



PORTLAND HARBOR RI/FS

ROUND 2 QUALITY ASSURANCE PROJECT PLAN

ADDENDUM 8: ROUND 3A STORMWATER SAMPLING

March 1, 2007

Prepared for:
The Lower Willamette Group

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IC07-0003

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LIST OF ACRONYMS

AAS	atomic absorption spectrometry
CVAAS	cold vapor atomic absorption spectrometry
EPA	Environmental Protection Agency
FSP	field sampling plan
GC/ECD	gas chromatography/electron capture detector
GC/MS	gas chromatography/mass spectrometry
HRGC/HRMS	high resolution gas chromatography/high resolution mass spectrometry
ICP/AES	inductively coupled plasma/atomic emission spectrometry
ICP/MS	inductively coupled plasma/mass spectrometry
LVI	large volume injector
NOAA	National Oceanic & Atmospheric Administration
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PSEP	Puget Sound Estuary Project
QAPP	quality assurance project plan
RI/FS	remedial investigation/feasibility study
SIM	selected ion monitoring
TOC	total organic carbon
TSS	total suspended solids
USGS	U.S. Geological Survey

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1.0 INTRODUCTION

This quality assurance project plan (QAPP) addendum describes procedures that will be used to conduct the chemical analysis of stormwater and sediment samples collected for the stormwater investigation for the Portland Harbor Superfund Site in Portland, Oregon. Round 3A stormwater sampling will be conducted as described in the field sampling plan (FSP; Anchor and Integral 2007). This QAPP addendum is provided as a supplement to the Round 2 QAPP (Integral and Windward 2004). The Round 2 QAPP describes procedures and requirements for the generation of data of documented acceptable quality that will be used for the remedial investigation and feasibility study (RI/FS). This QAPP addendum addresses procedures that will be used for the stormwater investigation that are not described in the Round 2 QAPP, Round 2 QAPP Addendum 1: Surface Water (Integral 2004a), or in the Round 2 QAPP Addendum 2: PCB Congener Analysis in Sediment Samples (Integral 2004b).

The following information is provided in this QAPP addendum:

- **Project Organization** (supplements QAPP Section A4.2): Contact information for laboratory personnel
- **Task Description** (supplements QAPP Section A6): A description of samples to be collected and submitted for analysis
- **Data Quality Indicators** (supplements QAPP Section A7.2): Laboratory control limits for quality control samples will be updated in a revision to this preliminary QAPP Addendum
- **Laboratory Methods** (supplements QAPP Section B4): Laboratory procedures for chemical analysis.
- **Quality Control** (supplements QAPP Section B5)

Additional procedures and criteria related to sample collection and analysis, data quality evaluation, and reporting for Round 2 of the Portland Harbor RI/FS will be completed as described in the Round 2 QAPP.

2.0 PROJECT ORGANIZATION

The organizational structure for activities associated with the Round 3A stormwater investigation is provided in Figure 4-1 of the Draft FSP. Contact information for the laboratories is as follows:

Columbia Analytical Services

Lee Wolf, Quality Assurance Officer
Greg Salata, Laboratory Project Manager
360-577-7222

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Vista Analytical Laboratory

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3.0 TASK DESCRIPTION

The Round 3A Stormwater FSP describes the field sampling and laboratory analysis procedures for this investigation. The sampling approach is divided into the following four elements:

- Collection of flow-weighted composite water samples from three storm events including whole water for organic compound analysis and filtered/unfiltered pairs for metals analysis.
- Collection of additional grab samples at 10 of the 31 locations for sampling of filtered/unfiltered pairs of selected organic compounds.
- Collection of sediment trap samples from sediment traps deployed for a minimum of three months
- Collection of continuous flow monitoring at each sampling site for the duration of the sediment trap deployment period.

The proposed sample types, number of samples, and analyses to be conducted are summarized in FSP Tables 2-1 through 2-3. The laboratory methods for analysis and the analyte concentration goals, method detection limits and method reporting limits are included in Tables 3-1a, 3-1b, 3-2a, and 3-2b. Table 3-3 summarizes the sample containers, holding time, and preservatives for this investigation.

4.0 DATA QUALITY INDICATORS

Round 2 QAPP Addenda 1 and 2 include laboratory control limits for quality control samples. Laboratories typically update their control limits on an annual basis. Current laboratory control limits for quality control samples are included in Tables 4-1 and 4-2 of this document.

5.0 LABORATORY METHODS

The laboratory methods for sediment and stormwater samples are included in Tables 3-1a and 3-1b. Sediment and stormwater samples will be analyzed for the following:

- Conventional analyses
- Polychlorinated biphenyl (PCB) congeners

- Organochlorine pesticides
- PCB Aroclors (sediments only)
- Polycyclic aromatic hydrocarbons (PAHs) and phthalate esters
- Metals
- Chlorinated herbicides
- Field parameters (stormwater only)

The total number of samples and the analyses that will be conducted on each sample are indicated in FSP Table 2-2 and Table 5-1 of this document.

5.1. CONVENTIONAL ANALYSES

Conventional analyses of sediment samples will include total organic carbon (TOC), percent solids, and grain size distribution. Conventional analyses of stormwater samples will include TOC and total suspended solids (TSS). EPA and Puget Sound Estuary Program (PSEP) methods will be used as shown in Tables 3-1a and 3-1b.

TOC in sediment samples will be analyzed according to Plumb (1981). Samples will be pretreated with hydrochloric acid to remove inorganic carbon, dried at 70°C, and analyzed by combustion in an induction furnace. TOC in stormwater samples will be analyzed according to EPA Method 415.1 (EPA 2006). Organic carbon in the samples will be oxidized and the evolved CO₂ will be analyzed using an infrared detector. Samples will be pretreated with hydrochloric acid to remove inorganic carbon.

Percent solids in sediment samples will be determined according to PSEP (1986). These results will be used to calculate analyte concentrations on a dry-weight basis and will also be reported in the database.

Grain size analysis will also be completed using PSEP (1986) protocols. Organic material in the samples will not be oxidized prior to analysis. Sieve sizes 4, 10, 18, 35, 60, 120, and 230 will be used to determine gravel and sand fractions, and phi size intervals 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, and >10 will be determined for the silt and clay fractions using the pipette method.

TSS in stormwater samples will be determined gravimetrically according to EPA Method 160.1 (EPA 2006).

5.2. PCB CONGENERS

PCB congener analyses of sediment and stormwater samples will be completed by Vista Analytical (Vista). Sediment and stormwater samples will be analyzed by high-resolution gas chromatography with high-resolution mass spectrometry (HRGC/HRMS) according to EPA Method 1668A (EPA 2006).

5.3. ORGANOCHLORINE PESTICIDES

Organochlorine pesticides in sediment samples will be extracted using Soxhlet extraction procedures followed by Florisil[®] column clean-up (EPA Method 3620; EPA 2006) and sulfur removal by tetrabutylammonium sulfite (EPA Method 3660; EPA 2006). Sample extracts will be analyzed by gas chromatography with an electron capture detector (GC/ECD).

Organochlorine pesticides will be extracted from stormwater samples using continuous liquid-liquid extraction procedures. Florisil[®] column clean-up will be performed on the sample extracts and then analyzed by GC/ECD.

5.4. PCB AROCLORS

Sediment samples will be analyzed for PCB Aroclors according to EPA Method 8082 (EPA 2006). Sediment samples will be prepared using Soxhlet extraction (EPA Method 3541; EPA 2006), followed by sulfuric acid cleanup (EPA Method 3665A; EPA 2006), Florisil[®] cleanup (EPA Method 3620B; EPA 2006), and sulfur removal by tetrabutylammonium sulfite (EPA Method 3660B; EPA 2006). Extracts will be analyzed by GC/ECD.

5.5. PAHs AND PHTHALATE ESTERS

Sediment and stormwater samples will be extracted using continuous liquid-liquid solvent extraction techniques. Sediment extracts will be analyzed for PAHs and phthalate esters by gas chromatography/mass spectrometry (GC/MS) techniques used in conjunction with a Large Volume Injector (LVI) system to enhance sensitivity (EPA Method 8270C; EPA 2006). Stormwater extracts will be analyzed for PAHs by GC/MS with selected ion monitoring (SIM; EPA Method 8270C; EPA 2006).

Stormwater samples will be analyzed for phthalate esters according to EPA Method 525.2 (EPA 1995). This method includes additional precautions in sample handling (e.g., special glassware cleaning) as well as sample preparation procedures (e.g., solid-phase extraction) to optimize the analysis for phthalates and reduce potential sources of laboratory contamination. Sample analysis is completed by GC/MS.

5.6. METALS

Sediment and stormwater samples will be analyzed for total metals according to EPA methodology detailed in Tables 3-1a,b. Strong acid digestion with nitric acid and hydrogen peroxide will be used to prepare samples for analysis of metals other than mercury.

Analyses for antimony, arsenic, cadmium, lead, and silver in sediment samples will be conducted using inductively coupled plasma/mass spectrometry (ICP/MS) according to EPA Method 6020 (EPA 2006). Analyses for aluminum, chromium, copper, nickel, and zinc in sediment samples will be conducted using inductively coupled plasma/atomic emission spectrometry (ICP/AES) according to EPA Method 6010B (EPA 2006). Selenium and arsenic analyses will be conducted using atomic absorption spectrometry (AAS) according to EPA Methods 7742 and 7062, respectively (EPA 2006).

Stormwater samples will be analyzed for total metals by ICP/MS, according to EPA Method 200.8 (EPA 2006).

Sediment and stormwater samples will be analyzed for mercury by extraction with aqua regia and oxidation using potassium permanganate. Analyses will be completed by cold vapor atomic absorption spectrometry (CVAAS) according to EPA Method 7471A (EPA 2006).

5.7. CHLORINATED HERBICIDES

Sediment and stormwater samples will be analyzed for chlorinated herbicides according to EPA Method 8151A (EPA 2006). Sediment samples will be extracted with methanolic potassium hydroxide, then acidified and extracted with ethyl ether and methylene chloride. The extract will be concentrated, and ester derivatives will be formed using diazomethane. Extracts will be analyzed by GC/MS.

Stormwater samples will be adjusted to a pH <2 and extracted with ethyl ether. The extracts will then be hydrolyzed to the acid form by the addition of sodium hydroxide, and ester derivatives will be formed using diazomethane. Extracts will be analyzed by GC/ECD.

5.8. FIELD PARAMETERS

In situ measurements of general water quality characteristics will be taken at all sampling stations, including conductivity, pH, temperature, and turbidity. River flow data will be tracked daily using information obtained from the U.S. Geological Survey (USGS) or National Oceanic & Atmospheric Administration (NOAA) databases.

6.0 QUALITY CONTROL

The field quality control samples and the frequency of collection for the Round 3A stormwater investigation are summarized in Section 3.8 of the Draft FSP and in FSP Table 2-2 and Table 5-1 of this document.

