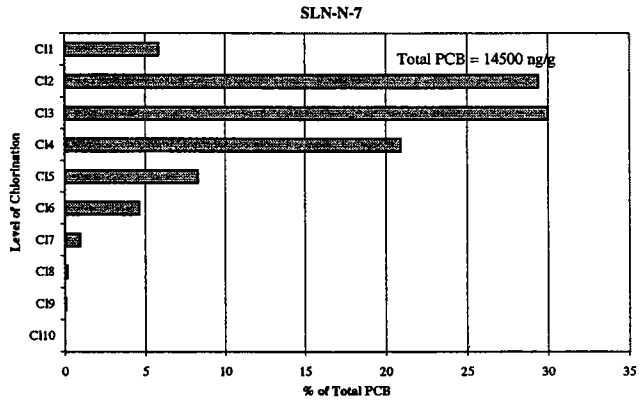


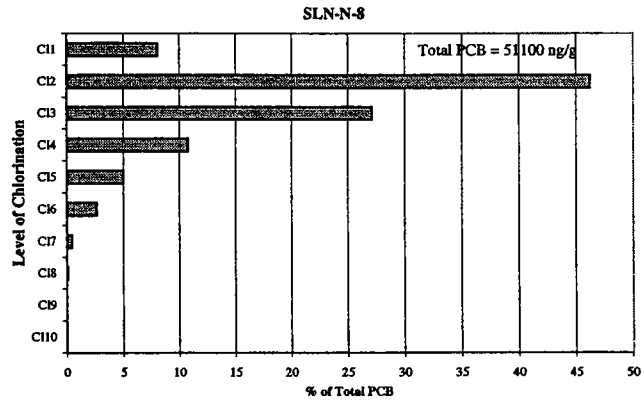
SLN-N-4

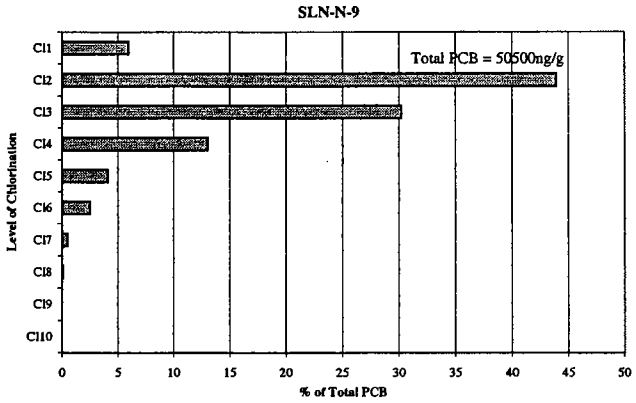


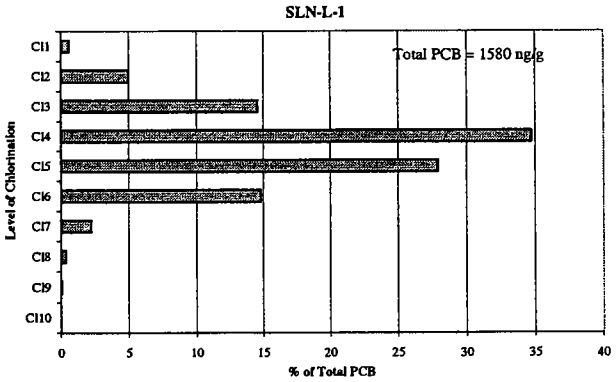

SLN-N-5
Total PCB = 9200 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
% of Total PCB

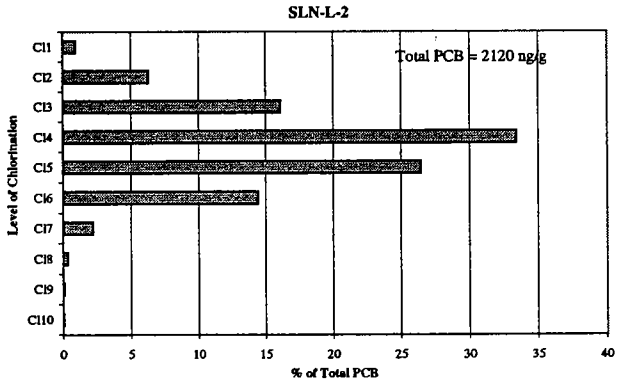

SLN-N-6
Total PCB = 10800 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB

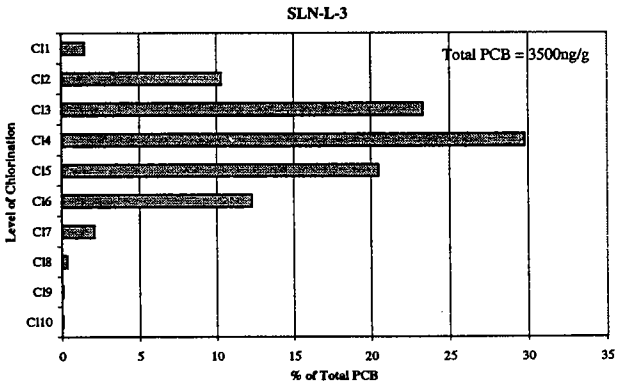

SLN-N-7
Total PCB = 14500 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB

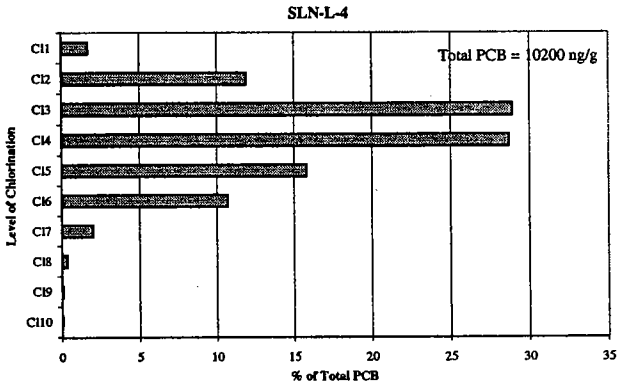

SLN-N-8
Total PCB = 51100 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
45
50
% of Total PCB

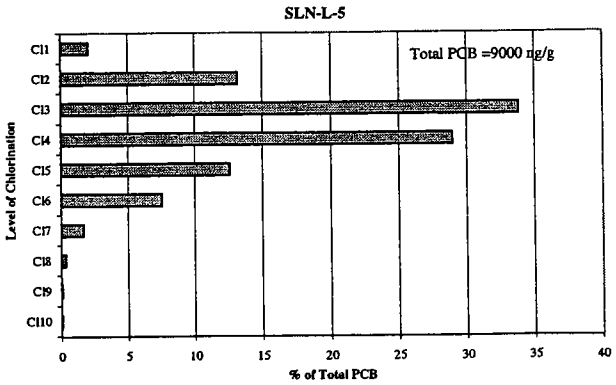

SLN-N-9
Total PCB = 50500ng/g
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
Level of Chlorination
0
5
10
15
20
25
30
35
40
45
50
% of Total PCB

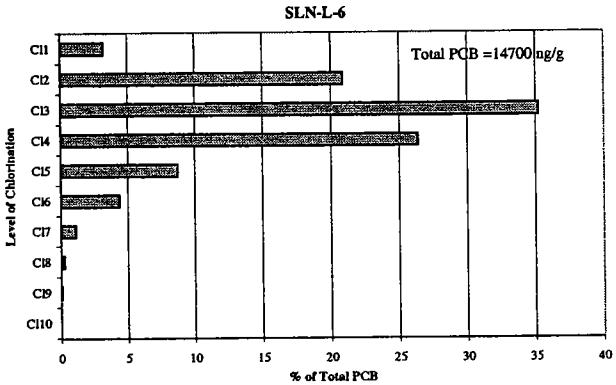

SLN-L-1
Total PCB = 1580 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
% of Total PCB

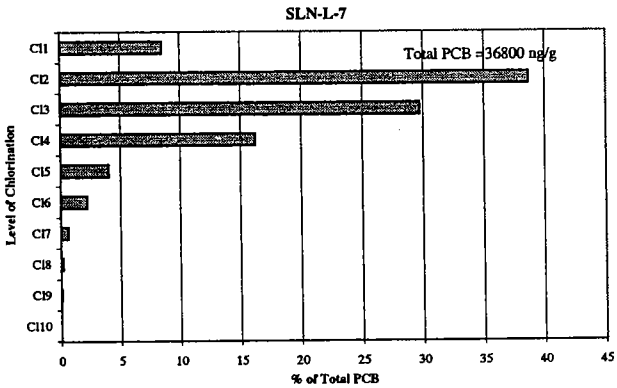

SLN-L-2
Total PCB = 2120 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
% of Total PCB

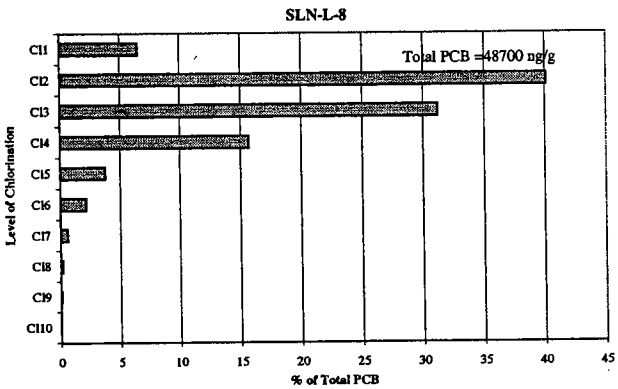

SLN-L-3
Total PCB = 3500ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB

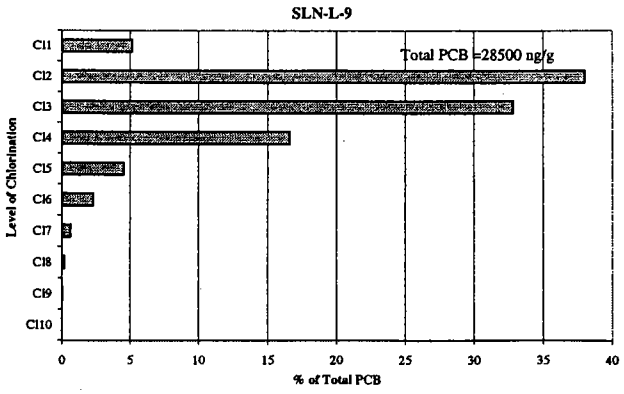

SLN-L-4
Total PCB = 10200 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB

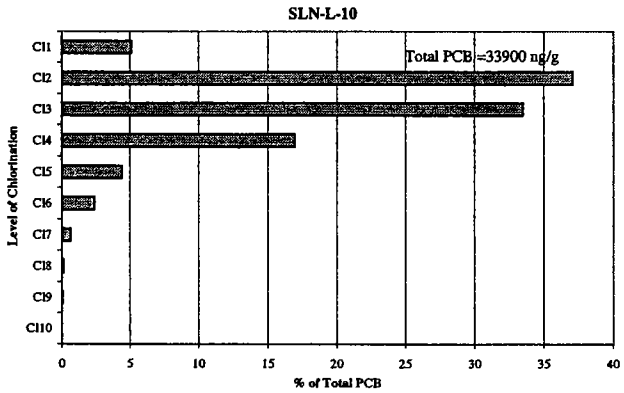

SLN-L-5
Total PCB =9000 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
% of Total PCB

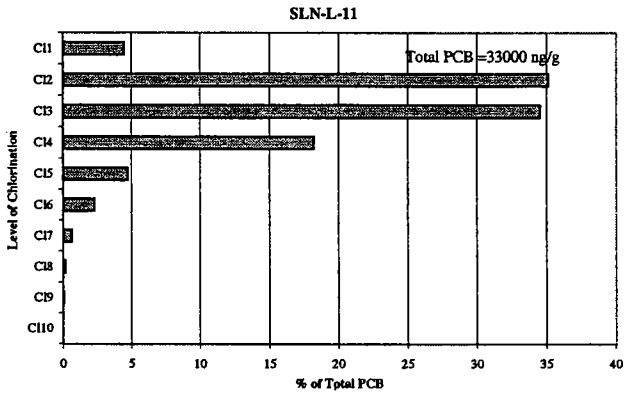

SLN-L-6
Total PCB =14700 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
% of Total PCB

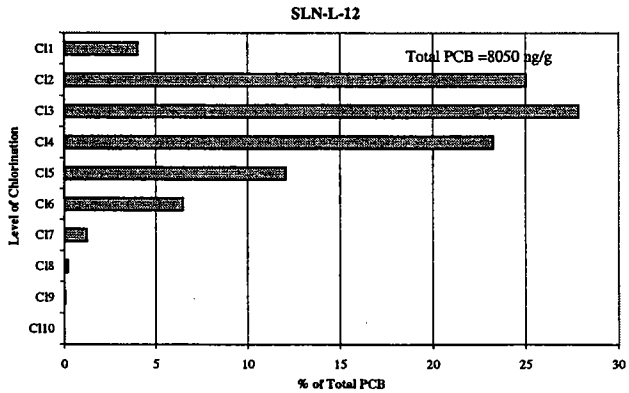

SLN-L-7
Total PCB =36800 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
45
% of Total PCB

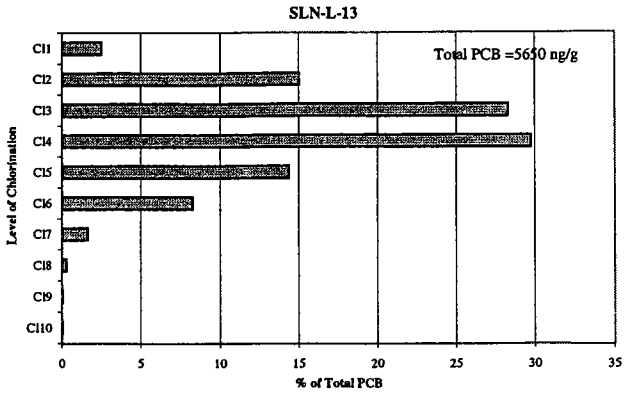

SLN-L-8
Total PCB =48700 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
45
% of Total PCB

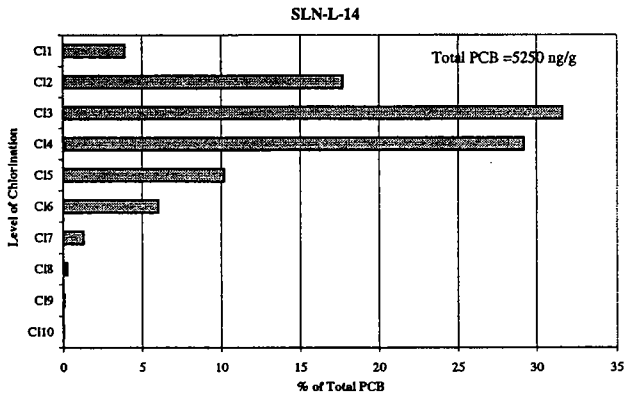

SLN-L-9
Total PCB =28500 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
% of Total PCB

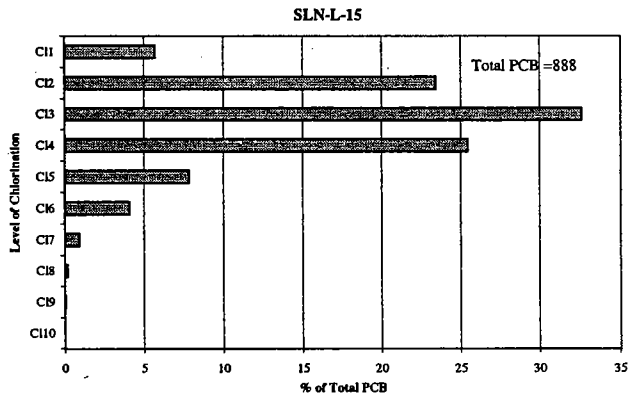

SLN-L-10
Total PCB =33900 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
% of Total PCB

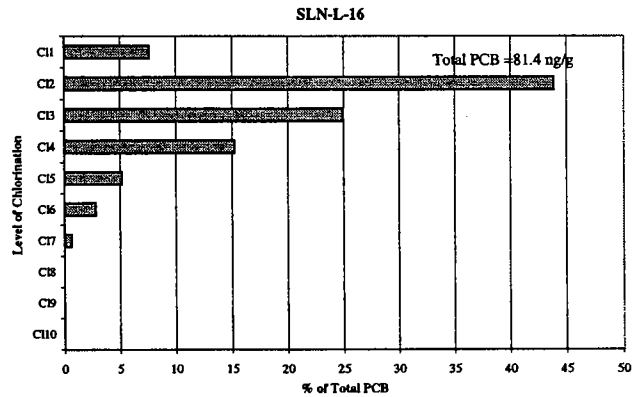

SLN-L-11
Total PCB =33000 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
% of Total PCB

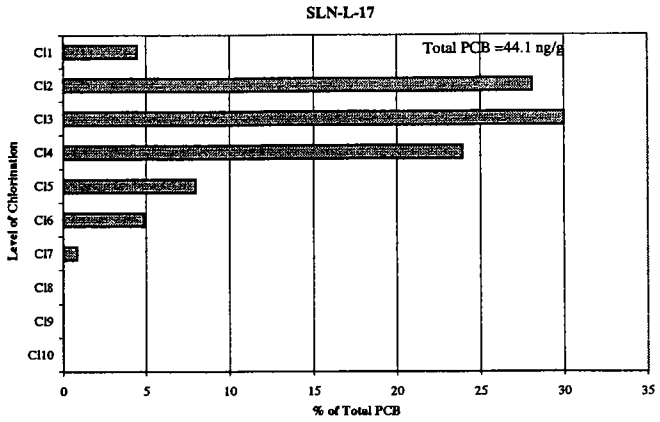

SLN-L-12
Total PCB =8050 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
% of Total PCB


SLN-L-13
Total PCB =5650 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB

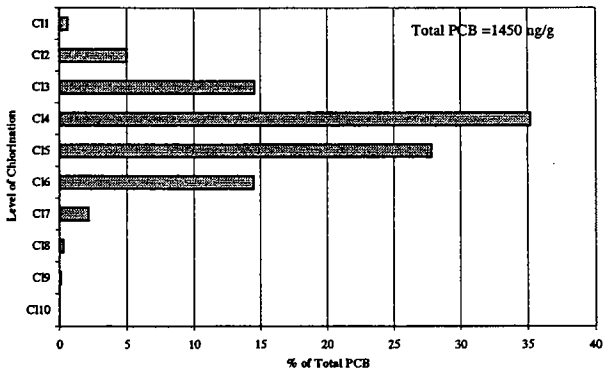

SLN-L-14
Total PCB =5250 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB


SLN-L-15
Total PCB =888
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB

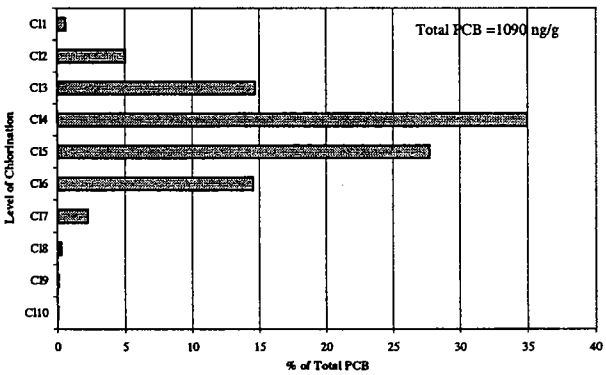

SLN-L-16
Total PCB =81.4 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
45
50
% of Total PCB


SLN-L-17
Total PCB =44.1 ng/g
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
Level of Chlorination
0
5
10
15
20
25
30
35
% of Total PCB

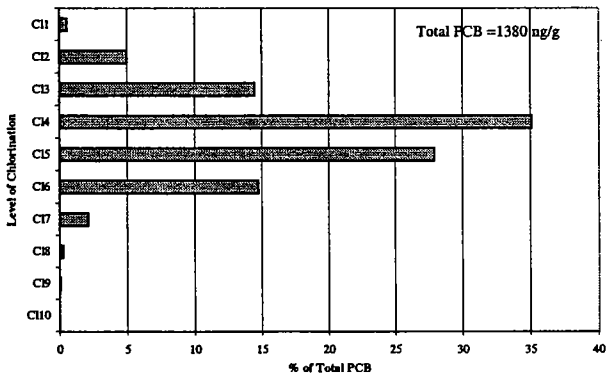
SLN-J-1



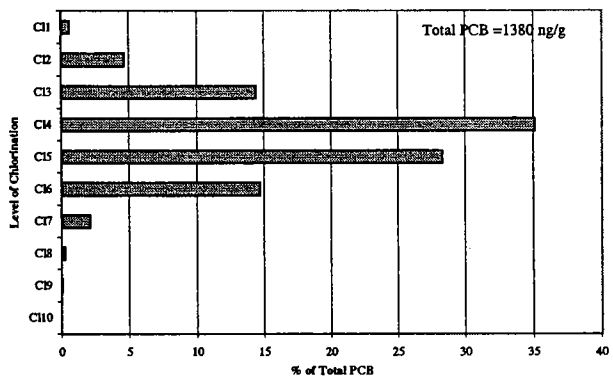
SLN-J-2

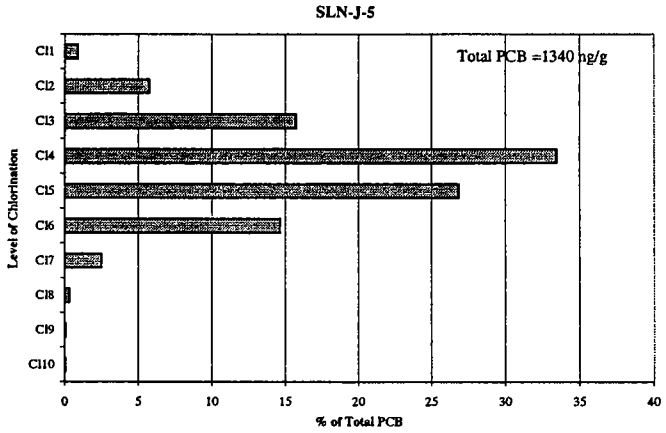


SLN-J-3

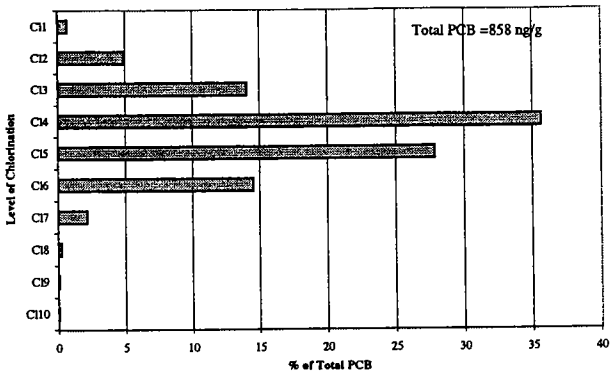


SLN-J-4

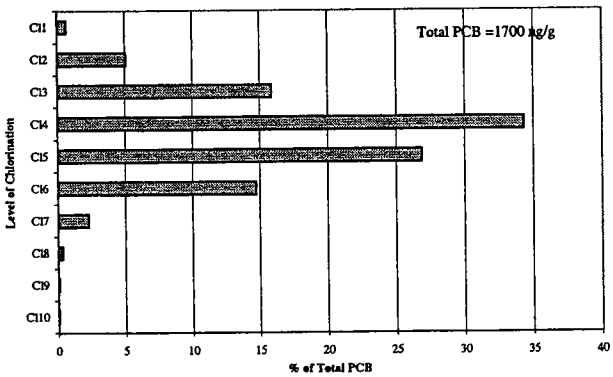



SLN-J-5
Total PCB =1340 ng/g
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
Level of Chlorination
0
5
10
15
20
25
30
35
40
% of Total PCB