7.0 REFERENCES

Anchor and Integral. 2007. Portland Harbor RI/FS Round 3A Field Sampling Plan Stormwater Sampling. Prepared for the Lower Willamette Group, Portland, OR. Anchor Environmental, Inc., Seattle, WA.

EPA. 1995. Methods for the Determination of Organic Compounds in Drinking Water, Supplement III. 500 Series. 1995. EPA-600/R-95/131. U.S. Environmental Protection Agency, National Exposure Research Laboratory, Washington, DC.

EPA. 2006. SW-846 On-line, Test Methods for Evaluating Solid Waste – Physical/Chemical Methods. U.S. Environmental Protection Agency.
<http://www.epa.gov/epaoswer/hazwaste/test/main.htm>. (Accessed January 22, 2007).

Integral and Windward Environmental. 2004. Portland Harbor RI/FS Round 2 Quality Assurance Project Plan. Prepared for the Lower Willamette Group, Portland, OR. Integral Consulting, Inc., Mercer Island, WA.

Integral. 2004a. Portland Harbor RI/FS Round 2 Quality Assurance Project Plan, Addendum 1: Surface Water. Prepared for the Lower Willamette Group, Portland, OR. Integral Consulting, Inc., Mercer Island, WA.

Integral. 2004b. Portland Harbor RI/FS Round 2 Quality Assurance Project Plan, Addendum 2: PCB Congener Analysis in Sediment Samples. Prepared for the Lower Willamette Group, Portland, OR. Integral Consulting, Inc., Mercer Island, WA.

Plumb, R.H. Jr. 1981. Procedures for Handling and Chemical Analysis of Sediment and Water Samples. Technical Report EPA/CE-81-1. U.S. Army Corps of Engineers, Vicksburg, MS.

PSEP. 1986. Puget Sound Estuary Program: Recommended Protocols for Measuring Conventional Sediment Variables in Puget Sound. Final Report. Prepared for U.S. EPA, Region 10, Office of Puget Sound, Seattle, WA and the U.S. Army Corps of Engineers, Seattle District, Seattle, WA. Tetra Tech, Inc., Bellevue, WA.

Table 3-1a. Laboratory Methods for Sediment Samples.

Analysis	Laboratory	Sample Preparation		Quantitative Analysis	
		Protocol	Procedure	Protocol	Procedure
Conventional Analyses	CAS				
Total solids		--	--	PSEP 1986	Balance
Grain size		--	--	PSEP 1986	Sieve and pipette method
Total organic carbon		Plumb 1981	Acid pretreatment	Plumb et al. 1981	Combustion; coulometric titration
Metals	CAS				
Antimony, arsenic ¹ , cadmium, lead, silver		EPA 3050	Strong acid digestion	EPA 6020	ICP/MS
Aluminum, chromium, copper, nickel, zinc		EPA 3050	Strong acid digestion	EPA 6010B	ICP/AES
Selenium		EPA 3050	Strong acid digestion	EPA 7742	AAS
		EPA 7742	Hydride generation		
Arsenic ¹		EPA 3050	Strong acid digestion	EPA 7062	AAS
Mercury		EPA 7471A	Acid digestion/oxidation	EPA 7471A	CVAAS
Chlorinated herbicides	CAS	EPA 8151A	Solvent extraction	EPA 8151A	GC/ECD
			Esterification		
Organochlorine pesticides and selected SVOCs	CAS	EPA 3541	Soxhlet extraction	EPA 8081A	GC/ECD
		EPA 3620B	Florisil [®] cleanup		
		EPA 3660B	Sulfur cleanup		
PCB Aroclors	CAS	EPA 3541	Soxhlet extraction	EPA 8082	GC/ECD
		EPA 3665A	Sulfuric acid cleanup		
		EPA 3620B	Florisil [®] cleanup		
		EPA 3660B	Sulfur cleanup		
Semivolatile organic compounds	CAS				
PAHs and phthalates		EPA 3541	Automated Soxhlet Extraction	EPA 8270C	GC/MS-LVI
		EPA 3640A	Gel permeation chromatography		
PCB Congeners²	Vista	EPA 1668A	Soxhlet/Dean Stark extraction	EPA 1668A	HRGC/HRMS
			Sulfuric acid cleanup		
			Silica column cleanup		

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Round 2 QAPP

Round 3A Stormwater Sampling

March 1, 2007

Notes:

^a Arsenic will be analyzed by EPA Method 7062 if it is not detected at the MRL by EPA Method 6020.

^b Analysis will be completed for all 209 PCB congeners.

AAS - atomic absorption spectrometry

CAS - Columbia Analytical Services

CVAAS - cold vapor atomic absorption spectrometry

EPA - U.S. Environmental Protection Agency

GC/ECD - gas chromatography/electron capture detection

GC/MS - gas chromatography/mass spectrometry

HRGC/HRMS - high-resolution gas chromatography/high-resolution mass spectrometry

ICP/AES - inductively coupled plasma/atomic emission spectrometry

ICP/MS - inductively coupled plasma/mass spectrometry

LVI - large-volume injector

PAH - polycyclic aromatic hydrocarbon

PCB - polychlorinated biphenyl

PSEP - Puget Sound Estuary Program

SVOC - semivolatile organic compound

Table 3-1b. Laboratory Methods for Water Samples.

Analytes	Laboratory	Sample Preparation		Quantitative Analysis	
		Protocol	Procedure	Protocol	Procedure
Conventional Analyses	CAS				
Total Suspended Solids		EPA 160.2	Filtration and drying	EPA 160.2	Balance
Total Organic Carbon		EPA 415.1	Chemical oxidation	EPA 415.1	Infrared detector
Metals	CAS				
Aluminum, antimony, cadmium, total chromium, copper, lead, nickel, selenium, silver, zinc		EPA 3005	Acid digestion	EPA 200.8	ICP/MS
Arsenic		EPA 3005A (Modified)	Acid Digestion/pre-concentration	EPA 200.8	ICP/MS
Mercury		EPA 7470	Acid digestion/oxidation	EPA 7470	CVAAS
Phthalate Esters	CAS	EPA 525.2	Solid-phase extraction	EPA 525.2	GC/MS
Chlorinated Herbicides	CAS	EPA 8151A	Solvent extraction	EPA 8151A	GC/ECD
			Esterification		
Organochlorine pesticides and selected SVOCs	CAS	EPA 3545	Pressurized fluid extraction	EPA 8081A	GC/ECD
		EPA 3640A	Gel permeation chromatography		
		EPA 3630C	Florisil [®] cleanup		
		EPA 3660B	Sulfur cleanup (as needed)		
Polycyclic Aromatic Hydrocarbons	CAS	EPA 3520C	Continuous liquid-liquid extraction	EPA 8270C	GC/MS-SIM
PCB congeners ¹	Vista	EPA 1668A	Florisil [®] cleanup	EPA 1668A	HRGC/HRMS
			Extract fractionation		
			Layered Acid/Base SiO ₃ Alumina		

Notes:

¹ Includes all 209 congeners.

CAS - Columbia Analytical Services

CVAAS - cold vapor atomic absorption spectrometry

EPA - U.S. Environmental Protection Agency

GC/ECD - gas chromatography/electron capture detection

GC/MS - gas chromatography/mass spectrometry

HRGC/HRMS - high resolution gas chromatography/high resolution mass spectrometry

ICP/MS - inductively coupled plasma/mass spectrometry

PCB - polychlorinated biphenyl

SIM - selected ion monitoring

SVOC - semivolatile organic compound

Table 3-2a. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Sediment Samples.

Analytes	Congener number (PCBs only)	ACG ^a	MDL	MRL ^b
Conventional Analyses				
Total solids (percent of whole weight)		*	0.01	0.01
Grain size (percent) ^c		*	0.1	0.1
Total organic carbon (percent)		*	0.02	0.05
Metals, mg/kg dry wt				
Aluminum		*	10.0	10.0
Antimony		*	0.02	0.05
Arsenic		*	0.07	0.5
Cadmium		*	0.007	0.05
Chromium		*	0.6	2.0
Copper		*	2.0	2.0
Lead		*	0.02	0.05
Mercury		*	0.008	0.02
Nickel		*	3.0	4.0
Selenium		*	0.2	1
Silver		*	0.003	0.02
Zinc		*	0.5	2.0
Chlorinated Herbicides, µg/kg dry wt				
2,4,5-T		2.8	5.9	50
2,4,5-TP (Silvex)		2.2	3.9	50
2,4-D		2.8	8	50
2,4-DB		2.2	9.7	50
Dalapon		*	7	50
Dicamba		*	5.4	50
Dichlorprop		*	9.5	50
Dinoseb		*	3.5	50
MCPA		*	520	10000
MCPP		*	530	10000
Organochlorine Pesticides and Selected SVOCs, µg/kg dry wt				
2,4'-DDD		*	0.02	0.13
2,4'-DDE		*	0.009	0.13
2,4'-DDT		*	0.01	0.13
4,4'-DDD		0.083	0.012	0.13
4,4'-DDE		0.0588	0.01	0.13
4,4'-DDT		0.0588	0.021	0.13
Total DDT		*	--	--
Aldrin		0.00038	0.031	0.13
alpha-BHC		0.001	0.01	0.13
beta-BHC		0.0036	0.028	0.13
delta-BHC		*	0.018	0.13
gamma-BHC (Lindane)		0.005	0.012	0.13
alpha-Chlordane		*	0.008	0.13
gamma-Chlordane		*	0.005	0.13
Oxychlordane		*	0.012	0.13

Table 3-2a. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Sediment Samples.

Analytes	Congener number (PCBs only)	ACG ^a	MDL	MRL ^b
<i>cis</i> -Nonachlor		*	0.005	0.13
<i>trans</i> -Nonachlor		*	0.004	0.13
Total chlordane ^d		0.057	--	--
Dieldrin		0.0004	0.01	0.13
Endosulfan I		1.7	0.014	0.13
Endosulfan II		*	0.008	0.13
Endosulfan sulfate		*	0.026	0.13
Endrin		0.084	0.03	0.13
Endrin aldehyde		*	0.02	0.13
Endrin ketone		*	0.007	0.13
Heptachlor		0.0014	0.012	0.13
Heptachlor epoxide		0.0007	0.018	0.13
Methoxychlor		1.4	0.024	0.13
Mirex		0.056	0.007	0.13
Toxaphene		0.0059	0.9	10
Hexachlorobenzene		0.33	0.02	0.2
Hexachlorobutadiene		0.6	0.12	0.2
Hexachloroethane		2.0	0.12	0.2
Semivolatile Organic Compounds, µg/kg dry wt				
Polycyclic Aromatic Hydrocarbons				
2-Methylnaphthalene		*	1.2	10
Acenaphthene		72	1	10
Acenaphthylene		*	1.4	10
Anthracene		360	1.4	10
Benz(a)anthracene		0.038	1.4	10
Benzo(a)pyrene		0.0038	1.6	10
Benzo(b)fluoranthene		0.038	2.5	10
Benzo(g,h,i)perylene		*	2.3	10
Benzo(k)fluoranthene		0.38	2.5	10
Chrysene		3.8	1.4	10
Dibenz(a,h)anthracene		0.0038	2.2	10
Dibenzofuran		8.2	1.3	10
Fluoranthene		48	2.2	10
Fluorene		48	1.7	10
Indeno(1,2,3-cd)pyrene		0.038	1.9	10
Naphthalene		24	1.3	10
Phenanthrene		*	1.3	10
Pyrene		36	1.3	10
Phthalates				
Bis(2-ethylhexyl) phthalate		3.4	1.7	200
Butylbenzyl phthalate		400	1.5	10
Dibutyl phthalate		204	2.6	10
Diethyl phthalate		*	3.5	10
Dimethyl phthalate		20000	1.8	10
Di-n-octyl phthalate		40.9	1.2	10

Table 3-2a. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Sediment Samples.