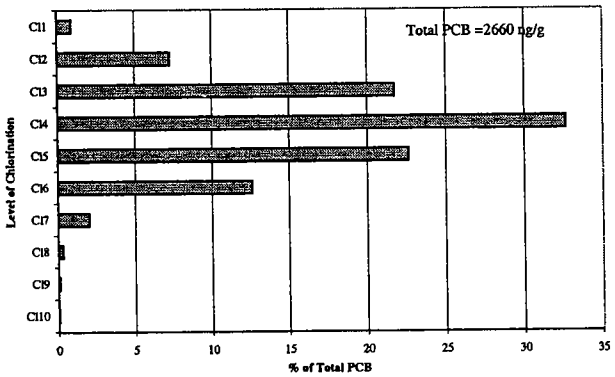
SLN-I-1



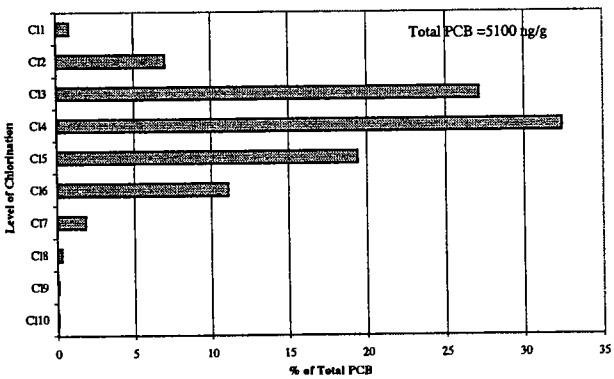
SLN-I-2

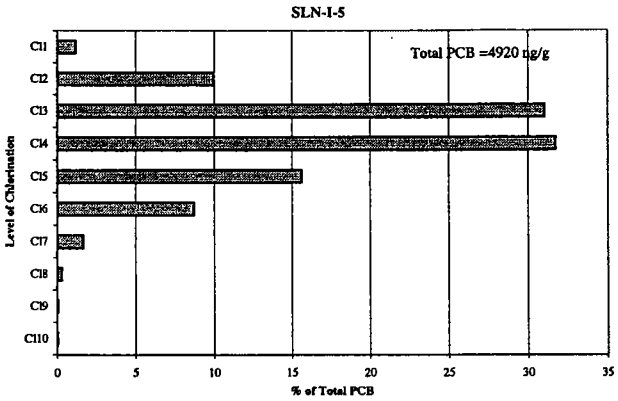


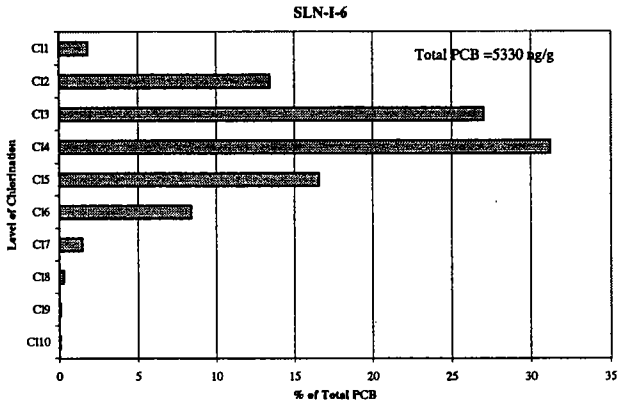
SLN-I-3

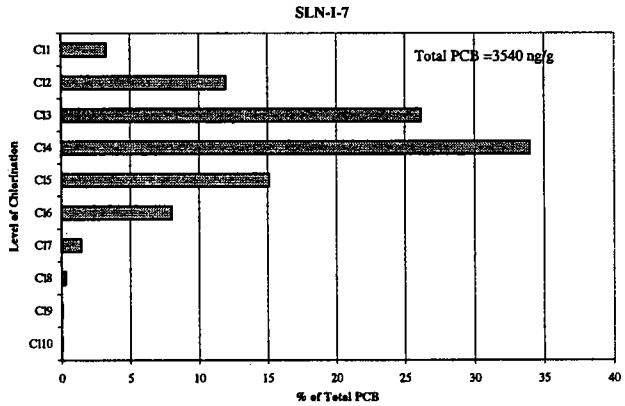


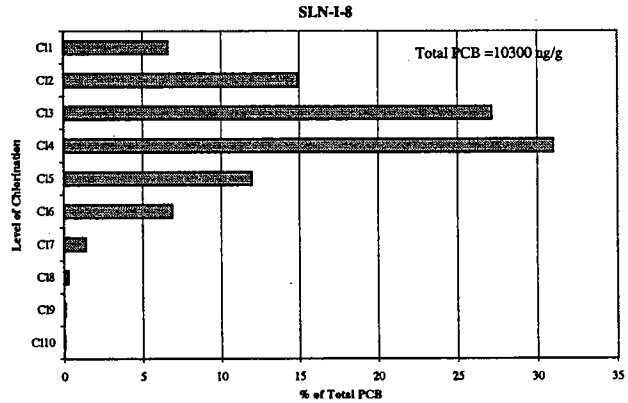
SLN-I-4



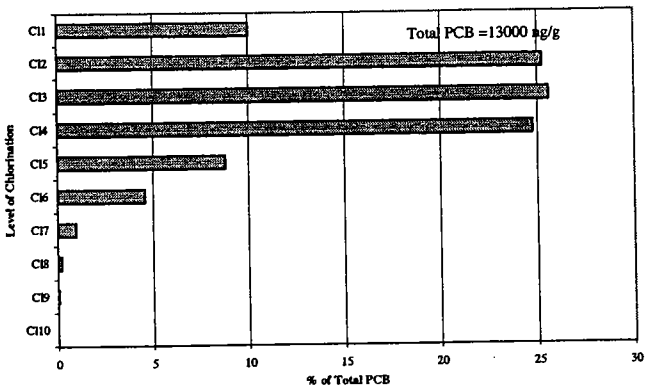

SLN-I-5
Total PCB =4920 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB


SLN-I-6
Total PCB =5330 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB

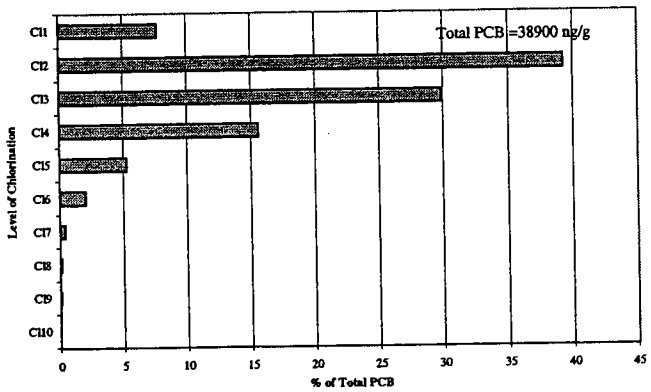

SLN-I-7
Total PCB =3540 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
40
% of Total PCB


SLN-I-8
Total PCB =10300 ng/g
Level of Chlorination
C11
C12
C13
C14
C15
C16
C17
C18
C19
C110
0
5
10
15
20
25
30
35
% of Total PCB