Analytes	Congener number (PCBs only)	ACG ^a	MDL	MRL ^b
PCB congeners				
Dioxin-like PCB congeners (WHO list)				
	Congener number			
3,3',4,4'-TetraCB	PCB-77	10	1.1	5
3,4,4',5'-TetraCB	PCB-81	10	1.0	5
2,3,3',4,4'-PentaCB	PCB-105	10	0.9	5
2,3,4,4',5'-PentaCB	PCB-114	2	0.7	5
2,3',4,4',5'-PentaCB	PCB-118	10	2.1	5
(coelution with 2,3,3',4,5- PentaCB)	(coelution with PCB 106)			
2',3,4,4',5'-PentaCB	PCB-123	10	0.9	5
3,3',4,4',5'-PentaCB	PCB-126	0.01	0.6	5
2,3,3',4,4',5'-HexaCB	PCB-156	2	0.8	5
2,3,3',4,4',5'-HexaCB	PCB-157	2	0.6	5
2,3,4,4',5,5'-HexaCB	PCB-167	100	0.5	5
3,3',4,4',5,5'-HexaCB	PCB-169	0.1	0.8	5
2,3,3',4,4',5,5'-HeptaCB	PCB-189	10	0.3	5
Other PCB congeners				
2-MonoCB	PCB-1		0.5	2.5
3-MonoCB	PCB-2		0.6	2.5
4-MonoCB	PCB-3		0.6	2.5
2,2'-DiCB/2,6-DiCB	PCB-4/10		4.3	2.5
2,3-DiCB/2,4'-DiCB	PCB-5/8		4.4	2.5
2,3'-DiCB	PCB-6		2.2	2.5
2,4-DiCB/2,5-DiCB	PCB-7/9		4.6	2.5
3,3'-DiCB	PCB-11		5.0	2.5
3,4-DiCB/3,4'-DiCB	PCB-12/13		6.1	2.5
3,5-DiCB	PCB-14		3.0	2.5
4,4'-DiCB	PCB-15		2.8	2.5
2,2',3-TriCB/2,4',6-TriCB	PCB-16/32		2.5	2.5
2,2',4-TriCB	PCB-17		1.3	2.5
2,2',5-TriCB	PCB-18		1.4	2.5
2,2',6-TriCB	PCB-19		1.0	2.5
2,3,3'-TriCB/2,3,4-TriCB/2,3,5- TriCB	PCB-20/21/33		1.4	2.5
2,3,4'-TriCB	PCB-22		0.9	2.5
2,3,5-TriCB	PCB-23		0.7	2.5
2,3,6-TriCB/2,3',6-TriCB	PCB-24/27		2.5	2.5
2,3',4-TriCB	PCB-25		0.8	2.5
2,3',5-TriCB	PCB-26		0.8	2.5
2,4,4'-TriCB	PCB-28		1.5	2.5
2,4,5-TriCB	PCB-29		0.6	2.5
2,4,6-TriCB	PCB-30		0.9	2.5
2,4',5-TriCB	PCB-31		1.2	2.5
2',3,5-TriCB	PCB-34		0.9	2.5
3,3',4-TriCB	PCB-35		0.4	2.5

Table 3-2a. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Sediment Samples.

Analytes	Congener number (PCBs only)	ACG ^a	MDL	MRL ^b
3,3',5'-TriCB	PCB-36		0.9	2.5
3,4,4'-TriCB	PCB-37		0.6	2.5
3,4,5'-TriCB	PCB-38		0.9	2.5
3,4',5'-TriCB	PCB-39		0.6	2.5
2,2',3,3'-TetraCB	PCB-40		1.2	5
2,2',3,4'-TetraCB/2,3,4',6'-TetraCB/2,3',4',6'-TetraCB/2,3',5,5'-TetraCB	PCB-41/64/71/72		3.5	5
2,2',3,4'-TetraCB/2,3,3',6'-TetraCB	PCB-42/59		2.0	5
2,2',3,5'-TetraCB/2,2',4,5'-TetraCB	PCB-43/49		2.2	5
2,2',3,5'-TetraCB	PCB-44		5.3	5
2,2',3,6'-TetraCB	PCB-45		1.3	5
2,2',3,6'-TetraCB	PCB-46		1.1	5
2,2',3,4'-TetraCB	PCB-47		3.4	5
2,2',4,5'-TetraCB/2,4,4',6'-TetraCB	PCB-48/75		1.8	5
2,2',4,6'-TetraCB	PCB-50		1.5	5
2,2',4,6'-TetraCB	PCB-51		1.1	5
2,2',5,5'-TetraCB/2,3',4,6'-TetraCB	PCB-52/69		3.3	5
2,2',5,6'-TetraCB	PCB-53		1.0	5
2,2',6,6'-TetraCB	PCB-54		1.9	5
2,3,3',4'-TetraCB	PCB-55		1.0	5
2,3,3',4'-TetraCB/2,3,4,4'-TetraCB	PCB-56/60		2.5	5
2,3,3',5'-TetraCB	PCB-57		1.2	5
2,3,3',5'-TetraCB	PCB-58		1.2	5
2,3,4,5'-TetraCB	PCB-61		1.2	5
2,3,4,6'-TetraCB	PCB-62		0.9	5
2,3,4',5'-TetraCB	PCB-63		1.1	5
2,3,5,6'-TetraCB	PCB-65		1.3	5
2,3',4,4'-TetraCB	PCB-66		1.8	5
2,3',4,5'-TetraCB	PCB-67		1.2	5
2,3',4,5'-TetraCB	PCB-68		1.3	5
2,3',4',5'-TetraCB	PCB-70		1.4	5
2,3',5,6'-TetraCB	PCB-73		0.7	5
2,4,4',5'-TetraCB	PCB-74		1.1	5
2',3,4',5'-TetraCB	PCB-76		2.3	5
3,3',4,5'-TetraCB	PCB-78		2.8	5
3,3',4,5'-TetraCB	PCB-79		1.7	5
3,3',5,5'-TetraCB	PCB-80		0.9	5
2,2',3,3',4'-PentaCB	PCB-82		1.3	5
2,2',3,3',5'-PentaCB	PCB-83		0.9	5
2,2',3,3',6'-PentaCB/2,2',3,5,5'-Pent	PCB-84/92		1.6	5
2,2',3,4,4'-PentaCB/2,3,4,5,6'-Penta	PCB-85/116		1.3	5
2,2',3,4,5'-PentaCB	PCB-86		1.8	5
2,2',3,4,5'-PentaCB/2,3,4',5,6'-PentaCB/2',3,4,5,6'-PentaCB	PCB-87/117/125		1.8	5
2,2',3,4,6'-PentaCB/2,2',3,4',6'-Pent	PCB-88/91		1.6	5

Table 3-2a. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Sediment Samples.

Analytes	Congener number (PCBs only)	ACG ^a	MDL	MRL ^b
2,2',3,4,6'-PentaCB	PCB-89		0.7	5
2,2',3,4',5'-PentaCB/2,2',4,5,5'-Pent	PCB-90/101		1.5	5
2,2',3,5,6'-PentaCB	PCB-93		1.5	5
2,2',3,5,6'-PentaCB	PCB-94		0.4	5
2,2',3,5',6'-PentaCB/2,2',3',4,6- PentaCB/2,2',4,5,6'-PentaCB	PCB-95/98/102		6.4	5
2,2',3,6,6'-PentaCB	PCB-96		0.5	5
2,2',3',4,5'-PentaCB	PCB-97		1.3	5
2,2',4,4',5'-PentaCB	PCB-99		1.0	5
2,2',4,4',6'-PentaCB	PCB-100		0.3	5
2,2',4,5,6'-PentaCB	PCB-103		0.4	5
2,2',4,6,6'-PentaCB	PCB-104		0.5	5
2,3,3',4',5'-PentaCB/2,3,3',4,6- PentaCB	PCB-107/109		1.3	5
2,3,3',4,5'-PentaCB/2,3,3',5,6- PentaCB	PCB-108/112		1.0	5
2,3,3',4',6'-PentaCB	PCB-110		1.8	5
2,3,3',5,5'-PentaCB/2,3,4,4',6- PentaCB	PCB-111/115		1.7	5
2,3,3',5',6'-PentaCB	PCB-113		1.0	5
2,3',4,4',6'-PentaCB	PCB-119		0.9	5
2,3',4,5,5'-PentaCB	PCB-120		1.0	5
2,3',4,5,6'-PentaCB	PCB-121		0.9	5
2',3,3',4,5'-PentaCB	PCB-122		1.0	5
2',3,4,5,5'-PentaCB	PCB-124		1.1	5
3,3',4,5,5'-PentaCB	PCB-127		0.8	5
2,2',3,3',4,4'-HexaCB/2,3,3',4',5,5'- HexaCB	PCB-128/162		1.2	5
2,2',3,3',4,5'-HexaCB	PCB-129		0.8	5
2,2',3,3',4,5'-HexaCB	PCB-130		0.8	5
2,2',3,3',4,6'-HexaCB	PCB-131		2.5	5
2,2',3,3',4,6'-HexaCB/2,3,3',4,5',6- HexaCB	PCB-132/161		1.0	5
2,2',3,3',5,5'-HexaCB/2,2',3,4,5,6- HexaCB	PCB-133/142		3.9	5
2,2',3,3',5,6'-HexaCB/2,2',3,4,5,6'- HexaCB	PCB-134/143		4.1	5
2,2',3,3',5,6'-HexaCB	PCB-135		1.4	5
2,2',3,3',6,6'-HexaCB	PCB-136		1.2	5
2,2',3,4,4',5'-HexaCB	PCB-137		1.0	5
2,2',3,4,4',5'-HexaCB/2,3,3',4',5,6- HexaCB/2,3,3',4',5',6'-HexaCB	PCB-138/163/164		2.1	5
2,2',3,4,4',6'-HexaCB/2,2',3,4',5',6- HexaCB	PCB-139/149		1.8	5
2,2',3,4,4',6'-HexaCB	PCB-140		1.0	5
2,2',3,4,5,5'-HexaCB	PCB-141		0.6	5

Table 3-2a. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Sediment Samples.