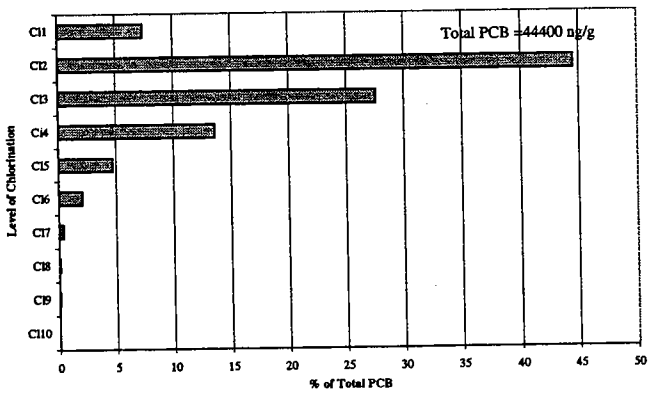
SLN-I-9



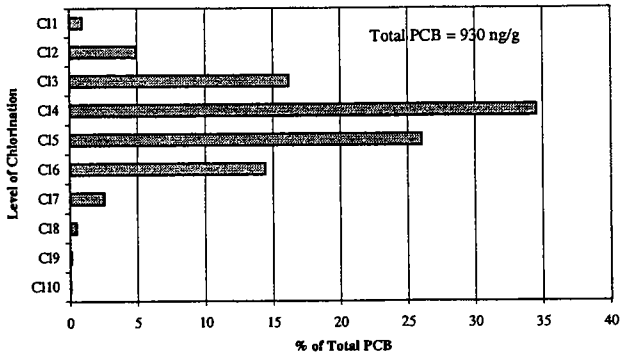
SLN-I-10



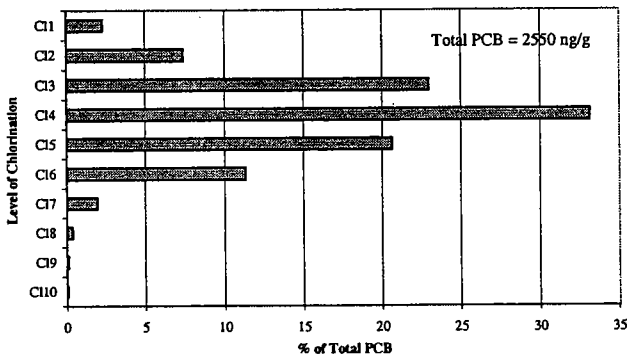
SLN-I-11



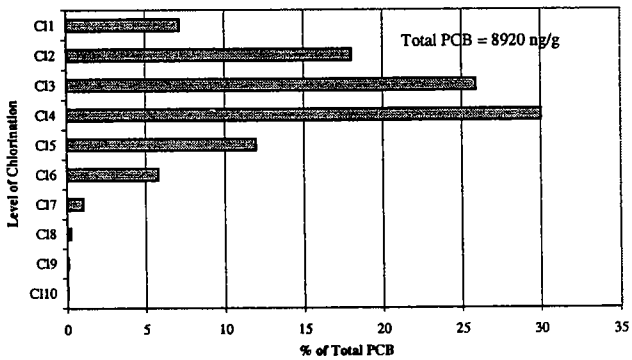
SLN-T6-1



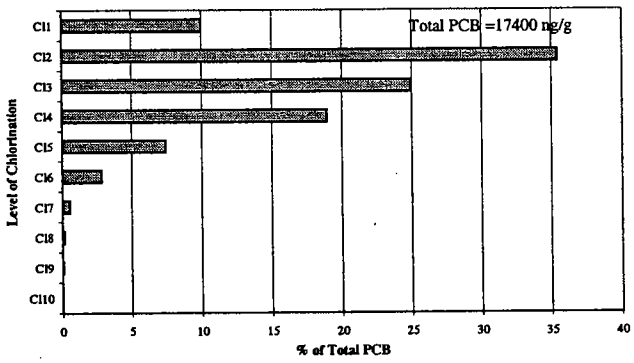
SLN-T6-2



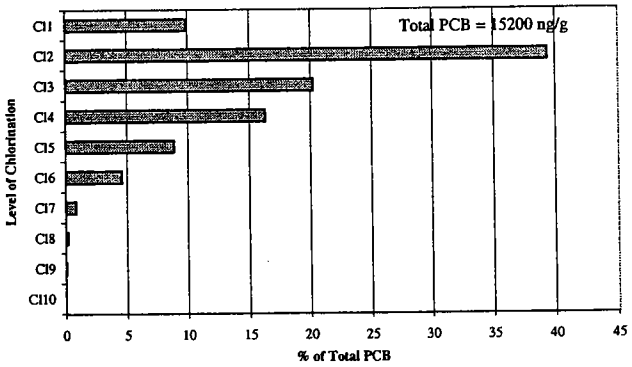
SLN-T6-3



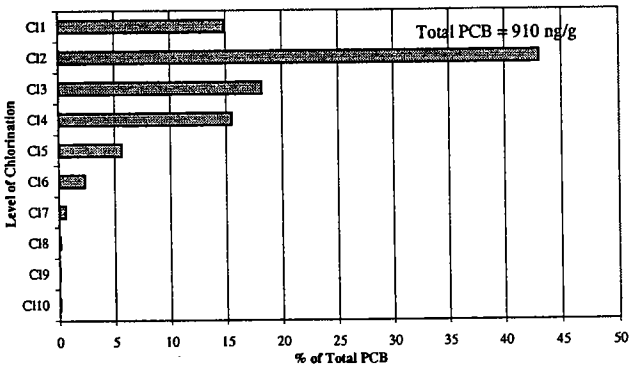
SLN-T6-4



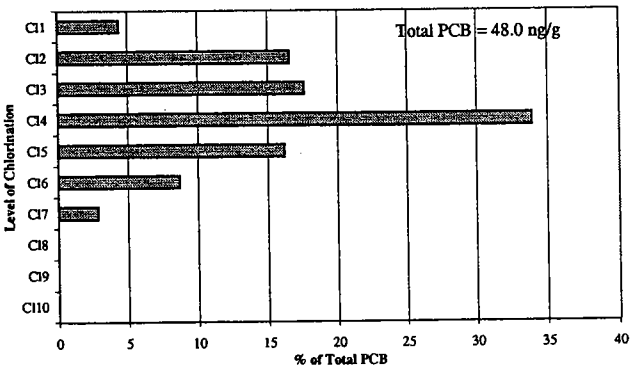
SLN-T6-5

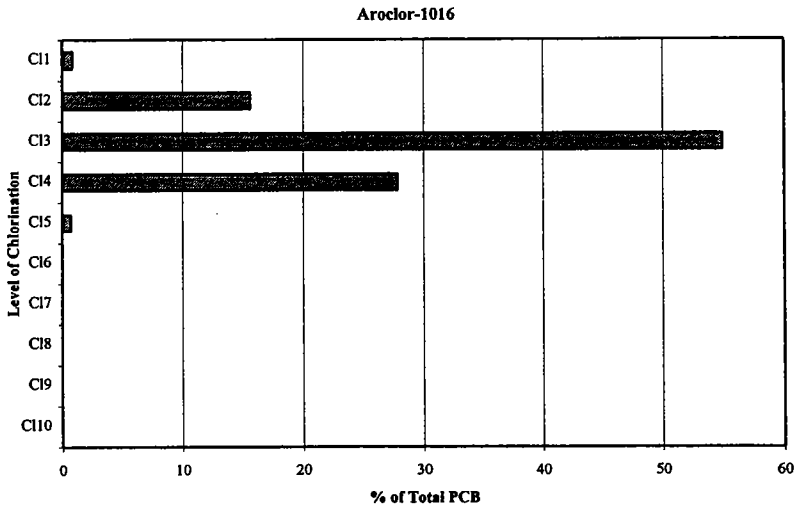


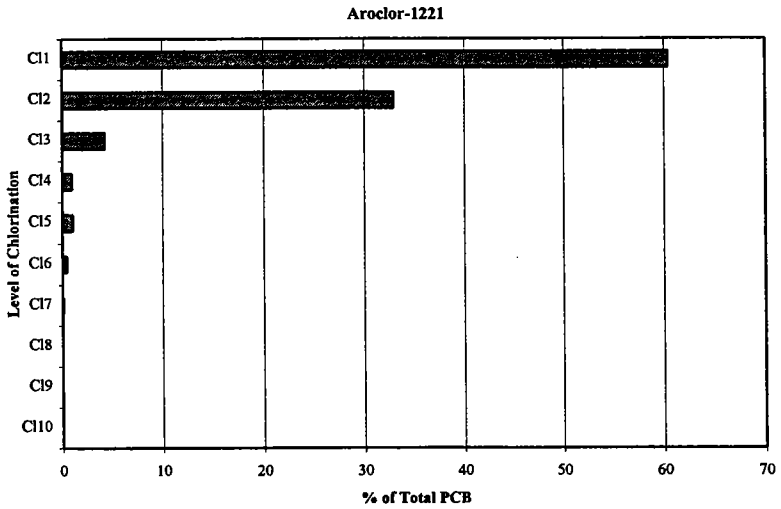
SLN-T6-6

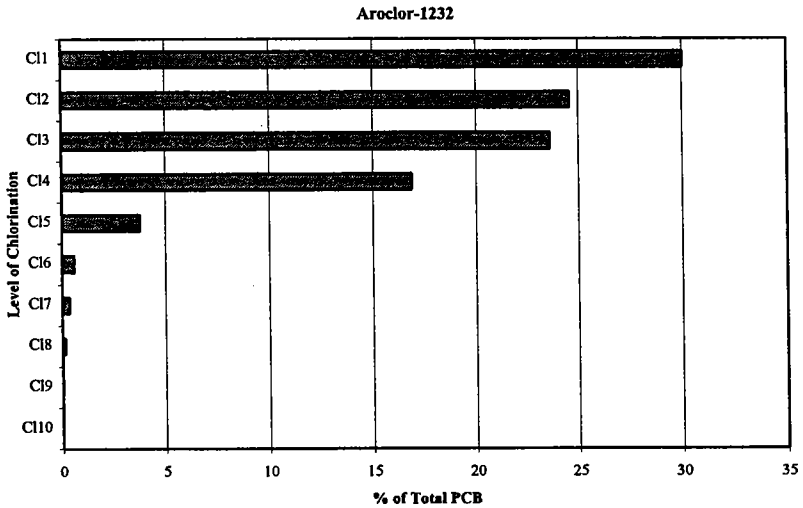


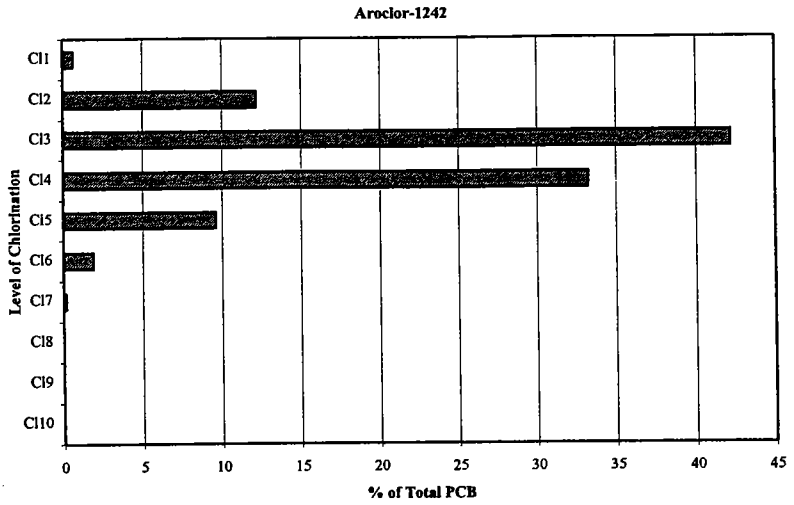
SLN-T6-7

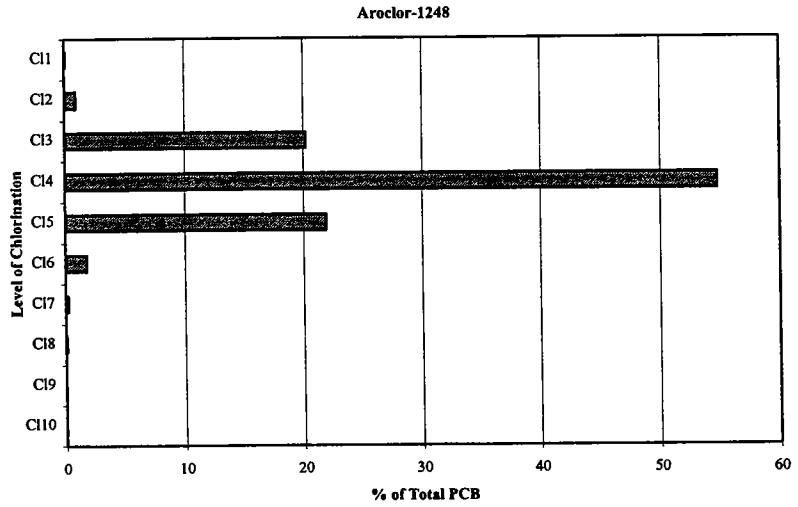


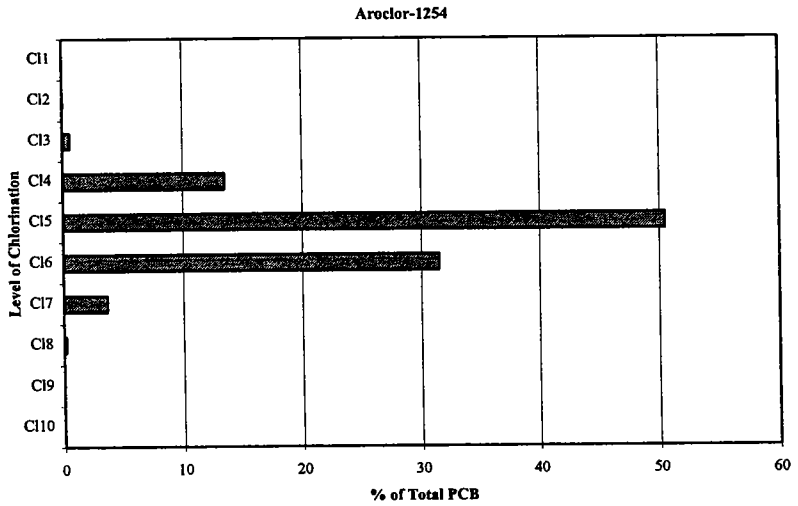

Aroclor-1016
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
Level of Chlorination
0
10
20
30
40
50
60
% of Total PCB

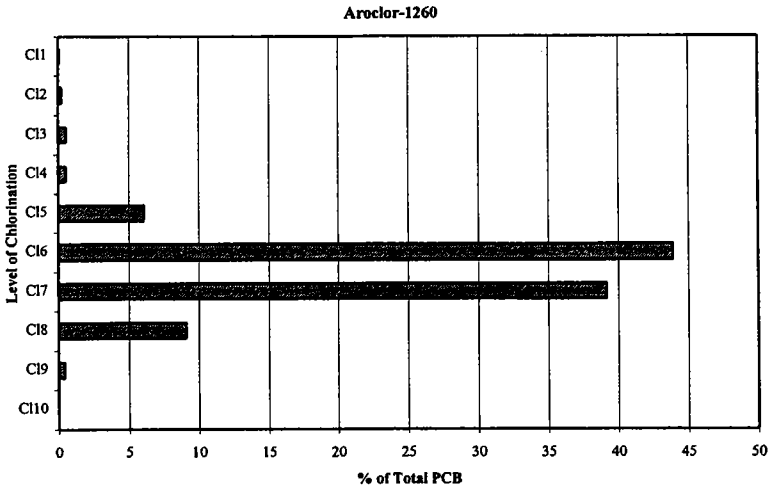

Aroclor-1221
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
Level of Chlorination
0
10
20
30
40
50
60
70
% of Total PCB

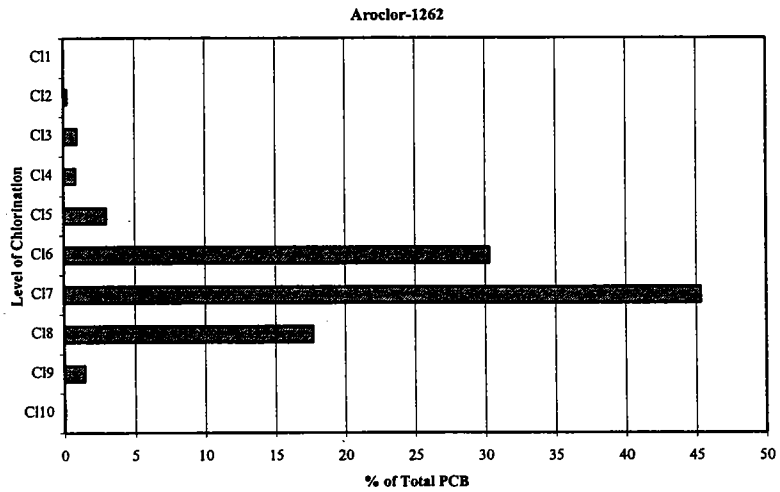

Aroclor-1232
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
Level of Chlorination
0
5
10
15
20
25
30
35
% of Total PCB

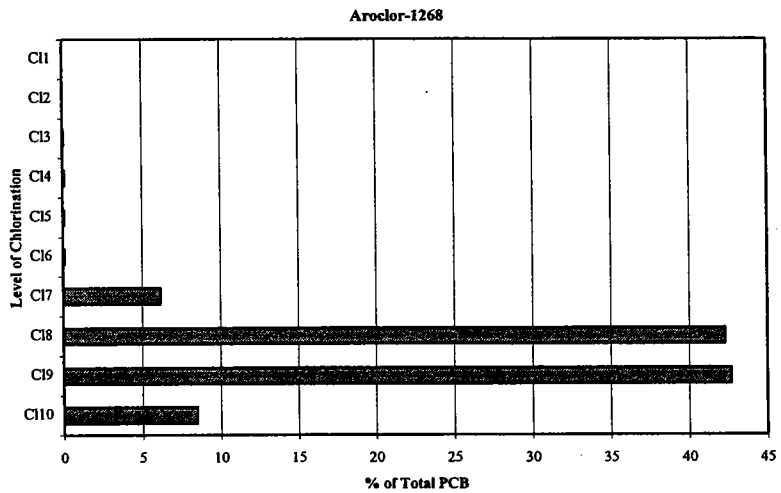

Aroclor-1242
Level of Chlorination
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
0
5
10
15
20
25
30
35
40
45
% of Total PCB


Aroclor-1248
Level of Chlorination
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
0
10
20
30
40
50
60
% of Total PCB


Aroclor-1254
Level of Chlorination
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
0
10
20
30
40
50
60
% of Total PCB

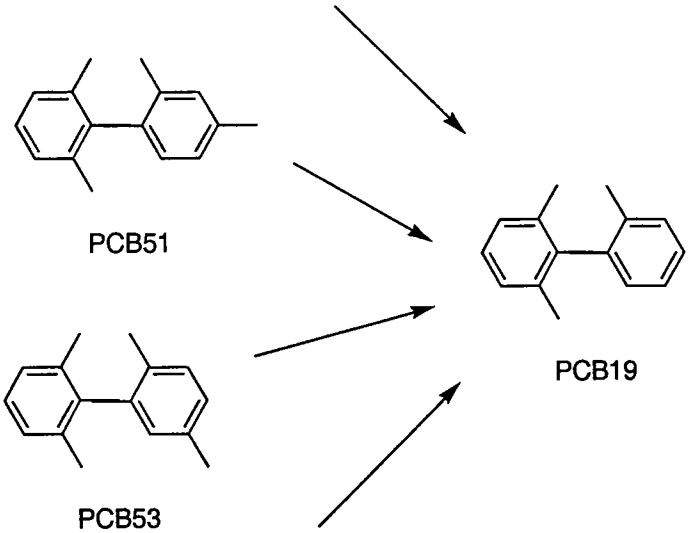

Aroclor-1260
Level of Chlorination
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
0
5
10
15
20
25
30
35
40
45
50
% of Total PCB

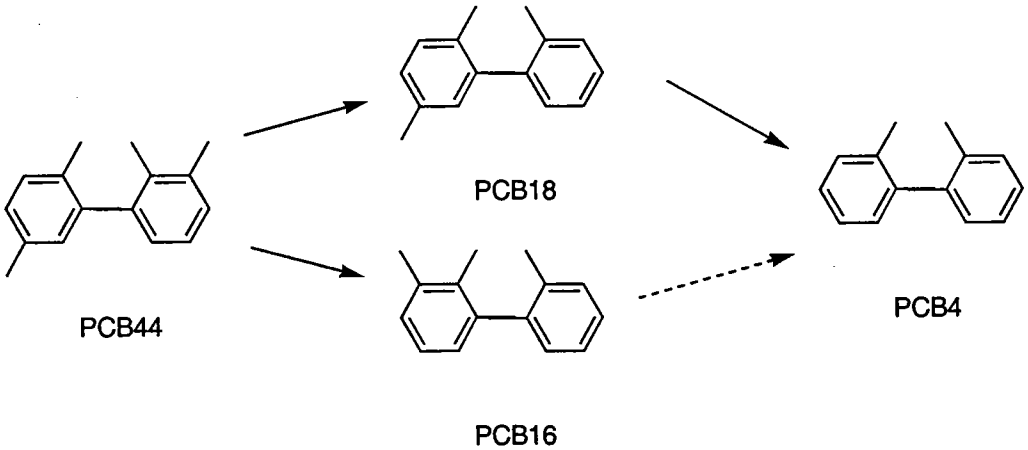

Aroclor-1262
Level of Chlorination
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
0
5
10
15
20
25
30
35
40
45
50
% of Total PCB

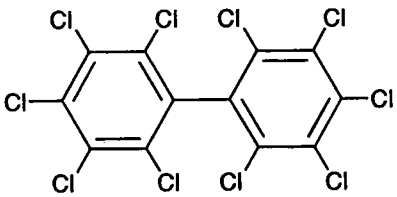

Aroclor-1268
Level of Chlorination
Cl1
Cl2
Cl3
Cl4
Cl5
Cl6
Cl7
Cl8
Cl9
Cl10
0
5
10
15
20
25
30
35
40
45
% of Total PCB

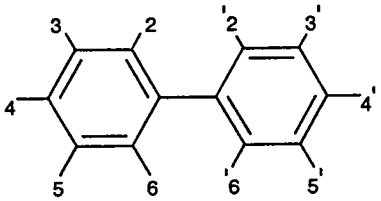
APPENDIX H

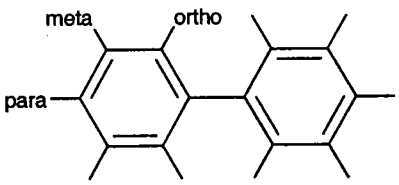
MOLECULAR STRUCTURES OF KEY PCB CONGENERS INVOLVED IN DECHLORINATION PROCESSES


PCB51
PCB53
PCB19

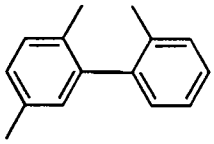

PCB18
PCB44
PCB4
PCB16


Cl
Cl
Cl
Cl
Cl
Cl
Cl
Cl
Cl
Cl

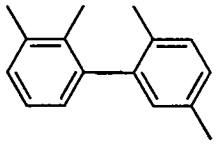

3
2
'2
3'
4
4'
5
6
'6
5'


meta
ortho
para

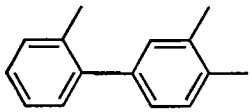
PCB Congeners with Decreases in Concentrations Due to Dechlorination



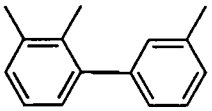
PCB18



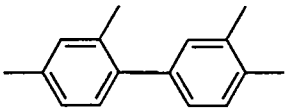
PCB44



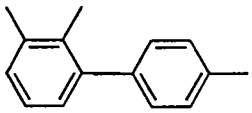
PCB33



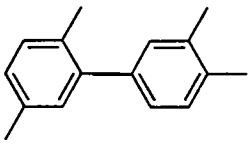
PCB20



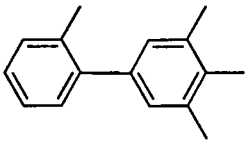
PCB66



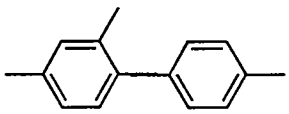
PCB22



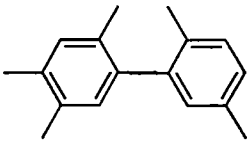
PCB70



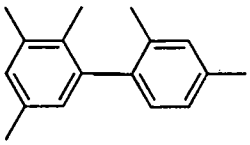
PCB76



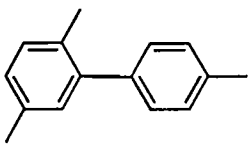
PCB28



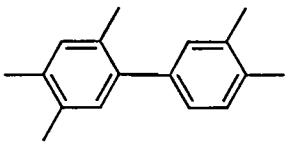
PCB101



PCB90

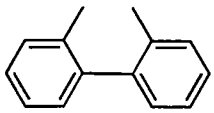


PCB31

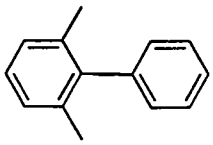


PCB118

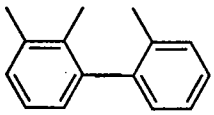
PCB Congeners with Increases in Concentrations Due to Dechlorination
(dechlorination products)



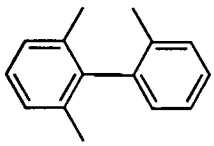
PCB4



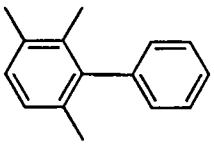
PCB10



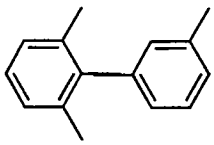
PCB16



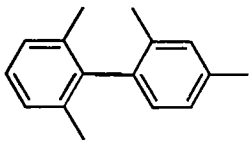
PCB19



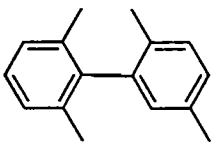
PCB24



PCB27



PCB51



PCB53

APPENDIX I

EXAMPLE PRINCIPAL COMPONENT ANALYSIS (PCA) AND HIERARCHICAL CLUSTER ANALYSIS (HCA) PLOTS

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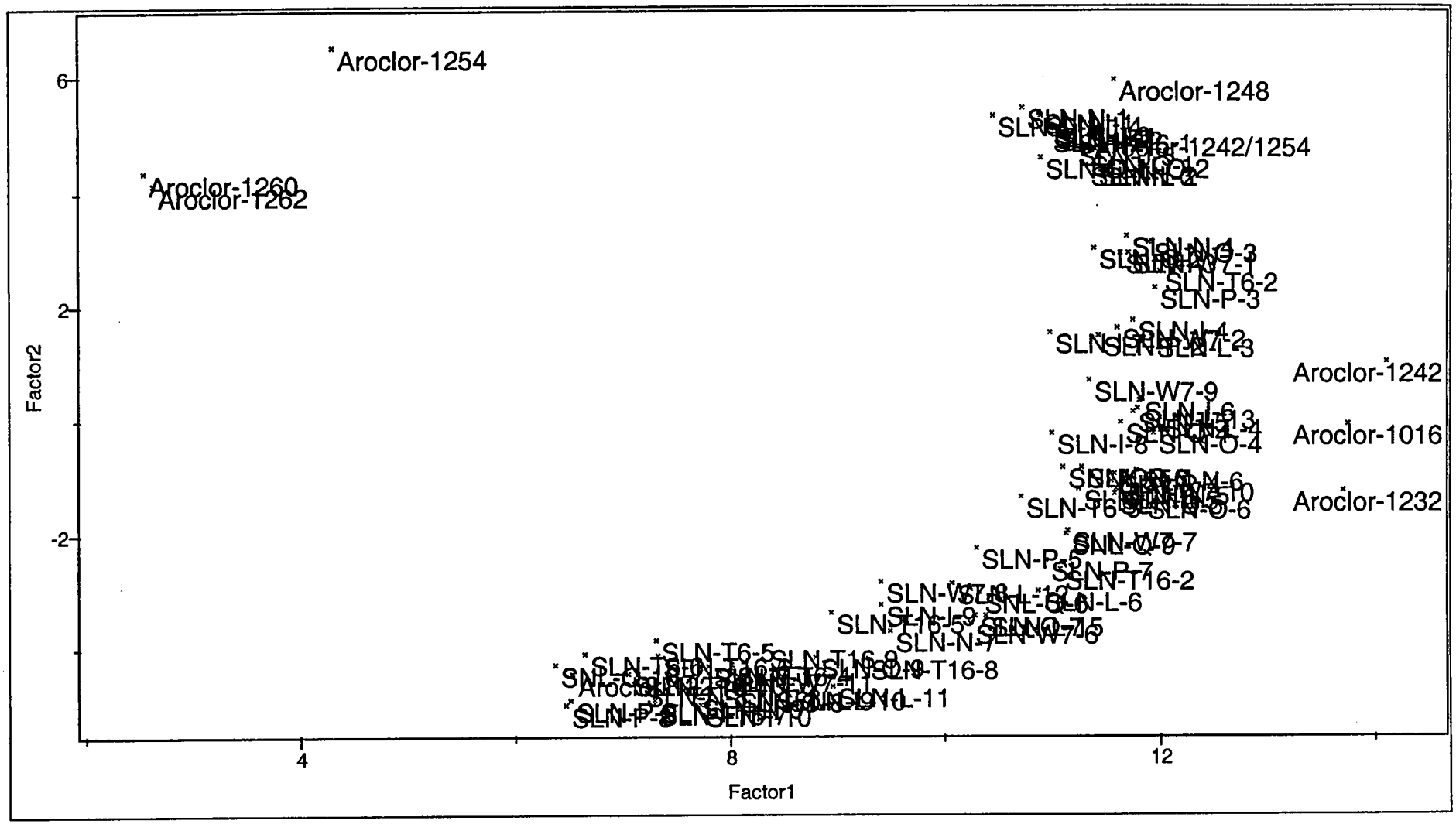
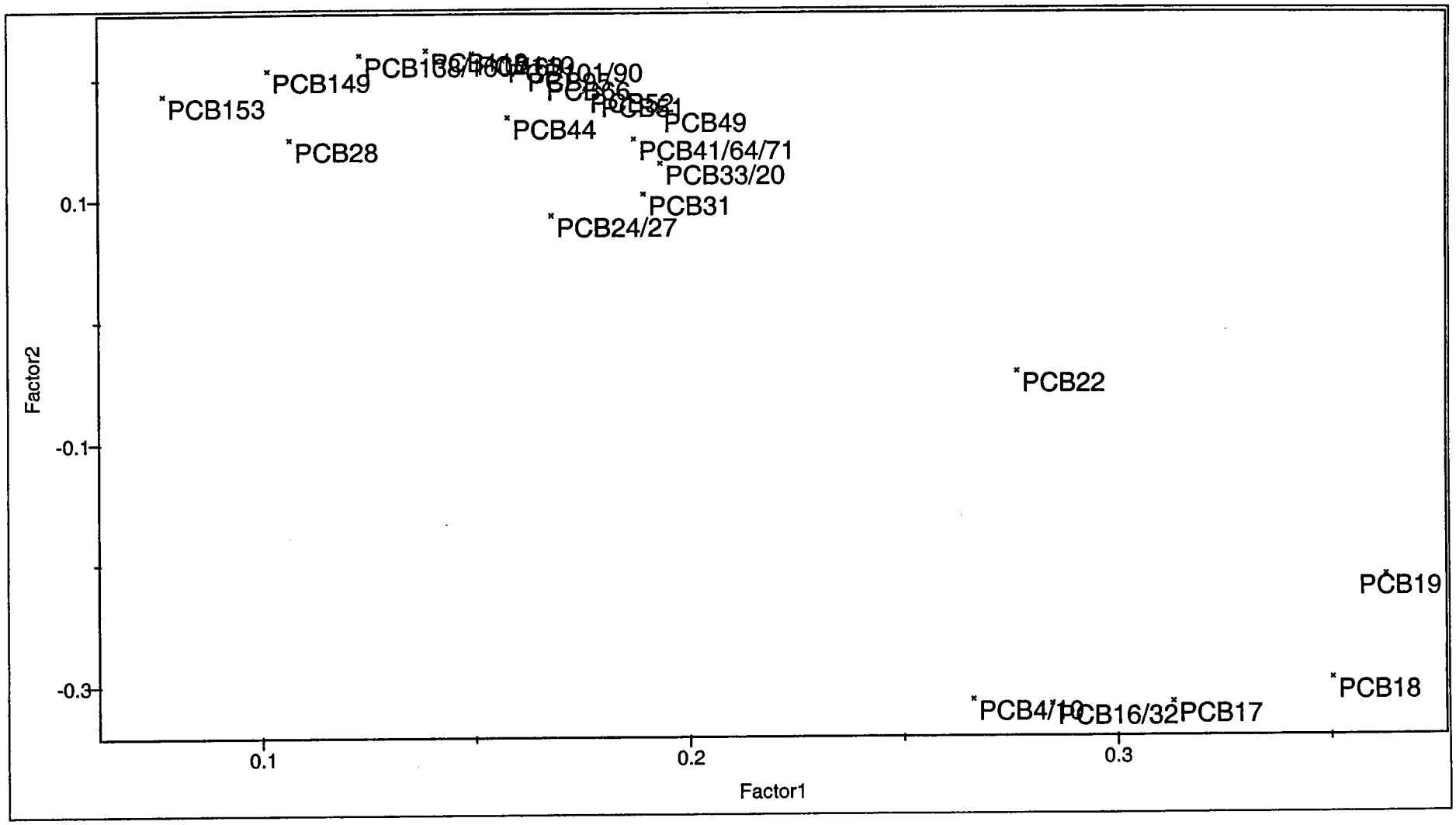
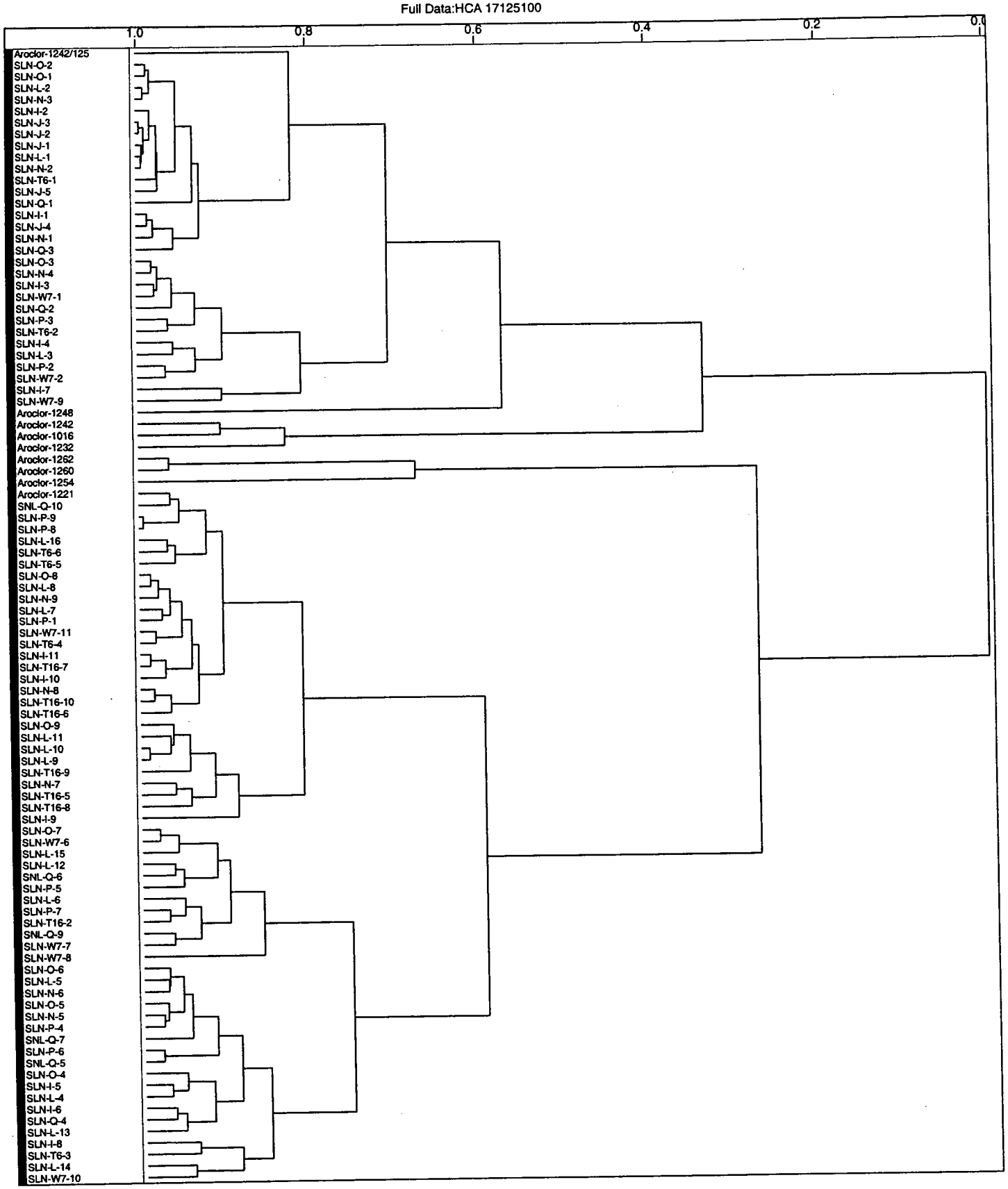