Analytes	Congener number (PCBs only)	ACG ^a	MDL	MRL ^b
2,2',3,4,5',6-HexaCB	PCB-144		1.7	5
2,2',3,4,6,6'-HexaCB	PCB-145		1.1	5
2,2',3,4',5,5'-HexaCB/2,3,3',5,5',6'-HexaCB	PCB-146/165		1.7	5
2,2',3,4',5,6-HexaCB	PCB-147		0.7	5
2,2',3,4',5,6'-HexaCB	PCB-148		1.1	5
2,2',3,4',6,6'-HexaCB	PCB-150		1.3	5
2,2',3,5,5',6-HexaCB	PCB-151		1.5	5
2,2',3,5,6,6'-HexaCB	PCB-152		1.3	5
2,2',4,4',5,5'-HexaCB	PCB-153		1.2	5
2,2',4,4',5',6-HexaCB	PCB-154		1.1	5
2,2',4,4',6,6'-HexaCB	PCB-155		0.9	5
2,3,3',4,4',6-HexaCB/2,3,3',4,5,6-HexaCB	PCB-158/160		1.3	5
2,3,3',4,5,5'-HexaCB	PCB-159		0.5	5
2,3,4,4',5,6-HexaCB	PCB-166		0.6	5
2,3',4,4',5',6-HexaCB	PCB-168		0.4	5
2,2',3,3',4,4',5-HeptaCB	PCB-170		0.4	5
2,2',3,3',4,4',6-HeptaCB	PCB-171		0.6	5
2,2',3,3',4,5,5'-HeptaCB	PCB-172		0.5	5
2,2',3,3',4,5,6-HeptaCB	PCB-173		0.7	5
2,2',3,3',4,5,6'-HeptaCB	PCB-174		1.4	5
2,2',3,3',4,5',6-HeptaCB	PCB-175		1.2	5
2,2',3,3',4,6,6'-HeptaCB	PCB-176		0.4	5
2,2',3,3',4',5,6-HeptaCB	PCB-177		0.7	5
2,2',3,3',5,5',6-HeptaCB	PCB-178		0.6	5
2,2',3,3',5,6,6'-HeptaCB	PCB-179		0.3	5
2,2',3,4,4',5,5'-HeptaCB	PCB-180		0.7	5
2,2',3,4,4',5,6-HeptaCB	PCB-181		0.8	5
2,2',3,4,4',5,6'-HeptaCB/2,2',3,4,5,5',6-HeptaCB	PCB-182/187		1.1	5
2,2',3,4,4',5',6-HeptaCB	PCB-183		0.6	5
2,2',3,4,4',6,6'-HeptaCB	PCB-184		0.5	5
2,2',3,4,5,5',6-HeptaCB	PCB-185		0.6	5
2,2',3,4,5,6,6'-HeptaCB	PCB-186		0.8	5
2,2',3,4',5,6,6'-HeptaCB	PCB-188		0.5	5
2,3,3',4,4',5,6-HeptaCB	PCB-190		0.7	5
2,3,3',4,4',5',6-HeptaCB	PCB-191		0.5	5
2,3,3',4,5,5',6-HeptaCB	PCB-192		0.8	5
2,3,3',4',5,5',6-HeptaCB	PCB-193		0.5	5
2,2',3,3',4,4',5,5'-OctaCB	PCB-194		0.9	7.5
2,2',3,3',4,4',5,6-OctaCB	PCB-195		2.1	7.5
2,2',3,3',4,4',5,6'-OctaCB/2,2',3,4,4',5,5',6-OctaCB	PCB-196/203		2.3	7.5
2,2',3,3',4,4',6,6'-OctaCB	PCB-197		0.9	7.5
2,2',3,3',4,5,5',6-OctaCB	PCB-198		1.4	7.5

Table 3-2a. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Sediment Samples.

Analytes	Congener number (PCBs only)	ACG ^a	MDL	MRL ^b
2,2',3,3',4,5,5',6'-OctaCB	PCB-199		1.5	7.5
2,2',3,3',4,5,6,6'-OctaCB	PCB-200		1.2	7.5
2,2',3,3',4,5',6,6'-OctaCB	PCB-201		1.1	7.5
2,2',3,3',5,5',6,6'-OctaCB	PCB-202		0.6	7.5
2,2',3,4,4',5,6,6'-OctaCB	PCB-204		0.7	7.5
2,3,3',4,4',5,5',6'-OctaCB	PCB-205		1.2	7.5
2,2',3,3',4,4',5,5',6'-NonaCB	PCB-206		0.5	7.5
2,2',3,3',4,4',5,6,6'-NonaCB	PCB-207		0.5	7.5
2,2',3,3',4,5,5',6,6'-NonaCB	PCB-208		0.7	7.5
DecaCB	PCB-209		0.9	7.5

Notes: Sed table

* A risk-based ACG has not been established.

^a Values are provided in bold font when the MRL is not expected to meet the ACG.

^b The MRL is provided on a dry-weight basis and assumes 50% moisture in the samples.

The MRL for project samples will vary with moisture content in the samples.

The MRL represents the level of lowest calibration standard (i.e., the practical quantitation limit).

^c Grain-size intervals will include the following:

Gravel	Fine sand	Fine silt
Very coarse sand	Very fine sand	Very fine silt
Coarse sand	Coarse silt	Clay, phi size >8
Medium sand	Medium silt	

^d Total chlordane will be calculated as the sum of the five components listed above this entry.

ACG = Analytical concentration goal; ACGs were established by EPA during *ad hoc* meeting with LWG on May 10, 2002

MDL = Method detection limit

MRL = Method reporting limit

PCB - polychlorinated biphenyl

Notes: Congener table

¹ ACGs for the dioxin-like congeners are based on the ACG of 0.01 pg/g dry wt for PCB-126 from the Round 1 QAPP and adjusted using the WHO TEFs.

² The MRLs and MDLs are provided on a dry-weight basis and assume 50% moisture in the samples and a sample weight of 10 or 50 g, as noted.

The MRL represents the level of lowest calibration standard (i.e., the practical quantitation limit).

Sample-specific MDLs are reported with the final data and will vary based on sample size and characteristics.

ACG = Analytical concentration goal

MDL = Method detection limit

MRL = Method reporting limit

tbd = to be determined

TEF = Toxicity equivalent factor

WHO = World Health Organization

Table 3-2b. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Water Samples.

Analytes	Congener number (PCBs only)	Ecological Screening Values		Human Health Screening Values			Analytical Concentration Goals			MDLs and MRLs	
		AWQC ¹	ORNL ²	EPA Region 9 Tap water PRG ³	Fish Consumption Only ⁴	Site-Specific Fish Consumption Only ⁵	Level 1 ACG ⁶	Level 2 ACG ⁷	Level 3 ACG ⁸	MDL	MRL
Conventional Analyses, mg/L (ppm)											
Total suspended solids							1 ⁹	1 ⁹	1 ⁹	1	1
Total organic carbon							NE	NE	NE	0.07	0.5
Metals/Inorganics, mg/L (ppm)											
Aluminum		0.087	0.46	36			0.087	0.087	0.087	0.0007	0.002
Antimony			0.61	0.015	0.64	0.064	0.015	0.015	0.015	0.00002	0.00005
Arsenic		0.15	0.914	0.000045	0.00014	0.000014	0.000045	0.000045	0.000014	TBD	0.00005
Cadmium ¹⁰		0.000094	0.00015	0.018			0.000094	0.000094	0.000094	0.00001	0.00002
Chromium, total							NE	NA	NA	0.00006	0.0002
Copper ¹⁰		0.00274	0.00023	1.5			0.00023	0.00023	0.00023	0.00004	0.0001
Lead ¹⁰		0.000541	0.012				0.000541	0.000541	0.000541	0.00001	0.00002
Mercury		0.00077	<0.00023	0.011			<0.00023	<0.00023	<0.00023	0.0001	0.0002
Nickel ¹⁰		0.016	<0.005	0.73	4.6	0.46	<0.005	<0.005	<0.005	0.00004	0.0002
Selenium		0.005	0.0883	0.18	4.2	0.42	0.005	0.005	0.005	0.0002	0.001
Silver			0.00012	0.18			0.00012	0.00012	0.00012	0.00001	0.00002
Zinc ¹⁰		0.0365	0.03	11	26	2.6	0.03	0.03	0.03	0.0002	0.0005
Chlorinated Herbicides, µg/L (ppb)											
Dalapon				1100			1100	1100	1100	0.06	0.4
Dicamba				1100			1100	1100	1100	0.071	0.4
MCPA							NE	NE	NE	24	100
Dichlorprop							NE	NE	NE	0.061	0.4
2,4-D				360			360	360	360	0.079	0.4
2,4,5-TP (Silvex)				290			290	290	290	0.085	0.2
2,4,5-T				360			360	360	360	0.017	0.2
2,4-DB				290			290	290	290	0.13	0.4
Dinoseb				36			36	36	36	0.091	0.2
MCPP				360			360	360	360	23	100
Organochlorine Pesticides, µg/L (ppb)											
2,4'-DDD							0.28	0.28	0.28	TBD	0.0005
2,4'-DDE							0.2	0.2	0.2	TBD	0.0005

Table 3-2b. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Water Samples.

Analytes	Congener number (PCBs only)	Ecological Screening Values		Human Health Screening Values			Analytical Concentration Goals			MDLs and MRLs	
		AWQC ¹	ORNL ²	EPA Region 9 Tap water PRG ³	Fish Consumption Only ⁴	Site-Specific Fish Consumption Only ⁵	Level 1 ACG ⁶	Level 2 ACG ⁷	Level 3 ACG ⁸	MDL	MRL
2,4'-DDT							0.2	0.2	0.2	TBD	0.0005
4,4'-DDD			0.011	0.28	0.00031	0.0000	0.280	0.00031	0.000031	TBD	0.0005
4,4'-DDE				0.2	0.00022	0.0000	0.2	0.00022	0.000022	TBD	0.0005
4,4'-DDT		0.001	0.013	0.2	0.00022	0.0000	0.001	0.00022	0.000022	TBD	0.0005
Total DDT				0.2			NE	NE	NE	NE	NE
Aldrin				0.004	0.00005	0.000005	0.004	0.00005	0.000005	TBD	0.0005
alpha-BHC			2.2	0.011	0.0049	0.00049	0.004	0.0049	0.00049	TBD	0.0005
beta-BHC				0.037	0.017	0.0017	0.004	0.017	0.0017	TBD	0.0005
delta-BHC				0.037			0.004	0.004	0.004	TBD	0.0005
gamma-BHC (Lindane)		0.08		0.052	1.8	0.18	0.052	0.052	0.0063	TBD	0.0005
alpha-Chlordane							0.0043	0.00081	0.000081	TBD	0.0005
gamma-Chlordane							0.0043	0.00081	0.000081	TBD	0.0005
Oxychlordane				0.19			0.19	0.19	0.19	TBD	0.0005
cis -Nonachlor				0.19			0.19	0.19	0.19	TBD	0.0005
trans -Nonachlor				0.19			0.19	0.19	0.19	TBD	0.0005
Total Chlordane ^a		0.0043		0.19	0.00081	0.000081	NE	NE	NE	NE	NE
Dieldrin		0.0019	0.051	0.0042	0.000054	0.0000054	0.0042	0.000054	0.0000054	TBD	0.0005
Endosulfan I		0.056	0.051	220	89	8.9	0.051	0.051	8.9	TBD	0.0005
Endosulfan II		0.056		220	89	8.9	0.051	0.051	0.051	TBD	0.0005
Endosulfan sulfate					89	8.9	NE	89	8.9	TBD	0.0005
Endrin		0.0023	0.061	11	0.06	0.006	0.036	0.036	0.006	TBD	0.0005
Endrin aldehyde					0.3	0.03	NE	0.3	0.03	TBD	0.0005
Endrin ketone							NE	NE	NE	TBD	0.0005
Heptachlor		0.0038	0.0069	0.015	0.000079	0.0000079	0.0038	0.000079	0.0000079	TBD	0.0005
Heptachlor epoxide		0.0038		0.0074	0.000039	0.0000039	0.0038	0.000039	0.0000039	TBD	0.0005
Methoxychlor		0.03	0.019	180			0.019	0.019	0.019	TBD	0.0005
Mirex							NE	NE	NE	NE	NE
Toxaphene		0.0002		0.061	0.00028	0.000028	0.0002	0.0002	0.000028	TBD	0.025
Hexachlorobenzene							0.042	0.00029	0.000029	TBD	0.0005
Hexachlorobutadiene							0.86	0.86	0.86	TBD	0.001

Table 3-2b. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Water Samples.

Analytes	Congener number (PCBs only)	Ecological Screening Values		Human Health Screening Values			Analytical Concentration Goals			MDLs and MRLs	
		AWQC ¹	ORNL ²	EPA Region 9 Tap water PRG ³	Fish Consumption Only ⁴	Site-Specific Fish Consumption Only ⁵	Level 1 ACG ⁶	Level 2 ACG ⁷	Level 3 ACG ⁸	MDL	MRL
Hexachloroethane											
Semivolatile Organic Compounds, µg/L (ppb)											
Polycyclic Aromatic Hydrocarbons											
Naphthalene			620	6.2			6.2	6.2	6.2	0.014	0.02
2-Methylnaphthalene							NE	NE	NE	0.012	0.02
Acenaphthylene							NE	NE	NE	0.0089	0.02
Acenaphthene		23	74	370	990	99	23	23	23	0.0097	0.02
Fluorene		3.9		240	5300	530	3.9	3.9	3.9	0.011	0.02
Phenanthrene		6.3	200				6.3	6.3	6.3	0.013	0.02
Anthracene		0.73	0.09	1800	40000	4000	0.09	0.09	0.09	0.01	0.02
Fluoranthene		6.2	15	1500	140	14	6.2	6.2	6.2	0.013	0.02
Pyrene				180	4000	400	180	180	180	0.012	0.02
Benz(a)anthracene		0.027	0.65	0.092	0.018	0.0018	0.027	0.018	0.0018	0.013	0.02
Chrysene				9.2	0.018	0.0018	9.2	0.018	0.0018	0.012	0.02
Benzo(b)fluoranthene				0.092	0.018	0.0018	0.092	0.018	0.0018	0.0098	0.02
Benzo(k)fluoranthene				0.92	0.018	0.0018	0.92	0.018	0.0018	0.011	0.02
Benzo(a)pyrene		0.14	0.3	0.0092	0.018	0.0018	0.0092	0.0092	0.0018	0.0087	0.02
Indeno(1,2,3-cd)pyrene				0.092	0.018	0.0018	0.092	0.018	0.0018	0.0087	0.02
Dibenz(a,h)anthracene				0.0092	0.018	0.0018	0.0092	0.0092	0.0018	0.0079	0.02
Benzo(g,h,i)perylene							NE	NE	NE	0.009	0.02
Phthalate Esters, µg/L (ppb)											
Dimethylphthalate		3		360000	1100000	110000	3	3	3	0.015	0.5
Diethylphthalate		3	85,600	29000	44000	4400	3	3	3	0.007	0.5
Di-n-butylphthalate		1.0		3600	4500	450	1	1	1	0.013	0.6
Butylbenzylphthalate		3		7300	1900	190	3	3	3	0.013	0.5
Di-n-octylphthalate		3		1500			3	3	3	0.005	0.1
Bis-(2-ethylhexyl) phthalate		0.12	912	4.8	2.2	0.22	0.12	0.12	0.12	0.049	0.5
PCB congeners, pg/L (ppg)											
2-MonoCB	PCB-1									2.4	5.0 - 10
3-MonoCB	PCB-2									1.1	5.0 - 10

Table 3-2b. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Water Samples.

Analytes	Congener number (PCBs only)	Ecological Screening Values		Human Health Screening Values			Analytical Concentration Goals			MDLs and MRLs	
		AWQC ¹	ORNL ²	EPA Region 9 Tap water PRG ³	Fish Consumption Only ⁴	Site-Specific Fish Consumption Only ⁵	Level 1 ACG ⁶	Level 2 ACG ⁷	Level 3 ACG ⁸	MDL	MRL
4-MonoCB	PCB-3									2.0	5.0 - 10
2,2'-DiCB	PCB-4									1.7	5.0 - 10
2,3-DiCB	PCB-5									1.4	5.0 - 10
2,3'-DiCB	PCB-6									2.0	5.0 - 10
2,4-DiCB	PCB-7									4.0	5.0 - 10
2,4'-DiCB	PCB-8									2.7	5.0 - 10
2,5-DiCB	PCB-9									2.4	5.0 - 10
2,6-DiCB	PCB-10									4.0	5.0 - 10
3,3'-DiCB	PCB-11									9.5	5.0 - 10
3,4-DiCB/3,4'-DiCB	PCB-12/13									5.1	5.0 - 10
3,5-DiCB	PCB-14									3.1	5.0 - 10
4,4'-DiCB	PCB-15									2.2	5.0 - 10
2,2',3-TriCB	PCB-16									1.4	5.0 - 10
2,2',4-TriCB	PCB-17									2.0	5.0 - 10
2,2',5-TriCB/2,4,6-TriCB	PCB-18/30									3.4	5.0 - 10
2,2',6-TriCB	PCB-19									2.8	5.0 - 10
2,3,3'-TriCB/2,4,4'-TriCB	PCB-20/28									3.9	5.0 - 10
2,3,4-TriCB/2,3,5-TriCB	PCB-21/33									3.9	5.0 - 10
2,3,4'-TriCB	PCB-22									2.7	5.0 - 10
2,3,5-TriCB	PCB-23									3.9	5.0 - 10
2,3,6-TriCB	PCB-24									2.6	5.0 - 10
2,3',4-TriCB	PCB-25									3.3	5.0 - 10
2,3',5-TriCB/2,4,5-TriCB	PCB-26/29									4.7	5.0 - 10
2,3',6-TriCB	PCB-27									2.5	5.0 - 10
2,4',5-TriCB	PCB-31									4.5	5.0 - 10
2,4',6-TriCB	PCB-32									2.2	5.0 - 10
2',3,5-TriCB	PCB-34									2.1	5.0 - 10
3,3',4-TriCB	PCB-35									4.3	5.0 - 10
3,3',5-TriCB	PCB-36									4.0	5.0 - 10
3,4,4'-TriCB	PCB-37									2.8	5.0 - 10
3,4,5-TriCB	PCB-38									2.5	5.0 - 10
3,4',5-TriCB	PCB-39									3.5	5.0 - 10

Table 3-2b. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Water Samples.

Analytes	Congener number (PCBs only)	Ecological Screening Values		Human Health Screening Values			Analytical Concentration Goals			MDLs and MRLs	
		AWQC ¹	ORNL ²	EPA Region 9 Tap water PRG ³	Fish Consumption Only ⁴	Site-Specific Fish Consumption Only ⁵	Level 1 ACG ⁶	Level 2 ACG ⁷	Level 3 ACG ⁸	MDL	MRL
2,2',3,3'-TetraCB/2,2',3,4-TetraCB	PCB-40/41/71									5.3	5.0 - 10
2,2',3,4'-TetraCB	PCB-42									3.7	5.0 - 10
2,2',3,5'-TetraCB	PCB-43									5.2	5.0 - 10
2,2',3,5'-TetraCB/2,2',4,4'-TetraCB/2,3,5,6-TetraCB	PCB-44/47/65									5.1	5.0 - 10
2,2',3,6'-TetraCB/2,2',4,6'-TetraCB	PCB-45/51									3.5	5.0 - 10
2,2',3,6'-TetraCB	PCB-46									1.5	5.0 - 10
2,2',4,5'-TetraCB	PCB-48									2.8	5.0 - 10
2,2',4,5'-TetraCB/2,3',4,6-TetraCB	PCB-49/69									6.4	5.0 - 10
2,2',4,6'-TetraCB/2,2',5,6'-TetraCB	PCB-50/53									6.2	5.0 - 10
2,2',5,5'-TetraCB	PCB-52									3.7	5.0 - 10
2,2',6,6'-TetraCB	PCB-54									2.2	5.0 - 10
2,3,3',4'-TetraCB	PCB-55									6.0	5.0 - 10
2,3,3',4'-TetraCB	PCB-56									5.1	5.0 - 10
2,3,3',5'-TetraCB	PCB-57									4.0	5.0 - 10
2,3,3',5'-TetraCB	PCB-58									6.9	5.0 - 10
2,3,3',6'-TetraCB/2,3,4,6-TetraCB/2,4,4',6-TetraCB	PCB-59/62/75									7.0	5.0 - 10
2,3,4,4'-TetraCB	PCB-60									4.4	5.0 - 10
2,3,4,5-TetraCB/2,3',4',5-TetraCB/2,4,4',5-TetraCB/2',3,4',5-TetraCB	PCB-61/70/74/76									10.1	5.0 - 10
2,3,4',5-TetraCB	PCB-63									2.4	5.0 - 10
2,3,4', 6-TetraCB	PCB-64									3.3	5.0 - 10
2,3',4,4'-TetraCB	PCB-66									6.5	5.0 - 10
2,3',4,5-TetraCB	PCB-67									5.8	5.0 - 10
2,3',4,5'-TetraCB	PCB-68									4.6	5.0 - 10
2,3',5,5'-TetraCB	PCB-72									4.3	5.0 - 10

Table 3-2b. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Water Samples.