Full Data:PCA 17122486:LDGS



Full Data:HCA 17125100



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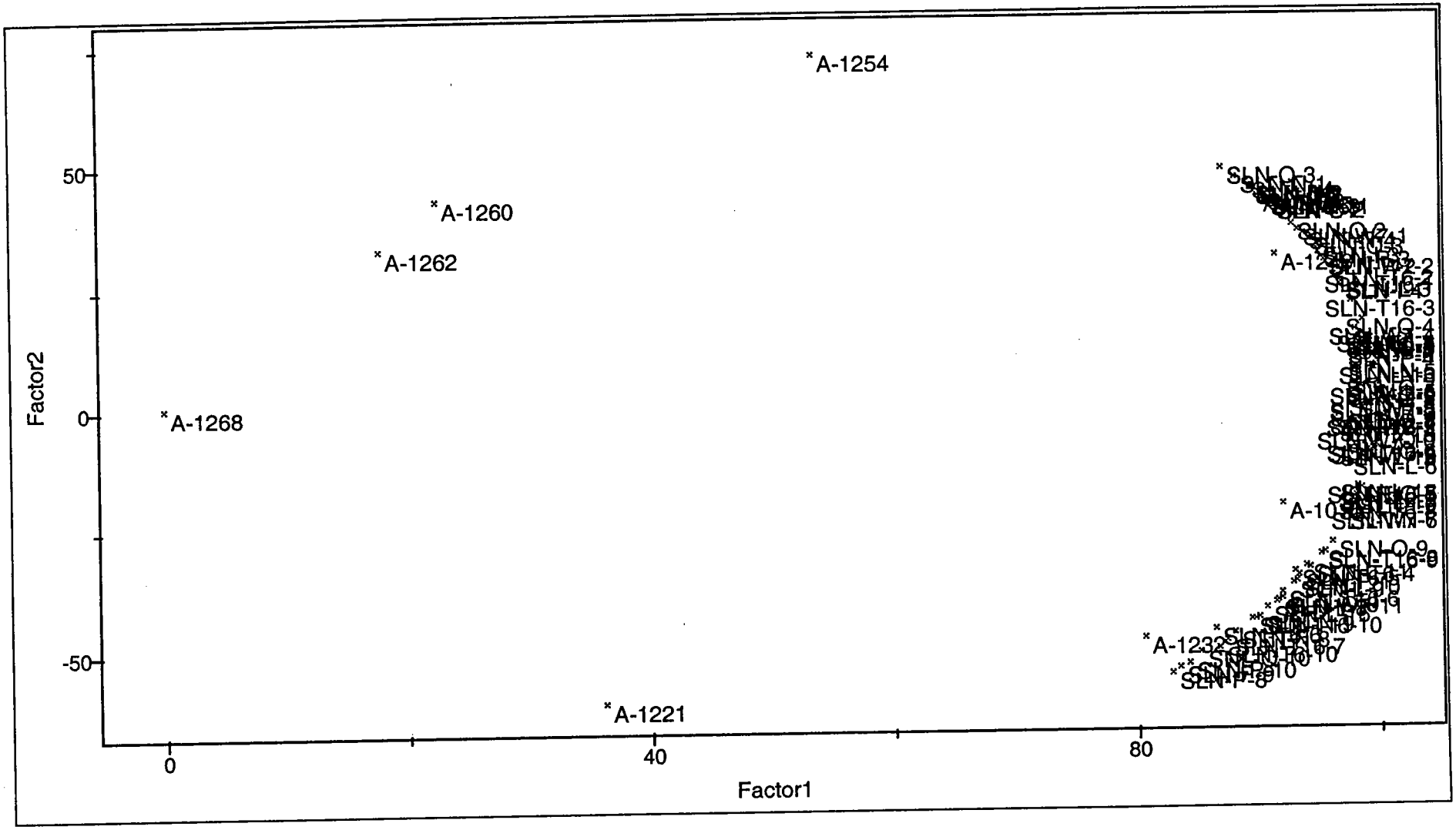

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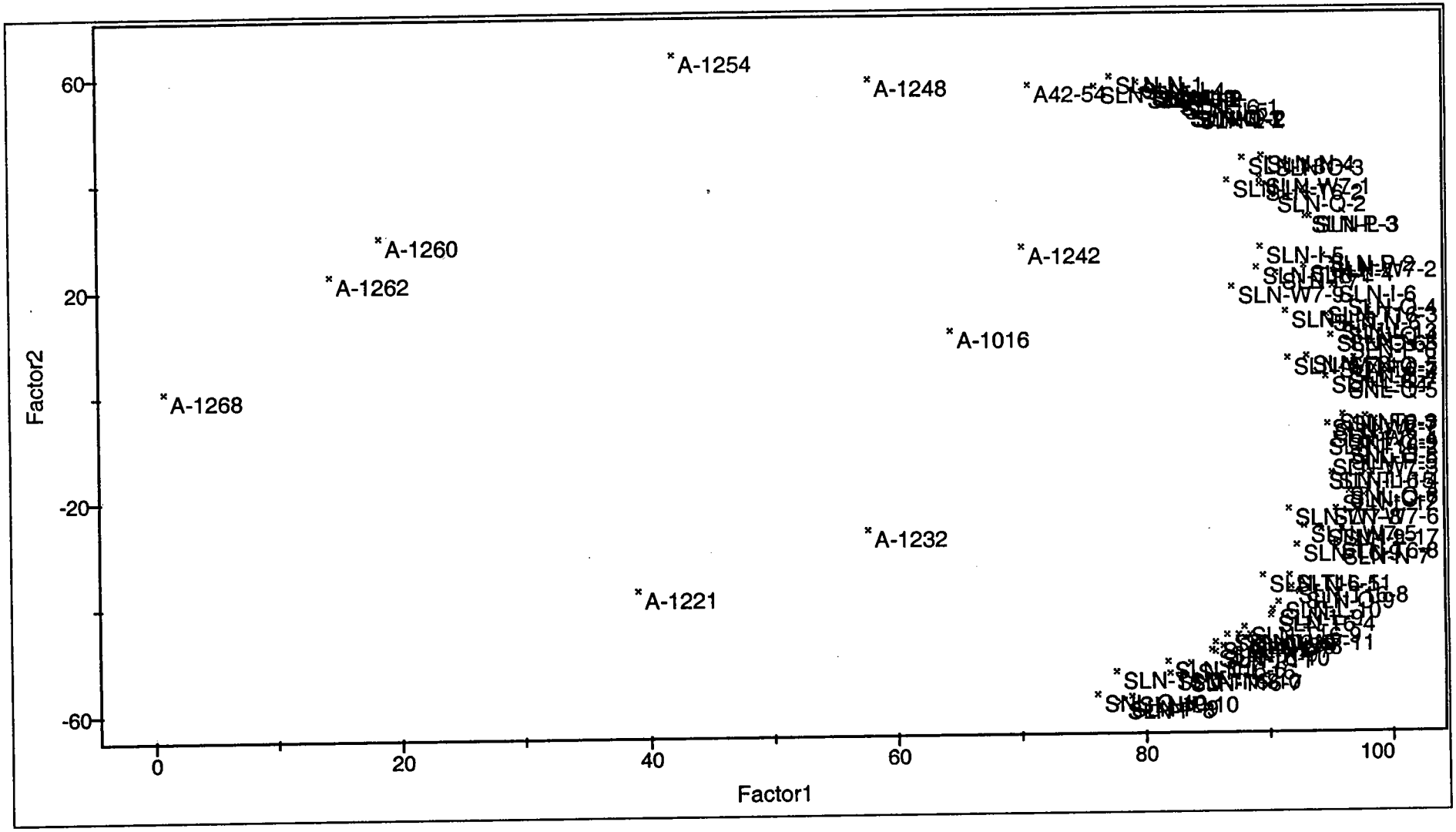
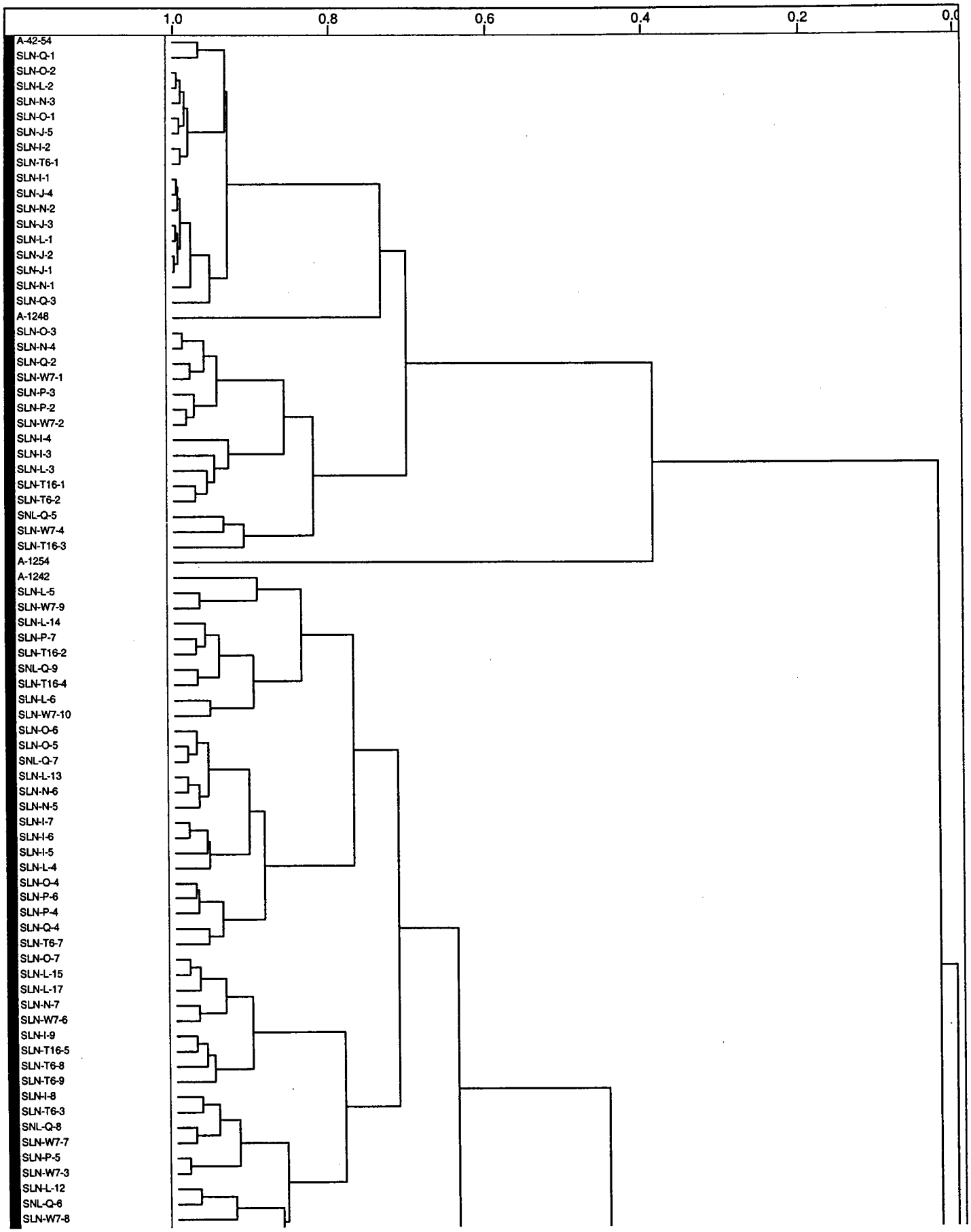
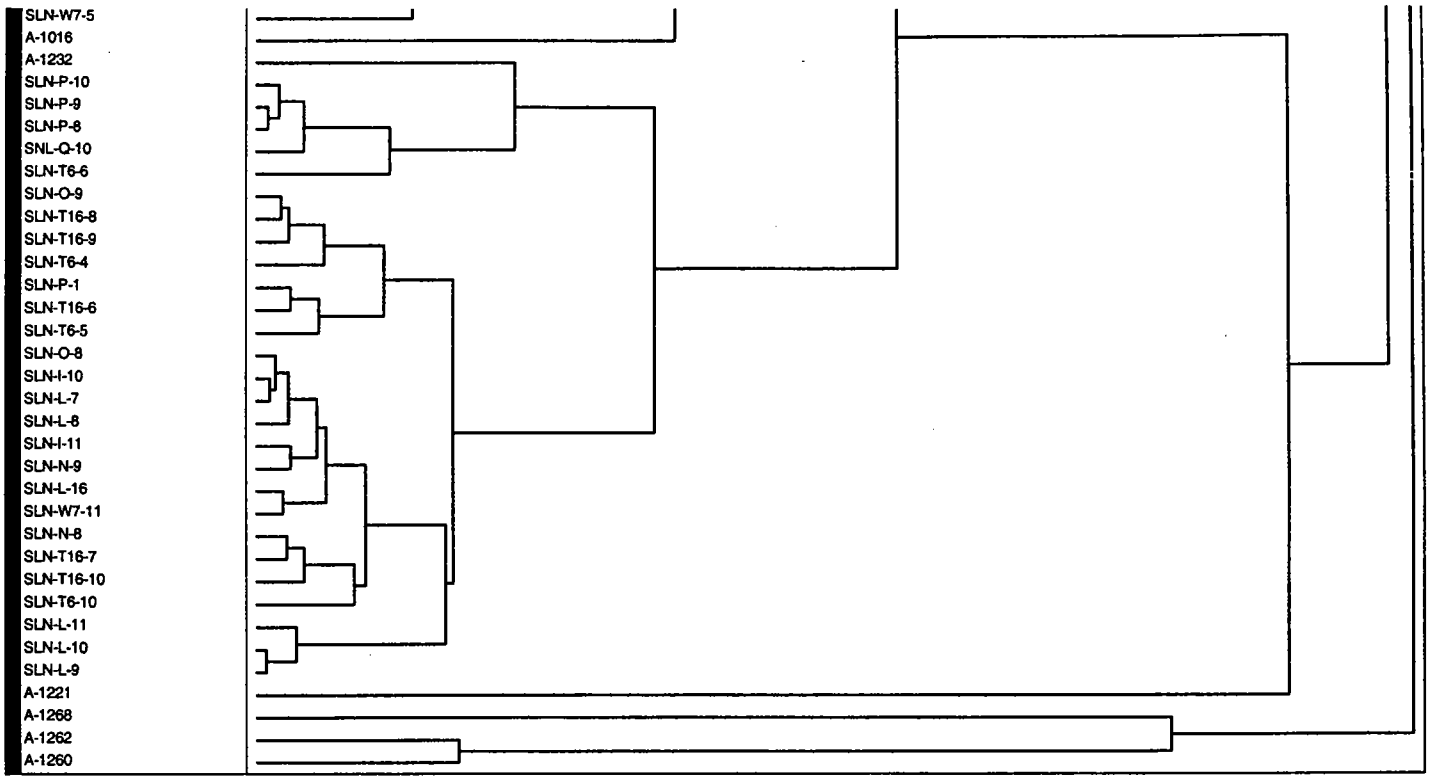