Analytes	Congener number (PCBs only)	Ecological Screening Values		Human Health Screening Values			Analytical Concentration Goals			MDLs and MRLs	
		AWQC ¹	ORNL ²	EPA Region 9 Tap water PRG ³	Fish Consumption Only ⁴	Site-Specific Fish Consumption Only ⁵	Level 1 ACG ⁶	Level 2 ACG ⁷	Level 3 ACG ⁸	MDL	MRL
2,3',5',6-TetraCB	PCB-73									1.9	5.0 - 10
3,3',4,4'-TetraCB	PCB-77									2.8	5.0 - 10
3,3',4,5-TetraCB	PCB-78									3.2	5.0 - 10
3,3',4,5'-TetraCB	PCB-79									4.2	5.0 - 10
3,3',5,5'-TetraCB	PCB-80									3.7	5.0 - 10
3,4,4',5-TetraCB	PCB-81									3.0	5.0 - 10
2,2',3,3',4-PentaCB	PCB-82									2.2	5.0 - 10
2,2',3,3',5-PentaCB/2,2',4,4',5-PentaCB	PCB-83/99									4.0	5.0 - 10
2,2',3,3',6-PentaCB	PCB-84									1.9	5.0 - 10
2,2',3,4,6-PentaCB/2,2',3,4',6-PentaCB	PCB-88/91									3.8	5.0 - 10
2,2',3,4,6'-PentaCB	PCB-89									1.5	5.0 - 10
2,2',3,5,5'-PentaCB	PCB-92									2.3	5.0 - 10
2,2',3,5,6'-PentaCB	PCB-94									4.0	5.0 - 10
2,2',3,5',6-PentaCB/2,2',3,5,6 - PentaCB/2,2',4,4',6 - PentaCB/2,2',4,5,6'-PentaCB	PCB-95/100/93/102									9.7	5.0 - 10
2,2',3,6,6'-PentaCB	PCB-96									2.0	5.0 - 10
2,2',4,5,6'-PentaCB	PCB-103									3.9	5.0 - 10
2,2',4,6,6'-PentaCB	PCB-104									3.2	5.0 - 10
2,3,3'4,4'-PentaCB	PCB-105									0.9	5.0 - 10
2,3,3'4,5-PentaCB	PCB-106									4.1	5.0 - 10
2,3,3',4',5-PentaCB/2',3,4,5,5'-PentaCB	PCB-107/124									1.9	5.0 - 10
2,3,3',4,5'-PentaCB/2,3',4,4',6-PentaCB/2,2',3,4,5-PentaCB/2,2',3',4,5-PentaCB	PCB-108/119/86/97									8.4	5.0 - 10
2,3,3',4,6-PentaCB	PCB-109									2.9	5.0 - 10
2,3,3',4',6-PentaCB/2,3,4,4',6-PentaCB	PCB-110/115									2.7	5.0 - 10
2,3,3',5,5'-PentaCB	PCB-111									2.0	5.0 - 10

Table 3-2b. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Water Samples.

Analytes	Congener number (PCBs only)	Ecological Screening Values		Human Health Screening Values			Analytical Concentration Goals			MDLs and MRLs	
		AWQC ¹	ORNL ²	EPA Region 9 Tap water PRG ³	Fish Consumption Only ⁴	Site-Specific Fish Consumption Only ⁵	Level 1 ACG ⁶	Level 2 ACG ⁷	Level 3 ACG ⁸	MDL	MRL
2,3,3',5,6-PentaCB	PCB-112									1.7	5.0 - 10
2,3,3',5',6-PentaCB	PCB-113									5.1	5.0 - 10
2,3,4,4',5-PentaCB	PCB-114									1.6	5.0 - 10
2,3,3',5',6-PentaCB/2,3,4,5,6-PentaCB/2,2',3,4,4'-PentaCB	PCB-117/116/85									7.2	5.0 - 10
2,3',4,4',5-PentaCB	PCB-118									2.4	5.0 - 10
2,3',4,5,5'-PentaCB	PCB-120									2.5	5.0 - 10
2,3',4,5,6-PentaCB	PCB-121									2.1	5.0 - 10
2',3,3',4,5-PentaCB	PCB-122									4.7	5.0 - 10
2',3,4,4',5-PentaCB	PCB-123									3.2	5.0 - 10
3,3',4,4',5-PentaCB	PCB-126									1.5	5.0 - 10
3,3',4,5,5'-PentaCB	PCB-127									3.5	5.0 - 10
2,2',3,3',4,4'-HexaCB/2,3,4,4',5,6-HexaCB	PCB-128/166									3.2	5.0 - 10
2,2',3,3',4,5'-HexaCB	PCB-130									1.3	5.0 - 10
2,2',3,3',4,6-HexaCB	PCB-131									1.9	5.0 - 10
2,2',3,3',4,6'-HexaCB	PCB-132									2.5	5.0 - 10
2,2',3,3',5,5'-HexaCB	PCB-133									2.4	5.0 - 10
2,2',3,3',5,6-HexaCB/2,2',3,4,5,6'-HexaCB	PCB-134/143									3.3	5.0 - 10
2,2',3,3',6,6'-HexaCB	PCB-136									2.3	5.0 - 10
2,2',3,4,4',5-HexaCB	PCB-137									2.5	5.0 - 10
2,2',3,4,4',5'-HexaCB/2,3,3',4',5,6-HexaCB/2,2',3,3',4,5-HexaCB/2,3,3',4,5,6-HexaCB	PCB-138/163/129/160									4.5	5.0 - 10
2,2',3,4,4',6-HexaCB/2,2',3,4,4',6'-HexaCB	PCB-139/140									3.9	5.0 - 10
2,2',3,4,5,5'-HexaCB	PCB-141									1.5	5.0 - 10
2,2',3,4,5,5'-HexaCB	PCB-142									3.9	5.0 - 10
2,2',3,4,5',6-HexaCB	PCB-144									2.0	5.0 - 10
2,2',3,4,6,6'-HexaCB	PCB-145									2.0	5.0 - 10

Table 3-2b. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Water Samples.

Analytes	Congener number (PCBs only)	Ecological Screening Values		Human Health Screening Values			Analytical Concentration Goals			MDLs and MRLs	
		AWQC ¹	ORNL ²	EPA Region 9 Tap water PRG ³	Fish Consumption Only ⁴	Site-Specific Fish Consumption Only ⁵	Level 1 ACG ⁶	Level 2 ACG ⁷	Level 3 ACG ⁸	MDL	MRL
2,2',3,4',5,5'-HexaCB	PCB-146									1.3	5.0 - 10
2,2',3,4',5,6-HexaCB/2,2',3,4',5',6'-HexaCB	PCB-147/149									2.3	5.0 - 10
2,2',3,4',5,6'-HexaCB	PCB-148									2.7	5.0 - 10
2,2',3,4',6,6'-HexaCB	PCB-150									2.5	5.0 - 10
2,2',3,5,5',6-HexaCB/2,2',3,3',5,6'-HexaCB/2,2',4,4',5',6-HexaCB	CB-151/135/154									6.8	5.0 - 10
2,2',3,5,6,6'-HexaCB	PCB-152									1.5	5.0 - 10
2,2',4,4',5,5'-HexaCB/2,3',4,4',5',6-HexaCB	PCB-153/168									3.8	5.0 - 10
2,2',4,4',6,6'-HexaCB	PCB-155									3.1	5.0 - 10
2,3,3',4,4',5-HexaCB/2,3,3',4,4',5'-HexaCB	PCB-156/157									1.2	5.0 - 10
2,3,3',4,4',6-HexaCB	PCB-158									1.3	5.0 - 10
2,3,3',4,5,5'-HexaCB	PCB-159									2.3	5.0 - 10
2,3,3',4,5',6-HexaCB	PCB-161									1.6	5.0 - 10
2,3,3',4',5,5'-HexaCB	PCB-162									2.8	5.0 - 10
2,3,3',4',5',6-HexaCB	PCB-164									1.7	5.0 - 10
2,3,3',5,5',6-HexaCB	PCB-165									3.1	5.0 - 10
2,3,4,4',5,5'-HexaCB	PCB-167									1.5	5.0 - 10
3,3',4,4',5,5'-HexaCB	PCB-169									1.2	5.0 - 10
2,2',3,3',4,4',5-HeptaCB	PCB-170									2.0	5.0 - 10
2,2',3,3',4,4',6-HeptaCB/2,2',3,3',4,5,6-HeptaCB	PCB-171/173									2.1	5.0 - 10
2,2',3,3',4,5,5'-HeptaCB	PCB-172									2.3	5.0 - 10
2,2',3,3',4,5,6'-HeptaCB	PCB-174									2.9	5.0 - 10
2,2',3,3',4,5',6-HeptaCB	PCB-175									1.7	5.0 - 10
2,2',3,3',4,6,6'-HeptaCB	PCB-176									2.7	5.0 - 10
2,2',3,3',4',5,6-HeptaCB	PCB-177									3.4	5.0 - 10

Table 3-2b. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Water Samples.