Full Data:HCA 13121636

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A-1232
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SLN-P-8
SNL-Q-10
SLN-T6-6
SLN-O-9
SLN-T16-8
SLN-T16-9
SLN-T6-4
SLN-P-1
SLN-T16-6
SLN-T6-5
SLN-O-8
SLN-I-10
SLN-L-7
SLN-L-8
SLN-I-11
SLN-N-9
SLN-L-16
SLN-W7-11
SLN-N-8
SLN-T16-7
SLN-T16-10
SLN-T6-10
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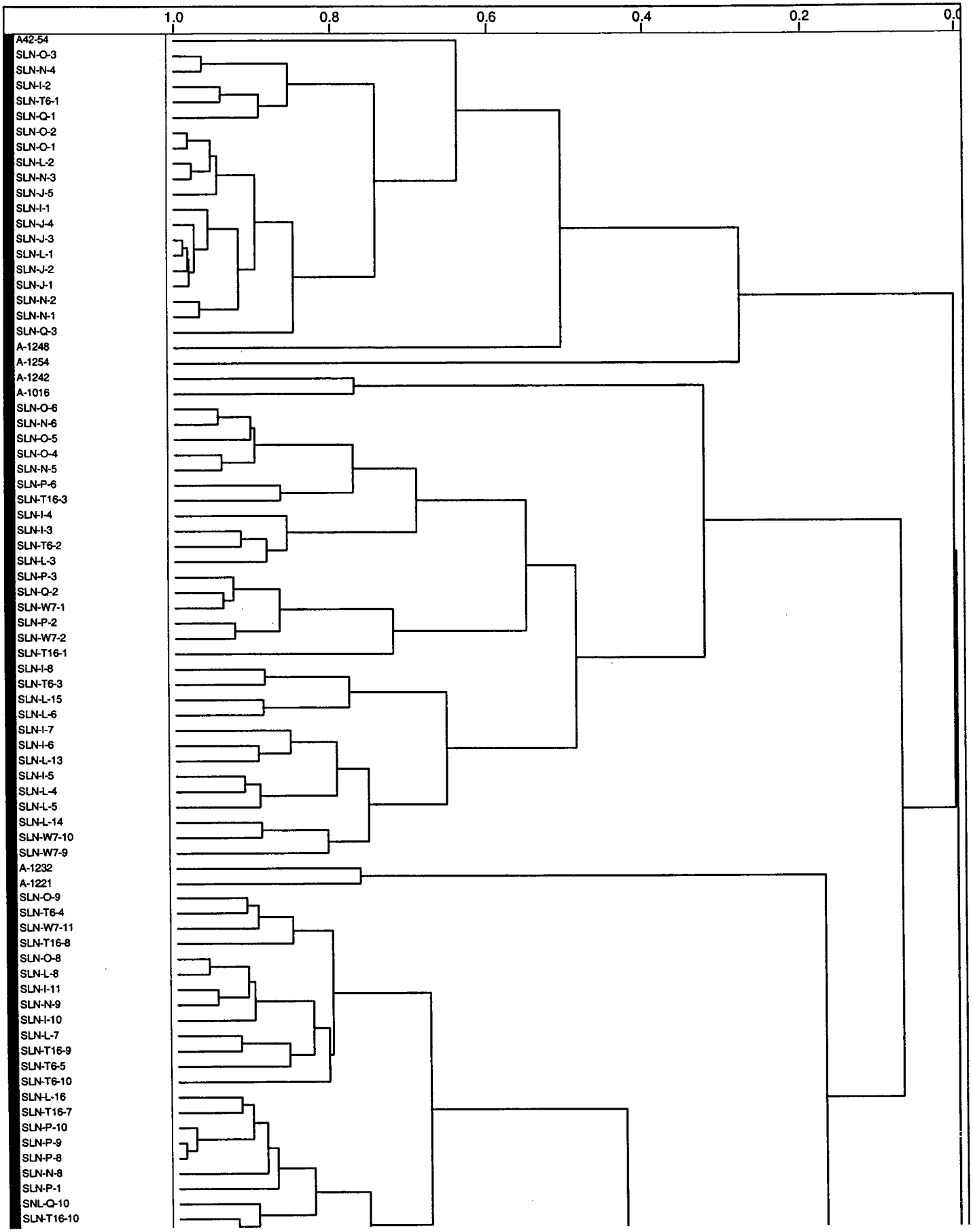
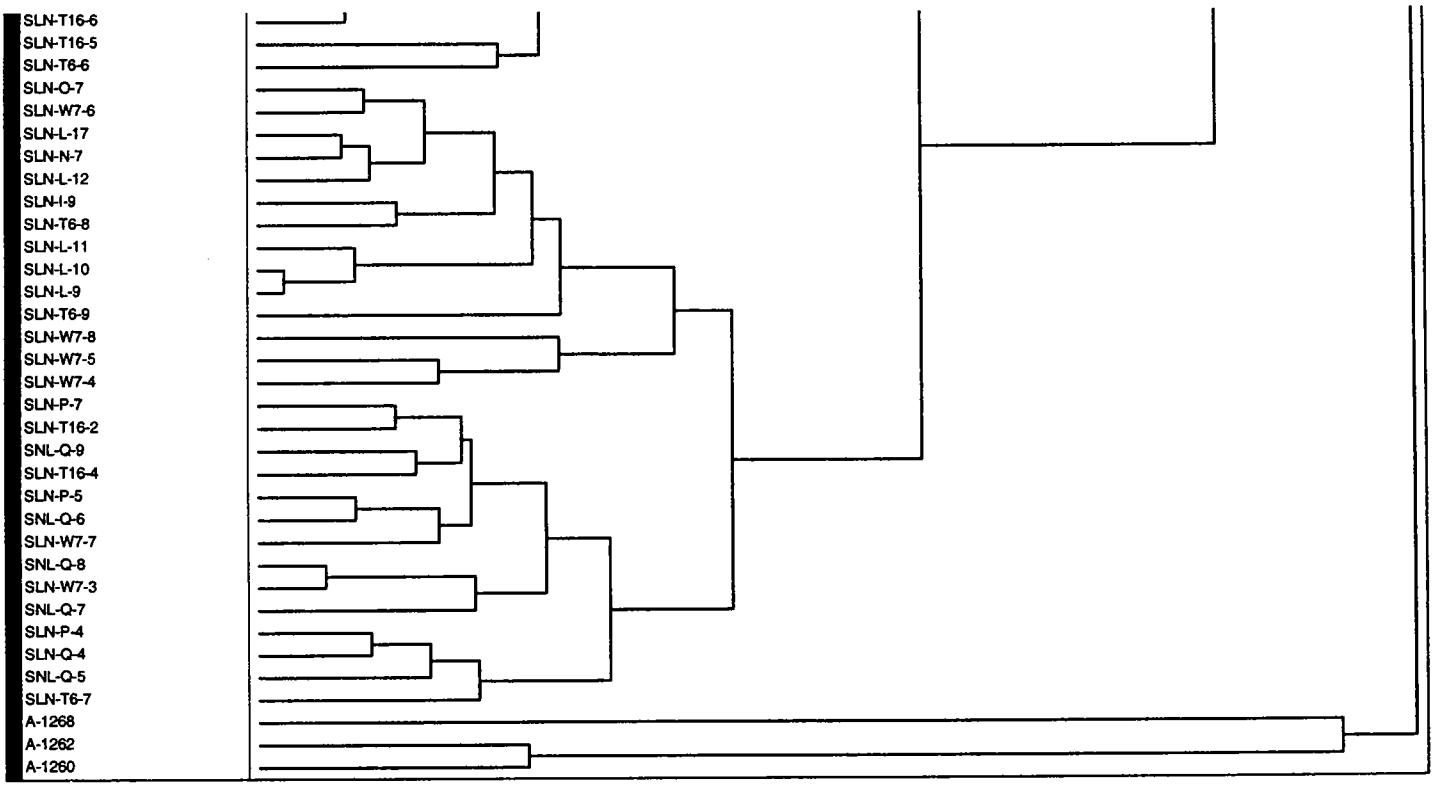
Full Data:HCA 13160046

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SLN-W7-8
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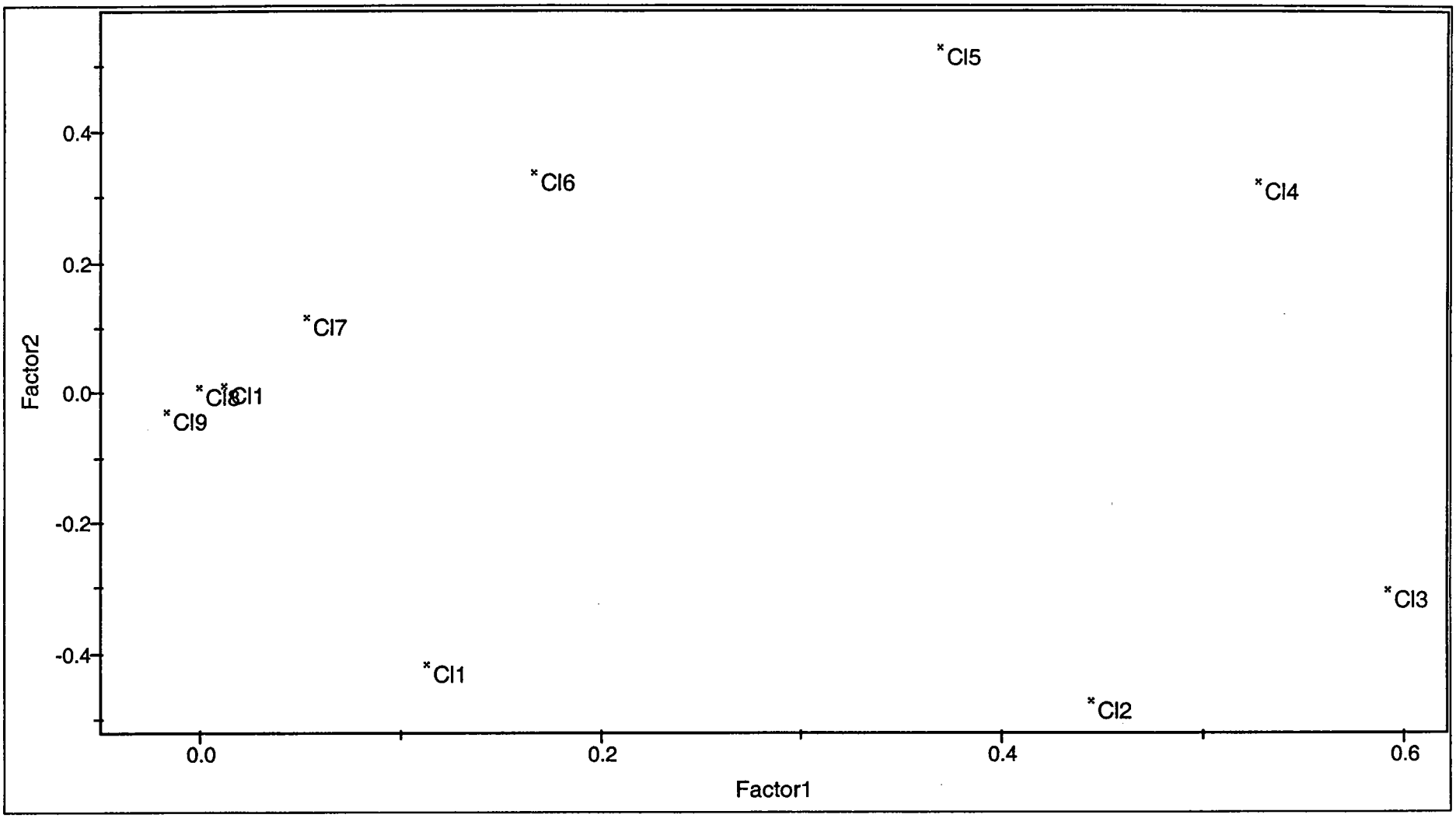
Full Data:PCA 13121686:LDGS



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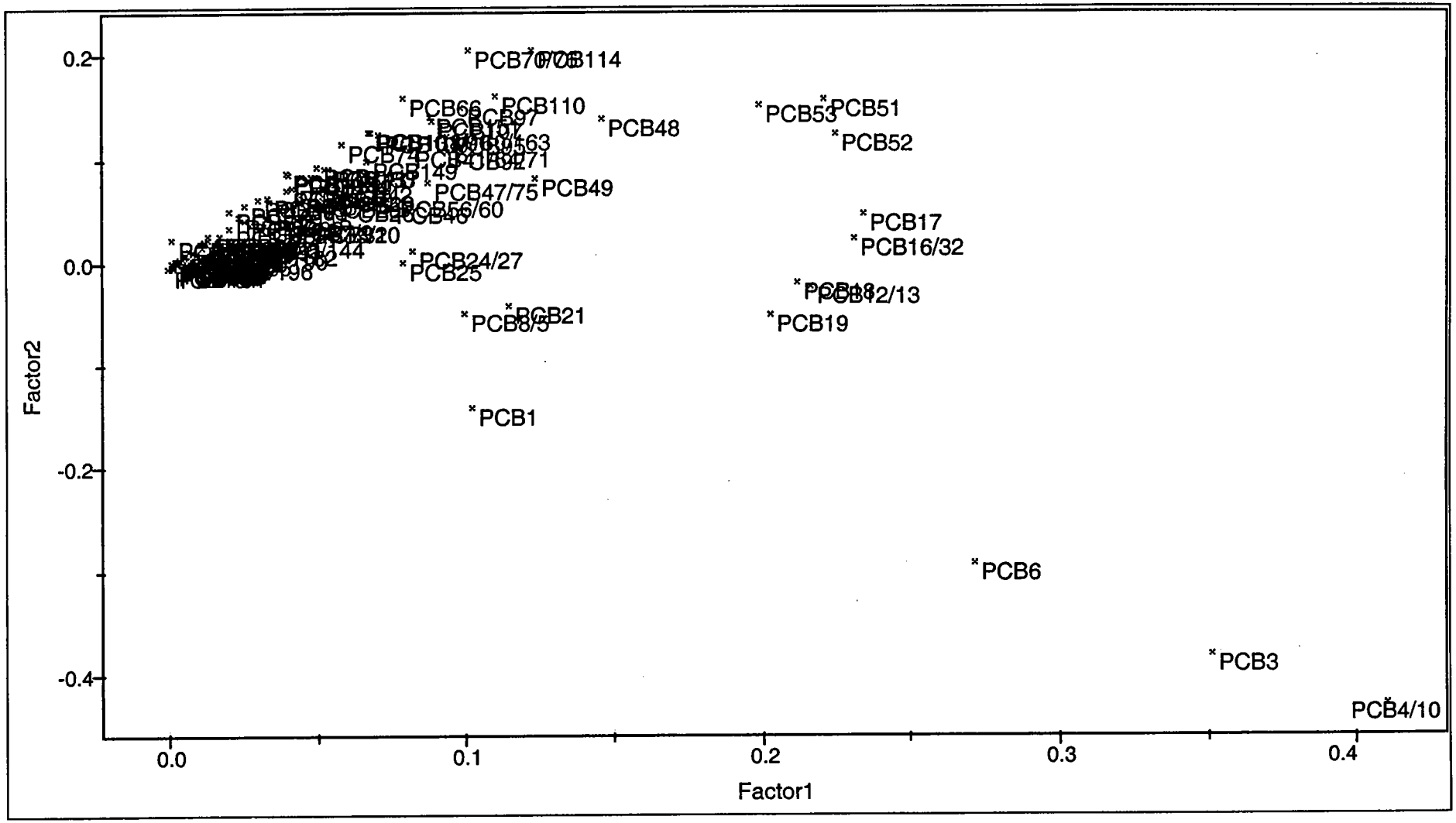

APPENDIX J

PCB PARTITIONING STUDIES

Appendix J: PCB Partitioning Studies

Vertical PCB advection and diffusion are controlled by the chemical properties of individual PCB compounds (e.g., their solubilities, diffusivities, and octanol-water partition coefficients) and by the capacity of the PCBs to adsorb to the sediment. Sorption onto sediments is controlled by the hydrophobic nature of the chemical, which is represented by the octanol-water partition coefficient, and by the amount of organic matter in the sediments, which is represented by the sediment TOC. PCB sorption experiments with Sangamo-Weston/Twelvemile Creek/LH sediments and LH water were conducted to compare the sorption of PCBs onto these specific sediments with literature-reported sorption coefficients. For this experiment, the relative concentration of PCBs is more important than the specific location or core from which the sediments are derived.

J.1 PCB Partitioning Approach

Sediment segments were shipped to BCO for partitioning studies. Partitioning studies were conducted after sediment PCB concentration profiles were determined, so a predefined PCB concentration range could be targeted for the partitioning study; samples were frozen until use. Table J-1 shows the sediment cores intervals used for the PCB partitioning studies, along with target PCB concentrations based on the PCB characterization work described above. Partitioning studies were conducted at 10°C and at neutral pH.

Table J-1 shows sediment segments and their expected concentrations used for the partitioning study. The selected sediment core segments were thawed at room temperature and placed into a clean glass or stainless steel container and homogenized by manual stirring. The homogenized sediments were analyzed for PCBs and TOC to establish baseline PCB and TOC loadings for the study. Bottles 9-20 were used for time-dependent desorption studies.

Table J-1. Sediment Core Segments Used for PCB Partitioning Studies

Partitioning Experimental Bottle No.	Sample Identification Number	Sediment Core Segment	Target t-PCB Concentration (mg/kg)
1	SLN-O	1	1
2	SLN-I	3	5
3	SLN-L	4	10
4	SLN-W7	6	25
5	SLN-W7	6 (Duplicate)	25
6	SLN-N	4	50
7	SLN-T16	17	85
8	Sand (Control)	Sand (Control)	–
9-20	SLN-L SLN-N SLN-W7	5, 6, and 9 3 11	23

Eight 250-mL Teflon™ bottles (Bottles 1-8) contained approximately 50 g of sediment (wet weight basis) plus approximately 200 mL of filtered (glass fiber) LH water. The bottles were placed onto a temperature-controlled shaker table (AROS 160 Adjustable Reciprocating Orbital Shaker inside a Precision

Mechanical Convection Incubator), operated at 200 revolutions per minute (rpm) and maintained at a temperature of 10°C. All eight bottles were shaken at the same time. Samples were protected from light while they are on the shaker table. Sediment cultures were not killed.

Twelve additional 250-mL bottles (Bottles 9-20) contained sediment and lake water and were incubated under the same laboratory conditions as the set of eight bottles described above. The mid-range PCB concentration sediment was targeted, with 50 g of sediment and 200 mL of lake water. Pairs of bottles were sacrificed after each of 2, 4, 6, 8, 10, and 12 weeks of incubation. The pH of a given aqueous matrix was measured using a pH meter calibrated against pH 4.0, 7.0, and 10.0 standards on the day it was used. The aqueous samples were centrifuged at 3,000 rpm for one hour and frozen until they were analyzed for PCB concentrations; sediment PCB concentrations were not determined for this portion of the experiment. All aqueous samples and the original eight bottles were analyzed after the 12-week incubation period.[2] The aqueous samples were used to determine how close the bottles approached sorption equilibrium.

When Bottles 1-8 were harvested, pH readings of the lake water in each bottle were made using a pH meter calibrated against pH 4.0, 7.0, and 10.0 standards on the days the bottles were sacrificed. Sacrificed bottles were centrifuged up to 3 hours, or until fines were visually removed from suspension; filtration was not practical due to the potential for PCB sorption onto filter media. Aqueous and sediment samples were maintained at 4°C until analyzed for PCB concentrations. A parallel set of samples was sent to Soil Technology, Inc. (Bainbridge Island, WA) for TOC analysis. Total solids/total volatile solids (TS/TVS) analyses were conducted at Battelle using American Public Health Methods 2540B and 2540E (Eaton et al., 1995).

J.2 PCB Partitioning Results

Initial sediment concentrations of total PCBs are listed in Table J-2, with measured aqueous- and solid-phase t-PCB concentrations after incubation and percent recoveries. The tabulated data for all partitioning experiments are shown at the end of this appendix. Because of variations between the cores analyzed by Battelle-Duxbury and those received by BCO, actual t-PCB concentrations differed significantly from targeted PCB concentrations.

Percent recovery values ranged from approximately 25% to approximately 58%. Sample SW-3 had a low percent recovery of 4.7%. This low recovery is probably due to the low initial PCB concentration. Bottle SW-3 was not used to calculate PCB K_d values.

Percent recoveries were lower than expected for all samples. Because the losses are unknown, it was impossible to determine whether the low recoveries were due to low aqueous recoveries, low sediment recoveries, or both. Thus, the extent to which the poor recoveries negatively effected the calculated K_d values is unknown.

[2] Freezing aqueous samples for more than two weeks exceeds the criterion that samples be extracted within two weeks of collection for organic analyses. However, the ability to extract and analyze samples simultaneously significantly reduced analytical costs for this task. The aqueous concentration over time was a non-critical data parameter, and was used solely to identify the extent to which sorption equilibrium was achieved. Consequently, freezing of the samples was not expected to negatively impact the overall experimental results.

Table J-2. Percent PCB Recovery for LH Partitioning Experiments

Sample ID	Initial Volume (L)	Initial Mass (g)	Final Sediment Concentration (ng/Kg)	Initial Sediment Concentration (ng/kg)	Final Liquid Concentration (ng/L)	Percent PCB Recovered
SW-1	0.2	51.8881	884.65	1519.63	0	58
SW-2	0.2	67.7028	1567.53	5276.42	511.3	30
SW-3	0.2	50.7122	0.19	4.04	0	4.7
SW-4	0.2	50.0973	8960.61	21951.8	3138.32	41
SW-5	0.2	51.1431	10207.71	21951.8	3200.81	47
SW-6	0.2	52.3529	9925.18	19699.61	4599.79	50
SW-7	0.2	52.3462	3.1	6.01	0	52
SW-8	0.2	51.2757	0	0	0	-
SW-9	0.2	53.3922	2581.07	9770.3	2166.36	27
SW-10	0.2	50.9328	2659.07	9770.3	2198.9	27
SW-11	0.2	49.7209	2647.71	9770.3	7174.66	27
SW-12	0.2	49.4427	2410.22	9770.3	8039.26	25
SW-13	0.2	49.5377	2577.66	9770.3	10969.49	27
SW-14	0.2	50.1320	3479.79	9770.3	1277.08	36
SW-15	0.2	48.7932	2927.75	9770.3	1602.2	30
SW-16	0.2	50.332	3223.3	9770.3	1679.55	33
SW-17	0.2	48.6784	3482.9	9770.3	1687.72	36
SW-18	0.2	50.8613	5091.13	9770.3	1477.7	52
SW-19	0.2	49.0604	5715.47	9770.3	1758.59	59
SW-20	0.2	50.5615	4984.23	9770.3	1893.99	51

(a) Sample EH-8 is the "clean" sand sample, SW-5 is a duplicate of SW-4, and Samples SW-9 through SW-20 are composites for the time series data.

Sorption coefficients (K_d) were calculated based on chlorination levels for PCBs. K_d and r^2 values are presented in Table J-3. Figures J-1 and J-2, for 2-chlorine and 4-chlorine PCBs, are provided as example isotherms used to calculate K_d and "1/n" coefficients using Freundlich Isotherms. Isotherms for 1-chlorine, 3-chlorine, 5-ring, and t-PCBs were similar to those presented in Figures J-1 and J-2. However, because data for 6-chlorine through 10-chlorine PCBs was limited to just one or two points, isotherms for those PCBs could not be created, and a K_d value for the higher chlorinated PCBs could not be calculated. In general desorption of PCB into the liquid phase was extremely low for all PCB congeners.

K_d values for these experiments were lower than those typically reported in the literature. One explanation for this is that these partitioning experiments were conducted with actual sediments that had been contaminated by PCBs for years or decades. In general, partitioning experiments are conducted by spiking uncontaminated soils or sediments with contaminants of interest.

Table J-3. Sorption Coefficient Data for PCBs

	ln K_d	K_d	1/n	R^2
1-Chlorine	10.533	2.355	0.388	0.581
2-Chlorine	6.123	1.812	1.141	0.990
3-Chlorine	3.577	1.275	1.732	0.937
4-Chlorine	9.262	2.226	0.993	0.272
5-Chlorine	6.977	1.943	2.007	0.91
Composite	8.636	2.156	0.909	0.973

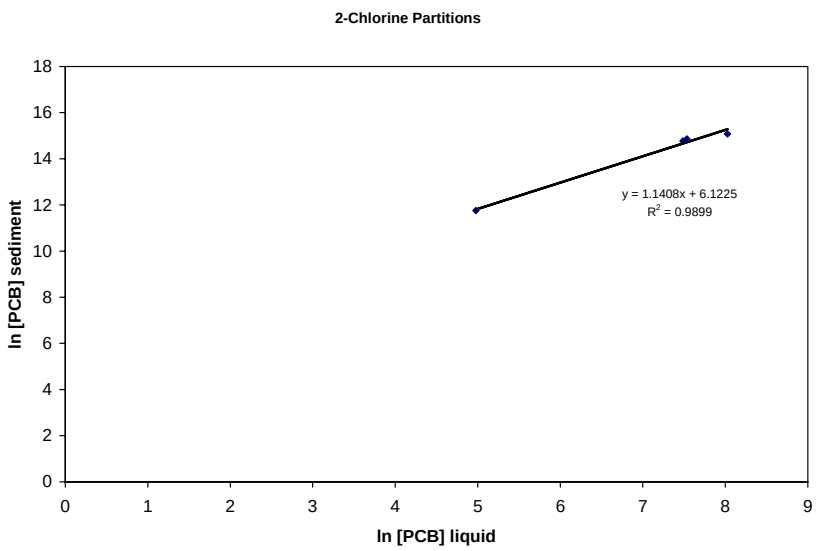

Figure J-1. Freundlich Sorption Isotherm for 2-Chlorine PCBs

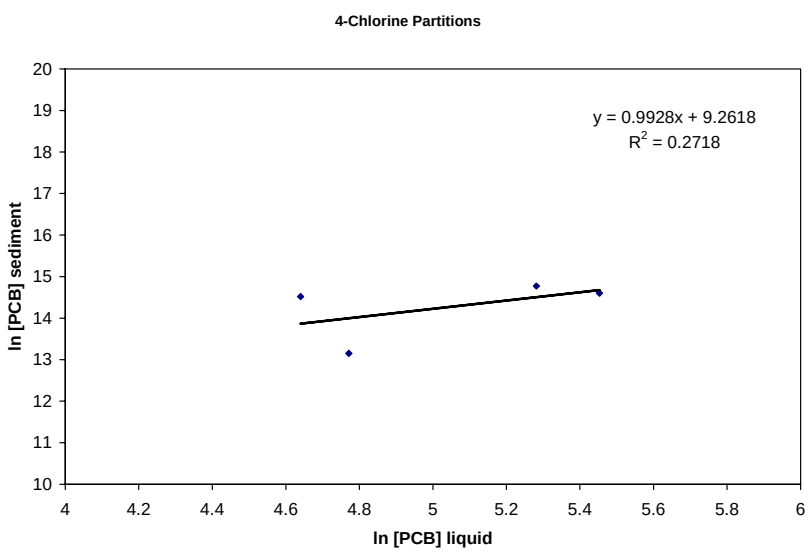

Figure J-2. Freundlich Sorption Isotherm for 4-Chlorine PCBs