Analytes	Congener number (PCBs only)	Ecological Screening Values		Human Health Screening Values			Analytical Concentration Goals			MDLs and MRLs	
		AWQC ¹	ORNL ²	EPA Region 9 Tap water PRG ³	Fish Consumption Only ⁴	Site-Specific Fish Consumption Only ⁵	Level 1 ACG ⁶	Level 2 ACG ⁷	Level 3 ACG ⁸	MDL	MRL
2,2',3,3',5,5',6-HeptaCB	PCB-178									0.8	5.0 - 10
2,2',3,3',5,6,6'-HeptaCB	PCB-179									2.3	5.0 - 10
2,2',3,4,4',5,5'-HeptaCB/2,3,3',4',5,5',6-HeptaCB	PCB-180/193									6.2	5.0 - 10
2,2',3,4,4',5,6-HeptaCB	PCB-181									3.7	5.0 - 10
2,2',3,4,4',5,6'-HeptaCB	PCB-182									2.4	5.0 - 10
2,2',3,4,4',5',6-HeptaCB/2,2',3,4,5,5',6-HeptaCB	PCB-183/185									2.3	5.0 - 10
2,2',3,4,4',6,6'-HeptaCB	PCB-184									2.7	5.0 - 10
2,2',3,4,5,6,6'-HeptaCB	PCB-186									2.3	5.0 - 10
2,2',3,4,5,5',6-HeptaCB	PCB-187									1.9	5.0 - 10
2,2',3,4',5,6,6'-HeptaCB	PCB-188									2.6	5.0 - 10
2,3,3',4,4',5,5'-HeptaCB	PCB-189									2.0	5.0 - 10
2,3,3',4,4',5,6-HeptaCB	PCB-190									3.7	5.0 - 10
2,3,3',4,4',5',6-HeptaCB	PCB-191									2.8	5.0 - 10
2,3,3',4,5,5',6-HeptaCB	PCB-192									3.7	5.0 - 10
2,2',3,3',4,4',5,5'-OctaCB	PCB-194									0.8	5.0 - 10
2,2',3,3',4,4',5,6-OctaCB	PCB-195									2.8	5.0 - 10
2,2',3,3',4,4',5,6'-OctaCB	PCB-196									3.6	5.0 - 10
2,2',3,3',4,4',6,6'-OctaCB/2,2',3,3',4,5,6,6'-OctaCB	PCB-197/200									2.4	5.0 - 10
2,2',3,3',4,5,5',6-OctaCB/2,2',3,3',4,5,5',6'-OctaCB	PCB-198/199									5.1	5.0 - 10
2,2',3,3',4,5',6,6'-OctaCB	PCB-201									2.6	5.0 - 10
2,2',3,3',5,5',6,6'-OctaCB	PCB-202									2.1	5.0 - 10
2,2',3,4,4',5,5',6-OctaCB	PCB-203									2.5	5.0 - 10
2,2',3,4,4',5,6,6'-OctaCB	PCB-204									1.7	5.0 - 10
2,3,3',4,4',5,5',6-OctaCB	PCB-205									2.9	5.0 - 10

Table 3-2b. Analytes, Analytical Concentration Goals, Method Detection Limits, and Method Reporting Limits for Water Samples.

Analytes	Congener number (PCBs only)	Ecological Screening Values		Human Health Screening Values			Analytical Concentration Goals			MDLs and MRLs	
		AWQC ¹	ORNL ²	EPA Region 9 Tap water PRG ³	Fish Consumption Only ⁴	Site-Specific Fish Consumption Only ⁵	Level 1 ACG ⁶	Level 2 ACG ⁷	Level 3 ACG ⁸	MDL	MRL
2,2',3,3',4,4',5,5',6-NonaCB	PCB-206									3.5	5.0 - 10
2,2',3,3',4,4',5,6,6'-NonaCB	PCB-207									2.2	5.0 - 10
2,2',3,3',4,5,5',6,6'-NonaCB	PCB-208									1.9	5.0 - 10
DecaCB	PCB-209									2.8	5.0 - 10

Notes:

¹ AWQC based on NRWQC freshwater aquatic life criteria (EPA 2002c).

² ORNL based on Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota (Suter and Tsao 1996) .

³ Based on EPA Region 9 Preliminary Remediation Goals (PRGs) (EPA 2002b).

⁴ Based on NRWQC human health criteria (EPA 2002c) and The Revised Human Health Water Quality Criteria (EPA 2003).

⁵ Based on Portland Harbor site-specific fish consumption rates in HHRA work plan of up to 175 g/day.

⁶ Level 1 ACGs are the lowest of the EPA Region 9 PRGs for Tap Water (EPA 2002b), NRWQC freshwater aquatic life criteria (EPA 2002c), or ORNL values (Suter and Tsao 1996).

⁷ Level 2 ACGs are the lowest of the EPA Region 9 PRGs for Tap Water (EPA 2002b), NRWQC freshwater aquatic life criteria and human health criteria (EPA 2002c), ORNL values (Suter and Tsao 1996), and the fish consumption criteria from the Revised Human Health Water Quality Criteria (EPA 2003).

⁸ Level 3 ACGs are the lowest of the EPA Region 9 PRGs for Tap Water (EPA 2002b), NRWQC freshwater aquatic life criteria and human health criteria (EPA 2002c), ORNL values (Suter and Tsao 1996), the subsistence fish consumption criteria from the Revised Human Health Water Quality Criteria (EPA 2003), and site-specific subsistence fish consumption criteria.

⁹ Required for natural attenuation evaluation (Anchor Environmental 2004).

¹⁰ Parameters for calculating freshwater dissolved metals criteria that are hardness-dependent are from NRWQC (EPA 2002c). Hardness dependent criteria based on average hardness of 25 mg/L (CaCO₃) (USGS database from 1974 to 1990).

Table 3-3. Sample Containers and Preservation Requirements for Sediment Trap and Stormwater Samples

Container ¹		Laboratory	Analysis	Preservation	Holding Time
Type	Size				
Sediment Trap Samples					
WMG	8 oz.	Alta	PCB Congeners	Deep Frozen (-20°C)	1 year
WMG	16 oz. ²	CAS	Total organic carbon	4 ± 2°C	28 days ³
			Percent solids		6 months ³
			Metals		6 months ³
			Mercury		28 days ³
WMG	16 oz.	CAS	Organochlorine pesticides	4 ± 2°C	1 year
			PAHs and Phthalates		1 year
WMG	8 oz.	CAS	Chlorinated herbicides	4 ± 2°C	1 year
WMG	8 oz.	CAS	Grain size	4 ± 2°C	6 months
Stormwater Samples					
HDPE	1 liter	CAS	Total suspended solids	4 ± 2°C	7 days
HDPE	250 mL	CAS	Total organic carbon	H ₂ SO ₄ to pH < 2; 4 ± 2°C	28 days
HDPE	1 liter	CAS	Total metals	5 mL of 1:1 HNO ₃ ; 4 ± 2°C	6 months/60 days ⁴
AG	1 liter	CAS	Organochlorine pesticides	4 ± 2°C	7/40 days ⁵
AG	1 liter	CAS	PAHs	4 ± 2°C	7/40 days ⁵
AG	1 liter	CAS	Phthalates	4 ± 2°C	7/40 days ⁵
AG	1 liter	Alta	PCB Congeners	4 ± 2°C	7/40 days ⁵
AG	1 liter	CAS	Chlorinated herbicides	4 ± 2°C	7/40 days ⁵

Notes:

AG - amber glass

CAS - Columbia Analytical Services

HDPE - high density polyethylene

WMG - wide mouth glass

¹ The size and number of containers may be modified by the analytical laboratories. Archive samples will be collected for all of the sediment samples.

² An additional 8 oz. to 16 oz. jar needed for lab QC for 5% of samples.

³ Holding times for frozen samples are as follows: Total organic carbon, 1 year; metals (except mercury) and percent solids, 2 years.

⁴ The holding time for mercury is 60 days, based on CRITFC study (EPA 2002a) and EPA Method 1631 revision D (EPA 2001a). The holding time for the remaining metals is 6 months.

⁵ The holding time is 7 days from collection to extraction, and 40 days from extraction to analysis.

Table 4-1. Laboratory Control Limits for Surrogate Samples

Analyte	Percent Recovery
Sediment Samples	
<i>Chlorinated Herbicides</i>	
2,4-Dichlorophenylacetic acid	22-132
<i>Organochlorine Pesticides</i>	
Tetrachloro- <i>m</i> -xylene	19-134
Decachlorobiphenyl	26-144
<i>PCB Aroclors</i>	
Tetrachloro- <i>m</i> -xylene	19-134
Decachlorobiphenyl	26-144
<i>PAHs and Phthalate Esters</i>	
2,4,6-Tribromophenol	12-111
2-Fluorobiphenyl	10-109
2-Fluorophenol	10-85
Nitrobenzene-d5	10-100
Phenol-d6	17-96
Terphenyl-d14	21-122
Stormwater Samples	
<i>Chlorinated Herbicides</i>	
2,4-Dichlorophenylacetic acid	10-121
<i>Organochlorine Pesticides</i>	
Tetrachloro- <i>m</i> -xylene	18-125
Decachlorobiphenyl	10-145
<i>PAHs and Phthalate Esters</i>	
2,4,6-Tribromophenol	44-124
2-Fluorobiphenyl	49-105
2-Fluorophenol	42-104
Nitrobenzene-d5	51-113
Phenol-d6	49-113
Terphenyl-d14	27-136

Note:

Control limits are updated periodically by the laboratories. Control limits that are in effect at the laboratory at the time of analysis will be used for sample analysis and data validation. These may differ slightly from the control limits shown in this table.

Table 4-2. Laboratory Control Limits for Matrix Spike and Laboratory Control Samples

Analyte	Matrix Spike Recovery (percent)	Laboratory Control Sample Recovery (percent)	Type of Duplicate	Control Limit Relative Percent Difference
Sediment Samples				
<i>Conventional Analyses</i>				
Total solids	NA	NA	LD	20
Grain size	NA	NA	Triplicate	Note-1
Total organic carbon	75-125	85-115	LD	20
<i>Metals</i>				
Aluminum	75-125	Note-2	LD	30
Antimony	20-108	Note-2	LD	30
Arsenic	74-120	Note-2	LD	30
Cadmium	63-136	Note-2	LD	30
Chromium	60-144	Note-2	LD	30
Copper	57-141	Note-2	LD	30
Lead	66-134	Note-2	LD	30
Mercury	60-128	Note-2	LD	30
Nickel	74-127	Note-2	LD	30
Selenium	62-123	Note-2	LD	30
Silver	83-107	Note-2	LD	30
Zinc	50-149	Note-2	LD	30
<i>Chlorinated Herbicides</i>				
2,4,5-T	28-138	41-133	LCSD	40
2,4,5-TP (Silvex)	20-137	40-131	LCSD	40
2,4-D	19-129	41-115	LCSD	40
2,4-DB	10-171	31-147	LCSD	40
Dalapon	10-137	18-112	LCSD	40
Dicamba	17-138	43-124	LCSD	40
Dichlorprop	22-121	38-113	LCSD	40
Dinoseb	10-108	10-112	LCSD	40
MCPA	10-145	31-125	LCSD	40
MCPP	13-129	24-137	LCSD	40
<i>Organochlorine Pesticides</i>				
2,4'-DDD	14-150	38-149	MSD	40
2,4'-DDE	14-152	39-149	MSD	40
2,4'-DDT	10-149	38-146	MSD	40
4,4'-DDD	15-144	48-145	MSD	40
4,4'-DDE	11-151	47-147	MSD	40
4,4'-DDT	10-163	47-150	MSD	40
Total DDT	NA	NA	NA	NA
Aldrin	11-146	41-137	MSD	40
alpha-BHC	16-140	43-144	MSD	40

Table 4-2. Laboratory Control Limits for Matrix Spike and Laboratory Control Samples

Analyte	Matrix Spike Recovery (percent)	Laboratory Control Sample Recovery (percent)	Type of Duplicate	Control Limit Relative Percent Difference
beta-BHC	18-142	52-139	MSD	40
delta-BHC	18-158	56-154	MSD	40
gamma-BHC (Lindane)	14-147	45-141	MSD	40
alpha-Chlordane	11-149	47-137	MSD	40
gamma-Chlordane	10-146	45-137	MSD	40
Oxychlordane	10-137	42-130	MSD	40
cis -Nonachlor	31-126	47-137	MSD	40
trans -Nonachlor	34-125	50-130	MSD	40
Total Chlordane ^a	NA	NA	NA	NA
Dieldrin	20-139	46-139	MSD	40
Endosulfan I	10-135	32-127	MSD	40
Endosulfan II	10-130	41-129	MSD	40
Endosulfan sulfate	10-152	48-139	MSD	40
Endrin	10-160	50-145	MSD	40
Endrin aldehyde	10-141	44-137	MSD	40
Endrin ketone	10-146	48-145	MSD	40
Heptachlor	12-147	43-138	MSD	40
Heptachlor epoxide	10-147	46-139	MSD	40
Methoxychlor	14-150	45-156	MSD	40
Mirex	23-151	48-142	MSD	40
Toxaphene	10-172	53-128	MSD	40
Hexachlorobenzene	27-111	29-133	MSD	40
Hexachlorobutadiene	70-130	70-130	MSD	40
Hexachloroethane	70-130	70-130	MSD	40
<i>PCB Aroclors</i>				
All target analytes	60-140	70-130	MSD	40
<i>Polycyclic Aromatic Hydrocarbons</i>				
2-Methylnaphthalene	10-106	43-91	MSD	40
Acenaphthene	10-115	47-94	MSD	40
Acenaphthylene	10-140	51-105	MSD	40
Anthracene	10-131	52-102	MSD	40
Benz(a)anthracene	10-142	53-111	MSD	40
Benzo(a)pyrene	10-128	52-110	MSD	40
Benzo(b)fluoranthene	10-145	52-111	MSD	40
Benzo(g,h,i)perylene	10-129	36-126	MSD	40
Benzo(k)fluoranthene	13-127	54-112	MSD	40
Chrysene	10-146	52-108	MSD	40
Dibenz(a,h)anthracene	16-129	45-124	MSD	40

Table 4-2. Laboratory Control Limits for Matrix Spike and Laboratory Control Samples

Analyte	Matrix Spike Recovery (percent)	Laboratory Control Sample Recovery (percent)	Type of Duplicate	Control Limit Relative Percent Difference
Dibenzofuran	10-115	45-96	MSD	40
Fluoranthene	10-156	50-108	MSD	40
Fluorene	10-123	47-100	MSD	40
Indeno(1,2,3-cd)pyrene	10-138	44-123	MSD	40
Naphthalene	10-111	45-89	MSD	40
Phenanthrene	10-155	51-99	MSD	40
Pyrene	10-157	48-107	MSD	40
<i>Phthalate Esters</i>				
Bis(2-ethylhexyl) phthalate	10-138	37-133	MSD	40
Butylbenzyl phthalate	10-128	50-111	MSD	40
Dibutyl phthalate	10-132	52-116	MSD	40
Diethyl phthalate	10-126	48-112	MSD	40
Dimethyl phthalate	21-114	49-102	MSD	40
Di-n-octyl phthalate	10-133	50-119	MSD	40
<i>PCB Congeners</i>				
All 209 congeners	50-150	NA	MSD	NA
Stormwater Samples				
<i>Conventional Analyses</i>				
Total suspended solids	NA	85-115	LCSD	20
Total organic carbon	65-133	90-109	LD	20
<i>Metals</i>				
Aluminum	70-130	85-115	LD	20
Antimony	70-130	85-115	LD	20
Arsenic	70-130	85-115	LD	20
Cadmium	70-130	85-115	LD	20
Chromium	70-130	85-115	LD	20
Copper	70-130	85-115	LD	20
Lead	70-130	85-115	LD	20
Mercury	73-121	82-114	LD	20
Nickel	70-130	85-115	LD	20
Selenium	70-130	85-115	LD	20
Silver	70-130	85-115	LD	20
Zinc	70-130	85-115	LD	20
<i>Chlorinated Herbicides</i>				
2,4,5-T	27-122	24-128	MSD	30
2,4,5-TP (Silvex)	10-166	19-132	MSD	30
2,4-D	10-134	24-112	MSD	30
2,4-DB	10-148	10-127	MSD	30
Dalapon	10-115	11-109	MSD	30

Table 4-2. Laboratory Control Limits for Matrix Spike and Laboratory Control Samples

Analyte	Matrix Spike Recovery (percent)	Laboratory Control Sample Recovery (percent)	Type of Duplicate	Control Limit Relative Percent Difference
Dicamba	31-107	28-111	MSD	30
Dichlorprop	21-109	26-112	MSD	30
Dinoseb	18-91	14-99	MSD	30
MCPA	10-114	13-110	MSD	30
MCPP	10-98	10-115	MSD	30
<i>Organochlorine Pesticides</i>				
2,4'-DDD	70-130	31-135	MSD	30
2,4'-DDE	70-130	33-133	MSD	30
2,4'-DDT	70-130	33-133	MSD	30
4,4'-DDD	36-132	34-142	MSD	30
4,4'-DDE	40-128	31-143	MSD	30
4,4'-DDT	33-144	32-149	MSD	30
Total DDT	NA	NA	NA	NA
Aldrin	30-114	24-123	MSD	30
alpha-BHC	43-123	40-131	MSD	30
beta-BHC	38-120	38-134	MSD	30
delta-BHC	43-136	41-147	MSD	30
gamma-BHC (Lindane)	43-120	39-130	MSD	30
alpha-Chlordane	38-123	44-123	MSD	30
gamma-Chlordane	39-120	42-121	MSD	30
Oxychlordane	70-130	67-109	MSD	30
cis -Nonachlor	70-130	75-113	MSD	30
trans -Nonachlor	70-130	77-107	MSD	30
Total Chlordane ^a	NA	NA	NA	NA
Dieldrin	41-118	42-125	MSD	30
Endosulfan I	28-112	30-115	MSD	30
Endosulfan II	32-114	35-121	MSD	30
Endosulfan sulfate	47-120	39-129	MSD	30
Endrin	43-129	45-130	MSD	30
Endrin aldehyde	23-124	25-133	MSD	30
Endrin ketone	45-119	47-126	MSD	30
Heptachlor	35-117	35-126	MSD	30
Heptachlor epoxide	43-116	43-124	MSD	30
Methoxychlor	28-151	32-151	MSD	30
Mirex	70-130	73-118	MSD	30
Toxaphene	29-164	51-157	MSD	30
Hexachlorobenzene	30-104	28-118	MSD	30
Hexachlorobutadiene	70-130	70-130	MSD	30

Table 4-2. Laboratory Control Limits for Matrix Spike and Laboratory Control Samples

Analyte	Matrix Spike Recovery (percent)	Laboratory Control Sample Recovery (percent)	Type of Duplicate	Control Limit Relative Percent Difference
Hexachloroethane	70-130	70-130	MSD	30
<i>Polycyclic Aromatic Hydrocarbons</i>				
2-Methylnaphthalene	49-100	50-104	MSD	30
Acenaphthylene	57-116	68-119	MSD	30
Acenaphthene	58-105	63-109	MSD	30
Anthracene	43-117	66-112	MSD	30
Benz(a)anthracene	53-118	71-116	MSD	30
Benzo(a)pyrene	44-120	64-116	MSD	30
Benzo(b)fluoranthene	43-134	64-122	MSD	30
Benzo(g,h,i)perylene	45-126	62-127	MSD	30
Benzo(k)fluoranthene	44-132	66-125	MSD	30
Chrysene	53-120	71-112	MSD	30
Dibenz(a,h)anthracene	46-127	65-127	MSD	30
Fluoranthene	50-123	64-118	MSD	30
Fluorene	61-112	66-112	MSD	30
Indeno(1,2,3-cd)pyrene	45-127	61-125	MSD	30
Naphthalene	51-98	54-103	MSD	30
Phenanthrene	59-111	68-109	MSD	30
Pyrene	52-117	66-111	MSD	30
<i>Phthalate Esters</i>				
Bis(2-ethylhexyl) phthalate	48-132	71-119	MSD	30
Butylbenzyl phthalate	59-122	71-114	MSD	30
Diethyl phthalate	65-125	71-123	MSD	30
Dimethyl phthalate	69-116	72-114	MSD	30
Di-n-butyl phthalate	59-123	67-126	MSD	30
Di-n-octyl phthalate	58-130	68-127	MSD	30
<i>PCB Congeners</i>				
All 209 congeners	50-150	NA	MSD	NA

Notes:

Note-1: RPD control limit is not applicable. Laboratory control limit is ± 10 percent in the weight of the fraction.

Note-2: Percent recovery control limits are not applicable. Laboratory control limits are established based on the manufacturer's established range of acceptable concentrations.

^a Total Chlordane will be calculated as the sum of the five components listed above this entry (alpha-Chlordane, gamma-Chlordane, Oxychlordane, *cis*-Nonachlor, *trans*-Nonachlor).

Table 5-1. Number of Samples to be Collected

Sediment Samples

Parameter	Natural Samples	Field Replicates	Field Rinsate Blank for Phthalates	Total Number of Samples
PCB Congeners	31	2	0	33
TOC	31	2	0	33
Percent Solids	31	2	0	33
Organochlorine pesticides	31	2	0	33
PAHs and Phthalates	31	2	2	35
Metals	31	2	0	33
Herbicides	31	2	0	33
Grain size	31	2	0	33

Stormwater Samples

Parameter	Natural Samples	Field Replicates	Field Rinsate Blanks	Total Number of Samples per Event	Total for 3 events
<i>Stormwater Composite Samples</i>					
TSS	31	2	2	35	105
TOC	31	2	2	35	105
Total Metals	31	2	2	35	105
Filtered Metals	31	2	2	35	105
PAHs	31	2	2	35	105
Phthalates*	11	1	1	13	39
PCB Congeners	31	2	2	35	105
Herbicides	31	2	2	35	105
Organochlorine pesticides	3	1	1	5	15
<i>Stormwater Grab Samples¹</i>					
TSS	20	1	1	22	NA
TOC	20	1	1	22	NA
PAHs	20	1	1	22	NA
Phthalates*	8	1	1	10	NA
PCB Congeners	20	1	1	22	NA
Herbicides	20	1	1	22	NA
Organochlorine pesticides	3	1	1	5	NA

Notes:

¹ These 10 grab samples will be analyzed for total and dissolved constituents to yield 20 samples for the laboratory. Each of these samples will be field filtered prior to analysis. Concentrations from the field filtered aliquots will be reported by the laboratory as dissolved concentrations. Does not yet include T-4 sampling sites (locations need to be confirmed).

*Phthalates are only sampled at potential source and a few selected non-potential source sites. Does not yet include T-4 phthalate sampling sites (locations need to be confirmed).